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Introduction

This guide contains the complete product documentation for Sisense.

Every Sisense user is assigned one of the following roles, Administrator, Designer, or Viewer. You should view the documentation that is relevant for your role.

**Administrators** are responsible for creating and managing users and user groups, managing connected ElastiCubes, defining the web configuration, connecting to Active Directory, and embedding Sisense analytics (OEM).

If you are an Administrator, you should review the following chapters:

*Administration*

**Designers** are responsible for building ElastiCubes and creating dashboards.

Your company may have a lone Designer or multiple Designers responsible for different aspects of Depending on your company's structure, Designers may split their responsibilities according to two types of Designers. The first type, Data Modelers, is responsible for managing your data, for example, by connecting data sources to Sisense and designing your ElastiCube schemas. The second type of Designer, Dashboard Designers, is responsible for creating dashboards and publishing them to other users.

If you are a Designer, you should review the following chapters:

*Managing Data (Data Modelers)*

*Creating Dashboards (Dashboard Designers)*
Sharing Dashboards (Dashboard Designers)

Data Connectors (Data Modelers)

**Viewers** can view, explore, drill down, make selections and filter the dashboards that Designers share with them.

If you are a Viewer, you should review chapter Using Dashboards.

**Basic Concepts and Terminology**

**Sisense Architecture**

The Sisense system is comprised of the following components.

---

**ElastiCube Manager**

The ElastiCube Manager is a visual environment in which you create ElastiCubes. The ElastiCube Manager enables you to structure and import multiple data sources, create relationships between data, and perform ETL (Extract, Transform, and Load) processes to prepare data for analysis and visualization. For more information, see ElastiCube Manager.
ElastiCube Server

The ElastiCube Server is installed locally on your computer and enables access to ElastiCubes. Both the Sisense Web Application and the ElastiCube Manager query the ElastiCube Server and receive results.

Sisense Server Console

The Sisense Server Console provides administration functions for managing ElastiCubes on the ElastiCube Server.

Sisense Web Application

The Sisense Web application is an interactive web application that provides the user interface in which users can design, share, view and explore dashboards. The Sisense Web application runs in popular web browsers and enables access to the Sisense server. Dashboards can also be viewed on mobile devices.

Sisense Web Server

The Sisense Web Server is installed locally on your computer and hosts the Sisense Web application.

Designers and Viewers

Note: In previous versions, Designers and Viewers were known as Contributors and Consumers.

Sisense Administrators can access the management settings. Administrators can create and manage users and user groups, manage connected ElastiCubes, define the web configuration, connect to Active Directory, and more.
Sisense Designers can create, design, edit and share dashboards. Sisense designers determine whether the user with whom they share a dashboard has editing rights (is a designer) or only viewing rights (viewer).

Sisense Viewers can view, explore, drill down, make selections and filter the dashboards that designers share with them. Viewers only require a standard web browser; no plugins or downloads. They cannot create new dashboards or edit existing ones.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Admin</th>
<th>Designer</th>
<th>Viewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server and User Management</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Create New Dashboard</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Share Dashboard</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Create New Widget</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Edit, Modify, Export Widget</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Add Dashboard Filters</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Create and Manager Folders</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Drill in Dashboards</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Access Dashboards on Mobile</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Receive Email Reports</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Export Dashboard to PDF</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

ElastiCubes

ElastiCubes are Sisense’s proprietary super-fast data stores. ElastiCubes are specifically designed to withstand the extensive querying typically required by business intelligence applications.
ElastiCubes enables you to mash up terabytes of data from a variety of sources, for example:

Traditional relational databases, such as SQL Server, MySQL or Oracle.

File-based data sources, such as spreadsheets (Excel) and CSV files.

Online web services, such as Salesforce.com, Google AdWords, Google Analytics, Zendesk and more.

ElastiCubes are based on Sisense’s proprietary In-Chip technology, which leverages Columnar and In-Memory database technologies in contrast to relational databases. Read more about the technology behind ElastiCube in Sisense’s technology section.

ElastiCubes are created and managed in the Sisense ElastiCube Manager.

ElastiCube Sets

Sisense ElastiCube Sets are collections of ElastiCubes with identical schemas that support high availability by allowing you to query running ElastiCubes within the ElastiCube Set while other ElastiCubes are in a building state.

Widgets

Each widget is a dynamic visualization of data. You pick the type of data to appear in a widget and you pick the type of visualization (chart type). A few examples of widgets are displayed below:
Column Chart Widget

Indicator Widget

GROWTH OF VISITORS

13.2%

# of Visitors 220K
Pie Widget

Pivot Widget

<table>
<thead>
<tr>
<th>Category</th>
<th>Female Total Revenue</th>
<th>Female Total Quantity</th>
<th>Male Total Revenue</th>
<th>Male Total Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Mac Desktops</td>
<td>1,151</td>
<td>4</td>
<td>26,071</td>
<td>47</td>
</tr>
<tr>
<td>Apple Mac Laptops</td>
<td>5,310</td>
<td>18</td>
<td>50,717</td>
<td>110</td>
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<td>Calculators</td>
<td>609</td>
<td>15</td>
<td>3,147</td>
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<td>Camcorders</td>
<td>2,790</td>
<td>23</td>
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<td>Camera Flashes</td>
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<td>Cell Phones</td>
<td>94,323</td>
<td>636</td>
<td>605,011</td>
<td>2,122</td>
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<tr>
<td>Digital Cameras</td>
<td>34,045</td>
<td>153</td>
<td>216,707</td>
<td>659</td>
</tr>
<tr>
<td>DVD Players</td>
<td>1,488</td>
<td>23</td>
<td>5,309</td>
<td>85</td>
</tr>
</tbody>
</table>
Scatter Chart Widget

Dashboards

A dashboard is a collection of one or more widgets that visualize the data that you select and design.
You define which widgets appear in the dashboard, their design, how they are organized and the filtering of the data that appears.

You can access your own dashboards and dashboards others shared with you.

Sisense allows you to create as many dashboards as you need. No limitations! When you create a dashboard, you are the dashboard's owner. Owners can share dashboards that they have created with other Sisense users (Viewers and Designers).

Sisense provides a variety of built-in automatic dashboard sharing features. You can easily share a dashboard with others in the Sisense environment or have a dashboard automatically delivered to your chosen recipients by email (on a scheduled basis or upon each data update).

**Fields**

Widgets are composed of fields that represent the data in your data sources. You create widgets by simply selecting from the fields displayed in a Data Browser, which appears in various places across the product. Each field represents a column of data in the ElastiCube.
When designing widgets, fields can be categorized into two groups:

**Numeric Fields:** Numbers (quantified data), such as salaries, sales, scores, number of clicks and so on. This is data that you may want to aggregate or calculate. For example, the sum of sales or the average of costs.

**Descriptive Fields:** Items used to label and categorize, such as Products, Locations, Categories and so on.

Generally, widgets combine both these types of fields.

For example, to show the sales of a product over time, **Sales** is the numeric data and both **Products** and **Time** are descriptive data.
Sisense Architecture Internals

This page provides an advanced description of Sisense’s architecture for IT managers and Administrators responsible for supporting Sisense in their organization.

When working with Sisense, there are two possible types of deployments. The first type is a **Single deployment** in which Sisense is installed on a single server. Single deployments can be leveraged to support single integrations or as proof of concept integrations for larger deployments.

The second type is a **Clustered deployment** where Sisense is installed on multiple machines, but only part of the components are active on each one. This type of configuration is used to support heavier traffic loads and high availability.

The Sisense full-stack solution is provided in a single installation process. After installing Sisense on a server, you will have access to all of the Sisense functionality.

The diagram below describes the main components of a Sisense Installation and how Sisense supports a full-stack solution:
In this diagram, the yellow components specify Sisense client applications or APIs. The blue components specify components of the Sisense Server.

The Windows service and application names that you can see in the Windows Task Manager under the Services or Processes tabs appear in a dark blue font.

When Sisense is installed on a single server, the dotted line indicates the boundaries of the server firewall. The lines between the components indicate communication between them, and its direction. When the Sisense Server listens on a specific port for inbound traffic, the relevant ports must be open in the firewall for the communication to succeed.
Sisense Architecture

Sisense supports a full stack solution from data, such as transaction details, user information, and machine-generated data, to dashboards accessible by viewers. There are two sides to this solution, the management of data and the analytic side where users can interact with the data.

This section provides a description of the Sisense architecture as part of the full stack solution, from data sources to dashboards.

Managing Data

The Sisense Server is responsible for managing data. Before you can begin to manage data however, Sisense communicates with remote servers for importing data sources, licensing information, tracking and similar activities.

Sisense Remote Servers

Sisense remote servers are used for license management, tracking and software updates.

Data Sources

Data sources may be files or databases located on servers on a local network, or remote locations and web services such as SalesForce and Google AdWords. Sisense supports a variety of data sources through native connectors, customer REST connectors, and ODBC drivers. These connectors are used to import data into the ElastiCube Server.
Sisense Server

The Sisense Server manages data and supports the Sisense Web Server, which hosts the Sisense Web Application. In a Single deployment, the Sisense Server resides locally on your machine. In a Clustered deployment, the Sisense Server can reside on one of your machines or across many machines depending on your needs. For example, if you want to support a high availability environment, you may install the ElastiCube Server on one machine, the web server on another, and the Multi-Node Orchestration server on another machine.

The Sisense Server is comprised of the following components:

**Licensing:** This service checks and validates licensing information.

**Multi-Node Orchestration:** The Sisense Orchestrator Service is an automated service that can be configured to synchronize builds across the ElastiCube Set.

**Remote Support Analysis:** This service is responsible for controlling logging, monitoring and automatic software updates.

**Web Server:** The Sisense Web Server is installed locally on your computer and hosts the Sisense Web application.

**ElastiCube Server:** The ElastiCube Server manages the process of importing data from various data sources and ETL processes. For more information, see ElastiCube Server below.
Server, which queries the ElastiCube Server where the ElastiCubes are hosted.

Within the ElastiCube Server are the following components:

**ElastiCube Catalog:** The catalog maintains a list of ElastiCubes contained within the ElastiCube server.

**Data Connectors:** The Data Connectors service is responsible for managing both native and 3rd party connectors.

The ElastiCube Server supports the following applications:

**Sisense ElastiCube Manager:** A Windows client application for managing data sources. The ElastiCube Manager provides the GUI for creating ElastiCubes, including importing data sources, preparing them, and building the ElastiCubes.

**Sisense Shell (PSM.exe):** A command line interface for managing ElastiCubes, such as building an ElastiCube, attaching and detaching ElastiCubes from a server, updating data sources, etc. The Sisense Shell can also be controlled programmatically.

**Sisense Server Console:** A Windows application that controls Sisense servers, including attaching ElastiCube folders to Sisense servers and starting and stopping ElastiCubes.

**Interacting with Data**

After you have created your ElastiCubes, your users can interact with data through Sisense dashboards.

Dashboards are hosted on the Sisense Web Server.
Web Server

The Web Server provides access to Sisense dashboards and Sisense Admin screens for user management.

The Sisense Web Server hosts the Sisense Web application, which provides the user interface from which users can design, share, view and explore dashboards on the Sisense Web Application and the Sisense Mobile App.

Each dashboard created is maintained within the Web Server catalog, which contains metadata regarding users, groups, and dashboards.

There are three main client applications that communicate with the Web Server:

**Sisense Web App:** This Sisense Web Application is the client application for dashboard creation and access, and system administration.

**Sisense Mobile App:** This Sisense Mobile Application is an Android and Apple-device compatible application for viewing dashboards across devices.

**REST API:** The Sisense REST API provides programmatic access to the Sisense web server functionality including managing ElastiCubes, user and group management, white labeling, user roles, reporting, and security.
Communication Ports

Sisense utilizes multiple communication ports. Some of the ports are used for communication between Sisense modules, and others are used for communication with remote locations.

When Sisense is installed as part of a Single machine deployment, ports used for communication between Sisense modules are considered internal ports, and do not need to be open in the firewall. When Sisense is installed in a Clustered deployment, where Sisense modules installed on different computers communicate with each other, ports used for communication between Sisense modules may need to be opened in the firewall. This depends on the specific deployment implemented in your environment.

The tables below lists the ports on which Sisense listens for communication.

Ports for External Communication

The following table list ports used for communication with external locations. These ports should be open on your firewall to allow for this communication.

<table>
<thead>
<tr>
<th>Module</th>
<th>Port #</th>
<th>Protocol</th>
<th>Description/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Server</td>
<td>8081(*)</td>
<td>HTTP</td>
<td>Sisense Web Server</td>
</tr>
<tr>
<td>Sisense.Orchestrator</td>
<td>445, 137-139</td>
<td>SMB</td>
<td>Used in high availability deployments. Otherwise, not used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In high-availability, it copies DB farm to query nodes.</td>
</tr>
</tbody>
</table>
## Ports for Internal and External Communication

The following table lists all ports in which the type of communication, internal or external, depends on your deployment. In a single deployment, Sisense communicates internally to other services. These ports do not need to be open on your firewall. In a clustered deployment, Sisense communicates across your deployment to other Sisense services. These ports should be open on your firewall to allow for this communication.

<table>
<thead>
<tr>
<th>Module</th>
<th>Port #</th>
<th>Protocol</th>
<th>Description/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sisense.Orchestrator</td>
<td>22(*)</td>
<td>SSH</td>
<td>Used in high availability deployments. Otherwise, not used. In high-availability, it copies DB farm to query nodes.</td>
</tr>
<tr>
<td>OAuth2 server</td>
<td>7077</td>
<td>HTTP</td>
<td>Used by GenericREST connectors that use OAuth authentication. Otherwise, not used.</td>
</tr>
</tbody>
</table>

(*) Indicates that the port is configurable.
<table>
<thead>
<tr>
<th>Module</th>
<th>Port #</th>
<th>Protocol</th>
<th>Description/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>ElastiCube Management Service,</td>
<td>812</td>
<td>TCP</td>
<td>In high-availability, it's the Elasticube query end point</td>
</tr>
<tr>
<td>QueryServiceTcpPort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ElastiCube Management Service,</td>
<td>16162</td>
<td>HTTP</td>
<td>In high-availability, it's the Elasticube query end point</td>
</tr>
<tr>
<td>QueryServiceHttpPort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ElastiCube Management Service,</td>
<td>811</td>
<td>TCP</td>
<td>Elasticube Management Service endpoint</td>
</tr>
<tr>
<td>ManagementServiceTcpPort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ElastiCube Management Service,</td>
<td>16161</td>
<td>HTTP</td>
<td>Elasticube Management Service endpoint</td>
</tr>
<tr>
<td>ManagementServiceHttpPort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>31112</td>
<td>TCP</td>
<td></td>
</tr>
<tr>
<td>MongoDB</td>
<td>27018(*)</td>
<td>TCP</td>
<td>(*) Indicates that the port is configurable.</td>
</tr>
</tbody>
</table>

**Ports for Internal Communication**

The following table lists all ports on which Sisense communicates internally. These ports do not need to be open on your firewall.

<table>
<thead>
<tr>
<th>Module</th>
<th>Port #</th>
<th>Protocol</th>
<th>Description/Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>MonitoringMongoDB</td>
<td>27019</td>
<td>TCP</td>
<td></td>
</tr>
<tr>
<td>Sisense.CLRConnectorsContainerServer</td>
<td>8090</td>
<td>TCP</td>
<td>CLR container server: Data transport between EC and data sources</td>
</tr>
<tr>
<td>Sisense.JVMConnectorsContainerServer</td>
<td>Dynamically allocated</td>
<td>TCP</td>
<td>JVM container server: Data transport between EC and data sources</td>
</tr>
<tr>
<td>Module</td>
<td>Port #</td>
<td>Protocol</td>
<td>Description/Purpose</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sisense.JVMConnectorsContainer Management</td>
<td>8095</td>
<td>TCP</td>
<td>Container management - e.g. Adding/Removing/Updating connectors</td>
</tr>
<tr>
<td>Sisense.Discovery</td>
<td>2181</td>
<td>TCP</td>
<td>Discovery service for connectors (Zookeeper)</td>
</tr>
<tr>
<td>CustomREST MongoDB</td>
<td>27077(*)</td>
<td>TCP</td>
<td>Intermediate and cache db for CustomREST: connector results</td>
</tr>
</tbody>
</table>

(*) Indicates that the port is configurable.
Minimum Requirements and Supported Platforms

The following prerequisites and supported platforms are required for working with Sisense.

**Supported Web Browsers**

The Sisense Web Application runs in the following HTML5 supported browsers:

The Sisense Web Application also works in mobile phone and tablet browsers that support HTML5.

**Supported Operating Systems**

ElastiCube Server and ElastiCube Manager can be installed on the following 64-bit operating systems:

- Windows 7 and up
- Windows Server 2008 R2 and up

Capacity and Hardware Requirements

Sisense easily scales up to billions of records with typical query response times of split seconds.

This section suggests system requirements for various performance capacities of the ElastiCube Server. Actual capacity requirements are provided after consultation with a Sisense technical representative at support@sisense.com. Extreme scenarios may require additional resources.

Sisense Dashboard viewers only require an HTML5 compliant Web browser.
# of rows | < 10 users | 10s of users | 100s of users |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAM (GB)</td>
<td>Logical Cores</td>
<td>RAM (GB)</td>
</tr>
<tr>
<td>Up to 100K</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>up to 500K</td>
<td>8</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>up to 1M</td>
<td>8</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>up to 10M</td>
<td>16</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>up to 50M</td>
<td>16</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>up to 100M</td>
<td>25</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>up to 200M</td>
<td>32</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>up to 300M</td>
<td>32</td>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>up to 500M</td>
<td>64</td>
<td>16</td>
<td>128</td>
</tr>
<tr>
<td>up to 600M</td>
<td>128</td>
<td>16</td>
<td>128</td>
</tr>
<tr>
<td>up to 700M</td>
<td>128</td>
<td>16</td>
<td>128</td>
</tr>
<tr>
<td>up to 800M</td>
<td>128</td>
<td>16</td>
<td>256</td>
</tr>
<tr>
<td>over 800M</td>
<td>256</td>
<td>16</td>
<td>256</td>
</tr>
</tbody>
</table>

**Supported Locales**

The formats for dates, times and numbers in your dashboards are based on your computer’s operating system or browser’s locale settings (depending on your browser).

Locales from the following countries are supported:
Notes

You can override the default locale settings for all users by updating a parameter via the Rest API. Click here to learn how to override default locale settings.

To use a locale file that is not included in the above list of countries, you can manually add a locale file in the following location:

\ProgramFiles\Sisense\PrismWeb\client\resources\base\localization

Click here to access locale files and view their codes.
Installing Sisense

The following sections list the prerequisites for installing Sisense, and explain how to install and customize your Sisense installation.

- Downloading and installing Sisense
- Setting Up your Production Environment
- Customizing the Sisense installation
- Performing a Silent Installation
- Migrating a Sisense installation
- Launching Sisense

Downloading Sisense

If you want to try Sisense for the first time, sign up for the free trial at Sisense.com. You will be prompted to download the installer.

Installing Sisense behind a Firewall

The standard installation requires internet access to download the necessary components. For machines behind a firewall, or without internet access, you can download and install the full self-contained installation file.

For detailed instructions, see Installing Sisense Offline.
Installing Sisense

The entire Sisense solution can be installed from one file, either locally or in a central place in your organization within a couple of minutes.

All Sisense components are installed with a default configuration, as follows:

- Sisense Web Application
- ElastiCube project manager
- Sisense Server Console
- ElastiCube Server
- IIS Express as the web server hosting Sisense Web Application platform

**Note:** To install Sisense, you must have administrator privileges on the machine where you are installing Sisense and your environment must meet the minimum requirements.

The Installation Process

**To install Sisense:**

1. Open the downloaded executable file to run the installation.
2. If you are not logged into Sisense, enter your username and password to confirm licensing and begin the installation process. If you are logged in already, the activation screen is not displayed.
3. After entering your login details, select Get Everything to run the default installation:

4. If you are upgrading your version, click Upgrade.
See also:

If you need to customize your installation, see Customizing the Installation. You can customize your installation during the first installation or after an installation, but not during an upgrade.

If you want to install Sisense on a remote machine, see Performing a Silent Installation.

If you are migrating your installation to a different machine, see Migrating an installation.
Setting Up Your Production Environment

Sisense recommends installing Sisense in a staging environment, where you can check all of your ElastiCubes and dashboards, as well as test different configurations and customization options. When everything is working as expected, deploy Sisense in your production environment.

Providing Remote Access to the Sisense Web Environment

To maximize the Sisense experience, you will want to make your dashboards accessible to external users outside the organization’s network. This requires the following configurations:

- Open TCP port (default is 8081) to access the Sisense Web Application internally.
- Ensure that your Sisense machine has a public IP address or domain name associated with a public IP for external access.
- Open port 443 if you are using SSL. Sisense recommends using SSL for secure connections or a VPN solution. For more about implementing SSL, see Setting Up SSL.

External users who were granted access can view dashboards by entering the machine’s IP and the port number, for example: xx.xxx.xx.xx:8081 or my.company.com:8081

Click here to learn more and see troubleshooting tips.

Providing Remote Access to the ElastiCube Manager

In some cases, you may want to provide external access to the ElastiCube Manager for designing and modeling your ElastiCubes. In
such cases it is necessary to consult your Sisense Success Manager to make sure your licensing terms allow this option.

In addition, make sure that ports 811, 812 on your Sisense machine are open.

**Note:** To avoid exposing your data, do not open ports 811/812 without the proper security measures.
Customizing the Installation

You can customize the settings for your web server application during the installation process or after Sisense is installed.

For example, you can configure your server to use the Long index edition of Sisense if your ElastiCubes are expected to contain a table with over 300 million rows.

Note: You cannot customize the settings during an upgrade process. If you upgraded Sisense and want to customize settings, refer to the post-installation option described below.

To access the customization options during the installation process:

- During the installation wizard process, click Customize Installation, and define the settings as described below.

To access the customization options after you have already installed Sisense:
1. Open the Control Panel, and go to Programs > Programs and Features. Right-click Sisense, and click Change.

   ![Change Sisense](image)

2. Click Continue > Change Features, and define the settings as described below.

   ![Custom Installation](image)

**Settings**

**ElastiCube Server**

Select the **Long index edition** if your ElastiCubes are expected to contain a table with over 300 million rows.

It is not recommended to use this configuration setting for ElastiCubes in which the largest table does not include at least 300 million rows.

**Sisense Web Application**

You must specify the Sisense Web Application **Port** and **Website Name**. Usually, if no other sites are running on the machine, you can use port **8081**.
There are three options for the server type:

- **Microsoft IIS Express**: This is the default web server used to host the web application.
- **Microsoft IIS**: This is recommended for production environments. In case there is an existing site with the same name, it will be overridden.
- **Manual**: This is recommended when you have to manually set up your IIS. If this is selected during upgrades, the installation will keep the existing site details and configuration in the IIS. When using this setting, make sure to define the physical path of the IIS site to the new installation folder (C:\Program Files\Sisense\PrismWeb).
Performing a Silent Installation

You can install Sisense using the command-line interpreter, for example, when you need to run an installation on a remote machine.

You can also customize the installation using variables, for example, install Sisense without the sample dashboards.

To perform a silent installation:

1. Download the latest Sisense version.
2. Open the command line interpreter and type in the installation commands as follows:

   **Full installation** (without previous user activation)

   `<Location of downloaded executable file>`\(\text{SisenseLatestFull.exe} -q -username=<> -password=<>\)

   **Full installation** (for user already activated by Sisense)

   `<Location of downloaded executable file>`\(\text{SisenseLatestFull.exe} -q\)

   **Full offline installation** (requires a license key from Sisense)

   Note: To get an offline license, go to My Account and click GET LICENSE KEY, or contact your Sisense Success Manager.

   After attaining your key, copy and paste it after `- offline_license= (replacing `<offline_license_key>` in the example below).

   `<Location of downloaded executable file>`\(\text{SisenseLatestFull.exe} -q -offline_license=<offline_license_key>\)

   **Installation without sample ElastiCubes and dashboards:**

   `<Location of downloaded executable file>`\(\text{SisenseLatestFull.exe} -nosamples -q\)

Choosing Sisense Website name and port:
Silent Customized Installations

To define which Sisense components are installed, you can edit the PrismFeature.xml and copy it to “%programData%sisense”.

If you are using IIS express, download PrismFeature.xml.

If you are using IIS, download PrismFeature.xml.

Note: Create “%programData%sisense” if it does not exist.

The PrismFeature.xml file contains an XML node named “Feature”. Changing its ‘Selected’ child node value (true/false) determines if the feature is installed or not. For example, in this configuration, the Prism Server Console is installed:

```xml
<Features>
  <Feature>
    <Id>PrismServerConsole_Feature</Id>
    <Name>Prism Server Console</Name>
    <Selected>true</Selected>
    <Manual>false</Manual>
    <Selector>CheckBox</Selector>
    <Tests />
  </Feature>
</Features>
```

After editing the XML file, run the installation according to the instructions above.

To uninstall Sisense using the command-line interpreter:

- In the command-line interpreter, enter:

  ```cmd
  \<Location of downloaded executable file>\SisenseLatestFull.exe /q /uninstall
  ```
Backing Up and Migrating a Sisense Installation

This section describes two separate, but related procedures, backing up a Sisense installation and migrating a Sisense installation from one machine to another.

Backing up your installation is recommended before a migration process, but also on a regular basis for securing your data and Sisense configurations.

You may need to migrate your entire setup when moving from a staging/development environment to a production environment, when upgrading hardware, etc.

**Note:** If you have advanced and/or customized web configurations, such as SSL, SSO, redirects, etc., please consult us through our Help Center.

**Backing Up a Sisense Installation**

The backup process requires backing up data from the two main Sisense components, the ElastiCube server and the Sisense Web Application.

In addition, if you have any custom plugins located in the directory C:\Program Files\Sisense\PrismWeb\plugins, this folder should be backed up as well.

The following procedure describes how to back up the data from the two components.

**To back up Sisense data:**

1. To back up ElastiCube data, enter the following path:
...\ProgramData\Sisense\PrismServer\ElastiCubeData

Note: This is the default path. To check which path is being used, open the Sisense Server Console and click on the server preferences icon 🔄 to verify the correct path.

Each folder in this location represents an ElastiCube, and contains both the ElastiCube schema, and the data that was imported when the ElastiCube was built. Copy the data to your backup location.

2. To back up Sisense Web data, go to:

...\ProgramData%\Sisense\PrismWeb\DB\Prod

Copy the data to your backup location.

3. (Optional) Back up your custom plugins by copying the folder C:\Program Files\Sisense\PrismWeb\plugins and saving it in the appropriate folder in the new server.

Migrating a Sisense Installation

The migration process involves migrating data for the two main Sisense components, the ElastiCube server and the Sisense Web Application. If you are using plugins, you must back up the Plugins folder as well located in C:\Program Files\Sisense\PrismWeb\plugins. The following procedures explain the migration procedures for each component.

ElastiCube Server

ElastiCube data is stored in folders per ElastiCube. Each folder contains both the ElastiCube schema, and the data that was imported when the ElastiCube was last built. You can either copy the folder
where the data is stored, or export the data.

Note: If you had build failures/server restarts, you may encounter multiple copies of the same ElastiCube. You can identify the latest ElastiCube by the path shown in the Server Console.

1. Before you begin, Sisense recommends declaring downtime to avoid the loss of work during the process.
2. Open the Sisense Server Console. Do one of the following:

   Copy the data folder (see above in the migration section) or

   Export the data to an .ecdata file. See Importing and Exporting ElastiCubes for instructions on how to export your data.

Note: You must stop the server before exporting the data. Click Stop to stop the server.

3. In the new server, attach the copied data, or import the .ecdata file you exported in the previous step.
4. Start the server.
5. If the database location was changed as well, modify the connectivity settings. See Changing Connectivity Settings to learn how.

Note: If you change the location, first stop the the IIS as follows:

   o If you are using IIS: Open the command line interpreter and type iisreset /stop.
If you are using IIS Express:
Open Services > sisensewebExpress, right-click and select Stop.

Sisense Web Application

The Sisense web data contains user, dashboard, widget, and other information. This information is stored in a MongoDB instance on the machine where your Sisense Web Application is installed. It’s stored in %ProgramData%\Sisense\PrismWeb\DB\Prod and can be backed up and moved to your new server.

Note: You can access the database on the Sisense web server using any MongoDB Browser by connecting to localhost on port 27018.

To transfer the Sisense Web Application data, you can use one of the following methods depending on your requirements:

- If you don’t have many dashboards already and do not need too much setting up (adding new users, configuring sharing, data security and other system settings), then you can export the dashboards from the old environment and import them into the new one, set new sharing permissions and configure the environment per your required settings.

  Note: If you have any plugins that are based on specific dashboards or widgets, you must modify them manually with their new IDs, as these IDs change when imported into a new environment.

- If you have created quite a few dashboards and have already configured sharing, data security and other system settings, you can transfer your existing environment as is. In this case, you must:
1. Back up your current MongoDB database and copy it to the new environment, as follows:
   - To back up the old environment, open your machine’s Control Panel, and go to **System and Security > Administrative Tools > Services**, and stop the *SisenseRepository* service (this will make the website inaccessible). You can run the following command: *Stop Sisense.Repository*
   - Create a copy of the entire **Prod** folder.
   - Start the *SisenseRepository* service again to get the website up again.
   - To restore in the new machine, stop the *SisenseRepository* service.
   - Replace the existing Prod folder with the one you backed up.
   - Start the *SisenseRepository* service.

2. Migrate the ecdata (schema and data):
   - Stop the Web service to ensure the ElastiCube is not triggered during the copy process:
     - If you are using IIS: Open the command line and type in *iisreset /stop*
     - If you are using IIS Express: Open **Services** > sisensewebExpress, right-click and click **Stop.**
Upgrading Sisense

Sisense releases four major versions a year, and several minor versions in between. Each version includes new features and enhancements as well as other improvements.

Sisense allows you to decide when you want to upgrade to the latest version. There are no automatic updates for the Sisense Server. Before upgrading, you can learn about the contents of each release in the Sisense Release Notes.

Before Your Upgrade

Sisense recommends you follow these guidelines before you begin the upgrade process:

- Install the new version of Sisense on a testing/staging environment and check all of your ElastiCubes and active dashboards. When you are sure that everything is working well, continue with the installation of the new version in your production environment.
- If you have a multi-server environment, make sure all of your Sisense servers are running the same version to avoid compatibility issues.
- Save all open ElastiCubes and close the ElastiCube Manager.
- Verify that no one is currently designing a dashboard.
- Declare a downtime of approximately 15 minutes and notify users.
- Install the new version with the same user who installed the original Sisense version (with the same administrator privileges).

Installing the Latest Version

To install the latest version:
1. Download the latest version of Sisense. For more information, see Downloading and Installing Sisense.

2. Run the installation file. Sisense automatically detects if a version is already installed, and displays the upgrade wizard.

3. Click **Continue**.

4. Click **Upgrade**.

Sisense is upgraded according to the installation settings you selected the last time you installed Sisense. To customize a
new installation, you should uninstall Sisense and then install the latest version.

**Downgrading Sisense**

When you upgrade Sisense, a backup copy of your MongoDB instance is automatically created. The MongoDB contains your user and dashboard information. This allows you to reinstall earlier versions of Sisense without having to set up your users or dashboards a second time.

During the uninstall process, you can choose to remove all user data, which deletes the MongoDB instance. The next time you install Sisense, your dashboard, dashboard list, and user data will be completely fresh.

Sisense is improving all the time and some versions of Sisense are incompatible with earlier versions. If you upgrade to a version and need to downgrade to an incompatible version, you can restore a backup copy of the MongoDB created automatically when you installed the last version of Sisense. For help downgrading to an earlier version of Sisense that is incompatible with the last version you installed, you can contact Sisense Support who can assist you in restoring a backup copy of your MongoDB instance.

**To downgrade to an earlier version of Sisense:**

1. In Windows, goto Add or Remove Programs.
2. Locate Sisense and click Uninstall

The Uninstall Wizard is displayed.

3. In the Uninstall Wizard, click Remove Anyway. If you select the Remove User Data checkbox, Sisense deletes all information stored in the MongoDB and this information must be configured the next time you install Sisense.

Sisense is uninstalled.

4. Install the previous version of Sisense. The downgrade process is complete.
Launching Sisense

To launch Sisense:

Use one of the following options to launch Sisense:

- If you have Sisense installed on your machine, select Sisense from the Start menu.
- From a standard browser, go to the URL of the Sisense environment provided to you by your system administrator.

To launch the Sisense ElastiCube Manager:

Use one of the following options:

From Windows: Open the Windows start menu and select Sisense ElastiCube Manager.

From the Sisense Web Application: Do one of the following:

1. Click ElastiCube Manager in the top menu.
2. Select View in ElastiCube's Page, which redirects you to the ElastiCube menu within the Admin page where you can open the ElastiCube Manager through any ElastiCube.
3. Select Open in ElastiCube Manager, which opens the ElastiCube Manager and displays the ElastiCube of your current dashboard.

To log into Sisense:

- If you installed Sisense, you can use the same credentials to log into Sisense.
If an account has been created for you, you should receive a password activation email. Click on the link to redirect you to choose a password and activate your account.
Managing Data

Introduction

ElastiCubes are super-fast data stores that are specifically designed to withstand extensive querying typically required by business intelligence applications.

ElastiCubes allow you to bring in data from multiple sources, and then merge, manipulate and query the data as if it was one consolidated data set. ElastiCubes perform so well, that in most cases the creation of dedicated OLAP cubes and/or optimized data marts are completely unnecessary – even when dealing with hundreds of millions of rows of raw data.

One of the biggest advantages of ElastiCubes is the ability to easily mash up multiple data sources. It is made up of fields where each value in one field has a corresponding value in another field. The data for an ElastiCube can come from one source, multiple sources or even from multiple physical locations. Once the data is inside the ElastiCube, it is all the same and every field coming from every table can be analyzed in the context of any other – quickly.

ElastiCube Advantages

ElastiCube technology make queries over hundreds of millions of rows of raw data return in seconds, with moderate hardware requirements including standard desktop-class computers with commodity hardware. More importantly, ElastiCubes can do this without having to pre-aggregate and pre-calculate the data ahead of
time and store it on the hard-drive, thus radically reducing required import/processing time and storage space.

ElastiCubes are most useful when one or more of the following is true:

- Large amounts of data need to be analyzed
- Data for analysis originates from multiple disparate sources

**ElastiCube Manager Environment**

The ElastiCube Manager is a visual environment where you can import and structure multiple data sources, create relationships between data, and perform ETL (Extract, transform, and load) processes to prepare data for analysis and visualization.

1. Data Schema Tab
2. Main Menu
3. Table and relationship layout
4. Search tables and fields
5. Zoom control
To learn more about the ElastiCube Manager, see Working in the ElastiCube Manager.

**ElastiCubes - Technical Overview**

**Introduction**

Relational databases (RDBMS) like SQL Server, Oracle, MySQL and even Access all store tabular data row-by-row. This structure is best for transactional/operational systems that require large numbers of concurrent insertions. With indexes, it can also provide realistic query response times for row-based queries that do not frequently require aggregations or joining of many tables.

Data analysis often requires aggregation of data as well as merging of data located in multiple disparate tables. When dealing with these types of queries, relational databases reach their limits pretty quickly. The only way to extend these limits is by putting in stronger hardware and pre-aggregating data to reduce the amounts of calculations that occur in real time.

**ElastiCube Columnar Database**

ElastiCube data is held in a Columnar Database Management System (CDBMS) that stores data field-by-field. Each field is individually stored in a memory-mapped file, the same mechanism the Windows operating system pagefile uses for memory dumping and loading.

When a query is executed over an ElastiCube, only fields referenced in the query need to be loaded into memory. This leaves enough space for actually processing the query entirely in memory without any read/write to the hard-drive - the prime reason for poor performance
of queries. Once a field is no longer used, it is removed from memory and its consumed space is freed.

This approach has several advantages:

- **Query Response Time**
  Queries over data sets containing millions of rows of data return in seconds even under modest hardware configurations such as desktop computers.

- **Materialization Time**
  ElastiCubes do not require pre-aggregations and/or creation of indexes to assure fast query response, therefore the actual creation of an ElastiCube takes a fraction of the time of a data mart or an OLAP cube.

- **Storage Space**
  Pre-aggregations and the creation of indexes are not needed to assure fast query response, making an ElastiCube's size significantly smaller than a datamart or an OLAP cube.

- **High Compression**
  This columnar storage strategy makes the data much more suitable for high levels of compression, without loss of detail or accuracy. This means less hardware is needed; less disk space and less RAM than for an equivalent-sized, traditional Business Intelligence DB.

- **64-bit Support**
  Written and designed to natively support 64-bit processing, it vastly increases the amount of memory the system can address at any given time. 64-bit architecture means you can work with virtually unlimited amounts of data.
True Multi-User, Multi-Application Architecture

ElastiCubes are not tightly coupled with the application layer of the system. This frees up a single ElastiCube to handle multiple applications and users. Not having to reproduce your data model for every application saves significant time developing and maintaining your dashboards and reports.

Just-In-Time, In-Memory Processing

Smart Cache and Instruction Recycling

CPU cycles and RAM space are the two most precious resources in any computer, and ElastiCube is designed to use both as efficiently and speedily as possible. Using our sophisticated caching algorithm, the data is only loaded into memory when it’s needed. As part of this algorithm, compute- and time-intense calculations are also intelligently cached to further reduce I/O calls.

Cache-aware Algorithm

Additional sophisticated algorithms further increase Sisense’s performance. Once data is loaded into memory, the main performance bottleneck becomes CPU cache misses that naturally come with random access. The ElastiCube is specifically designed to minimize these errors by employing a unique cache-aware algorithm, further increasing Sisense’s performance by an additional order of magnitude.

Compressed Calculations

Every DB compresses data to save disk space and RAM. ElastiCube is designed to work directly on this compressed
data, so that the need for decompression is virtually eliminated, further increasing ElastiCube’s performance.

**Designed with Standard Hardware in Mind**

Just about every new computer on the market—even portables like iPhones and iPads—are built with very powerful multi-core processors, putting several CPUs into one. ElastiCube was built specifically to take advantage of these powerful CPUs, further increasing Sisense’s performance on standard hardware, enabling you to run multiple applications and support multiple users.

- **Highly RAM-efficient**
  
  The thing we know for sure about DBs is that they grow. Fast. So, no matter how much fancy footwork is done with completely in-memory DBs, eventually you run out of RAM space and need to upgrade—at least your RAM (best case) or your entire hardware platform (worst, very expensive, case). At Sisense we know this, so we spent years designing the ElastiCube to be able to handle terabytes—billions of rows—of data efficiently and quickly, even on standard PC hardware.

**Unified Analytics Engine**

Sisense can execute queries against a wide variety of data sources as if they were all of the same type, essentially making the individual characteristics of each physical data source unimportant. Our Unified Analytics Engine is what makes this possible.

When Sisense imports data, the Unified Analytics Engine creates a metadata layer, or abstraction layer, which is then used to formulate queries across any number of tables from any number of data sources
in any number of formats. It even supports the combined querying of resident and external (live) database sources without first loading data into the database!

These capabilities provide the user with unparalleled flexibility and speed in creating, executing and sharing highly complex reports, dashboards, and analytic applications, with any number and variety of data sources.

**Compliant with Industry Standards**

- **Supports SQL-92 Standard**
  
  Even with all this advanced technology, we knew that none of it would be any good if our users couldn't access their existing data. So, we built in an SQL layer to the system, which allows users to integrate Sisense to external applications without needing to learn new scripting languages.

- **Seamless Integration with Existing Data Sources**
  
  Got an ODBC/OleDB compliant DB today? Great, we built in the ability to access those, too. ElastiCube will seamlessly connect to those data sources so, again, there is no need to learn a new language or write special code to connect to your existing data. With ElastiCube there’s no need to start over, you just get faster, easier, and more scalable, with minimal need for IT.
Working with the ElastiCube Manager

Menu options in the ElastiCube Manager are located on the top panel. Below are descriptions of the main menu items.

File

Your data model or schema is saved in an ecube file. ecube files contain the schema and the data connection settings required for building your ElastiCube. The ecube file does not contain the raw data. After building your ElastiCube from an ecube file, your ElastiCube with the data is stored in an ecdata file.

- **Files**: Open and save ElastiCube schema diagrams (ecube files)
- **Recent Files**: Access a recently used schema diagram.

Add Data

The **Add Data** menu controls access to multiple data sources.

- **Database servers**: Includes data connectors for traditional and generic databases such as MS SQL and Oracle.
- **Files**: Includes data connectors for data files like Excel and Access.
- **Web Services**: Includes data connectors for web-based services like Google Analytics and SalesForce.
- **Custom**: Custom SQL tables can be generated based on tables and data within the schema.

Build

- Provides access to build settings to import data into ElastiCube.
Dashboard

- Opens the Sisense web app to begin designing the dashboard.

ElastiCube

- *Build ElastiCube:* Provides access to build settings.
- *Build Settings:* Provides options to change connectivity to data sources, schedule builds and run custom plugins.

Servers

- Lists available Sisense server consoles and associated ElastiCubes that can be edited or deleted.

Layout

- Automatically rearranges the layout of tables in the schema diagram.
Sisense Live Connect

Sisense Live Connect queries are run directly against the data source. Sisense performs no additional caching on the data.

Having the right data available at the right time is absolutely critical to making smart business decisions. To ensure that you have the latest data available, Sisense provides live connections to some of the most popular data sources.

Traditionally, your data was only as fresh as your latest ElastiCube build. With live connections, you can refresh your dashboards manually or set them to refresh automatically every few seconds.

When you add a live connection, Sisense creates a data set. A data set includes connection and credential details to the data source and defines the table where live data is pulled from. Each data set supports a single table from your data source. After creating a data set, it is displayed in the ElastiCube page of the Admin section from where you can manage all your data sets.
Adding Live Connections

To add a live connection:

1. In the Sisense Web Application, select **Admin > ElastiCubes & Data Sets**. The ElastiCubes & Data Sets page is displayed.

2. In the ElastiCubes & Data Sets page, click **Add Live Connection**. The Add Live Connection dialog box is displayed.

3. In the Add Live Connection dialog box, select your live data source.

4. Under the Connect tab, enter the following credentials:
   - **Location**: The IP address of your data source.
**User Name:** The user name to access data source.

**Password:** The password to access your data source.

5. Click **Next**.

6. Under the Select Data tab, on the left side is a list of schemas located in your data source. Select the relevant schema. You can find the schema easily by searching for it through the search field at the top of the list to filter the schemas displayed. After selecting the schema, a list of the available tables and views are displayed.

7. Select a table or view. You can find the table easily by searching for it through the search field at the top of the list to filter the tables displayed.

8. Click **Next**.

9. Under the Connection Settings tab, set the following:

   **Connection Name:** Enter a name for your connection. This field defines the name of your data source displayed in the Sisense Web Application.

   **Refresh Rate:** Enter or select the refresh rate for your data source. The shortest refresh rate you can set is 10 seconds.

   **Time Out:** Enter or select the Time Out rate for your data source. The Time Out rate determines how long Sisense waits before cancelling a query that does not receive a response from your data source.

10. Click **Done**. The connection is added as a data set to your ElastiCube & Data Set page.
Working with Data Sets

After you have added your data set, you can begin to create visualizations like you would with any other data source. See Creating Dashboards and Creating Filters for more information.

In the Sisense Web Application, live data sources have the ⚡ icon next to their name.

While you can create dashboards from a live data set like you would an ElastiCube, you can also add data sets as a data source to a dashboard that already has a data source such as an ElastiCube. When have multiple data sources working together on a single dashboard, the data source and the widgets built on it operate independently of each other. This allows you to view widgets that visualize time sensitive information in addition to widgets that are refreshed less frequently. For more information about adding multiple data sources, see Changing a Dashboard’s Data Source.

In terms of governance, all existing access rights settings and data security settings can be applied for live connections.

Load Management

The most significant difference between dashboards built on ElastiCubes and dashboards connected to live data sources is how the load is managed. With an ElastiCube, you refresh the data when you build an ElastiCube and query the ElastiCube, not the data sources that define your ElastiCube. With live connections, queries are run
against the data source itself. This means that you don’t have to wait for an ElastiCube to finish building before you see the results, however, your data source must be able to handle the potential load of multiple refreshes.

When you refresh the data for a live connection, Sisense uses the connection settings and credentials in the data set to query the live data source. Depending on your Sisense role, there are several options for refreshing the data.

Administrators create the data set. They define the refresh rate in seconds and timeout for each data set. After the refresh rate is set by the Administrator, no user can set a refresh rate shorter than the rate set by the Administrator. Administrators can manually refresh the data set from the ElastiCube & Data Set page in the Admin section.

Keep in mind that each time a refresh takes place, your data source is queried, so your data source needs to handle the refresh rate you define. Designers can reduce the frequency of data refreshes or stop automatic refreshes on a per widget level, but they cannot increase the frequency of refreshes beyond the threshold set by an Administrator.
Refreshing a Data Set

There are several ways in which you can refresh a widget build on a live data set depending on your Sisense role.

Administrators set the default refresh and can refresh the data manually from the ElastiCubes & Data Sets page in the Admin section of the Sisense Web Application.

Designers can refresh a widget from the widget’s information window.

In addition, Designers can reset the Refresh Rate, however, the rate cannot be lower than the default rate set by the Administrator.

Like Designers, Viewers can refresh a widget from the widget’s information window, but they cannot modify the refresh rate.
While any users can refresh a widget, Sisense has a minimum 10 second refresh limit. Any refreshes requested within 10 seconds are ignored.

**Cancelling a Refresh**

If you have a refresh that you want to cancel, you can cancel it by clicking Cancel in the widget's information box.

This button is displayed only when a refresh is in progress.

In addition, any time a user leaves a query, for example, to view another page in their browser, Sisense pauses the query.

**Limitations**

The current features are not supported by live connections:

1. Pulse alerts
2. Bow & Whisker
3. R is not currently supported
4. Some functions are not currently supported

**Frequently Asked Questions**

**Q:** I cannot connect to my data source?

**A:** As the connection is live, the data source must be available for Sisense to connect. Also, if your credentials changes, you must update the Administrator must update their data set so Sisense can continue to connect and refresh the data.

**Q:** No data sources are displayed when trying to add one?

**A:** In Windows Services, verify that the following are running, and if not, restart them:

Sisense.CLRConnectorsContainer

Sisense.Discovery

IIS

**Q:** If I use Windows Authentication with my SQL server, what do I enter in the Username and Password fields?

**A:** Enter the Location and leave the Username and Password fields blank.

**Q:** After entering a data set name, the Done button is not displayed?

**A:** Make sure the data set’s name is unique. You cannot create data sets with the same name.
Connecting to Data Sources

Introduction to Data Sources

Data is the basis for any analytical or explorative business intelligence. In Sisense, data is generally managed via one or more data source. Data Sources hold information on metadata and connectivity settings for the data used in dashboards.

One of the biggest advantages of this approach is the ability to combine and mash up data from multiple sources quickly and easily.

A Data Source contains the following:

- *Connectivity information* such as the server address, table name, login credentials, etc. A Data Source maintains a connection for a single table, view, OLAP cube or an ElastiCube.

- *A dimensional representation* of the data, in terms of dimensions and measures.

- *User-created resources* such as custom filters or measures, widgets or questions.

This section provides a list of each connector and how to connect to its data source.
Connecting to Amazon RDS

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud.

With ElastiCube Manager you can easily connect to your Amazon RDS instances.

Amazon RDS supports instances with MySQL, Oracle and SQL Server databases. You can connect to those instances in the same manner as connecting to those databases on premise, with the IP and credentials as supplied by Amazon. Follow these instructions depending on your RDS type:

Connecting to Amazon RedShift

The ElastiCube Manager enables easy and quick access to databases, tables and views contained within Amazon RedShift databases. The steps below detail how to connect to this type of data source.

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Web Services category select Amazon RedShift.
3. You will be prompted to enter the following information:

- **Database server location**: Enter the computer/server IP address that holds the database.
- Either use your **Windows Authentication** if configured with the database, or alternatively enter the **Username** and **Password** to connect to the database.
- **Database**: Enter the name of the database to which you want to connect.
4. Click **Connect to Database**.

All tables and views associated with the database will appear in a new window.

To view a preview of data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the **Preview** checkbox.

Enable the checkbox next to each table or view you would like to use.

Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.

**Note:** If you encounter problems connecting to Amazon RedShift, please see [this article](#) in our support forums.

5. Once all relevant tables are selected click **Add**.
Connecting to Access

The ElastiCube Manager enables easy and quick access to tables contained within Microsoft Access files. The steps below describe how to connect to this type of data source.

1. Click **Add data** in the top menu of the ElastiCube Manager.
2. Under the **Files** category, select **Microsoft Access File**.
3. In the window that opens, locate and select the Microsoft Access file you want to use. Click **OK**.
4. A popup will open with the following options.
   All tables and views associated with the database will appear in a new window. To preview the data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the **Preview** checkbox.
5. Select the checkboxes next to each table or view you want to use.
   Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.
6. Once all relevant tables are selected, click **OK**.
Note: Sisense does not support Access files that were created with the 32-bit version of Access. If you try to upload an Access file created in a 32-bit version of Access, the following connection error is displayed.

[Image of Connection Error]

To upload 32-bit Access files, you can install Microsoft’s 64-bit [Access Database Engine](#) to upload your Access files or click [here](#) for more information.
Connecting to Bing

The Sisense Bing connector is a standalone connector that allows you to import data from Bing’s APIs into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to Bing’s API. To obtain a connection string, you will need to create a Bing app.

Once you have connected to Bing, you can import a variety of tables from the Bing API.

This section describes how to install the Bing connector, how to connect to Bing with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Bing Connector

Sisense provides the Bing connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Bing connector:

1. Download the Bing installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.

   The Bing connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Bing REST API

To access Bing’s REST API from Sisense, you must obtain a valid API key. The API Key is provided by Bing after you subscribe to an API.

Obtaining an API Key:

1. Log in to https://www.bing.com/dev.
2. From the main menu, select the API you want to retrieve data from.
3. If you have already subscribed to it, you will see two subscription types, Free Trial and Labs. Select the relevant subscription type.
The API Key is displayed.

4. Click **Copy** for the relevant key.
5. Save the key to paste it into your connection string.

**Adding Bing Tables to your ElastiCube**

Sisense uses connection strings to connect to Bing and import data into the ElastiCube Manager.

The connection string to connect to Bing has the following structure:

```
jdbc:bing:ApiKey=73529b7a4994ytec8d4ca6c33049;InitiateOAuth=GETANDREFRESH;
```

Mandatory properties are ApiKey, and InitiateOAuth.

- **ApiKey**: Application key provided by Microsoft that authenticates your account.
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

Note: To switch between accounts, you need to delete the file OAuthsettings.txt file located at

```
...\Users\xxx\AppData\Roaming\CData\Bing Data Provider.
```

**To add Bing data:**
1. In ElastiCube Manager, click **Add Data** and then, **Bing**. The Connect to Bing window is displayed.

2. In **Datasource Connection String**, enter your connection string.

3. Click **Connect to Server**. Bing is displayed in the Select Database list.

4. Click **OK**. Sisense connects to Bing and displays a list of tables available for you to import.

5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

**Switching between Accounts**

When you connect to the Bing data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at .\Users\xxx\AppData\Roaming\CData\Bing Data Provider on your Sisense server. To connect to the Bing data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the OAuthSettingsLocation parameter. When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Bing data source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```
jdbc:Bing:OAuthSettingsLocation=C:\Bing\auth\john.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```
In the example above, two OAuth files are created, one for John and one for Sally in the location C:\Bing\auth. This is useful if you support many users who each need to access the Bing data source.

**Bing Tables**

The Sisense Bing connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ImageSearch</td>
<td>Query the Bing image search engine.</td>
</tr>
<tr>
<td></td>
<td>When querying this table the SearchTerms parameter must be specified. For example, to search Bing Images for the term 'bing' use the following query: SELECT * FROM ImageSearch where SearchTerms = 'bing' You can also specify a search safety level: SELECT * FROM ImageSearch where SearchTerms = 'bing' and SafeSearch = 'Moderate'</td>
</tr>
<tr>
<td>NewsSearch</td>
<td>Query the Bing news search engine</td>
</tr>
<tr>
<td></td>
<td>When querying this table the SearchTerms parameter must be specified. For example, to search Bing Images for the term 'bing' use the following query:</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Search</td>
<td>Query the Bing search engine.</td>
</tr>
<tr>
<td></td>
<td>When querying this table the SearchTerms parameter must be specified.</td>
</tr>
<tr>
<td></td>
<td>For example, to search Bing Images for the term 'bing' use the following query:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM Search where SearchTerms = 'bing'</td>
</tr>
<tr>
<td></td>
<td>You can also specify a search safety level:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM Search where SearchTerms = 'bing' and SafeSearch = 'Moderate'</td>
</tr>
<tr>
<td>VideoSearch</td>
<td>Query the Bing video search engine.</td>
</tr>
<tr>
<td></td>
<td>When querying this table the SearchTerms parameter must be specified.</td>
</tr>
<tr>
<td></td>
<td>For example, to search Bing Images for the term 'bing' use the following query:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM VideoSearch where SearchTerms = 'bing'</td>
</tr>
<tr>
<td></td>
<td>You can also specify a search safety level:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM VideoSearch where SearchTerms = 'bing' and SafeSearch = 'Moderate'</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>WebSearch</td>
<td>Query the Bing web search engine. When querying this table the SearchTerms parameter must be specified. For example, to search Bing Images for the term 'bing' use the following query: SELECT * FROM WebSearch where SearchTerms = 'bing' You can also specify a search safety level: SELECT * FROM WebSearch where SearchTerms = 'bing' and SafeSearch = 'Moderate'</td>
</tr>
</tbody>
</table>
Connecting to Box

The Sisense Box connector is a standalone connector that allows you to import data from Box’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Box APIs. To obtain a connection string, you will need to register a Box app.

Once you have connected to Box, you can import a variety of tables from the Box API.

This section describes how to install the Box connector, how to connect to Box with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Box Connector

Sisense provides the Box connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Box connector:

1. Download the Box installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Box connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Box REST API

To access Box’s REST API from the ElastiCube Manager, you must provide valid Oauth Box credentials through a connection string. These credentials are provided by Box when you create an application.

After you receive your credentials from Box, you can create the connection string and provide Sisense with it to connect to your data.

Registering an App

You can follow the procedure below to register an app and obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log in to your Box developers dashboard and click Create a Box Application.

2. If you are making a desktop application, set the Redirect URI to http://localhost:33333 or a different port number of your choice. If you are making a Web application, set the Redirect URI to a page on your Web app you would like the user to be returned to after they have authorized your application. The OAuthClientId and OAuthClientSecret are also displayed in the same page.

3. Select the scope of user permissions your app will request.

Authenticating through Box

After setting the following properties, you are ready to connect:

- **OAuthClientId**: Set this to the Client Id in your app settings.
- **OAuthClientSecret**: Set this to the Client Secret in your app settings.
- **CallbackURL**: Set this to the Redirect URL in your app settings.
InitiateOAuth: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver completes the OAuth process.

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding Box Tables to your ElastiCube

Sisense uses connection strings to connect to Box and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

To add Box data:

1. In ElastiCube Manager, click Add Data and then, Box. The Connect to Box window is displayed.
2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. Box is displayed in the Select Database list.
4. Click OK. Sisense connects to Box and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

**Box Tables**

Box’s RESTful APIs expose the following Box tables that you can import into the ElastiCube Manager through the Sisense Box connector:

**Available Tables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborations</td>
<td>Create, update, delete, and query the available Collaborations in Box.</td>
</tr>
<tr>
<td>Comments</td>
<td>Create, update, delete, and query the available Comments in Box.</td>
</tr>
<tr>
<td>Files</td>
<td>Update, delete, and query the available Files in Box.</td>
</tr>
<tr>
<td>Folders</td>
<td>Create, update, delete, and query the available Folders in Box.</td>
</tr>
<tr>
<td>Groups</td>
<td>Create, update, delete, and query the available Groups in Box.</td>
</tr>
<tr>
<td>Memberships</td>
<td>Create, update, delete, and query the available Memberships in Box.</td>
</tr>
<tr>
<td>TaskAssignments</td>
<td>Create, update, delete, and query the available Task Assignments in Box.</td>
</tr>
<tr>
<td>Tasks</td>
<td>Create, update, delete, and query the available Tasks in Box.</td>
</tr>
<tr>
<td>TrashedItems</td>
<td>Delete and query the available TrashedItems in Box.</td>
</tr>
<tr>
<td>Users</td>
<td>Create, update, delete, and query the available Users in Box.</td>
</tr>
</tbody>
</table>
Available Views

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SharedItems</td>
<td>Query the available shared items in Box.</td>
</tr>
<tr>
<td>UserEvents</td>
<td>Query the available Events in Box.</td>
</tr>
</tbody>
</table>

Limitations

1. Aggregate functions are not supported.
2. To query the Collaborations table, specify an Id, FolderId, or a GroupId.
   
   ```
   SELECT * FROM Collaborations WHERE Id = '123'
   ```
3. To select from the Tasks table you need to specify an Id or an ItemId.
   
   ```
   SELECT * FROM Tasks WHERE Id = '123'
   ```
4. To select from the TasksAssignments table you need to specify an Id or a TaskId.
   
   ```
   SELECT * FROM TasksAssignments WHERE Id = '123'
   ```
5. To select from the Memberships table you need to specify an Id or a GroupId.
   
   ```
   SELECT * FROM Memberships WHERE Id = '123'
   ```
6. To select from SharedItems specify the Shared Link that points to the item.
   
   ```
   SELECT * FROM SharedItems WHERE SharedLink = 'www.url.com'
   ```
   
   If the SharedItem has a password also specify the password.
   
   ```
   SELECT * FROM SharedItems WHERE SharedLink = 'www.url.com' AND SharedLinkPassword = 'password'
   ```
7. To query the Comments table specify an Id or a Fileld.
   
   ```
   SELECT * FROM Comments WHERE Id = '123'
   ```
8. Due to these limitations, ElastiCubes cannot be built without custom SQL.

**Connecting to CSV**

The ElastiCube Manager enables easy and quick access to tables contained within CSV files.

You can add a single csv file or multiple csv files to your ElastiCube. A typical use case for importing multiple files is when you want to split a large csv file into multiple smaller files.

**Notes:**

- Make sure that all the files adhere to the same structure, including the presence or absence of headers in the first row. Files will be added to the table based on their file names in alphabetical order.
- When you import multiple files from a folder and build your ElastiCube, each consecutive build will import data from all the updated and new files in the folder. If you have any questions about data accumulation between builds, please contact our support team.
- If your csv file contains special symbols or foreign characters, the import process may fail. To resolve this issue, convert the csv file to the UTF-8 format. One way to do this is to open the .csv file in an application like Notepad, and then select File > Save As. At the bottom of the dialog box, open the Encoding settings, select UTF-8 and save the file as a new file.

**To connect CSV files:**

1. In the Elasticube Manager, click **Add Data**.
2. Under the **Files** category select **CSV File**.

3. Select a file to import. If you want to import multiple files, select just a single file that will be used for previewing the configuration options. However, all files are treated with the same configuration.
4. Define the following settings in the Data Properties window:
   
   ▶ **What delimiter separates your sheets**: Allows you to choose the character that separates values within the csv file.
   
   ▶ **First Row Contains Field Names**: Enables you to specify table column names based on the header in the first row of the spreadsheet.
   
   ▶ Click **Advanced Options** to reveal more options to filter rows:
     
     o **Ignore rows that start with**: Specify rows to ignore that start with a specific symbol, value or letter.
     
     o **Ignore rows that contain**: Specify rows to ignore that contain a specific symbol, value or letter.
     
     o **Text qualifier**: Change the value if necessary.
     
     o **Ignore first rows**: Specify a number of first rows to ignore.
     
     o **Ignore last rows**: Specify a number of last rows to ignore.

5. To add additional files:
   
   1. Click **Select multiple files**...
   
   2. Click **Select folder to import**. Locate and select the folder. Click **OK**.
3. All csv files in the folder will be selected for import. Click OK.

![Import Manager dialog box showing selected files](image)

6. Click Add to complete the import configuration.
Connecting to DynamoDB

The Sisense DynamoDB connector is a standalone connector that allows you to import data from the DynamoDB API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the DynamoDB API. To obtain a connection string, you will need to create a DynamoDB developers account.

Once you have connected to DynamoDB, you can import a variety of tables from the DynamoDB API.

This section describes how to install the DynamoDB connector, how to connect to DynamoDB with a connection string, and what tables you can import into the ElastiCube Manager:

Installing the DynamoDB Connector

Sisense provides the DynamoDB connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the DynamoDB connector:

1. Download the DynamoDB installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The DynamoDB connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the DynamoDB REST API

The connection to DynamoDB is made using your **AccessKey**, **SecretKey**, and optionally your **Domain** and **Region**. Your AccessKey and SecretKey can be obtained on the security credentials page for your Amazon Web Services account. Your Region will be displayed in the upper left-hand corner when you are logged into DynamoDB.

- **AccessKey**: Your AWS account access key. This value is accessible from your AWS security credentials page.
- **SecretKey**: Your AWS account secret key. This value is accessible from your AWS security credentials page.
- **Domain**: Your AWS domain name. You can optionally choose to associate your domain name with AWS.
- **Region**: The hosting region for your Amazon Web Services. Available values are NORTHERNVIRGINIA, OREGON,
NORTHERN CALIFORNIA, IRELAND, SINGAPORE, SYDNEY, TOKYO, and SAOPAULO. The default value is NORTHERN VIRGINIA.

Adding DynamoDB Tables to your ElastiCube

Sisense uses connection strings to connect to DynamoDB and import data into the ElastiCube Manager.

The connection string to connect to DynamoDB has the following structure:

```
jdbc:DynamoDB:Property1=Value1;Property2=Value2;
```

An example of a connection string:

```
jdbc:dynamodb:Access Key=AKIAJH283HDH2932DQ;Secret Key=vG07bFgSmvgsrdfgHsB6iQU/HV0qO9L9g;Domain=amazonaws.com;Region=OREGON;
```

**Note:** To switch between accounts, you need to delete the file OAuthsettings.txt file located at

```
...\Users\xxx\AppData\Roaming\CData\DynamoDB Data Provider.
```

**To add DynamoDB data:**
1. In ElastiCube Manager, click **Add Data** and then, **DynamoDB**. The Connect to DynamoDB window is displayed.

![Connect to Dynamo DB](image)

2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. DynamoDB is displayed in the Select Database list.
4. Click **OK**. Sisense connects to DynamoDB and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**.
   The tables are displayed in the ElastiCube Manager.

**Switching between Accounts**

When you connect to the DynamoDB data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at `\Users\xxx\AppData\Roaming\CData\DynamoDB Data Provider` on your Sisense server. To connect to the DynamoDB data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.
Another option to support multiple users is to define the location and file name of an OAuth settings file for each unique user in your connection string through the `OAuthSettingsLocation` parameter.

When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the DynamoDB data source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```
jdbc:DynamoDB:OAuthSettingsLocation=C:\DynamoDB\auth\john.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

```
jdbc:DynamoDB:OAuthSettingsLocation=C:\DynamoDB\auth\sally.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

In the example above, two OAuth files are created, one for John and one for Sally in the location `C:\DynamoDB\auth\`.

This is useful if you support many users who each need to access the DynamoDB data source.

**DynamoDB Tables**

The Sisense DynamoDB connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table0</td>
<td>Test table.</td>
</tr>
<tr>
<td>Table1</td>
<td>Test table.</td>
</tr>
<tr>
<td>Movies</td>
<td>Sample data file that contains information about a few thousand movies from the Internet Movie Database (IMDb).</td>
</tr>
</tbody>
</table>
Accumulative Builds

Sisense support accumulative builds for all numeric and dates data types. However, the data must be sorted before building the ElastiCube.
Connecting to Exact

The Sisense Exact connector is a standalone connector that allows you to import data from Exact’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Exact APIs. To obtain a connection string, you will need to create a Exact app.

Once you have connected to Exact, you can import a variety of tables from the Exact API.

This section describes how to install the Exact connector, how to connect to Exact with a connection string, and what tables you can import into the ElastiCube Manager:

Installing the Exact Connector

Sisense provides the Exact connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Exact connector:

1. Download the Exact installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Exact connector is displayed in the ElastiCube Manager under Add Data > Web Services.

Connecting to the Exact REST API

To access Exact’s REST API from the ElastiCube Manager, you must provide valid Oauth Exact credentials through a connection string.
These credentials are provided by Exact when you register an application.

After you receive your credentials from Exact, you can create the connection string and provide Sisense with it to connect to your data.

**Registering an App**

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Create an Exact Online developer account.
2. Log into the App Center and click Manage Apps > Add a New Application.
3. Enter the app name to be displayed to users when they are prompted to grant permissions to your app.
4. Enter the Redirect URI. If you are making a desktop application, set the Redirect URI to http://localhost:portnumber. If you are making a Web application, set the Redirect URI to a page you would like the user to be returned to after they have granted your application permissions.
5. Click Edit for your app. The client credentials, the client Id and client secret, are displayed.

**Authenticating through Exact**

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: If you want to use an app you registered with Exact Online, set this value to the client Id you defined in your app settings. To use the embedded credentials of the driver, leave this value blank.
OAuthClientSecret: If you want to use an app you registered with Exact Online, set this value to the client secret you defined in your app settings. To use the embedded credentials of the driver, leave this value blank.

OAuthCallbackURL: If you want to use an app you registered with Exact Online, set this value to the Redirect URI in your app settings. To use the embedded credentials of the driver, leave this value blank.

Region: Set this to the region of the Exact Online service you want to connect to.

InitiateOAuth: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the access token in the connection string.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding Exact Tables to your ElastiCube

Sisense uses connection strings to connect to Exact and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.
To add Exact data:

1. In ElastiCube Manager, click Add Data and then, Exact. The Connect to Exact window is displayed.
2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. Exact is displayed in the Select Database list.
4. Click OK. Sisense connects to Exact and displays a list of tables available for you to import.
5. Select the relevant tables and click Add. The tables are displayed in the ElastiCube Manager.

Exact Tables

Exact’s RESTful APIs expose the following Exact tables that you can import into the ElastiCube Manager through the Sisense Exact connector:

Available Tables

- AcceptQuotation
- AccountInvolvedAccounts
- AccountOwners
- Accounts
- Addresses
- BankAccounts
- BankEntries
- BankEntryLines
- CashEntries
- CashEntryLines
- CommunicationNotes
Complaints
Contacts
Costcenters
CostTransactions
Costunits
DepreciationMethods
DirectDebitMandates
DocumentAttachments
DocumentFolders
DocumentTypeFolders
Events
ExchangeRates
GeneralJournalEntries
GeneralJournalEntryLines
GLAccounts
GoodsDeliveries
GoodsDeliveryLines
InvoiceSalesOrders
InvoiceTerms
InvolvedUserRoles
InvolvedUsers
Items
ItemWarehouses
Journals
Mailboxes
MailMessageAttachments
MailMessages
OperationResources
- ShopOrderMaterialPlans
- ShopOrderRoutingStepPlans
- ShopOrders
- SolutionLinks
- StockCountLines
- StockCounts
- SubscriptionLines
- SubscriptionRestrictionEmployees
- SubscriptionRestrictionItems
- Subscriptions
- Tasks
- TimeCorrections
- TimeTransactions
- VATCodes
- Warehouses
- Workcenters

Available Views

- AccountantInfo
- AccountClasses
- AccountClassificationNames
- AccountClassifications
- ActiveEmployments
- AddressStates
- AgingOverview
- AgingPayablesList
- AgingReceivablesList
- Assets
- AvailableFeatures
- Banks
- BatchNumbers
- Budgets
- Currencies
- DefaultMailbox
- Departments
- Divisions
- DocumentCategories
- Documents
- DocumentsAttachments
- DocumentTypeCategories
- DocumentTypes
- Employees
- EmploymentContractFlexPhases
- EmploymentContracts
- EmploymentEndReasons
- EmploymentOrganizations
- Employments
- EmploymentSalariesFinancialPeriods
- GLClassifications
- GLSchemes
- GLTransactionTypes
- HourCostTypes
- ItemGroups
- ItemVersions
- JobGroups
- JobTitles
- JournalStatusList
- Layouts
- OpportunityContacts
- OutstandingInvoicesOverview
- PayablesList
- PreferredMailbox
- PriceLists
- ProfitLossOverview
- ProjectBudgetTypes
- PurchaseOrderLines
- PurchaseOrders
- ReasonCodes
- ReceivablesList
- RecentCosts
- RecentHours
- ReportingBalance
- Returns
- RevenueList
- SalesPriceListDetails
- Schedules
- SerialNumbers
- ShippingMethods
- StockBatchNumbers
- StockSerialNumbers
- StorageLocations
- SubscriptionLineTypes
- SubscriptionReasonCodes
- SubscriptionTypes
- TaxComponentRates
- TaxEmploymentEndFlexCodes
- TaxScheduleComponents
- TaxSchedules
- TimeAndBillingAccountDetails
- TimeAndBillingActivitiesAndExpenses
- TimeAndBillingEntryAccounts
- TimeAndBillingEntryProjects
- TimeAndBillingEntryRecentAccounts
- TimeAndBillingEntryRecentActivitiesAndExpenses
- TimeAndBillingEntryRecentHourCostTypes
- TimeAndBillingEntryRecentProjects
- TimeAndBillingItemDetails
- TimeAndBillingProjectDetails
- TransactionLines
- Transactions
- Units
- UserRoles
- UserRolesPerDivision
- Users
- VatPercentages
Connecting to Microsoft Excel

The ElastiCube Manager enables easy and quick access to tables contained within Excel spreadsheets.

You can add multiple Excel files to your ElastiCube. A typical use case for importing multiple files is when you want to split a large file into multiple smaller files.

**Note:** See Preparing Your Excel for see tips on how to prepare your Excel files before adding them to your schema in the ElastiCube.

The steps below detail how to connect to this type of data source.

1. Click **Add Data** in the top menu of the ElastiCube Manager.
2. Under the Files category select **Microsoft Excel File**.
3. In the window that opens, locate the Excel file.
4. Select the Excel file and click **OK**.
5. In the window that opens, you have the following options:
Fetch cells from: You can fetch cells from either a sheet or a named range (provided you have named ranges in your file).

Available Sheets: Select a sheet contained in the spreadsheet.

Range: Select a Static Range or Take range from whole sheet.

For a Static Range, enter two cells, each with a leading $ sign and a colon as a delimiter. Hit Enter to preview the selection. Selecting Static Range option enables you to select a specific range of data in the sheet. Data needs to be in a table structure, starting at the top left cell of the range, with field names as the first row.

For a static range between cells A1 and E10, type in $A1:$E10.

Selecting whole sheet will import all data within the sheet. Data within the sheet needs to be in a table structure starting at the top left corner (cell A1) with the field names as the first row.
> **Preview:** Shows a preview of data contained in the sheet.

> **First Row Contains Field Names:** Enables you to specify table column names based on the header in the first row of the spreadsheet.

> Click **Select multiple files**…to import multiple files.

---

**Note:** Make sure that all the files adhere to the same structure, including the presence or absence of headers in the first row. Files will be added to the table based on their file names in alphabetical order.

Select the **Select folder to import** option. All the Excel files in
the folder are added to the selected files list.

Click OK.

6. Click Add.
Connecting to Facebook

The Sisense Facebook connector is a standalone connector that allows you to import data from various Facebook APIs into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect to Facebook through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to Facebook’s APIs. To obtain a connection string, you will need to create a Facebook developers account.

Once you have connected to Facebook, you can import a variety of tables from multiple Facebook APIs.

This section describes how to install the Facebook connector, how to connect to Facebook with a connection string, and what tables you can import into the ElastiCube Manager:

Installing the Facebook Connector

Sisense provides the Facebook connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Facebook connector:

1. Download the Facebook installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Facebook connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Facebook REST API

To access Facebook’s REST API from Sisense, you must provide Sisense with valid Oauth Facebook credentials in a connection string. These credentials are provided by Facebook when you create an application.

Creating an App

To obtain the OAuth client credentials, follow the steps below:

1. Log into Facebook and navigate to https://developers.facebook.com/apps.
2. Click + Add a New App.
3. Define your app’s name and click Create App ID. The Product Setup page is displayed.
4. Click **Add Product**.

5. For the Marketing API, click **Get Started**.

6. Open the Settings page.
7. In the Settings page, the OAuth client credentials, **App Id** and **App Secret**, are displayed.

![Image of OAuth client credentials]

8. In the **App Domains** field, enter localhost.

9. In the Settings page, click **+ Add Platform** and select **Website**.
   
   The Website area is added to the Settings page.

10. In the **Site URL** field, enter http://localhost. This value represents the callback URL in your connection string where the user will return with the token that verifies that they have granted your app access.

![Image of Site URL]

11. In the bottom-right corner of the Settings page, click **Save Changes**. Facebook requests that you authenticate your account.

12. Enter your password to authenticate your account and click **OK**. Your app is saved.

13. After you have authenticated your account, you must set permissions for the app to retrieve your data. Open
the Facebook Explorer to set your permissions.


15. Select the relevant permissions you need and click Get Access Token. Your permissions are now set and you can request the relevant data from Facebook.

Note: For apps to manage ads, you must be granted the app ads_management or ads_read extended permission. Use ads_read if you only need Ad Insights API access, to pull
reporting information. Use ads_management when you need to read, create and update ads. For more information about permissions, click here.

Accessing the Facebook API

Facebook has three levels of access to its Marketing API, which determine how you can use and access data from your Facebook app:

- **Development**: Try and test apps with the API.
- **Basic**: Test, iterate, build apps with up to 25 external accounts.
- **Standard**: Support unlimited accounts and be nominated to Facebook Marketing Partner program.

When you create a Facebook, you are assigned a Development level of access by default. Each access level has its own account and rate limitations. You can modify your level of access by submitting a request to Facebook. For more information about these limitations and upgrading your access, click here.

Authenticating through Facebook

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the App ID in your app settings.
- **OAuthClientSecret**: Set this to the App Secret in your app settings.
- **CallbackURL**: Set this to the Return URL in your app settings.
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.
**Note:** When switching accounts, you must sign out of your account and then sign it with the new account.

When you connect the Sisense connector completes the OAuth process:

1. Extracts the access token from the CallbackURL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

**Adding Facebook Tables to Your ElastiCube**

Sisense uses connection strings to connect to Facebook and import data into the ElastiCube Manager. Each connection string contains authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

**To add Facebook data:**
1. In ElastiCube Manager, click **Add Data** and then, **Facebook**. The Connect to Facebook window is displayed.

![Connect to Facebook window](image)

2. In **Datasource Connection String**, enter your connection string.

3. Click **Connect to Server**. Facebook is displayed in the Select Database list.

4. Click **OK**. Sisense connects to Facebook and displays a list of tables available for you to import. For a list of tables you can import, see **Facebook Tables**.

5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

**Facebook Tables**

The table below describes the tables you can import from various Facebook APIs. Facebook limits the number of calls and the amount of data that you can retrieve from their APIs. These limitations depend on which Facebook API you are using and your account type. When you reach a limit, Sisense returns the error provided by Facebook. For example, if you receive any of the following error codes, this usually indicates that you have reached one of Facebook’s limitations:
- error code = 4, CodedException
- error code = 32, CodedException
- error code = 17, User request limit reached

If you encounter one of these errors, refer to the Facebook API that exposed the table for more details regarding that API’s limitations.

**Note:** Some Facebook tables require custom SQL, the table below provides examples of custom SQL statements you can use to access the relevant table.

### Available Tables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| Comments | Query the Comments for a Target. Comments may also be inserted based on a Target or deleted based on Id. When querying comments, either the Target or the Id of the comment must be specified. For example, to retrieve all the comments about a specific post, your SELECT statement could look something like this:  

```
SELECT * FROM Comments WHERE Target = '15526475270_410830705612736'
```

Alternatively, you can specify the Id to retrieve a specific comment. For example:  

```
SELECT * FROM Comments WHERE Id = '15526475270_410830705612736_5193593'
```

The following is an example in which dynamic targets have been implemented:  

```
SELECT * FROM Comments where target in (SELECT ID FROM Posts where target in (select ID from Pages ))
```
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likes</td>
<td>Query the Likes for a Target. Alternatively, lists Pages that the specified User or Page Likes. Authentication is required to use this table.</td>
</tr>
<tr>
<td></td>
<td>The following is an example in which dynamic targets have been implemented:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM Likes where target in (SELECT ID FROM Posts where target in (select ID from Pages ))</td>
</tr>
<tr>
<td>Milestones</td>
<td>Query a list of Milestones for the given Page. Milestones may only be inserted, updated, or deleted when authenticating as the target Page. Unless you are using the option Authenticate As Page, you need to supply a Target when retrieving milestones. For instance:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM Milestones WHERE Target='facebook'</td>
</tr>
<tr>
<td>Posts</td>
<td>Query the Posts for a Target based on either the Target or Id. Posts can also be inserted based on a Target, or deleted based on Id. This table requires authentication.</td>
</tr>
<tr>
<td></td>
<td>The following is an example in which dynamic targets have been implemented:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM Posts where target in (SELECT ID FROM Pages)</td>
</tr>
<tr>
<td>Users</td>
<td>Query Users by SearchTerms or Id.</td>
</tr>
</tbody>
</table>
# Available Views

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdAccounts</td>
<td>Query the Ad Accounts available for a User. Accessing Ad Account information requires the ads_read permission.</td>
</tr>
<tr>
<td>AdCreatives</td>
<td>Query information about an Ad Creative or the Ad Creatives on a specific Ad Account, Ad Set, or Ad. Accessing Ad Creative information requires the ads_read permission.</td>
</tr>
</tbody>
</table>

The following is an example in which dynamic targets have been implemented:

```
SELECT * FROM AdCreatives where target in (select ID from AdAccounts);
```

<table>
<thead>
<tr>
<th>AdInsights</th>
<th>Query an Ad Report. Accessing Ad Report information requires the ads_read permission. When requesting AdInsights, a Target must be specified. This indicates what element to retrieve the insights from. It can be an AdAccount, Campaign, AdSet, or an Ad. For example:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>view source SELECT * FROM AdInsights WHERE Target = 'act_123456'</td>
</tr>
<tr>
<td></td>
<td>A date range can be specified using DateStart and DateEnd, or DatePreset must also be specified. For example:</td>
</tr>
<tr>
<td></td>
<td>view source SELECT DateStart, DateEnd, AdAccountid, Spend, Impressions FROM AdInsights WHERE Target =</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>'act_123456' AND DateStart &gt;= '01/01/2015' AND DateEnd &lt;= '03/31/2015'</td>
<td>view source SELECT DateStart, DateEnd, AdAccountId, Spend, Impressions FROM AdInsights WHERE Target = 'act_123456' AND DatePreset='last_90_days'</td>
</tr>
</tbody>
</table>

The available values for DatePreset are:

- today
- yesterday
- this_week
- last_week
- last_7_days
- last_14_days
- last_28_days
- last_30_days
- last_90_days
- this_month
- last_month
- this_quarter
- last_3_months

The TimIncrement can be used to specify how many days should be included in each report row. For instance:

view source SELECT DateStart, DateEnd, AdAccountId, Age, Spend, Impressions FROM AdInsights WHERE Target = 'act_123456' AND DatePreset='last_90_days' AND TimIncrement='7' view source SELECT DateStart, DateEnd, AdAccountId, Age, Spend, Impressions FROM AdInsights WHERE Target = 'act_123456' AND DatePreset='last_90_days' AND TimIncrement='monthly'

The Level column can be used to specify what level insights are retrieved at. This can set to
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ad,adset,campaign, or account. For example: view source SELECT DateStart, DateEnd, AdAccountId, Age, Spend, Impressions FROM AdInsights WHERE Target = 'act_123456' AND Level='campaign'</td>
<td>The following is an example in which dynamic targets have been implemented: SELECT Target, DateStart, DateEnd, AdAccountId, AdAccountName, CampaignId, CampaignName, AdSetId, AdSetName, AdId, AdName, Placement, Clicks, CPC, CPM, CPP, CTR, Frequency, Impressions, Reach, Spend, TotalActions, TotalUniqueActions, UniqueClicks, UniqueCTR, WebsiteClicks FROM AdInsights where target in (SELECT ID FROM AdAccounts ) and level='ad' and DatePreset='last_7_days' and TimeIncrement=1</td>
</tr>
<tr>
<td>AdInsightsActions</td>
<td>Query an Ad Report. Accessing Ad Report information requires the ads_read permission.</td>
</tr>
<tr>
<td></td>
<td>AdInsightsActions represents a breakdown of the Actions column from the AdInsights. See AdInsights for general information on querying AdInsights.</td>
</tr>
<tr>
<td></td>
<td>When requesting AdInsightsActions, a Target must be specified. This indicates what element to retrieve the insights from. It can be an AdAccount, Campaign, AdSet, or an Ad. For instance:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM AdInsights WHERE Target = 'act_123456'</td>
</tr>
<tr>
<td></td>
<td>In comparison to all of the available selection criteria from AdInsights, only the breakdowns listed below are available. Other than that, ActionAttributionWindows is available to input a comma separated list of attribution windows. For instance:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM AdInsightsActions WHERE Target='act_123456' AND level='ad' AND</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ActionAttributionWindows='1d_view,7d_view,28d_click'</td>
<td></td>
</tr>
</tbody>
</table>

**Columns**

**Age:** The age range for the metrics in this row. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**Country:** The country for the metrics in this row. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**FrequencyValue:** The number of times an ad in your Reach and Frequency campaign was served to each person. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**Gender:** The gender for the metrics in this row. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**HStatsByAdvertiserTZ:** Time period over which the stats were taken for the advertiser. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**HStatsByAudienceTZ:** Time period over which the stats were taken for the audience. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**ImpressionDevice:** The devices used to view the Ad. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**Placement:** The placement of the Ad on the screen. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.

**PlatformPosition:** The position on the platform.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Id</strong>: The product Id advertised in the Ad. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.</td>
<td></td>
</tr>
<tr>
<td><strong>Publisher Platform</strong>: The platforms the ads were published on.</td>
<td></td>
</tr>
<tr>
<td><strong>Region</strong>: The region someone viewed the Ad from. This is a breakdown column and selecting this column will cause results to be further broken down by this metric.</td>
<td></td>
</tr>
</tbody>
</table>

The following is an example in which dynamic targets have been implemented:

```sql
select Target, DatePreset, DateStart, DateEnd, Timelncrement, Level, ActionAttributionWindows, AdAccountId, AdAccountName, CampaignId, CampaignName, AdSetId, AdSetName, AdId, AdName, ActionType, ActionValue, Action1dClick, Action1dView, Action7dClick, Action7dView, Action28dClick, Action28dView, ActionCarouselCardId, ActionCarouselCardName, ActionDestination, ActionDevice, ActionReaction, ActionTargetId, ActionVideoSound, ActionVideoType FROM AdInsightsActions where target in (SELECT ID FROM AdAccounts ) and level='ad' and DatePreset='today' and Timelncrement=1 and ActionAttributionWindows='1d_view,1d_click,7d_view,7d_click,28d_view,28d_click'
```

<p>| Ads                        | Query information about an Ad or the Ads in a specific Ad Set, Campaign, or Ad Account. Accessing Ad Information requires the ads_read permission. The following is an example in which dynamic targets have been implemented |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdScheduledReports</td>
<td>Query the Scheduled Reports for a given Ad Account. Accessing Scheduled Report information requires the ads_read permission.</td>
</tr>
<tr>
<td>AdSets</td>
<td>Query information about an Ad Set or the Ad Sets on a specific Campaign or Ad Account. Accessing Ad Set information requires the ads_read permission.</td>
</tr>
<tr>
<td>Albums</td>
<td>Query Albums associated with a Target. Accessing Album information typically requires the user_photos permission.</td>
</tr>
<tr>
<td>Applications</td>
<td>Query the Application specified by the Id.</td>
</tr>
<tr>
<td>Books</td>
<td>Query the Books a User is interested in. Accessing Book information typically requires the user_books permissions.</td>
</tr>
<tr>
<td>Campaigns</td>
<td>Query information about a Campaign or the Campaigns on a specific Ad Account. Accessing Campaign information requires the ads_read permission.</td>
</tr>
</tbody>
</table>

For example:

```sql
SELECT * FROM Campaigns WHERE Target = 'act_123456'
```

The following is an example in which dynamic targets have been implemented:

```sql
select * from Ads where target in (SELECT ID FROM AdAccounts ) and AdStatus='ACTIVE'
```
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>SELECT * FROM Campaigns where Target in (SELECT ID FROM AdAccounts ) and Status='ACTIVE'</td>
<td></td>
</tr>
<tr>
<td>Events</td>
<td>Query the Events for a Target based on either the Target or SearchTerms. May require the user_events permission.</td>
</tr>
<tr>
<td>Friends</td>
<td>Query Friends of the authenticated User or Target User. Requires the user_friends permission. A Target may be specified to request Friend information for, but Friends may only be retrieved for the authenticated User or Friends of the authenticated User that use the same Facebook app.</td>
</tr>
<tr>
<td>Games</td>
<td>Query the Games a User is interested in. Accessing Game information may require the user_likes and user_interests permissions.</td>
</tr>
<tr>
<td>Groups</td>
<td>Query the Groups based on the supplied SearchTerms, Id, or Target. Groups may require the user_groups permission.</td>
</tr>
<tr>
<td>GroupMembership</td>
<td>Query the Groups based on the supplied GroupId. Groups may require the user_groups permission. GroupMemberships in Facebook are the individual members of a given group. GroupMemberships are currently only exposed as a view.</td>
</tr>
<tr>
<td></td>
<td>When selecting group memberships, a GroupID must be specified. For example, to retrieve the members of a group:</td>
</tr>
<tr>
<td></td>
<td>SELECT * FROM GroupMemberships WHERE GroupId = 'GroupId'</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>InsightsByConsumptionType</td>
<td>Allows retrieval of insights by consumption type.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>InsightsByFeedbackType</td>
<td>Allows retrieval of insights by feedback type.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SELECT * FROM GroupMemberships WHERE GroupId in (select ID from Groups)
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST_NEGATIVE_FEEDBACK_BY_TYPE</td>
<td></td>
</tr>
<tr>
<td>POST_NEGATIVE_FEEDBACK_BY_TYPE_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>InsightsByLikeSourceType</td>
<td>Allows retrieval of insights by like source type.</td>
</tr>
<tr>
<td></td>
<td>The following are values for the parameters InsightName:</td>
</tr>
<tr>
<td></td>
<td>PAGE_FANS_BY_LIKE_SOURCE</td>
</tr>
<tr>
<td></td>
<td>PAGE_FANS_BY_LIKE_SOURCE_UNIQUE</td>
</tr>
<tr>
<td></td>
<td>PAGE_FANS_BY_UNLIKE_SOURCE_UNIQUE</td>
</tr>
<tr>
<td>InsightsByPaidStatus</td>
<td>Allows retrieval of insights by paid status.</td>
</tr>
<tr>
<td></td>
<td>The following are values for the parameters InsightName:</td>
</tr>
<tr>
<td></td>
<td>PAGE_IMPRESSIONS_BY_PAID_NON_PAID</td>
</tr>
<tr>
<td></td>
<td>PAGE_IMPRESSIONS_BY_PAID_NON_PAID_UNIQUE</td>
</tr>
<tr>
<td></td>
<td>POST_IMPRESSIONS_BY_PAID_NON_PAID</td>
</tr>
<tr>
<td></td>
<td>POST_IMPRESSIONS_BY_PAID_NON_PAID_UNIQUE</td>
</tr>
<tr>
<td></td>
<td>PAGE_POSTS_IMPRESSIONS_BY_PAID_NON_PAID</td>
</tr>
<tr>
<td></td>
<td>PAGE_POSTS_IMPRESSIONS_BY_PAID_NON_PAID_UNIQUE</td>
</tr>
<tr>
<td></td>
<td>The following is an example in which dynamic targets have been implemented:</td>
</tr>
<tr>
<td></td>
<td>SELECT EndTime as Date, Paid, Unpaid FROM InsightsByPaidStatus where target in (SELECT ID FROM Pages) and InsightName = 'PAGE_IMPRESSIONS_BY_PAID_NON_PAID' and Period = 'day'</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>InsightsByTabType</td>
<td>Allows retrieval of insights by tab type</td>
</tr>
<tr>
<td></td>
<td>The following are values for the parameters InsightName:</td>
</tr>
<tr>
<td></td>
<td>PAGE_TAB_VIEWS_LOGIN_TOP_UNIQUE</td>
</tr>
<tr>
<td></td>
<td>PAGE_TAB_VIEWS_LOGIN_TOP</td>
</tr>
<tr>
<td></td>
<td>PAGE_TAB_VIEWS_LOGOUT_TOP</td>
</tr>
<tr>
<td>LeadValues</td>
<td>Query information about a lead. Accessing Lead Information requires the ads_read permission.</td>
</tr>
<tr>
<td>Music</td>
<td>Query the Music a User is interested in. Accessing Music requires the user_likes and user_interests permissions.</td>
</tr>
<tr>
<td>Pages</td>
<td>Query the Pages based on the supplied SearchTerms or Id.</td>
</tr>
<tr>
<td>Permissions</td>
<td>Query the Permissions the User has granted the current application.</td>
</tr>
<tr>
<td>Photos</td>
<td>Query Photos associated with a Target. Accessing Photo information typically requires the user_photos permission.</td>
</tr>
<tr>
<td>Places</td>
<td>Query the Places based on the supplied SearchTerms or Id. Places are stored as Pages in Facebook.</td>
</tr>
<tr>
<td>ScheduledReportRuns</td>
<td>Query a list of the recently completed runs of a given Scheduled Report. Accessing Scheduled Report information requires the ads_read permission.</td>
</tr>
<tr>
<td>SimpleInsights</td>
<td>Allows the retrieval of simple insights with a single value in the response.</td>
</tr>
<tr>
<td></td>
<td>The following are values for the parameters InsightName:</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PAGE_STORIES</td>
<td></td>
</tr>
<tr>
<td>POST_STORIES</td>
<td></td>
</tr>
<tr>
<td>POST_STORYTELLERS</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_PAID</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_PAID_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_ORGANIC_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_VIRAL</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_VIRAL_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_FREQUENCY_DISTRIBUTION</td>
<td></td>
</tr>
<tr>
<td>PAGE_IMPRESSIONS_VIRAL_FREQUENCY_DISTRIBUTION</td>
<td></td>
</tr>
<tr>
<td>PAGE_ENGAGED_USERS</td>
<td></td>
</tr>
<tr>
<td>PAGE_CONSUMPTIONS</td>
<td></td>
</tr>
<tr>
<td>PAGE_CONSUMPTIONS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_PLACES_CHECKIN_TOTAL</td>
<td></td>
</tr>
<tr>
<td>PAGE_PLACES_CHECKIN_TOTAL_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_PLACES_CHECKIN_MOBILE</td>
<td></td>
</tr>
<tr>
<td>PAGE_PLACES_CHECKIN_MOBILE_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_NEGATIVE_FEEDBACK</td>
<td></td>
</tr>
<tr>
<td>PAGE_NEGATIVE_FEEDBACK_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_FANS_ONLINE</td>
<td></td>
</tr>
<tr>
<td>PAGE_FANS_ONLINE_PER_DAY</td>
<td></td>
</tr>
<tr>
<td>PAGE_FANS</td>
<td></td>
</tr>
<tr>
<td>PAGE_FAN_ADDS</td>
<td></td>
</tr>
<tr>
<td>PAGE_FAN_ADDS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_FAN_REMOVES</td>
<td></td>
</tr>
<tr>
<td>PAGE_FAN_REMOVES_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIEWS</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIEWS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>PAGE_VIEWS_LOGIN</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIEWS_LOGIN_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIEWS_LOGOUT</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS_PAID</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS_AUTOPLAYED</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS_CLICK_TO_PLAY</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_VIEWS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_REPEAT_VIEWS</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S_PAID</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S.AUTOPLAYED</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S_CLICK_TO_PLAY</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_VIDEO_COMPLETE_VIEWS_30S_REPEAT_VIEWS</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_PAID</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_PAID_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_ORGANIC_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_VIRAL</td>
<td></td>
</tr>
<tr>
<td>PAGE_POSTS_IMPRESSIONS_VIRAL_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_PAID</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_PAID_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_FAN</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_FAN_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_FAN_PAID</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
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<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>POST_IMPRESSIONS_FAN_PAID_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_ORGANIC_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_VIRAL</td>
<td></td>
</tr>
<tr>
<td>POST_IMPRESSIONS_VIRAL_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_CONSUMPTIONS</td>
<td></td>
</tr>
<tr>
<td>POST_CONSUMPTIONS_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_ENGAGED_USERS</td>
<td></td>
</tr>
<tr>
<td>POST_NEGATIVE_FEEDBACK</td>
<td></td>
</tr>
<tr>
<td>POST_NEGATIVE_FEEDBACK_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_AVG_TIME_WATCHED</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_COMPLETE_VIEWS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_COMPLETE_VIEWS_ORGANIC_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_COMPLETE_VIEWS_PAID</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_COMPLETE_VIEWS_PAID_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_VIEWS_ORGANIC</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_VIEWS_ORGANIC_UNIQUE</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_VIEWS_PAID</td>
<td></td>
</tr>
<tr>
<td>POST_VIDEO_VIEWS_PAID_UNIQUE</td>
<td></td>
</tr>
</tbody>
</table>

**TaggedBy**

Query information about Posts, Statuses, Photos, and other entities that have tagged the User or Page. This view is a derivative of the Wall connection where only entries that have tagged the Target User or Page will be returned. In general it is only available for Pages.

**Television**

Query the TV shows a User is interested in. Accessing Television information may require the user_likes and user_interested permissions.

**Videos**

Query Videos from a Target. Normally requires the user_videos permission.
Name | Description
--- | ---
Wall | Query Posts from the Wall of a Target.

**Note:** For the following tables: InsightsByConsumptionType, InsightsByFeedbackType, InsightsByLikeSourceType, InsightsByPaidStatus, InsightsByTabType, SimpleInsights, the Object Insights period {day, week, month, lifetime} lifetime is not supported for all measures. For more information, see Facebook’s API documentation.

**Dynamic Targets**

Some Facebook tables allow you to define a target, such as an account, to retrieve specific data. This is used for some tables, such as AdInsights, where a target can be specified.

While you can define the value of the target parameter in your connection string, if you support multiple accounts, you can use a dynamic target to retrieve data from each of those accounts.

The following is an example of the a dynamic target as the value of Target:

```sql
SELECT Target, DateStart, DateEnd, AdAccountId, AdAccountName, CampaignId, CampaignName, AdSetId, AdSetName, AdId, AdName, Placement, Clicks, CPC, CPM, CPP, CTR, Frequency, Impressions, Reach, Spend, TotalActions, TotalUniqueActions, UniqueClicks, UniqueCTR, WebsiteClicks FROM AdInsights where target in (SELECT ID FROM AdAccounts) and level='ad' and DatePreset='last_7_days' and TimeIncrement=1
```
Accumulative Builds

Sisense support accumulative builds for all numeric and dates data types. However, the data must be sorted before building the ElastiCube.
Connecting via ODBC Drivers

Open Database Connectivity

The ODBC provider allows access to a data source via an installed driver on the operating system regardless of the architecture of the data source.

In Sisense, it serves as a connector to data providers, such as MS Sql, MySql, Oracle, Hive and so forth.

DSN vs. Connection-String (DSN-Less)

A connection to the provider is configured by a connection-string. Microsoft windows allows you to store the connection string properties in its registry for further use. It supplies an ODBC configuration wizard and requests an identifying Data Source Name (DSN).

When you add an ODBC table in the ElastiCube Manager, the connection configuration dialog will provide you with two options:

- DSN: Choosing a data source name.
- Connection String (DSN-Less): Typing the actual connection string

Adding a Table to the ElastiCube Manager:

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Database servers category, select Generic ODBC Driver.
3. From the ODBC Connectivity Properties dialog choose DSN or Connection String (DSN-Less).
**DSN:** Choose one of the existing DSNs from the drop-down list (each item is represented by its name), or click **Add DSN** to open the **Create New Data Source** window. In this window, you’ll be asked to select one of the installed ODBC drivers, select a name for the DSN, and configure your connection using the wizard steps. At the end, the newly added DSN will be added to the drop-down list as the selected item.

**Connection String:** Type the connection string in the input box. For known connection strings, click the Help link to navigate to **Connection Strings** (External site from Sisense). Click **Test Connection** to test the connection. Click **OK** to move to the final dialog. From the tables selection dialog, select tables that you want to add and click **Add** to complete the wizard.

**Note:** You may need to update the executed table query.
Setting the table query (Troubleshoot)

ODBC and OLE DB are generic drivers; therefore the SQL syntax being executed against the actual data source may vary from one provider to another.

Sisense sets by default the standard SQL for the ODBC/OLE DB tables which covers most of today’s known data providers. For cases where non-standard SQL must be supplied, the table addition dialog provides a quick preview of the current SQL query and an edit button that opens the Query Properties dialog.

In Query Properties, you can set the following options:

- **Auto Query Structure**: Choosing the proper SQL syntax delimiter.

- **Manual Query Input**: Type the desired query.

**Note**

The automatic options can be applied on the current table or on all tables, while the manual option defines a single table and can only be applied on the current table. **Apply All** and **Apply Table** will be enabled according to the selection made.
Connecting via OLE DB Drivers

Object Linking and Embedding Database

The OLE DB provides access to a data source via an installed driver on the operating system regardless of the architecture of the data source.

In Sisense, it serves as a connector to data providers that are not included in the common providers list, such as MS Sql, MySql, Oracle and so forth.

Adding a table to the ElastiCube manager:

1. Click Add Data on the top menu of the ElastiCube Manager.
2. Under the Database servers category select Generic OleDB Driver.
3. In the **Data Link Properties** dialog, select a connection by choosing the relevant OLE DB driver and the connection properties.

![Data Link Properties dialog](image)

**Note**

*When the data source server requires a login credentials, you must select the Allow saving password checkbox.*

*Follow all wizard steps and click **OK** to move to the final dialog.*

4. From the tables selection dialog, select tables that you want to add and click **Add** to complete the wizard.
**Note:** You may need to update the executed table query described below.

**Setting the Table Query (Troubleshoot)**

ODBC and OLE DB are generic drivers; therefore the SQL syntax being executed against the actual data source may vary from one provider to the other.

Sisense sets by default the standard SQL for the ODBC/OLE DB tables which covers most of the known data providers. For cases where non-standard SQL must be supplied, the table addition dialog provides a quick preview of the current SQL query and an edit button which opens the *Query Properties* dialog.

In the *Query Properties* dialog, two options are available:
**Auto Query Structure:** Choose the proper SQL syntax delimiter

**Manual Query Input:** Type the desired query.

**Note:** The automatic options can be applied on the current table or on all tables, while the manual option defines a single table and can only be applied on the current table. The **Apply All** and **Apply Table** buttons will be enabled according to the selection made.

**Misc Troubleshooting:**

- When an ODBC table is added by a DSN connection, the DSN must exist on the target ElastiCube Server machine, or else the server will fail to connect and import data from that table. In general, setting a connection by a DSN (not by connection string) is not recommended practice.
- Regarding ODBC only, ensure that the addressed ODBC driver platform (32 or 64 bit) matches the current installation of Sisense (Manager and Server). Platform mismatches will lead to connectivity errors.
- When setting an OLE DB connection, and the data source server requires login credentials, the Allow saving password checkbox must be selected.
Connecting to Gmail

The Sisense Gmail connector is a standalone connector that allows you to import data from Gmail’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Gmail APIs. To obtain a connection string, you will need to register a Gmail app.

Once you have connected to Gmail, you can import a variety of tables from the Gmail API.

This section describes how to install the Gmail connector, how to connect to Gmail with a connection string, and what tables you can import into the ElastiCube Manager:

Installing the Gmail Connector

Sisense provides the Gmail connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Gmail connector:

1. **Download** the Gmail installation file.
2. Open the installation file and click **Install**.
3. After the installation process is complete, click **Close**.
   The Gmail connector is displayed in the ElastiCube Manager under **Add Data > Web Services**.

Connecting to the Gmail REST API

To access Gmail’s REST API from the ElastiCube Manager, you must provide valid Oauth Gmail credentials through a connection string.
These credentials are provided by Gmail when you register an application.

After you receive your credentials from Gmail, you can create the connection string and provide Sisense with it to connect to your data.

**Registering an App**

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log into the Google API Console.
2. Click **Create Project** or select an existing project.
3. In the API Manager, click **Credentials > Create Credentials > OAuth Client Id**.
4. Select the application type. If you are making a Web application, select Web application. In the Authorized Redirect URIs box, enter the URL you want to be used as a trusted redirect URL, where the user will return with the token that verifies that they have granted your app access. If you are making a desktop application, select Other.
5. Click **Create**. The OAuthClientId and OAuthClientSecret are displayed.
6. Click **Library > Gmail API > Enable API**.

**Authenticating through Gmail**

After setting the following connection properties, you are ready to connect:
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.
- **OAuthClientId**: Set this to the Client ID in your app settings.
- **OAuthClientSecret**: Set this to the Client secret in your app settings.
- **User**: Set this to the user of the Gmail account.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

**Adding Gmail Tables to your ElastiCube**

Sisense uses connection strings to connect to Gmail and import data into the ElastiCube Manager.

The connection string to connect to Gmail has the following structure:

```
jdbc:Gmail:Property1=Value1;Property2=Value2;
```

The following is an example of a Gmail connection string:

```
jdbc:gmail:User=xxxx@xxxxx.com;InitiateOAuth=GETANDREFRESH;OAuthClientId=
xxxxxxxxxxxxxxxxxxxxxxxx;OAuthClientSecret=xxxxxxxxxxxxxxxxxxxxxxxxxxx xxxx;
```
**Note:** To switch between accounts, you need to delete the file OAuthsettings.txt file located at

\Users\xxx\AppData\Roaming\CData\Gmail Data Provider.

**To add Gmail data:**

1. In ElastiCube Manager, click **Add Data** and then, **Gmail**. The Connect to Gmail window is displayed.
2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. Gmail is displayed in the Select Database list.
4. Click **OK**. Sisense connects to Gmail and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

**Switching between Accounts**

When you connect to the Gmail data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at

\Users\xxx\AppData\Roaming\CData\Gmail Data Provider on your Sisense server. To connect to the Gmail data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the **OAuthSettingsLocation** parameter. When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Gmail data
source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```java
jdbc:Gmail:OAuthSettingsLocation=C:\Gmail\auth\john.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

```java
jdbc:Gmail:OAuthSettingsLocation=C:\Gmail\auth\sally.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

In the example above, two OAuth files are created, one for John and one for Sally in the location C:\Gmail\auth\. This is useful if you support many users who each need to access the Gmail data source.

**Gmail Tables**

Gmail’s RESTful APIs expose the following Gmail tables that you can import into the ElastiCube Manager through the Sisense Gmail connector:

- Gmail/All Mail
- Gmail/Drafts
- Gmail/Important
- Gmail/Sent Mail
- Gmail/Spam
- Gmail/Starred
- Gmail/Trash
- Inbox
- Test Label
Limitations

1. The default Gmail table names contain a backslash; some also contain spaces. You can use square brackets to escape the table names for the default Gmail folders.
   
   For example:
   ```sql
   SELECT * FROM [Gmail/All Mail]
   ```

2. The default number of messages returned is 100. This can be changed by setting either LIMIT or MaxItems. If you wish to return all mail within a mailbox, specify a value of 0 or -1.

3. Aggregate functions not supported.
Connecting to Google Adwords

The ElastiCube Manager enables easy and quick access to tables contained within Google Adwords. The steps below describe how to connect to this type of data source.

Note

Importing data from Google Adwords is performed using the Sisense developer key and Sisense pays for the data imported from AdWords. For this reason your AdWords account must have access to the ‘Campaign Service’ and the user needs to have Standard Access.

To check the type of access, log into your AdWords account, then go to My Account > Account Access. A list of all associated campaigns and permission levels will be displayed.

Increasing the permission level can only be performed by a campaign administrator using the “invite user functionality”.

See Campaign Management and Users for more details.

In addition, you will need an MCC account. For more information, click here.

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Web Services category, select Google AdWords.
3. You will be prompted to enter the following information:
   ▶ Email: Enter email associated with your Google Analytics account.
   ▶ Auth Code: Google requires an authentication code to enable access from the ElastiCube to data associated with a Google Analytics account (site name and profile IDs). To attain the Auth code click on the link Get Auth Code. The browser will open and you will need to sign in to your Google Analytics account. After signing in, click on the ‘Allow access’ button. This will
generate a temporary code that you must paste into the **Auth Code** text box in the connection window.

**Customer ID:** Enter your Google AdWords Customer ID. Your Customer ID appears at the top corner of your AdWords screen (after logging into your AdWords account).

4. Click Connect.

5. Select the relevant client email associated with Adwords you want to work with and click **OK**.

All tables and views associated with the website will appear in a new window.
6. Select the checkbox next to each table you want to use.

7. Once all relevant tables are selected, click Add.

**Note about possible build failures:** If you upgrade your version of Sisense to 5.8.1, and the build fails, it may be due to the fact that the newer Sisense version is using a newer version of the Google AdWords API (v201506). If this is the case, then this API version includes changes to some of the AdWords predefined columns. Consequently, it is required for you to click refresh in the ‘Change Connectivity Settings’ window next to your AdWords data source and rebuild your ElastiCube. Unless this action is taken, your ElastiCube build will fail due to the change in Google AdWords schema.

See also Customizing Google Analytics and AdWords Tables.
Connecting to Google Analytics

The ElastiCube Manager enables easy and quick access to tables contained within Google Analytics. The steps below describe how to connect to this type of data source.

**Note:** Google Analytics provides a quota on the free daily API requests. For this reason a developer key must be supplied. Read more details about [Quota Limits](#).

1. Click **Add Data** in the top menu of the ElastiCube Manager.
2. Under the **Web Services** category, select **Google Analytics**.

3. You will be prompted to enter the following information:
   - **Email:** Enter email associated with your Google Analytics account.
   - **Auth Code:** Google requires an authentication code to enable access from the ElastiCube to data associated with a Google Analytics account (site name and profile IDs). To attain the Auth code click on the link **Get Auth Code**. The browser will open
and you will need to sign in to your Google Analytics account. After signing in, click on the ‘Allow access’ button. This will generate a temporary code that you must paste into the Auth Code text box in the connection window.

**Date Range**: Select the date range of the analytics data you require.

4. Click **Connect** to display a list of available websites the list box below.
5. Select the relevant website that you want to work with, and click **OK**.
6. All tables and views associated with the website appear in a new window.
7. Select the checkbox next to each table you want to use.
Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.

8. Once all relevant tables are selected, click **Add**.

See Customizing Google Analytics and AdWords Tables for in-depth info on controlling your Google Analytics tables.

**Avoiding Sampling in Google Analytics**

Google Analytics applies sampling whenever more than 500,000 sessions are returned within a given query. For example, if we are asking for a 1-month time period that had 1,000,000 session in it, Google will apply sampling and we will only get 50% of the actual sessions. Whereas in some cases sampling might only slightly affect the results accuracy, it many cases it is crucial.

Sisense supports 2 configuration options to reduce the chances of sampling:

1. **Split Intervals**: A Google Analytics table can be configured to be split into a number of given intervals. For example, if intervals=4, then a one month period will be split into 4 query requests equal in days.

2. **Day Intervals**: A Google Analytics table can be configured to be split into multiple intervals where each is the size of the given number of days. For example, if day_intervals=10, then a 30 day time period will be split into 3 intervals.
Since Google limitations are applied separately per request, this reduces the risk of overall sampling.

**Configuring Google Analytics sampling intervals**

Edit the following xml file (if it doesn’t exist, create it):

```
%appdata%\Sisense\PrismServer\LocalRepository2.0\Resources\Analytics\GAnalytics.Tables.xml
```

The xml file needs to have a table node for each table, under a tables root:

```
<?xml version="1.0" encoding="utf-8" ?>
<table name="MyGoogleAnalyticsTable" days_interval="2" split_by="10" />
</tables>
```

For Split Intervals as described above use the “split_by” attribute. For Day Intervals use the “days_interval” attribute.

Note that only one of these attributes should be used. “split_by” will be used in case both are available.
Connecting to Google BigQuery

Google BigQuery Overview

The ElastiCube Manager provides you with quick and easy access to Google BigQuery tables enabling you to generate and analyze your data.

There are two connection types you can configure when connecting to your BigQuery tables, DSN and Connection String (DSN-Less). For more information about the differences between the connection types, click here.

Downloading and Connecting the Sisense Google BigQuery ODBC Driver

1. Download and install the Sisense BigQuery ODBC Driver.
2. In ElastiCube Manager, click Add Data and then, Generic ODBC Driver.
3. Select DSN. If a DSN file has already been created, select it in the dropdown list, and click Test Connection. If you need to add a DSN, see Adding a DSN. If your connection has been set up, you can click OK and review the tables generated by the Sisense BigQuery ODBC driver.
Select Connection String (DSN-Less) and enter your Connection String. Click Test Connection. For more information, see Connecting without a DSN.

Adding a DSN

If a DSN has not yet been created, you must add the DSN manually.

Note: To add a DSN you must run the Sisense ElastiCube Manager as an administrator.

To add a DSN:
1. Click **Add DSN**.

![Create New Data Source](image1.png)

2. Select the **System Data Source** option. The created file applies to all users in a specific machine only. Click **Next**.

3. Select the Sisense Google BigQuery ODBC Driver, and click **Next**.

![Create New Data Source](image2.png)
4. Click **Finish**.

5. In the Sisense BigQuery ODBC Driver DSN Setup window, do the following:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source Name</td>
<td>Enter your name for the DSN that is to be displayed in the DSN dropdown list.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter your description of the DSN.</td>
</tr>
<tr>
<td>Confirmation Code</td>
<td>Click <strong>Sign In</strong>. Your browser opens Google’s BigQuery Authentication page. Enter your credentials and click <strong>Sign In</strong>. Google prompts you to allow BigQuery Client Tools to access your data in Google BigQuery, click <strong>Accept</strong>. Your <strong>Confirmation Code</strong> is displayed. Copy and paste this value into the Confirmation Code field.</td>
</tr>
<tr>
<td>Refresh Token</td>
<td>This field is automatically populated when you enter your Confirmation Code. The refresh token is used whenever the driver needs to access your BigQuery data.</td>
</tr>
<tr>
<td>Use Proxy Server</td>
<td><em>(Optional)</em> Select to connect to a proxy server. After selecting the checkbox, enter the following information:</td>
</tr>
<tr>
<td></td>
<td><strong>Proxy Host</strong>: Enter the IP address or hostname of the proxy server.</td>
</tr>
<tr>
<td></td>
<td><strong>Proxy Port</strong>: Enter the port number that the proxy server is listening to.</td>
</tr>
<tr>
<td></td>
<td><strong>Proxy Username</strong>: Enter your proxy server user name.</td>
</tr>
<tr>
<td></td>
<td><strong>Proxy Password</strong>: Enter your proxy server password.</td>
</tr>
<tr>
<td>Catalog (Project)</td>
<td>Select the name of your BigQuery project.</td>
</tr>
<tr>
<td>Billed Project</td>
<td>Select the project to bill for queries that are run using the DSN.</td>
</tr>
</tbody>
</table>

6. *(Optional)* To configure advanced driver options, click **Advanced Options**. For more information, see Advanced Options.

7. *(Optional)* To configure logging behavior for the driver, click **Logging Options**. For more information, see Logging Options.
8. Click **Test**. A pop window is displayed that indicates the connection was successful.

9. Click **OK**.

10. In the ODBC Connectivity Properties window, click **Test Connection**.

11. Click **OK** to save and close the ODBC Data Source Administrator.

**Advanced Options**

You can configure advanced driver by clicking **Advanced Options** in the Sisense BigQuery ODBC Driver DSN Setup window. This displays the Advanced Options window from which you can configure the following options:

![Advanced Options Window](image)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Requests Per Second (0=unlimited)</td>
<td>Enter the maximum number of requests that can be made per second.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Rows Per Block</strong></td>
<td>Enter the maximum number of rows to fetch for each data request.</td>
</tr>
<tr>
<td><strong>Default String Column Length</strong></td>
<td>Enter the maximum data length for String columns.</td>
</tr>
</tbody>
</table>
| **Dataset Name For Large Result Sets** | Enter the name of the BigQuery dataset to use to store temporary tables.  

**Note:** The dataset created from the default ID is hidden. |
| **Temporary Table Expiration Time (ms)** | Enter the length of time (in milliseconds) that the temporary table exists for.                                                               |
| **Use Native Query**          | Select the Use Native Query checkbox to disable the SQL Connector feature and allow the driver to execute BigQuery SQL directly.  

When Use Native Query is selected, the driver does not transform the queries emitted by an application, so the native query is used.  

When Use Native Query is disabled, the driver transforms the queries emitted by an application and converts them into an equivalent form in BigQuery SQL.  

**Note:** If an application already emits BigQuery SQL, then enable this option to avoid the extra overhead of query transformation. (Optional) |
| **Enable SQLPrepare Metadata with Native Query (slower)** | To enable the driver to retrieve metadata during the prepare stage of a query when working in Native Query mode, select the Enable SQLPrepare Metadata with Native Query checkbox. |
### Field Description

**Note:** This option is available only if the Use Native Query checkbox is selected.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow Large Result Sets</td>
<td>Select to to allow query results larger than 128MB in size.</td>
</tr>
<tr>
<td></td>
<td>After you select this checkbox, the Dataset Name For Large Result Sets and Temporary Table Expiration Time(ms) fields are enabled.</td>
</tr>
</tbody>
</table>

### Logging Options

You can configure logging options by clicking **Logging Options** in the Sisense BigQuery ODBC Driver DSN Setup window. This displays the Logging Options window.

![Logging Options](image)

The ODBC Data Source Administrator provides tracing functionality, which you can activate to help troubleshoot issues.

**Important:** Only enable logging long enough to capture an issue.

Logging decreases performance and can consume a large quantity of disk space.
The driver allows you to set the amount of detail included in log files. The table below lists the logging levels provided by the Sisense ODBC Driver with SQL Connector for Google BigQuery, in order from least verbose to most verbose.

In the Logging Options window, you can configure the following information:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Level</td>
<td>Select the Log Level. There are seven possible options:</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_OFF</strong>: Disables all logging.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_FATAL</strong>: Logs very severe error events that lead the driver to abort.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_ERROR</strong>: Logs error events that might still allow the driver to continue running.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_WARNING</strong>: Logs potentially harmful situations.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_INFO</strong>: Logs general information that describes the progress of the driver.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_DEBUG</strong>: Logs detailed information that is useful for debugging the driver.</td>
</tr>
<tr>
<td></td>
<td><strong>LOG_TRACE</strong>: Logs more detailed information than the DEBUG level.</td>
</tr>
<tr>
<td>Log Path</td>
<td>Enter the full path to the folder where you want to save log files.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>Click <strong>Browse</strong> and select the folder where you want to save log files.</td>
</tr>
<tr>
<td>Log Rotation</td>
<td>Enter the maximum number of log files to keep in the Max Number Files field.</td>
</tr>
</tbody>
</table>

**Note**: After the maximum number of log files is reached, each time an additional file is created, the driver deletes the oldest log file.

Enter the maximum size of each log file in megabytes (MB) in the Max File Size field.
Connecting without a DSN

When you choose to connect without a DSN, you must define the connection string that sets the configuration options.

The following is an example connection string that sets advanced options:

```plaintext
DSN=Sample Sisense BigQuery DSN; Catalog=public_data;
MaxRequestsPerSecond=20; UseNativeQuery=0;
AllowLargeResults=0;
LargeResultsDataSetId=_bqodbc_temp_tables;
LargeResultsTempTableExpirationTime=3600000
```

The table below provides a list of possible keys you can add to your string and their descriptions:

<table>
<thead>
<tr>
<th>Key Name</th>
<th>Mandatory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AllowLargeResults</td>
<td>No</td>
<td>The value of this key is 0 or 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Disabled. The driver returns an error when query results are larger than 128MB in size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Enabled. The driver allows query results that are larger than 128MB in size.</td>
</tr>
<tr>
<td>Key Name</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ExecCatalog</td>
<td>Yes</td>
<td>The name of the project to bill for queries that are run using the DSN.</td>
</tr>
<tr>
<td>Project or Catalog</td>
<td>Yes</td>
<td>The name of your BigQuery project.</td>
</tr>
<tr>
<td>LargeResultDataSetId</td>
<td>Yes*</td>
<td>The ID of the BigQuery dataset to use to store temporary tables.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> This option is available only when the Allow Large Result Sets option is enabled (the AllowLargeResults key is set to 1). The dataset created from the default ID is hidden.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Required if AllowLargeResults is enabled.</td>
</tr>
<tr>
<td>DefaultStringColumnLength</td>
<td>No</td>
<td>The maximum data length for STRING columns.</td>
</tr>
<tr>
<td>UseNativeQueryMetadata</td>
<td>No</td>
<td>The value of this key is 0 or 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Disabled. The driver does not retrieve metadata during the prepare stage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Enabled. The driver retrieves metadata during the prepare stage of a query when working in Native Query mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> This option is available only when UseNativeQuery key is set to 1.</td>
</tr>
<tr>
<td>MaxRequestsPerSecond</td>
<td>No</td>
<td>The maximum number of requests that can be made per second. To allow an unlimited number of requests per second with no throttling, set the value to 0.</td>
</tr>
<tr>
<td>Key Name</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ProxyHost</td>
<td>No</td>
<td>The IP address or hostname of the proxy server. If this key is not set for the Linux or Mac OS X driver, then support for connecting to proxy servers is disabled.</td>
</tr>
<tr>
<td>ProxyPwd</td>
<td>Yes*</td>
<td>The password corresponding to the user name provided in the Proxy Username field (the ProxyUid key). *Required if connecting to a proxy server.</td>
</tr>
<tr>
<td>ProxyPort</td>
<td>Yes*</td>
<td>The number of the port on which the proxy server is listening. *Required if connecting to a proxy server.</td>
</tr>
<tr>
<td>ProxyUid</td>
<td>Yes*</td>
<td>The user name that you use to access the proxy server. *Required if connecting to a proxy server.</td>
</tr>
<tr>
<td>RefreshToken</td>
<td>Yes</td>
<td>The refresh token that you obtain from Google for authorizing access to BigQuery. When you configure a DSN with the Windows driver, the refresh token is generated automatically after you provide the confirmation code. When you configure a DSN with the Linux or Mac OS X versions of the driver, you must use the Refresh Token configuration tool to generate the token.</td>
</tr>
<tr>
<td>RowsFetchedPerBlock</td>
<td>No</td>
<td>The maximum number of rows that the driver can fetch for each data request.</td>
</tr>
<tr>
<td>Key Name</td>
<td>Mandatory</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>LargeResultsTempTable</td>
<td>Yes*</td>
<td>The length of time (in milliseconds) for which a temporary table exists.</td>
</tr>
<tr>
<td>ExpirationTime</td>
<td></td>
<td><strong>Note</strong>: This option is available only when AllowLargeResults key is set to 1. The default value is 1 hour in milliseconds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Required if AllowLargeResults is enabled.</td>
</tr>
<tr>
<td>UseNativeQuery</td>
<td>No</td>
<td>The value of this key is 0 or 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>0</strong>: Disabled. The driver transforms the queries emitted by an application and converts them into an equivalent form in BigQuery SQL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1</strong>: Enabled. The driver does not transform the queries emitted by an application, so the native query is used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: If an application already emits BigQuery SQL, then enable this option to avoid the extra overhead of query transformation.</td>
</tr>
</tbody>
</table>

**Adding BigQuery Tables to your Project**

After setting up the DSN or the DSN-less connection, the Add table from BigQuery Tables window is displayed.
From this window, you add your BigQuery tables to your ElastiCube Manager. In addition, you can view the SQL syntax in the Query Preview section and click **Edit** to customize it.

**To add BigQuery Tables to your Project:**

1. Connect to Google BigQuery via the Sisense ODBC Tool.
2. Add your data source.
3. In the Add table from BigQuery Tables window, select the table you want to add to the ElastiCube Manager.
4. Click **Add**. The selected tables are added to your ElastiCube Manager.
Connecting to Google Spreadsheets

The ElastiCube Manager enables easy and quick access to tables contained within Google Spreadsheets.

Note: To work with Google Spreadsheets, you must have a professional Google account, since Google’s API is only available to business accounts.

To connect to Google Spreadsheets:

1. Click the Add Data icon in the top menu of the ElastiCube Manager.
2. Under the Web Services category, select Google Spreadsheets.

Note: Make sure you are working with Sisense version 5.7.6.71 or above. If you are working with a previous version and cannot connect to Google Spreadsheets, click here to upgrade your Sisense version and learn how to refresh your data.

The following screen appears.
3. In the **User Account** field, enter your user account email.
4. Click **Get** to obtain your Google 2-Step Verification code, and enter it in the **Auth Code** field.
5. Click **Connect to Server**.
6. From the **Select Database** drop-down list, select the relevant spreadsheet you want to work with and click **OK**.
7. Select the checkbox next to each sheet you want to use.
8. Once all relevant tables are selected, click **Add**.
Connecting to Hadoop via Hive

Hive Overview

The Sisense ODBC Driver with SQL Connector for Apache Hive enables standard SQL-92 access directly to Apache Hive distributions. It efficiently maps SQL to HiveQL delivering full SQL application functionality and real-time analytic and reporting capabilities to viewers.

Downloading and Connecting the Sisense Hive ODBC Driver

1. [Download](#) and install the Sisense Hive ODBC Driver.
2. In ElastiCube Manager, click [Add Data](#) and then, [Generic ODBC Driver](#).
3. Select [DSN](#). If a DSN file has already been created, select it in the dropdown list, and click [Test Connection](#). If you need to add a DSN, see Adding a DSN. If your connection has been set up, you can click [OK](#) and review the tables generated by the Sisense Hive ODBC driver.
OR
Select **Connection String (DSN-Less)** and enter your **Connection String**. Click **Test Connection**. For more information, see Connecting without a DSN.

**Adding a DSN**

If a DSN has not yet been created, you must add the DSN manually.

**Note:** To add a DSN you must run the Sisense ElastiCube Manager as an administrator.

**To add a DSN:**

1. Click **Add DSN**.
2. Select the **System Data Source** option. The created file applies to all users in a specific machine only. Click **Next**.

3. Select the Sisense Hive ODBC Driver, and click **Next**.
4. Click **Finish**.
5. In the Sisense Hive ODBC Driver DSN Setup window, do the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source Name</td>
<td>Enter your name for the DSN that is to be displayed in the DSN dropdown list.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter your description of the DSN.</td>
</tr>
<tr>
<td>Hive Server Type</td>
<td>Select the server type used by your data source.</td>
</tr>
</tbody>
</table>

**Note:** If you are connecting through Apache ZooKeeper, then Hive Server 1 is not supported.
### Field | Procedure
--- | ---
**Service Discovery Mode** | Select the Service Discovery Mode. There are two possible options you can select:

- **No Service Discovery**: The driver connects to Hive without using the ZooKeeper service.
- **ZooKeeper**: The driver discovers Hive Server 2 services via the ZooKeeper service.

**Host(s)** | If you selected No Service Discovery above as the Service Discovery Mode, then enter the IP address or hostname of the Hive server.

OR

If you selected ZooKeeper as the Service Discovery Mode, enter a comma-separated list of ZooKeeper servers.

Use the following format, where zk_host is the IP address or hostname of the ZooKeeper server and zk_port is the number of the port that the ZooKeeper server uses: zk_host1:zk_port1,zk_host2:zk_port2.

**Port** | If you selected No Service Discovery above as the Service Discovery Mode, then enter the number of the TCP port on which the Hive server is listening. Otherwise, do not type a value in the field.

**Database** | Enter the name of the database schema to use when a schema is not explicitly specified in a query. You can still issue queries on other schemas by explicitly specifying the schema in the query. To inspect your databases and determine the appropriate schema to use, type the show databases command at the Hive command prompt.
<table>
<thead>
<tr>
<th>Field</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZooKeeper Namespace</td>
<td>If you selected ZooKeeper as the Service Discovery Mode, enter the namespace on ZooKeeper under which Hive Server 2 znodes are added. Otherwise, do not type a value in the field.</td>
</tr>
</tbody>
</table>
| Authentication     | Some Hive servers are configured to require authentication for access. To connect to a Hive server, you must configure the Sisense Hive ODBC Driver to use the authentication mechanism that matches the access requirements of the server and provides the necessary credentials.  

Hive Server 1 does not support authentication.  

Most default configurations of Hive Server 2 require User Name authentication. To verify the authentication mechanism that you need to use for your connection, check the configuration of your Hadoop/Hive distribution. |
| Mechanism          | If your Hive server is configured to use authentication, select the appropriate authentication mechanism and provide the necessary credentials and authentication settings in the fields below the list.                                                                            |
| Realm              | This field is available when Kerberos is selected as your authentication mechanism.  

Enter the realm of the Hive Server 2 host.  

If your Kerberos configuration already defines the realm of the Hive Server 2 host as the default realm, then you do not need to configure this option. |
| Host FQDN          | This field is available when Kerberos is selected as your authentication mechanism.  

Enter the HS2HostFQDN key to the fully qualified domain name of the Hive Server 2 host. |
<table>
<thead>
<tr>
<th>Field</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>This field is available when Kerberos is selected as your authentication mechanism. Enter the HS2KrbServiceName key to the service name of the Hive Server 2 host.</td>
</tr>
<tr>
<td>User Name</td>
<td>This field is available when User Name, User Name and Password, or Windows Azure is selected as your authentication mechanism. The user name that you use to access Hive Server 2.</td>
</tr>
<tr>
<td>Password</td>
<td>This field is available when User Name and Password or Windows Azure is selected as your authentication mechanism. The password corresponding to the user name that you provided in the User Name field (the UID key).</td>
</tr>
<tr>
<td>Delegation UID</td>
<td>Enter the name of the user to be delegated in the Delegation UID field. The Delegation UID represents a user that is different than the authenticated user for the connection. This option is applicable only when connecting to a Hive Server 2 instance that supports this feature.</td>
</tr>
<tr>
<td>Thrift Transport</td>
<td>Select the transport protocol to use in the Thrift layer. For Hive Server 1, select Binary. When using an authentication mechanism, the Binary transport protocol is not supported. For Hive Server 2, select SASL. If you select HTTP, the HTTP Options button is enabled. See Configuring HTTP Options for more information.</td>
</tr>
</tbody>
</table>
To configure client-server verification over SSL, click SSL Options. See SSL Options for more information.

6. (Optional) To configure advanced driver options, click Advanced Options. For more information, see Advanced Options.

7. (Optional) To configure logging behavior for the driver, click Logging Options. For more information, see Logging Options.

8. Click Test. A pop window is displayed that indicates the connection was successful.

9. Click OK.

10. In the ODBC Connectivity Properties window, click Test Connection.

11. Click OK to save and close the ODBC Data Source Administrator.

**Configuring HTTP Options**

You can configure options such as custom headers when using the HTTP transport protocol in the Thrift layer.

**To configure HTTP options:**

1. In the Sisense Hive ODBC Driver DSN Setup window, select HTTP as the HTTP transport protocol from the Thrift Transport list.
2. Click **HTTP Options**. The HTTP Properties window is displayed.

   ![HTTP Properties window]

3. In the **HTTP Path** field, enter the partial URL corresponding to the Hive server.

4. Click **Add**. The Edit Property window is displayed.

   ![Edit Property window]

5. In the **Key** and **Value** fields, enter the appropriate keys and values and click **OK**.

6. After you add an HTTP header, you can edit or delete the header by clicking **Edit** or **Delete**.

7. Click **OK**.

**SSL Options**

You can configure verification between the client and the Hive server over SSL.

**To configure SSL verification:**

1. In the Sisense Hive ODBC Driver DSN Setup window, click **SSL Options**. The SSL Options window is displayed.
2. Select **Enable SSL**.
3. Select the **Allow Self-signed Server Certificate** checkbox to allow self-signed certificates from the server.
4. Select the **Allow Common Name Host Name Mismatch** checkbox to allow the common name of a CA-issued SSL certificate to not match the host name of the Hive server.
5. In the **Trusted Certificates** field, enter the path or click **Browse** and navigate to the location of your PEM file if you want the driver to load your SSL certificates when verifying the server.

   OR

   To use the trusted CA certificates PEM file that is installed with the driver, leave the Trusted Certificates field empty.
6. Select the **Two-Way SSL** checkbox if you want to configure two-way SSL verification. The Client authentication fields are enabled.
7. In the **Client Certificate File** field, enter the path or click **Browse** and navigate to the location of your PEM containing the client’s certificate.
8. In the **Client Private Key File** field, enter the path or click **Browse** and navigate to the location of your file containing the client’s private key.

9. In the **Client Private Key Password** field, if the private key file is protected with a password, enter the password. Select the **Save Password (Encrypted)** checkbox to save the password.

10. Click **OK**.

**Advanced Options**

You can configure advanced driver by clicking **Advanced Options** in the Sisense Hive ODBC Driver DSN Setup window. This displays the Advanced Options window from which you can configure the following options:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Native Query</td>
<td>Select to disable the SQL Connector feature. Select Use Native Query to disable the SQL Connector feature and allow the driver to execute HiveQL directly.</td>
</tr>
<tr>
<td>Fast SQLPrepare</td>
<td></td>
</tr>
<tr>
<td>Driver Config Take Precedence</td>
<td></td>
</tr>
<tr>
<td>Use Async Exec</td>
<td></td>
</tr>
<tr>
<td>Get Tables With Query</td>
<td></td>
</tr>
<tr>
<td>Unicode SQL character types</td>
<td></td>
</tr>
<tr>
<td>Show System Table</td>
<td></td>
</tr>
<tr>
<td>Use only SSPI</td>
<td></td>
</tr>
<tr>
<td>Rows fetched per block</td>
<td>10000</td>
</tr>
<tr>
<td>Default string column length:</td>
<td>255</td>
</tr>
<tr>
<td>Binary column length:</td>
<td>32767</td>
</tr>
<tr>
<td>Decimal column scale:</td>
<td>10</td>
</tr>
<tr>
<td>Async Exec Poll Interval (ms):</td>
<td>100</td>
</tr>
<tr>
<td>Socket Timeout (s):</td>
<td>30</td>
</tr>
</tbody>
</table>

You can configure advanced driver by clicking **Advanced Options** in the Sisense Hive ODBC Driver DSN Setup window. This displays the Advanced Options window from which you can configure the following options:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When Use Native Query is selected, the driver does not transform the queries emitted by an application, so the native query is used. When Use Native Query is disabled, the driver transforms the queries emitted by an application and converts them into an equivalent form for Hive.</td>
</tr>
<tr>
<td>Fast SQLPrepare</td>
<td>Select to defer query execution to SQLExecute.</td>
</tr>
<tr>
<td>Driver Config Take Precedence</td>
<td>Select to allow driver-wide configurations to take precedence over connection and DSN settings.</td>
</tr>
<tr>
<td>Use Async Exec</td>
<td>Select to use the asynchronous version of the API call against Hive for executing a query. This option is applicable only when connecting to a Hive cluster running Hive 0.12.0 or later.</td>
</tr>
<tr>
<td>Get Tables With Query</td>
<td>Select to retrieve the names of tables in a database by using the SHOW TABLES query. This option is applicable only when connecting to Hive Server 2.</td>
</tr>
<tr>
<td>Unicode SQL character types</td>
<td>Select to enable the driver to return SQL_WVARCHAR instead of SQL_VARCHAR for STRING and VARCHAR columns, and SQL_WCHAR instead of SQL_CHAR for CHAR columns.</td>
</tr>
<tr>
<td>Show System Table</td>
<td>Select to enable the driver to return the hive_system table for catalog function calls such as SQLTables and SQLColumns.</td>
</tr>
<tr>
<td>Use only SSPI</td>
<td>Select to handle Kerberos authentication using the SSPI plugin instead of Kerberos by default.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Rows fetched per block</td>
<td>Enter the number of rows to be fetched per block.</td>
</tr>
<tr>
<td>Default string column length</td>
<td>Enter the maximum data length for STRING columns.</td>
</tr>
<tr>
<td>Binary column length</td>
<td>Enter the maximum data length for BINARY columns.</td>
</tr>
<tr>
<td>Decimal column</td>
<td>Enter the maximum number of digits to the right of the decimal point for numeric data types.</td>
</tr>
<tr>
<td>Async Exec Poll Interval (ms)</td>
<td>Enter the time in milliseconds between each poll for the query execution status. This option is applicable only to HDInsight clusters.</td>
</tr>
<tr>
<td>Socket Timeout (s)</td>
<td>Define the amount of time until the connection times out. The default amount of time is 30 seconds.</td>
</tr>
</tbody>
</table>

1. Click **Server Side Properties** to configure the driver to apply configuration properties to the Hive server. For more information, see Configuring Server Side Properties.

2. Click **OK**.

**Configuring Server-Side Properties**

You can use the driver to apply configuration properties to the Hive server.

The Sisense ODBC Driver with SQL Connector for Apache Hive allows you to set server-side properties via a DSN. Server-side properties specified in a DSN affect only the connection that is established using the DSN.

To create a server-side property:
1. In the Sisense Hive ODBC Driver DSN Setup window, click **Advanced Options > Side Server Properties**. The Server Side Properties window is displayed.

   ![Server Side Properties Window](image)

2. Click **Add**. The Edit Property window is displayed.

   ![Edit Property Window](image)

3. In the **Key** and **Value** fields, enter the appropriate keys and values and click **OK**.
   For a list of all Hadoop and Hive server-side properties that your implementation supports, type `set -v` at the Hive CLI command line or Beeline. You can also execute the `set -v` query after connecting using the driver. After you add your properties, you can edit or delete the properties by clicking **Edit** or **Delete**.

4. Click **OK**.

5. Select the **Apply properties with queries** checkbox to configure the driver to apply each server-side property by executing a query when opening a session to the Hive server.
   OR
   Clear the Apply Server Side Properties with Queries checkbox to configure the driver to use a more efficient method for applying server-side properties that does not involve additional network round-tripping.
   The more efficient method is not available for Hive Server 1, and
it might not be compatible with some Hive Server 2 builds. If the server-side properties do not take effect when the checkbox is clear, then select the checkbox.

6. Select the **Convert Key Name to Lower Case** checkbox to force the driver to convert server-side property key names to all lower case characters.

7. Click **OK**.

**Logging Options**

You can configure logging options by clicking **Logging Options** in the Sisense Hive ODBC Driver DSN Setup window. This displays the Logging Options window.

![Logging Options window](image)

The ODBC Data Source Administrator provides tracing functionality, which you can activate to help troubleshoot issues.

**Important:** Only enable logging long enough to capture an issue. Logging decreases performance and can consume a large quantity of disk space.

The driver allows you to set the amount of detail included in log files. The table below lists the logging levels provided by the Sisense ODBC Driver with SQL Connector for Hive, in order from least verbose to most verbose.

<table>
<thead>
<tr>
<th>Logging Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG_OFF</td>
</tr>
<tr>
<td>LOGERROR</td>
</tr>
<tr>
<td>LOGWARNING</td>
</tr>
<tr>
<td>LOGINFO</td>
</tr>
<tr>
<td>LOGDEBUG</td>
</tr>
</tbody>
</table>

In the Logging Options window, you can configure the following information:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Level</td>
<td>Select the Log Level. There are seven possible options:</td>
</tr>
<tr>
<td></td>
<td>LOG_OFF: Disables all logging.</td>
</tr>
<tr>
<td></td>
<td>LOG_FATAL: Logs very severe error events that lead the driver to abort.</td>
</tr>
<tr>
<td></td>
<td>LOG_ERROR: Logs error events that might still allow the driver to continue running.</td>
</tr>
<tr>
<td></td>
<td>LOG_WARNING: Logs potentially harmful situations.</td>
</tr>
<tr>
<td></td>
<td>LOG_INFO: Logs general information that describes the progress of the driver.</td>
</tr>
<tr>
<td></td>
<td>LOG_DEBUG: Logs detailed information that is useful for debugging the driver.</td>
</tr>
<tr>
<td></td>
<td>LOG_TRACE: Logs more detailed information than the DEBUG level.</td>
</tr>
<tr>
<td>Log Path</td>
<td>Enter the full path to the folder where you want to save log files.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>Click <strong>Browse</strong> and select the folder where you want to save log files.</td>
</tr>
<tr>
<td>Log Namespace</td>
<td>Enter a name for the log.</td>
</tr>
</tbody>
</table>

**Connecting without a DSN**

Some client applications provide support for connecting to a data source using a driver without a DSN. To configure a DSN-less connection, you can use a connection string.

The following is an example of a connection string for a DSN-less connection:

```
Driver=DriverNameOrFile;HOST=MyHiveServer;PORT=PortNumber;Schema=DefaultSchema;HiveServerType=ServerType
```
The table below provides a list of possible keys you can add to your string and their descriptions:

<table>
<thead>
<tr>
<th>Key Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DriverNameOrFile</td>
<td>The absolute path of the shared object file for the driver.</td>
</tr>
<tr>
<td>MyHiveServer</td>
<td>The IP address or host name of the Hive server.</td>
</tr>
<tr>
<td>PortNumber</td>
<td>The number of the port that the Hive server uses.</td>
</tr>
<tr>
<td>DefaultSchema</td>
<td>The database schema to use when a schema is not explicitly specified in a query.</td>
</tr>
<tr>
<td>ServerType</td>
<td>The server type, either 1 (for Hive Server 1) or 2 (for Hive Server 2).</td>
</tr>
</tbody>
</table>

**Adding Hive Tables to your Project**

After setting up the DSN or the DSN-less connection, the Add table from Hive Tables window is displayed.

From this window, you add your Hive tables to your ElastiCube Manager. In addition, you can view the SQL syntax in the Query Preview section and click **Edit** to customize it.

**To add Hive Tables to your Project:**

1. Connect to Hive via the Sisense ODBC Tool.
2. Add your data source.
3. In the Add table from Hive Tables window, select the table you want to add to the ElastiCube Manager.
4. Click **Add**. The selected tables are added to your ElastiCube Manager.
Connecting to HubSpot

The Sisense HubSpot connector is a standalone connector that allows you to import data from HubSpot’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the HubSpot APIs. To obtain a connection string, you will need to create a HubSpot app.

Once you have connected to HubSpot, you can import a variety of tables from the HubSpot API.

This section describes how to install the HubSpot connector, how to connect to HubSpot with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the HubSpot Connector

Sisense provides the HubSpot connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the HubSpot connector:

1. Download the HubSpot installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.

The HubSpot connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the HubSpot REST API

To access HubSpot’s REST API from the ElastiCube Manager, you must provide valid OAuth HubSpot credentials through a connection string. These credentials are provided by HubSpot when you create an application.

After you receive your credentials from HubSpot, you can create the connection string and provide Sisense with it to connect to your data.

Creating an App

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log into your HubSpot developer account.
2. Click Create App.
3. If you will only use the app to connect to your portal, select One Off. If other users will use the app to connect to their own portals, select For Everyone.
4. Click the name of your app.
5. Enter values to be displayed to users when you connect. These values include the app name, author name, and a description of the app.

**Authenticating through HubSpot**

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the client Id in your app settings.
- **OAuthClientSecret**: Set this to the client secret in your app settings.
- **CallbackURL**: Set this to http://localhost.
- **HubId**: Set this to the Hub Id of the HubSpot account you are connecting to.
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

**Adding HubSpot Tables to your ElastiCube**

Sisense uses connection strings to connect to HubSpot and import data into the ElastiCube Manager. Each connection string contains an authentication parameter that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.
To add HubSpot data:

1. In ElastiCube Manager, click **Add Data** and then, **HubSpot**. The Connect to HubSpot window is displayed.

![Connect to HubSpot window](image)

2. In **Datasource Connection String**, enter your connection string.

3. Click **Connect to Server**. HubSpot is displayed in the Select Database list.

4. Click **OK**. Sisense connects to HubSpot and displays a list of tables available for you to import.

5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

**HubSpot Tables**

HubSpot’s RESTful APIs expose the following HubSpot tables that you can import into the ElastiCube Manager through the Sisense HubSpot connector:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlogAuthors</td>
<td>Retrieve the available blog authors in HubSpot.</td>
</tr>
<tr>
<td>BlogPosts</td>
<td>Retrieve the available blog posts in HubSpot.</td>
</tr>
<tr>
<td>Blogs</td>
<td>Retrieve the available blogs in HubSpot.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BlogTopics</td>
<td>Retrieve the available blog topics in HubSpot.</td>
</tr>
<tr>
<td>Comments</td>
<td>Retrieve the available comments from your blog in HubSpot.</td>
</tr>
<tr>
<td>CompanyProperties</td>
<td>Company properties are the standard and custom pieces of field data that appear in HubSpot.</td>
</tr>
<tr>
<td>CompanyPropertyGroups</td>
<td>Company property groups in HubSpot offer a way of organizing individual types of properties for companies. Each company property must belong to a property group.</td>
</tr>
<tr>
<td>ContactLists</td>
<td>Contact lists in HubSpot can be used to group together contacts with similar characteristics.</td>
</tr>
<tr>
<td>ContactProperties</td>
<td>Contact properties are the standard and custom pieces of field data that appear in HubSpot.</td>
</tr>
<tr>
<td>ContactPropertyGroups</td>
<td>Contact property groups in HubSpot offer a way of organizing individual types of properties for contacts. Each contact property must belong to a property group.</td>
</tr>
<tr>
<td>DealProperties</td>
<td>Deal properties are the standard and custom pieces of field data that appear in HubSpot.</td>
</tr>
<tr>
<td>DealPropertyGroups</td>
<td>Contact property groups in HubSpot offer a way of organizing individual types of properties for contacts. Each contact property must belong to a property group.</td>
</tr>
<tr>
<td>Domains</td>
<td>Retrieve the available domains in HubSpot.</td>
</tr>
<tr>
<td>EmailCampaigns</td>
<td>Email campaigns in HubSpot allow you to keep track of and update email marketing campaigns. This table allows you to create, update, and delete your email campaigns in HubSpot.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>EmailCampaignEvents</td>
<td>The events associated with an email campaign or a recipient.</td>
</tr>
<tr>
<td>EmailSubscriptions</td>
<td>The subscription types a given email is subscribed to. An email must be</td>
</tr>
<tr>
<td></td>
<td>specified to return results. Subscriptions may be removed by deleting them.</td>
</tr>
<tr>
<td>EmailSubscriptionTypes</td>
<td>A list of email subscription types for a HubSpot hub.</td>
</tr>
<tr>
<td>Files</td>
<td>Retrieves information about the available files in HubSpot.</td>
</tr>
<tr>
<td>Folders</td>
<td>Retrieves information about the available folders in HubSpot.</td>
</tr>
<tr>
<td>Forms</td>
<td>HubSpot Forms.</td>
</tr>
<tr>
<td>Owners</td>
<td>Retrieve the owners in HubSpot.</td>
</tr>
<tr>
<td>Pages</td>
<td>Retrieve the available pages in HubSpot.</td>
</tr>
<tr>
<td>SocialMediaChannels</td>
<td>List available social media channels in HubSpot.</td>
</tr>
<tr>
<td>Settings</td>
<td>HubSpot settings.</td>
</tr>
<tr>
<td>SocialMediaMessages</td>
<td>Social media messages.</td>
</tr>
<tr>
<td>Templates</td>
<td>Retrieve the available templates in HubSpot.</td>
</tr>
<tr>
<td>UrlMappings</td>
<td>Retrieve the available url mappings in HubSpot.</td>
</tr>
<tr>
<td>Workflows</td>
<td>HubSpot workflows.</td>
</tr>
</tbody>
</table>

**Accumulative Builds**

Sisense support accumulative builds for all numeric and dates data types. However, the data must be sorted before building the ElastiCube.
Connecting to MailChimp

This connector is currently in beta and subject to change.

The Sisense MailChimp connector is a standalone connector that allows you to import data from MailChimp’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to MailChimp’s API. To obtain a connection string, you will need to retrieve an API Key from MailChimp or register a MailChimp app.

Once you have connected to MailChimp, you can import a variety of tables from the MailChimp API.

This section describes how to install the MailChimp connector, how to connect to MailChIMP with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the MailChimp Connector

Sisense provides the MailChimp connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the MailChimp connector:

1. Download the MailChimp installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close. The MailChimp connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the MailChimp REST API

There are two authentication methods available for connecting to MailChimp, through an API Key or through OAuth. Both methods expose the same data, the difference is in what information is required by MailChimp to authenticate your account. For the API Key, all you need is a key provided by MailChimp in your account. For OAuth, you need to register an app with MailChimp, and then pass those details to Sisense.

After you have the relevant information from MailChimp, you create a connection string and connect to MailChimp.

The steps below describe how to retrieve the API Key and OAuth credentials that need to be included in the connection string.
Using the API Key to Connect to MailChimp

The APIKey grants full access to your MailChimp account. To obtain the APIKey, log into MailChimp and click Account > Extras > API Keys.

With the API Key, you can connect to MailChimp by passing the key in a connection string.

Using OAuth to Connect to MailChimp

To access MailChimp’s REST API from Sisense, you must provide valid OAuth MailChimp credentials. These credentials are provided by MailChimp when you register an application.

OAuth requires the authenticating user to interact with MailChimp using the browser. The driver facilitates this in various ways as described below.

Register Your Application

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log into your MailChimp account and click Account > Extras > API Keys > Register and Manage Your Apps.
2. Enter the information you want to be displayed to users when they are prompted to grant permissions to your application. This information includes your app name, company, and website.
3. If you are making a desktop application, in the Redirect URI box enter http://127.0.0.1. If you are making a Web application, in the Redirect URI box enter a URL where you would like users to be redirected after they grant permissions to your application.
Authenticating through MailChimp

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the consumer key in your app settings.
- **OAuthClientSecret**: Set this to the consumer secret in your app settings.
- **CallbackURL**: Set this to the callback URL you specified in your app settings.
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken and OAuthAccessTokenSecret.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding MailChimp Tables to Your ElastiCube

After you have retrieve your API Key or OAuth credentials from MailChimp, you provide the relevant information in a connection string. Sisense uses connection strings to connect to MailChimp and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.
For API Keys, the connection string to MailChimp is in the following format:

`jdbc:mailchimp:APIKey=xxxxxxxxxxxxxxxxxxxxxxxxx;`

For OAuth, the connection string to MailChimp is in the following format:

`jdbc:mailchimp:OAuthClientId=xxxxxxxxx;OAuthClientSecret=xxxxxxx;CallbackURL=http://127.0.0.1;InitiateOAuth=GETANDREFRESH;`

To add MailChimp data:

1. In ElastiCube Manager, click **Add Data** and then, **MailChimp**. The Connect to MailChimp window is displayed.

2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. MailChimp is displayed in the Select Database list.
4. Click **OK**. Sisense connects to MailChimp and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.
MailChimp Tables

The Sisense MailChimp connector allows you to import the following tables into the ElastiCube Manager.

Available Tables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AuthorizedApps</td>
<td>A list of applications authorized to access the account.</td>
</tr>
<tr>
<td>AutomationEmailQueues</td>
<td>A summary of the queue for an email in an automation workflow.</td>
</tr>
<tr>
<td>AutomationsRemovedSubscribers</td>
<td>A summary of the subscribers removed from an automation workflow.</td>
</tr>
<tr>
<td>CampaignFeedback</td>
<td>A summary of the comment feedback for a specific campaign.</td>
</tr>
<tr>
<td>CampaignFolders</td>
<td>Folders for organizing campaigns.</td>
</tr>
<tr>
<td>Campaigns</td>
<td>A summary of the campaigns within an account.</td>
</tr>
<tr>
<td>ConversationMessages</td>
<td>Messages from a specific conversation. Conversation tracking is a feature available to paid accounts that lets you view replies to your campaigns from inside your MailChimp account.</td>
</tr>
<tr>
<td>EcommerceCartLines</td>
<td>A list of an ecommerce cart's lines.</td>
</tr>
<tr>
<td>EcommerceCarts</td>
<td>A list of an account's ecommerce carts.</td>
</tr>
<tr>
<td>EcommerceCustomers</td>
<td>A list of an account's ecommerce customers.</td>
</tr>
<tr>
<td>EcommerceOrderLines</td>
<td>A list of an ecommerce order's lines.</td>
</tr>
<tr>
<td>EcommerceOrders</td>
<td>A list of an account's ecommerce orders.</td>
</tr>
<tr>
<td>EcommerceProducts</td>
<td>A list of an account's ecommerce products.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>EcommerceProductVariants</td>
<td>A list of an ecommerce product's variants.</td>
</tr>
<tr>
<td>EcommerceStores</td>
<td>A list of an account's ecommerce stores.</td>
</tr>
<tr>
<td>FileManagerFiles</td>
<td>A listing of all available images and files within an account's gallery.</td>
</tr>
<tr>
<td>FileManagerFolders</td>
<td>A listing of all variable folders within an account's gallery.</td>
</tr>
<tr>
<td>ListInterestCategories</td>
<td>A listing of this list's interest categories.</td>
</tr>
<tr>
<td>ListInterests</td>
<td>A list of this category's interests</td>
</tr>
<tr>
<td>ListMemberNotes</td>
<td>The last 10 notes for a specific list member, based on date created.</td>
</tr>
<tr>
<td>ListMembers</td>
<td>Individuals who are currently or have been previously subscribed to this list, including members who have bounced or unsubscribed.</td>
</tr>
<tr>
<td>ListMergeFields</td>
<td>The merge field (formerly merge vars) for a given list. These correspond to merge fields in MailChimp's lists and subscriber profiles.</td>
</tr>
<tr>
<td>Lists</td>
<td>A collection of subscriber lists associated with this account. Lists contain subscribers who have opted-in to receive correspondence from you or your organization.</td>
</tr>
<tr>
<td>ListSegmentMembers</td>
<td>Individuals who are currently or have been previously subscribed to this list, including members who have bounced or unsubscribed.</td>
</tr>
<tr>
<td>ListSegments</td>
<td>A list of available segments.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>ListsTwitterLeadGenCards</td>
<td>Twitter Lead Generation Cards for given List</td>
</tr>
<tr>
<td>ListsWebhooks</td>
<td>Webhooks configured for the given list.</td>
</tr>
<tr>
<td>TemplateFolders</td>
<td>Folders for organizing templates</td>
</tr>
<tr>
<td>Templates</td>
<td>A list an account's available templates.</td>
</tr>
</tbody>
</table>

**Available Views**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomationEmails</td>
<td>A summary of the emails in an automation workflow.</td>
</tr>
<tr>
<td>Automations</td>
<td>A summary of the automations within an account.</td>
</tr>
<tr>
<td>Conversations</td>
<td>A collection of this account's tracked conversations. Conversation tracking is a feature available to paid accounts that lets you view replies to your campaigns from inside your MailChimp account.</td>
</tr>
<tr>
<td>ListAbuse</td>
<td>A collection of abuse complaints for a specific list. An abuse complaint occurs when your recipient clicks to 'report spam' in their email program.</td>
</tr>
<tr>
<td>ListActivity</td>
<td>Up to the previous 180 days of daily detailed aggregated activity stats for a given list. Does not include AutoResponder or Automation activity.</td>
</tr>
<tr>
<td>ListClients</td>
<td>Top email clients used, as measured by their user-agent string</td>
</tr>
<tr>
<td>ListGrowthHistory</td>
<td>A month-by-month summary of a specific list's growth activity.</td>
</tr>
<tr>
<td>ListMemberActivity</td>
<td>The last 50 member events for a list.</td>
</tr>
<tr>
<td>ListSignupForms</td>
<td>Collection of List Signup Forms</td>
</tr>
</tbody>
</table>

[Image of Sisense logo]
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReportAbuse</td>
<td>A list of abuse complaints for a specific list.</td>
</tr>
<tr>
<td>ReportAdvice</td>
<td>A list of feedback based on a campaign's statistics.</td>
</tr>
<tr>
<td>ReportClickDetails</td>
<td>A list of URLs and unique IDs included in HTML and plain-text versions of a campaign.</td>
</tr>
<tr>
<td>ReportClickDetailsMembers</td>
<td>A collection of members who clicked on a specific link within a campaign.</td>
</tr>
<tr>
<td>ReportDomainPerformance</td>
<td>Statistics for the top-performing email domains in a campaign.</td>
</tr>
<tr>
<td>ReportEmailActivity</td>
<td>A list of member's subscriber activity in a specific campaign.</td>
</tr>
<tr>
<td>ReportLocations</td>
<td>Top open locations for a specific campaign.</td>
</tr>
<tr>
<td>Reports</td>
<td>A list of reports containing campaigns marked as Sent.</td>
</tr>
<tr>
<td>ReportSentTo</td>
<td>A list of subscribers who were sent a specific campaign.</td>
</tr>
<tr>
<td>ReportUnsubscribes</td>
<td>A list of members who have unsubscribed from a specific campaign.</td>
</tr>
</tbody>
</table>
Connecting to Microsoft Active Directory

The Sisense Microsoft Active Directory connector is a standalone connector that allows you to import data from Microsoft Active Directory’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Microsoft Active Directory tables.

Once you have connected to Microsoft Active Directory, you can import a variety of tables from the Microsoft Active Directory API.

This section describes how to install the Microsoft Active Directory connector, how to connect to Microsoft Active Directory with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Microsoft Active Directory Connector

Sisense provides the Microsoft Active Directory connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Microsoft Active Directory connector:

1. Download the Microsoft Active Directory installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Microsoft Active Directory connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Microsoft Active Directory

Sisense uses connection strings to connect to Microsoft Active Directory and import data into the ElastiCube Manager.

The connection string to connect to Microsoft Active Directory has the following structure:

```
jdbc:Microsoft Active Directory:Property1=Value1;Property2=Value2;
```

The following is an example of a Microsoft Active Directory connection string:

```
jdbc:User=xxxxxxxxx;Password=xxxxxxxxxx;Server=xxxxxxxxxx;Port=389;BaseDN=CN=xxxx,DC=xxxx,DC=xxxxxxx,DC=xxxxx;
```

To establish a connection, the following properties under the Authentication section must be provided:

- Valid User and Password credentials (e.g., Domain\BobF or cn=Bob F,ou=Employees,dc=Domain).
- Server information, including the IP or host name of the Server and the Port.
- BaseDN will limit the scope of LDAP searches to the height of the distinguished name provided.

**Note:** Specifying a narrow BaseDN may greatly increase performance; for example, cn=users,dc=domain will only return results contained within cn=users and its children.

- If you define your own custom schemas to work with your ActiveDirectory object classes, set Location to the path to the folder containing the schema files.

**Note:** To switch between accounts, you need to delete the file OAuthsettings.txt file located at
To add Microsoft Active Directory data:

1. In ElastiCube Manager, click Add Data and then, Microsoft Active Directory. The Connect to Microsoft Active Directory window is displayed.
2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. Microsoft Active Directory is displayed in the Select Database list.
4. Click OK. Sisense connects to Microsoft Active Directory and displays a list of tables available for you to import.
5. Select the relevant tables and click Add.
6. The tables are displayed in the ElastiCube Manager.

Switching between Accounts

When you connect to the Microsoft Active Directory data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at .\Users\xxx\AppData\Roaming\CData\Microsoft Active Directory Data Provider on your Sisense server. To connect to the Microsoft Active Directory data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the OAuthSettingsLocation parameter. When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Microsoft Active Directory data source and for each user, Sisense generates a
file that contains that user’s OAuth values in the location defined in
the string.

```
jdbc:MicrosoftActiveDirectory:OAuthSettingsLocation=C:\MicrosoftActiveDirectory\auth\john.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

```
jdbc:MicrosoftActiveDirectory:OAuthSettingsLocation=C:\MicrosoftActiveDirectory\auth\sally.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

In the example above, two OAuth files are created, one for John and one
for Sally in the location C:\Microsoft Active Directory\auth\.

This is useful if you support many users who each need to access the
Microsoft Active Directory data source.

**Microsoft Active Directory Tables**

Microsoft Active Directory’s RESTful APIs expose the following
Microsoft Active Directory tables that you can import into the
ElastiCube Manager through the Sisense Microsoft Active Directory
connector:

**Available Tables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account</td>
<td>The account object class is used to define entries that represent computer accounts.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ApplicationEntity</td>
<td>X.500 base class for applications: Directory Service only uses subclass MSFT-DSA.</td>
</tr>
<tr>
<td>ApplicationProcess</td>
<td>X.500 base class for applications: Exchange only uses subclass DSA-Application.</td>
</tr>
<tr>
<td>ApplicationSettings</td>
<td>Base class for server-specific application settings.</td>
</tr>
<tr>
<td>ApplicationSiteSettings</td>
<td>Contains all site-specific settings.</td>
</tr>
<tr>
<td>ApplicationVersion</td>
<td>Can be used by application developers to store version information about their application or its schema.</td>
</tr>
<tr>
<td>BuiltinDomain</td>
<td>The container that holds the default groups for a domain.</td>
</tr>
<tr>
<td>CertificationAuthority</td>
<td>Represents a process that issues public key certificates, for example, a Certificate Server.</td>
</tr>
<tr>
<td>Computer</td>
<td>This class represents a computer account in the domain.</td>
</tr>
<tr>
<td>Contact</td>
<td>This class contains information about a person or company that you may need to contact on a regular basis.</td>
</tr>
<tr>
<td>Events</td>
<td>Query the Events for a Target based on either the Target or SearchTerms. May require the user_events permission.</td>
</tr>
<tr>
<td>CRLDistributionPoint</td>
<td>The object holding Certificate, Authority, and Delta Revocation lists.</td>
</tr>
<tr>
<td>DHCPClass</td>
<td>Represents a DHCP Server (or set of servers).</td>
</tr>
<tr>
<td>DnsNode</td>
<td>Holds the DNS resource records for a single host.</td>
</tr>
<tr>
<td>DnsZone</td>
<td>The container for DNS Nodes. Holds zone metadata.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Domain</td>
<td>Contains information about a domain.</td>
</tr>
<tr>
<td>DomainDNS</td>
<td>Windows NT domain with DNS-based (DC=) naming.</td>
</tr>
<tr>
<td>DomainPolicy</td>
<td>Defines the local security authority policy for one or more domains.</td>
</tr>
<tr>
<td>DomainRelatedObject</td>
<td>The domainRelatedObject object class is used to define an entry that represents a series of documents.</td>
</tr>
<tr>
<td>ForeignSecurityPrincipal</td>
<td>The Security Principal from an external source.</td>
</tr>
<tr>
<td>Group</td>
<td>Stores a list of user names. Used to apply security principals on resources.</td>
</tr>
<tr>
<td>GroupOfNames</td>
<td>Used to define entries that represent an unordered set of names that represent individual objects or other groups of names.</td>
</tr>
<tr>
<td>GroupOfUniqueNames</td>
<td>Defines the entries for a group of unique names. In general, used to store account objects.</td>
</tr>
<tr>
<td>GroupPolicyContainer</td>
<td>This represents the Group Policy Object. It is used to define group polices.</td>
</tr>
<tr>
<td>IpHost</td>
<td>Represents an abstraction of a host or other IP device.</td>
</tr>
<tr>
<td>IpNetwork</td>
<td>Represents an abstraction of a network. The distinguished name value of the Common-Name attribute denotes the canonical name of the network.</td>
</tr>
<tr>
<td>Organization</td>
<td>Stores information about a company or organization.</td>
</tr>
<tr>
<td>OrganizationalPerson</td>
<td>This class is used for objects that contain organizational information about a user, such as the employee number, department, manager, title, office address, and so on.</td>
</tr>
<tr>
<td>OrganizationalRole</td>
<td>This class is used for objects that contain information that pertains to a position or role within an organization, such as a system administrator,</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>manager, and so on.</td>
<td>It can also be used for a nonhuman identity in an organization.</td>
</tr>
<tr>
<td>OrganizationalUnit</td>
<td>A container for storing users, computers, and other account objects.</td>
</tr>
<tr>
<td>Person</td>
<td>Contains personal information about a user.</td>
</tr>
<tr>
<td>PosixAccount</td>
<td>Represents an abstraction of an account with Portable Operating System Interface (POSIX) attributes.</td>
</tr>
<tr>
<td>PosixGroup</td>
<td>Represents an abstraction of a group of accounts.</td>
</tr>
<tr>
<td>PrintQueue</td>
<td>Contains information about a print queue.</td>
</tr>
<tr>
<td>SecurityObject</td>
<td>This is an auxiliary class that is used to identify security principals.</td>
</tr>
<tr>
<td>SecurityPrincipal</td>
<td>Contains the security information for an object.</td>
</tr>
<tr>
<td>Server</td>
<td>This class represents a server computer in a site.</td>
</tr>
<tr>
<td>Site</td>
<td>A container for storing server objects. Represents a physical location that contains computers. Used to manage replication.</td>
</tr>
<tr>
<td>Top</td>
<td>The top level class from which all classes are derived.</td>
</tr>
<tr>
<td>TrustedDomain</td>
<td>An object that represents a domain trusted by (or trusting) the local domain.</td>
</tr>
<tr>
<td>User</td>
<td>This class is used to store information about an employee or contractor who works for an organization. It is also possible to apply this class to long term visitors.</td>
</tr>
</tbody>
</table>
Limitations

1. Accumulated builds are supported because all tables have string columns.
2. Aggregate functions are not supported
Connecting to Microsoft Dynamics CRM

The Sisense Microsoft Dynamics CRM connector is a standalone connector that allows you to import data from Microsoft Dynamics CRM’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Microsoft Dynamics CRM tables. To obtain a connection string, you will need to obtain your credentials from Microsoft Dynamics CRM.

Once you have connected to Microsoft Dynamics CRM, you can import a variety of tables from the Microsoft Dynamics CRM API.

This section describes how to install the Microsoft Dynamics CRM connector, how to connect to Microsoft Dynamics CRM with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Microsoft Dynamics CRM Connector

Sisense provides the Microsoft Dynamics CRM connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Microsoft Dynamics CRM connector:

1. Download the Microsoft Dynamics CRM installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Microsoft Dynamics CRM connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Microsoft Dynamics CRM

The connection string used to connect to the Microsoft Dynamics CRM connects to various instances you have in the Microsoft Dynamics CRM. By providing your Microsoft Dynamics CRM credentials as values in the connection string, you can add Microsoft Dynamic CRM tables to the ElastiCube.

Adding Microsoft Dynamics CRM Tables to your ElastiCube

Sisense uses connection strings to connect to Microsoft Dynamics CRM and import data into the ElastiCube Manager.

The connection string to connect to Microsoft Dynamics CRM has the following structure:

```
jdbc:dynamicscrm:Property1=Value1;Property2=Value2;
```

The following is an example of a Microsoft Dynamics CRM connection string:

```
jdbc:dynamicscrm:User=xxxxxxxxxx;Password=xxxxxxxxxx;URL=https://xxxxxxxxxx.dynamics.com/;CRMVersion=CRM Online Office 365;
```

To connect to your instance, set the User and Password properties, under the Authentication section, to valid Dynamics CRM user credentials and set the Url to a valid Dynamics CRM server organization root.

Additionally, set the CRMVersion property. Supported versions are CRM Online Office 365, CRM 4.0, CRM 2011, CRM 2013, CRM 2015.

**Note:** To switch between accounts, you need to delete the file OAuthsettings.txt file located at

```
..\Users\xxx\AppData\Roaming\CData\Microsoft Dynamics CRM
```
Data Provider or you can add OAuthSettingsLocation to the connection string. See Switching between Accounts for more information.

To add Microsoft Dynamics CRM data:

1. In ElastiCube Manager, click **Add Data** and then, **Microsoft Dynamics CRM**. The Connect to Microsoft Dynamics CRM window is displayed.
2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. Microsoft Dynamics CRM is displayed in the Select Database list.
4. Click **OK**. Sisense connects to Microsoft Dynamics CRM and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**.
6. The tables are displayed in the ElastiCube Manager.

Switching between Accounts

When you connect to the Microsoft Dynamics CRM data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at \Users\xxx\AppData\Roaming\CData\Microsoft Dynamics CRM Data Provider on your Sisense server. To connect to the Microsoft Dynamics CRM data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the **OAuthSettingsLocation** parameter.

When each user connects to the data source, Sisense generates the
OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Microsoft Dynamics CRM data source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```
jdbc:MicrosoftDynamicsCRM:OAuthSettingsLocation=C:\MicrosoftDynamicsCRM\auth\john.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
jdbc:MicrosoftDynamicsCRM:OAuthSettingsLocation=C:\MicrosoftDynamicsCRM\auth\sally.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

In the example above, two OAuth files are created, one for John and one for Sally in the location C:\MicrosoftDynamicsCRM\auth\.

This is useful if you support many users who each need to access the Microsoft Dynamics CRM data source.

**Microsoft Dynamics CRM Tables**

Microsoft Dynamics CRM exposes the following Microsoft Dynamics CRM tables that you can import into the ElastiCube Manager through the Sisense Microsoft Dynamics CRM connector:
# Available Tables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts</td>
<td>Create, update, delete, and query Account entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ActivityMimeAttachment</td>
<td>Create, update, delete, and query ActivityMimeAttachment entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ActivityParty</td>
<td>Create, update, delete, and query ActivityParty entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ActivityPointer</td>
<td>Create, update, delete, and query ActivityPointer entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Annotation</td>
<td>Create, update, delete, and query Annotation entities in Dynamics CRM.</td>
</tr>
<tr>
<td>AnnualFiscalCalendar</td>
<td>Create, update, delete, and query annual fiscal calendar entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ApplicationFile</td>
<td>Create, update, delete, and query ApplicationFile entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Appointment</td>
<td>Create, update, delete, and query Appointment entities in Dynamics CRM.</td>
</tr>
<tr>
<td>AsyncOperation</td>
<td>Create, update, delete, and query AsyncOperation entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Attachment</td>
<td>Create, update, delete, and query Attachment entities in Dynamics CRM.</td>
</tr>
<tr>
<td>AttributeMap</td>
<td>Create, update, delete, and query AttributeMap entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Audit</td>
<td>Create, update, delete, and query Audit entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BulkDeleteFailure</td>
<td>Create, update, delete, and query BulkDeleteFailure entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BulkDeleteOperation</td>
<td>Create, update, delete, and query BulkDeleteOperation entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BulkOperation</td>
<td>Create, update, delete, and query BulkOperation entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BulkOperationLog</td>
<td>This is a table representing the BulkOperationLog entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BusinessUnit</td>
<td>This is a table representing the BusinessUnit entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BusinessUnitMap</td>
<td>This is a table representing the BusinessUnitMap entities in Dynamics CRM.</td>
</tr>
<tr>
<td>BusinessUnitNewsArticle</td>
<td>This is a table representing the BusinessUnitNewsArticle entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Calendar</td>
<td>This is a table representing the Calendar entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CalendarRule</td>
<td>This is a table representing the CalendarRule entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Campaign</td>
<td>This is a table representing the Campaign entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CampaignActivity</td>
<td>This is a table representing the CampaignActivityItem entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CampaignActivityItem</td>
<td>This is a table representing the CampaignActivityItem entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CampaignItem</td>
<td>This is a table representing the CampaignItem entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CampaignResponse</td>
<td>This is a table representing the CampaignResponse entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ClientUpdate</td>
<td>This is a table representing the ClientUpdate entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ColumnMapping</td>
<td>This is a table representing the ColumnMapping entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Commitment</td>
<td>This is a table representing the Commitment entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Competitor</td>
<td>This is a table representing the Competitor entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CompetitorAddress</td>
<td>This is a table representing the CompetitorAddress entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CompetitorProduct</td>
<td>This is a table representing the CompetitorProduct entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CompetitorSalesLiterature</td>
<td>This is a table representing the CompetitorSalesLiterature entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Connection</td>
<td>This is a table representing the Connection entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ConnectionRole</td>
<td>This is a table representing the ConnectionRole entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ConnectionRoleAssociation</td>
<td>This is a table representing the ConnectionRoleAssociation entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ConnectionRoleObjectTypeCode</td>
<td>This is a table representing the ConnectionRoleObjectTypeCode entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ConstraintBasedGroup</td>
<td>This is a table representing the ConstraintBasedGroup entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Contact</td>
<td>This is a table representing the Contact entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ContactInvoices</td>
<td>This is a table representing the ContactInvoices entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ContactLeads</td>
<td>This is a table representing the ContactLeads entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ContactOrders</td>
<td>This is a table representing the ContactOrders entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ContactQuotes</td>
<td>This is a table representing the ContactQuotes entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Contract</td>
<td>This is a table representing the Contract entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ContractDetail</td>
<td>This is a table representing the ContractDetail entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ContractTemplate</td>
<td>This is a table representing the ContractTemplate entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CustomerAddress</td>
<td>This is a table representing the CustomerAddress entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CustomerOpportunityRole</td>
<td>This is a table representing the CustomerOpportunityRole entities in Dynamics CRM.</td>
</tr>
<tr>
<td>CustomerRelationship</td>
<td>This is a table representing the CustomerRelationship entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Dependency</td>
<td>This is a table representing the Dependency entities in Dynamics CRM.</td>
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<tr>
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<td>DiscountType</td>
<td>This is a table representing the DiscountType entities in Dynamics CRM.</td>
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<tr>
<td>DisplayString</td>
<td>This is a table representing the DisplayString entities in Dynamics CRM.</td>
</tr>
<tr>
<td>DisplayStringMap</td>
<td>This is a table representing the DisplayStringMap entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>DocumentIndex</td>
<td>This is a table representing the DocumentIndex entities in Dynamics CRM.</td>
</tr>
<tr>
<td>DuplicateRecord</td>
<td>This is a table representing the DuplicateRecord entities in Dynamics CRM.</td>
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<tr>
<td>DuplicateRule</td>
<td>This is a table representing the DuplicateRule entities in Dynamics CRM.</td>
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<tr>
<td>DuplicateRuleCondition</td>
<td>This is a table representing the DuplicateRuleCondition entities in Dynamics CRM.</td>
</tr>
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<td>This is a table representing the Email entities in Dynamics CRM.</td>
</tr>
<tr>
<td>EmailHash</td>
<td>This is a table representing the EmailHash entities in Dynamics CRM.</td>
</tr>
<tr>
<td>EmailSearch</td>
<td>This is a table representing the EmailSearch entities in Dynamics CRM.</td>
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<tr>
<td>EntityMap</td>
<td>This is a table representing the EntityMap entities in Dynamics CRM.</td>
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<tr>
<td>Equipment</td>
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<tr>
<td>Fax</td>
<td>This is a table representing the Fax entities in Dynamics CRM.</td>
</tr>
<tr>
<td>FieldPermission</td>
<td>This is a table representing the FieldPermission entities in Dynamics CRM.</td>
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<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>FieldSecurityProfile</td>
<td>This is a table representing the FieldSecurityProfile entities in Dynamics CRM.</td>
</tr>
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<td>FilterTemplate</td>
<td>This is a table representing the FilterTemplate entities in Dynamics CRM.</td>
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<tr>
<td>FixedMonthlyFiscalCalendar</td>
<td>This is a table representing the FixedMonthlyFiscalCalendar entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Goal</td>
<td>This is a table representing the Goal entities in Dynamics CRM.</td>
</tr>
<tr>
<td>GoalRollupQuery</td>
<td>This is a table representing the GoalRollupQuery entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Import</td>
<td>This is a table representing the ImportData entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ImportData</td>
<td>This is a table representing the ImportEntityMapping entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ImportEntityMapping</td>
<td>This is a table representing the ImportEntityMapping entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ImportFile</td>
<td>This is a table representing the ImportFile entities in Dynamics CRM.</td>
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<tr>
<td>ImportJob</td>
<td>This is a table representing the ImportJob entities in Dynamics CRM.</td>
</tr>
<tr>
<td>ImportLog</td>
<td>This is a table representing the ImportLog entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
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<td>------------------</td>
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<tr>
<td>ImportMap</td>
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<tr>
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<tr>
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<td>This is a table representing the IncidentResolution entities in Dynamics CRM.</td>
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<tr>
<td>InternalAddress</td>
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<tr>
<td>InterProcessLock</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>This is a table representing the KbArticle entities in Dynamics CRM.</td>
</tr>
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<td>Name</td>
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<td>This is a table representing the KbArticleComment entities in Dynamics CRM.</td>
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<td>Lead</td>
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</tr>
<tr>
<td>LeadAddress</td>
<td>This is a table representing the LeadAddress entities in Dynamics CRM.</td>
</tr>
<tr>
<td>LeadCompetitors</td>
<td>This is a table representing the LeadCompetitors entities in Dynamics CRM.</td>
</tr>
<tr>
<td>LeadProduct</td>
<td>This is a table representing the LeadProduct entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Letter</td>
<td>This is a table representing the Letter entities in Dynamics CRM.</td>
</tr>
<tr>
<td>License</td>
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<tr>
<td>List</td>
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<tr>
<td>ListMember</td>
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</tr>
<tr>
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<td>This is a table representing the LookUpMapping entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
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<tr>
<td>MailMergeTemplate</td>
<td>This is a table representing the MailMergeTemplate entities in Dynamics CRM.</td>
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<tr>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Opportunity</td>
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</tr>
<tr>
<td>OpportunityClose</td>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>OrderClose</td>
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</tr>
<tr>
<td>Organization</td>
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</tr>
<tr>
<td>OrganizationStatistic</td>
<td>This is a table representing the OrganizationStatistic entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>OrganizationUI</td>
<td>This is a table representing the OrganizationUI entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Owner</td>
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</tr>
<tr>
<td>OwnerMapping</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>plug-intype</td>
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</tr>
<tr>
<td>PluginTypeStatistic</td>
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<tr>
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</tr>
<tr>
<td>PrincipalEntityMap</td>
<td>This is a table representing the PrincipalEntityMap entities in Dynamics CRM.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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Connecting to MongoDB

MongoDB Overview

The ElastiCube Manager enables easy and quick access to databases, tables and views contained within MongoDB databases.

Sisense provides a MongoDB connector for the ElastiCube. Click here to download the driver.

Note: Before connecting to MongoDB database with Sisense, please note that MongoDB is an unstructured database, and therefore tables may be flattened with additional tables being created for nested items.

Upgrading to MongoDB v2.0

The latest version of MongoDB provides enhanced security and improved handling for complex MongoDB models.

The latest version of MongoDB makes significant breaking changes, if you use a version of MongoDB prior to version 2.0, and you are satisfied with your service, you can continue without upgrading.

When to Upgrade?

In certain circumstances it is recommended or necessary that you upgrade your driver for MongoDB version 2.0, for example:

1. You are new to Sisense and MongoDB
2. You want to connect with the Sisense Native REST Connector
3. You experience security-related issues in MongoDB v1.0
4. You have a really complex MongoDB model that v1.0 can’t handle
Before Upgrading

When upgrading to MongoDB v2.0, your current DSN names configured locally may be deleted. As a workaround, you can export the ODBC registry entry and then import after completing the upgrade.

To migrate your ODBC Data Source registry file:

1. In Windows, open the Run box with by pressing the Windows key + r.
2. In the Run line, enter regedit.
3. Click OK.
4. Navigate to the ODBC Data Source registry entry at the following location:
   HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBC.INI\ODBC Data Sources
5. Right click the entry and select Export.
6. Save the registry file on your machine.
7. After installing MongoDB v2, click the exported registry file. The Regi ster Editor warning message is displayed.

8. Click Yes to import the entry.

**After Upgrading**

After upgrading to MongoDB v2.0, note the following:

1. The new ODBC schema creation is different than v1.0. MongoDB v2.0 will not create virtual tables (_vt_ tables) in the ElastiCube Manager. As a result, your current ElastiCube schema will not match schemas created before upgrading. Create a new schema using the new v2.0 DSN.

2. The MongoDB v2.0 driver saves a JSON format of the extracted schema, as opposed to the v1.0 driver which uses XML.

3. The MongoDB v2.0 driver stores the schema extracted in MongoDB by default. This allows multiple users to work with the same extracted schema from different servers without extracting a new schema individually each time. However, any changes to the schema affects the schema for everyone else.

4. Storing the schema in the MongoDB means your DB is not **ReadOnly**. Administrators should be aware of this and protect their database with authentication and access control, or communicate this store action and its effects to all users.
Downloading and Connecting to the MongoDB ODBC Driver

To connect to MongoDB, complete the following procedures:

1. Download and install the MongoDB ODBC Driver.
2. In the ElastiCube Manager, click Add Data, and then Generic ODBC Driver.
3. Select DSN. If a DSN file has already been created, look for it in the drop-down list, and click Test Connection.
4. If you need to add a DSN, see the next section. If your connection has been set up, you can click OK and review the tables generated by the MongoDB ODBC Driver.

Adding a DSN

If a DSN has not yet been created, you will need to add it as follows:

1. Click Add DSN.
   
   Note: To add a DSN you must run the Sisense ElastiCube Manager as an administrator.

2. Select the System Data Source option. The created file will apply to all users in a specific machine only. Click Next.
3. Select the previously installed Sisense MongoDB ODBC Driver, and click **Next**, and then **Finish**.

4. Open the MongoDB ODBC Driver from the ODBC Data Source Administrator.

5. Provide a **Data source name**. The DSN file will be available thereafter when the user/system data source is chosen.

6. In the **Host** field, enter the DB hosting machine’s IP address (if the DB is stored locally, enter **localhost**).

7. In the **Port** field, enter the MongoDB default port which is **27017**.
8. In the **Database** field, enter the name that can be found by connecting to the DB using Mongovue/RoboMongo. **Note:** The name is case sensitive.

9. If authentication is required, then enter the **Username**.

10. Use **Additional servers** when connecting to a shared cluster or a replica set. Type in a comma-separated list of additional servers that you need, indicate the port on which a server is listening by appending a colon (:), and the port number to the server name or IP address.

11. Select **Connect to a replica set** if you are connecting to a replica set, and type the name of the replica set in the **Replica set name** field. Make sure that the names of the secondary servers in the replica set are listed in the **Additional servers** field, as described in the previous step.

---

**DSN Schema Definition**

1. Open the MongoDB ODBC Driver from the ODBC Data Source Administrator.
2. Click **Schema Definition** to review the schema and make changes if needed:

- **External schema file**: The driver automatically generates the schema if not manually defined (path to file is displayed). To edit an existing DSN schema, click **Browse** to locate and open the file in the ODBC Data Source Administrator.

- **Export** options include:
  - **Export Existing**: Exports metadata that has already been generated.
  - **Generate All**: Exports metadata for all the tables in the database.
  - **Generate Missing**: Exports metadata for tables that have not been included in the schema.
**Edit Schema File:** Use this option to edit the schema before updating metadata (change field types, hide columns etc.).

**Upload Metadata:** Updates metadata after settings are complete. **Current metadata source** displays the source that has been set in **Advanced Options**.

**Clear Existing Metadata:** Deletes all the metadata that the driver has generated for the MongoDB instance.

**Virtual Tables Options:** Sisense enables virtual tables creation by default. Virtual tables are created when Sisense detects an array within a field of the main table. Virtual tables can be disabled or custom configured. By default, virtual tables will receive the name MAINTABLE_vt_FIELD and the main table will receive the suffix "main". We recommend leaving these settings as is.
3. When done, click **Test Connection**, and **OK**.

**Selecting Tables in the ElastiCube Manager**

After setting up the DSN, you can preview and customize the query (similar to other ODBC connections) of the imported MongoDB table.

In the ElastiCube Manager you can view the SQL syntax in the **Query Preview** section. Click **Edit** to customize it.

Select the tables created by the Sisense MongoDB ODBC Driver (tables including `MAINTABLE_vt_FIELD`), as opposed to the table that includes all the raw data (with suffix `main`).
DSN Advanced Options

Click **Advanced Options** if you require additional settings:

- **Document fetched per block**: Maximum number of documents (rows) that the query returns each time.
- **Nested column separator**: Characters/strings used to separate names of nested columns.
- **Read preference**: Specifies how the driver routes read operations to the members of a replica set.
▲ **Sampling strategy:** Location in the table to sample rows from when detecting the schema (beginning, end or random position in table). *End* is recommended.

▲ **Documents to sample:** Number of documents to sample when detecting schema for a table (0 scans all documents).

▲ **Use SQL_WVARCHAR for string data types:** Select this option for the driver to map the MongoDB String data type to SQL_WVARCHAR instead of SQLVARCHAR.
Connecting to Sisense MongoDB ODBC Driver using a Connection String

If you have a driver already defined, then you can connect to Sisense MongoDB ODBC Driver using strings (without using a DSN).

1. Select **Connection String (DSN-Less)**.

   ![Connection String](connection_string.png)

2. Type in the connection details as strings, as follows:

   **Example with minimum required attributes**

   ```
   Driver=Sisense MongoDB ODBC Driver;
   Host=localhost;
   Port=27017;
   Database=aff;
   ```

   **Example with with advanced options**:

   ```
   Driver=Sisense MongoDB ODBC Driver
   Host=192.168.100.100;
   Port=27017;
   Database=MyDatabase;
   UID=MyUsername;
   PWD=MyPassword;
   RowsFetchedPerBlock=4096;
   DefaultStringColumnLength=255;
   DefaultContainerColumnLength=511;
   UseSqlWVarchar=0;
   CacheMetadata=1; VirtualTableDetection=1
   ```

3. When done, click **Test Connection**, and **OK**.
Connecting to MySQL

The ElastiCube Manager enables easy and quick access to databases, tables and views contained with MySQL databases. The steps below detail how to connect to this type of data source.

1. Click **Add data** on the top menu of the ElastiCube Manager.
2. Under **Database servers**, select **MySQL Database**.

The Connect to MySQL window is displayed.

3. **Database server location**: Enter the computer/server IP address of the database. To connect to a database running on your own computer enter **localhost**.
4. Select either **Windows Authentication** if configured with the database or alternatively, **Use the Following User Name & Password**, and enter the database credentials.
5. (Optional) Select **Use SSL** to if you are connecting to an SSL server. Enter the relevant information to configure verification between the client and the MySql server over SSL:
In the **Private Key** field, enter the path or click and navigate to the location of your file containing the your private key.

In the **Certificate** field, enter the path or click and navigate to the location of your PEM file containing the client’s certificate.

In the **Authority** field, enter the path or click and navigate to the location of your PEM file containing the trusted SSL certificate authority.

Alternatively, you can use Sisense’s ODBC connectors to connect to secure data sources.

6. Click **Connect to server**.

7. From the **Select Database** drop-down list, select the relevant database you want to work with, and click **OK**

All tables and views associated with the database will appear in a new window.
To view a preview of data contained in a particular table, highlight the table or view in the list and in click the preview pane below. To preview the table, select the Preview checkbox. Enable the checkbox next to each table or view you would like to use.

Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the Automatically create relationships from database option. Likewise fields with similar names can be linked by selecting the Automatically create relationships for fields with the same name option.

8. If you want to customize the data before importing it into the ElastiCube, you can run a custom SQL query to manipulate the data. This can be useful, for example, when you want to import only a portion of the data, rather than all of the data.

9. Once all relevant tables are selected, click Add.
Connecting to Oracle

The ElastiCube Manager enables easy and quick access to databases, tables and views contained within Oracle databases. The steps below describe how to connect to this type of data source.

1. Click **Add data** in the top menu of the ElastiCube Manager.
2. Under the **Database servers** category, select **Oracle Database**.
3. You are prompted to enter the following information:
   - **Database server location**: Enter the computer/server IP address with the database. To connect to a database running on your own computer, type in `localhost`.
   - **Login details**: Either use your Windows login details if they are configured with the database, or alternatively enter the username and password to connect to the database.
   - **Use Direct Connection**: You can also use a direct connection to connect. You will need to enter the **Service ID** and **Port** number to connect.
     - As long as you choose to work in direct mode to Oracle (this can be defined in the Oracle provider wizard), no client software needs to be installed. If you want to work with an already installed Oracle client, you can use the
indirect mode, which assumes you have the Oracle client already installed.

- Service ID can be found in the TNSNAMES.ora file. You can find a full description in the following topic: Service ID
- Note that in the file for each tnsname, you can find the service ID and service name.

4. Click **Connect to Server**.

5. A list of available databases will appear in the list box below.

![Connect to Oracle](image)

6. Select the relevant database you want to work with and click **OK**.

All tables and views associated with the database will appear in a new window.

To view a preview of data contained in a particular table, highlight the
table or view in the list and in click the preview pane below. To preview the table, select the **Preview** checkbox.

![Table selection and preview](image)

7. Select the check box next to each table or view you want to use.
8. If you want to customize the data before importing it into the ElastiCube, you can run a custom SQL query to manipulate the data. This can be useful, for example, when you want to import only a portion of the data, rather than all of the data. [Click here](#) to learn more.
9. Once all relevant tables are selected, click **Add**.
Connecting to PostgreSQL

The ElastiCube Manager enables easy and quick access to databases, tables and views contained within PostgreSQL databases. The steps below describe how to connect to this type of data source.

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Database servers category, select PostgreSQL.

3. You will be prompted to enter the following information:
   - **Database server location**: Enter the computer/server IP address where the database is located. To connect to a database on running on your own computer enter localhost.
   - **Login details**: Either use your Windows login details if they are configured with the database, or alternatively enter the username and password to connect to the database.
4. Click **Connect to Server**.
5. A list of available databases will appear in the drop-down list below.
6. Select the relevant database you want to work with and click **OK**.
7. All tables and views associated with the database will appear in a new window.
To view a preview of data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the **Preview** checkbox.

8. Select the checkboxes next to each table or view you want to use.

Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting **Automatically create relationships for fields with the same name**.

9. If you want to customize the data before importing it into the ElastiCube, you can run a custom SQL query to manipulate the data. This can be useful, for example, when you want to import only a portion of the data, rather than all of the data.

10. Once all relevant tables are selected, click **Add**.
Connecting to Quickbooks Desktop

The Sisense Quickbooks Desktop connector is a standalone connector that allows you to import data from Quickbooks Desktop’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Quickbooks Desktop APIs. To obtain a connection string, you will need to create a Quickbooks Desktop app.

Once you have connected to Quickbooks Desktop, you can import a variety of tables from the Quickbooks Desktop API.

This section describes how to install the Quickbooks Desktop connector, how to connect to Quickbooks Desktop with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Quickbooks Desktop Connector

Sisense provides the Quickbooks Desktop connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Quickbooks Desktop connector:

1. Download the Quickbooks Desktop installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
The Quickbooks Desktop connector is displayed in the ElastiCube Manager under Add Data > Web Services.

Connecting to the Quickbooks Desktop REST API
The Quickbooks Desktop connector makes requests to QuickBooks through the Remote Connector. The Remote Connector is an easy-to-use tool that enables developers to access QuickBooks data remotely. The Remote Connector runs on the same machine as QuickBooks and accepts connections through a lightweight, embedded Web server.

The server supports SSL/TLS, enabling users to connect securely from remote machines. The first time you connect, you will need to authorize the driver with QuickBooks.

The Remote Connector can be used to read and write to QuickBooks in situations where direct COM access to QuickBooks is not available (e.g., ASP.NET, Java, or QuickBooks on a remote machine).

In the Remote Connector, you can define users and their passwords and then use these credentials in the connection string that you create to connect to your QuickBooks Desktop tables.

Follow the procedure below to connect to QuickBooks for the first time through the Remote Connector:

1. Download the Remote Connector from remoteconnector.com and install the Remote Connector on the machine where QuickBooks is installed.
2. Open the company file you want to connect to in QuickBooks using an administrator account in single-user mode.
3. Open the Remote Connector from the system tray and add a user on the Users tab. Enter a User and Password and select the level of access in the Data Access menu.
**Note:** The Remote Connector does not use the User and Password properties to access QuickBooks; the User and Password properties authenticate the user to the Remote Connector. Authentication to QuickBooks is handled based on the Application Name property.

4. When you first connect, a dialog will appear in QuickBooks prompting you to authorize the application. After authorizing the application, you can then execute commands to QuickBooks. Specify the URL of the Remote Connector and the User and Password. By default, the Remote Connector connects to the currently open company file.

5. If you want to access QuickBooks when QuickBooks is not running, save the company file information for the user. The Remote Connector will then automatically open QuickBooks in the background with the company file for that user.

**Note:** If the QuickBooks UI is open, you can only connect to that company file. Additionally, note that the user permissions you run the Remote Connector under must match the user permissions you run
QuickBooks under. The Remote Connector installation process installs the Remote Connector as a service under the current user account.

Adding Quickbooks Desktop Tables to your ElastiCube

Sisense uses connection strings to connect to Quickbooks Desktop and import data into the ElastiCube Manager.

The connection string to connect to Quickbooks Desktop has the following structure:

```
jdbc:Quickbooks Desktop:Property1=Value1;Property2=Value2;
```

The following is an example of a Quickbooks Desktop connection string:

```
jdbc:quickbooks:User=xxxxx;Password=xxxxxxxxxx;URL=http://xxxx xxxxxxxx;
```

- **User**: Set this to username defined in Remote Connector.
- **Password**: Set this to password defined in Remote Connector.
- **URL**: The IP address of the remote machine where Remote Connector wa installed and the port. The port is defined under Connection Settings in the **Advanced** tab of the Remote Connector.
- **OAuthSettingsLocation**: The location of the settings file where OAuth values are saved for each user when InitiateOAuth is set to GETANDREFRESH. See Switching between Accounts for more information.

**Note**: To switch between accounts, you need to delete the file OAuthsettings.txt file located.
To add Quickbooks Desktop data:

1. In ElastiCube Manager, click Add Data and then, Quickbooks Desktop. The Connect to Quickbooks Desktop window is displayed.
2. InDatasource Connection String, enter your connection string.
3. Click Connect to Server. Quickbooks Desktop is displayed in the Select Database list.
4. Click OK. Sisense connects to Quickbooks Desktop and displays a list of tables available for you to import.
5. Select the relevant tables and click Add.
6. The tables are displayed in the ElastiCube Manager.

Switching between Accounts

When you connect to the Quickbooks Desktop data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at .\Users\xxx\AppData\Roaming\CData\QuickbooksDesktop\DataProvider on your Sisense server. To connect to the Quickbooks Desktop data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the OAuthSettingsLocation parameter. When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Quickbooks
Desktop data source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```sql
jdbc:QuickbooksDesktop:OAuthSettingsLocation=C:\QuickbooksDesktop\auth\john.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
jdbc:QuickbooksDesktop:OAuthSettingsLocation=C:\QuickbooksDesktop\auth\sally.txt;OAuthClientId=11276856774486;
OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

In the example above, two OAuth files are created, one for John and one for Sally in the location C:\QuickbooksDesktop\auth\.

This is useful if you support many users who each need to access the Quickbooks Desktop data source.

**Quickbooks Desktop Tables**

Quickbooks Desktop’s RESTful APIs expose the following Quickbooks Desktop tables that you can import into the ElastiCube Manager through the Sisense Quickbooks Desktop connector:

**Available Tables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts</td>
<td>Create, update, delete, and query QuickBooks Accounts. To update Accounts, set the QBXMLVersion to 6.0 or higher.</td>
</tr>
<tr>
<td>BillExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Bill Expense Line Items.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BillLineItems</td>
<td>Create, update, delete, and query QuickBooks Bill Line Items.</td>
</tr>
<tr>
<td>BillPaymentChecks</td>
<td>Create, update, delete, and query QuickBooks Bill Payment Checks. QBXMLVersion must be set to 6.0 or higher to update a BillPaymentCheck.</td>
</tr>
<tr>
<td>BillPaymentChecksAppliedTo</td>
<td>Create, update, delete, and query QuickBooks Bill Payment AppliedTo aggregates. In a Bill Payment, each AppliedTo aggregate represents the Bill transaction to which this part of the payment is being applied.</td>
</tr>
<tr>
<td>BillPaymentCreditCards</td>
<td>Create, update, delete, and query QuickBooks Bill Payments.</td>
</tr>
<tr>
<td>BillPaymentCreditCardsAppliedTo</td>
<td>Create, update, delete, and query QuickBooks Bill Payment AppliedTo aggregates. In a Bill Payment, each AppliedTo aggregate represents the Bill transaction to which this part of the payment is being applied.</td>
</tr>
<tr>
<td>Bills</td>
<td>Create, update, delete, and query QuickBooks Bills.</td>
</tr>
<tr>
<td>BuildAssemblies</td>
<td>Insert, Update, delete, and query QuickBooks Build Assembly transactions.</td>
</tr>
<tr>
<td>BuildAssemblyLineItems</td>
<td>Create and query QuickBooks Build Assembly transactions.</td>
</tr>
<tr>
<td>CheckExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Check Expense Line Items.</td>
</tr>
<tr>
<td>Checks</td>
<td>Create, update, delete, and query QuickBooks Check Line Items.</td>
</tr>
<tr>
<td>Class</td>
<td>Create, update, delete, and query QuickBooks Classes. QuickBooks requires QBXML version 8.0 or higher for updates to a Class.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CreditCardChargeExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Credit Card Charge Expense Line Items.</td>
</tr>
<tr>
<td>CreditCardChargeLineItems</td>
<td>Create, update, delete, and query QuickBooks Credit Card Charge Line Items.</td>
</tr>
<tr>
<td>CreditCardCharges</td>
<td>Create, update, delete, and query QuickBooks Credit Card Charges.</td>
</tr>
<tr>
<td>CreditCardCreditExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Credit Card Credit Expense Line Items.</td>
</tr>
<tr>
<td>CreditCardCreditLineItems</td>
<td>Create, update, delete, and query QuickBooks Credit Card Credit Line Items.</td>
</tr>
<tr>
<td>CreditCardCredits</td>
<td>Create, update, delete, and query QuickBooks Credit Card Credits.</td>
</tr>
<tr>
<td>CreditMemoLineItems</td>
<td>Create, update, delete, and query QuickBooks Credit Memo Line Items.</td>
</tr>
<tr>
<td>CreditMemos</td>
<td>Create, update, delete, and query QuickBooks Credit Memos.</td>
</tr>
<tr>
<td>Currency</td>
<td>Create, update, delete, and query QuickBooks Currencies. This table requires QBXML version 8.0 or higher, and you will need to enable multiple Currencies in your QuickBooks company file to use it.</td>
</tr>
<tr>
<td>CustomerContacts</td>
<td>Create, update, delete, and query QuickBooks Customer Contacts. This table requires QBXML version 12.0 or higher, and is only available in QuickBooks editions 2016 and above.</td>
</tr>
<tr>
<td>CustomerMessages</td>
<td>Create, delete, and query Customer Messages.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CustomerNotes</td>
<td>Create, update, and query QuickBooks Customer Notes. This table requires QBXML version 12.0 or higher.</td>
</tr>
<tr>
<td>Customers</td>
<td>Create, update, delete, and query QuickBooks Customers.</td>
</tr>
<tr>
<td>CustomerShippingAddresses</td>
<td>Create, update, delete, and query QuickBooks Customer Shipping Addresses. Multiple Customer Shipping Addresses are supported in only QuickBooks 2013 and higher. Additionally, this table requires QBXML version 12.0 or higher.</td>
</tr>
<tr>
<td>CustomerTypes</td>
<td>Create, update, delete, and query QuickBooks Customer Types.</td>
</tr>
<tr>
<td>DateDrivenTerms</td>
<td>Create, delete, and query QuickBooks Date Driven Terms.</td>
</tr>
<tr>
<td>DepositLineItems</td>
<td>Create, update, delete, and query QuickBooks Deposit Line Items. QBXMLVersion must be set to 7.0 or higher to update a deposit.</td>
</tr>
<tr>
<td>Deposits</td>
<td>Create, update, delete, and query QuickBooks Deposits. QBXMLVersion must be set to 7.0 or higher to update a deposit.</td>
</tr>
<tr>
<td>EmployeeEarnings</td>
<td>Create, update, delete, and query QuickBooks Employee Earnings.</td>
</tr>
<tr>
<td>Employees</td>
<td>Create, update, delete, and query QuickBooks Employees.</td>
</tr>
<tr>
<td>EstimateLineItems</td>
<td>Create, update, delete, and query QuickBooks Estimate Line Items.</td>
</tr>
<tr>
<td>Estimates</td>
<td>Create, update, delete, and query QuickBooks Estimates.</td>
</tr>
<tr>
<td>InventoryAdjustmentLineItems</td>
<td>Create and query QuickBooks Inventory Adjustment Line Items.</td>
</tr>
<tr>
<td>InventoryAdjustments</td>
<td>Create, query, and delete QuickBooks Inventory Adjustments.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>InventorySites</td>
<td>Create, update, delete, and query QuickBooks Inventory Sites. Inventory Sites are only available in QuickBooks Enterprise 2010 and above, and only with the Advanced Inventory add-on.</td>
</tr>
<tr>
<td>InvoiceLineItems</td>
<td>Create, update, delete, and query QuickBooks Invoice Line Items.</td>
</tr>
<tr>
<td>Invoices</td>
<td>Create, update, delete, and query QuickBooks Invoices.</td>
</tr>
<tr>
<td>ItemLineItems</td>
<td>Create, update, delete, and query QuickBooks Item Line Items.</td>
</tr>
<tr>
<td>ItemReceiptExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Item Receipt Expense Line Items.</td>
</tr>
<tr>
<td>ItemReceiptLineItems</td>
<td>Create, update, delete, and query QuickBooks Item Receipt Line Items.</td>
</tr>
<tr>
<td>ItemReceipts</td>
<td>Create, update, delete, and query QuickBooks Item Receipts.</td>
</tr>
<tr>
<td>Items</td>
<td>Create, update, delete, and query QuickBooks Items.</td>
</tr>
<tr>
<td>JobTypes</td>
<td>Create and query QuickBooks JobTypes.</td>
</tr>
<tr>
<td>JournalEntries</td>
<td>Create, update, delete, and query QuickBooks Journal Entries. Note that while Journal Entry Lines can be created with a new Journal Entry, they cannot be added or removed from an existing Journal Entry.</td>
</tr>
<tr>
<td>JournalEntryLines</td>
<td>Create, update, delete, and query QuickBooks Journal Entries. Note that while Journal Entry Lines can be created with a new Journal Entry, they cannot be added or removed from an existing Journal Entry.</td>
</tr>
<tr>
<td>OtherNames</td>
<td>Create, update, delete, and query QuickBooks Other Name entities.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PaymentMethods</td>
<td>Create, update, delete, and query QuickBooks Payment Methods.</td>
</tr>
<tr>
<td>PayrollNonWageItems</td>
<td>Query QuickBooks Non-Wage Payroll Items.</td>
</tr>
<tr>
<td>PayrollWageItems</td>
<td>Create and query QuickBooks Wage Payroll Items.</td>
</tr>
<tr>
<td>PriceLevelPerItem</td>
<td>Create and query QuickBooks Price Levels Per Item. Only QuickBooks Premier and Enterprise support Per-Item Price Levels. Note that while Price Levels can be added from this table, you may only add Per-Item Price Levels from this table. Price Levels may be deleted from the PriceLevels table. This table requires QBXML version 4.0 or later.</td>
</tr>
<tr>
<td>PriceLevels</td>
<td>Create, delete, and query QuickBooks Price Levels. Note that while Price Levels can be added and deleted from this table, you may add only fixed-percentage Price Levels from this table. Per-Item Price Levels may be added via the PriceLevelPerItem table. This table requires QBXML version 4.0 or higher.</td>
</tr>
<tr>
<td>PurchaseOrderLineItems</td>
<td>Create, update, delete, and query QuickBooks Purchase Order Line Items.</td>
</tr>
<tr>
<td>PurchaseOrders</td>
<td>Create, update, delete, and query QuickBooks Purchase Orders.</td>
</tr>
<tr>
<td>ReceivePayments</td>
<td>Create, update, delete, and query QuickBooks Receive Payment transactions. QBXMLVersion must be set to 6.0 or higher to update a ReceivePayment.</td>
</tr>
<tr>
<td>ReceivePaymentsAppliedTo</td>
<td>Create, update, and query QuickBooks Receive Payment AppliedTo aggregates. In a Receive Payment, each AppliedTo aggregate represents the transaction to which this part of the payment is being applied. QBXMLVersion must be set to 6.0 or higher to update a ReceivePayment.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SalesOrderLineItems</td>
<td>Create, update, delete, and query QuickBooks Sales Order Line Items.</td>
</tr>
<tr>
<td>SalesOrders</td>
<td>Create, update, delete, and query QuickBooks Sales Orders.</td>
</tr>
<tr>
<td>SalesReceiptLineItems</td>
<td>Create, update, delete, and query QuickBooks Sales Receipt Line Items.</td>
</tr>
<tr>
<td>SalesReceipts</td>
<td>Create, update, delete, and query QuickBooks Sales Receipts.</td>
</tr>
<tr>
<td>SalesReps</td>
<td>Create, update, delete, and query QuickBooks Sales Rep entities.</td>
</tr>
<tr>
<td>SalesTaxCodes</td>
<td>Create, update, delete, and query QuickBooks Sales Tax Codes.</td>
</tr>
<tr>
<td>SalesTaxItems</td>
<td>Create, update, delete, and query QuickBooks Sales Tax Items.</td>
</tr>
<tr>
<td>ShippingMethods</td>
<td>Create, update, delete, and query QuickBooks Shipping Methods.</td>
</tr>
<tr>
<td>StandardTerms</td>
<td>Create, update, delete, and query QuickBooks Standard Terms.</td>
</tr>
<tr>
<td>StatementCharges</td>
<td>Create, update, delete, and query QuickBooks Statement Charges.</td>
</tr>
<tr>
<td>TimeTracking</td>
<td>Create, update, delete, and query QuickBooks Time Tracking events.</td>
</tr>
<tr>
<td>ToDo</td>
<td>Create, update, delete, and query QuickBooks To Do entries.</td>
</tr>
<tr>
<td>TransferInventory</td>
<td>Query and delete QuickBooks Transfer Inventory transactions.</td>
</tr>
<tr>
<td></td>
<td>Transfer Inventory is available in only QuickBooks Enterprise 2010 and above, and only with the Advanced Inventory add-on.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TransferInventoryLineItems</td>
<td>Create and query QuickBooks Transfer Inventory Line Items. Transfer Inventory is available in only QuickBooks Enterprise 2010 and above, and only with the Advanced Inventory add-on.</td>
</tr>
<tr>
<td>Transfers</td>
<td>Create, update, and query QuickBooks transfers. Requires QBXML version 12.0 or higher.</td>
</tr>
<tr>
<td>UnitOfMeasure</td>
<td>Create, update, delete, and query QuickBooks units of measure. QuickBooks requires QBXML version 7.0 or higher to use this table.</td>
</tr>
<tr>
<td>UnitOfMeasureDefaultUnits</td>
<td>Create and query QuickBooks unit-of-measure default units. QuickBooks requires QBXML version 7.0 or higher to use this table.</td>
</tr>
<tr>
<td>UnitOfMeasureRelatedUnits</td>
<td>Create and query QuickBooks unit-of-measure related units. QuickBooks requires QBXML version 7.0 or higher to use this table.</td>
</tr>
<tr>
<td>VehicleMileage</td>
<td>Create, update, delete, and query QuickBooks Vehicle Mileage entities. QuickBooks requires QBXML version 6.0 or higher to use this table.</td>
</tr>
<tr>
<td>VendorCreditExpenseItems</td>
<td>Create, update, delete, and query QuickBooks Vendor Credit Expense Line Items.</td>
</tr>
<tr>
<td>VendorCreditLineItems</td>
<td>Create, update, delete, and query QuickBooks Vendor Credit Line Items.</td>
</tr>
<tr>
<td>VendorCredits</td>
<td>Create, update, delete, and query QuickBooks Vendor Credits.</td>
</tr>
<tr>
<td>Vendors</td>
<td>Create, update, delete, and query QuickBooks Vendors.</td>
</tr>
<tr>
<td>VendorTypes</td>
<td>Create, update, delete, and query QuickBooks Vendor Types.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>WorkersCompCodeLines</td>
<td>Query QuickBooks Workers Comp Code entries by line. Requires QBXML Version 7.0 or higher.</td>
</tr>
<tr>
<td>WorkersCompCodes</td>
<td>Query QuickBooks Workers Comp Code entries. Requires QBXML Version 7.0 or higher.</td>
</tr>
</tbody>
</table>

### Available Views

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BillLinkedTransactions</td>
<td>Query QuickBooks Bill Linked Transactions.</td>
</tr>
<tr>
<td>CompanyInfo</td>
<td>Query the company information from QuickBooks.</td>
</tr>
<tr>
<td>CreditMemoLinkedTransactions</td>
<td>Query QuickBooks Credit Memo Linked Transactions.</td>
</tr>
<tr>
<td>DeletedEntities</td>
<td>Query deleted Entities.</td>
</tr>
<tr>
<td>DeletedTransactions</td>
<td>Query deleted Transactions.</td>
</tr>
<tr>
<td>EstimateLinkedTransactions</td>
<td>Query QuickBooks Estimate Linked transactions.</td>
</tr>
<tr>
<td>Host</td>
<td>Query the QuickBooks host process. The Host represents information about the QuickBooks process currently being executed.</td>
</tr>
<tr>
<td>InvoiceLinkedTransactions</td>
<td>Query QuickBooks Invoice Linked Transactions.</td>
</tr>
<tr>
<td>ItemReceiptLinkedTransactions</td>
<td>Query QuickBooks Item Receipt Linked Transactions.</td>
</tr>
<tr>
<td>ItemSites</td>
<td>Create, update, delete, and query QuickBooks Item Sites. Item sites are only available in QuickBooks Enterprise 2010 and above, and only with the Advanced Inventory add-on. This table requires a minimum of QBXML version 10.0.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Preferences</td>
<td>Query information about many of the preferences the QuickBooks user has set in the company file.</td>
</tr>
<tr>
<td>PurchaseOrderLinkedTransactions</td>
<td>Query QuickBooks Purchase Order Linked Transactions.</td>
</tr>
<tr>
<td>SalesOrderLinkedTransactions</td>
<td>Query QuickBooks Sales Order Linked Transactions.</td>
</tr>
<tr>
<td>StatementChargeLinkedTransactions</td>
<td>Query QuickBooks Statement Charge Linked Transactions.</td>
</tr>
<tr>
<td>Templates</td>
<td>Query QuickBooks templates.</td>
</tr>
<tr>
<td>Transactions</td>
<td>Query QuickBooks transactions. You may search the Transactions using a number of values including Type, Entity, Account, ReferenceNumber, Item, Class, Date, and TimeModified.</td>
</tr>
<tr>
<td>VendorCreditLinkedTransactions</td>
<td>Query QuickBooks Vendor Credit Linked Transactions.</td>
</tr>
</tbody>
</table>
Connecting to QuickBooks Online

The Sisense QuickBooks Online connector is a standalone connector that allows you to import data from the QuickBooks Online API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect to Quickbooks Online API through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the QuickBooks Online API. To obtain a connection string, you will need to create a QuickBooks Online app.

Once you have connected to QuickBooks Online, you can import a variety of tables from the QuickBooks Online API.

This section describes how to install the QuickBooks Online connector, how to connect to QuickBooks Online with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Quickbooks Online Connector

Sisense provides the Quickbooks Online connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the QuickBooks Online connector:

1. Download the Quickbooks Online installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.

The Quickbooks Online connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Quickbooks Online REST API

To access Quickbooks Online’s REST API from Sisense, you must provide valid Oauth Quickbooks Online credentials. These credentials are provided by Quickbooks Online when you create an application.

Creating an App

You can follow the steps below to create an app and obtain the OAuth client credentials, the consumer key and consumer secret. You will need to create an Intuit developer account if you do not already have one.

2. Click My Apps > Create New App > Select APIs. Select the Accounting API.
3. On the Settings tab, define the Launch URL. If you are making a desktop application, set Launch URL to http://localhost/. For a Web application, set Launch URL to a page you would like the
user to be returned to after they have granted your application permissions.

Once you have created the app, you will be redirected to a page with information about your app. The Development tab contains your Sandbox credentials and the Production tab contains credentials for use with a production account. The consumer key and consumer secret are displayed on the Keys tab.

**Authenticating through Quickbooks Online**

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the consumer key in your app settings.
- **OAuthClientSecret**: Set this to the consumer secret in your app settings.
- **CompanyId**: Set this to the ID of the company you want to connect to.
- **CallbackURL**: Set this to http://localhost.
- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken and OAuthAccessTokenSecret.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.

3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding Quickbooks Online Tables to your ElastiCube

Sisense uses connection strings to connect to Quickbooks Online and import data into the ElastiCube Manager. Each connection string contains authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

To add Quickbooks Online data:

1. In ElastiCube Manager, click Add Data and then, Quickbooks Online. The Connect to Quickbooks Online window is displayed.

2. In Datasource Connection String, enter your connection string.

3. Click Connect to Server. Quickbooks Online is displayed in the Select Database list.

4. Click OK. Sisense connects to Quickbooks Online and displays a list of tables available for you to import.

5. Select the relevant tables and click Add.
The tables are displayed in the ElastiCube Manager.

**Quickbooks Online Tables**

The Sisense Quickbooks Online connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts</td>
<td>Query QuickBooks Accounts.</td>
</tr>
<tr>
<td>Attachables</td>
<td>Attachables.</td>
</tr>
<tr>
<td>BillLineItems</td>
<td>Query QuickBooks Bill Line Items.</td>
</tr>
<tr>
<td>BillPaymentLineItems</td>
<td>Query QuickBooks Bill Payment Line Items.</td>
</tr>
<tr>
<td>BillPayments</td>
<td>Query QuickBooks Bill Payments.</td>
</tr>
<tr>
<td>Bills</td>
<td>Query QuickBooks Bills.</td>
</tr>
<tr>
<td>BudgetDetails</td>
<td>Query QuickBooks BudgetDetails.</td>
</tr>
<tr>
<td>Budgets</td>
<td>Query QuickBooks Budgets.</td>
</tr>
<tr>
<td>Class</td>
<td>Query QuickBooks Classes.</td>
</tr>
<tr>
<td>CompanyInfo</td>
<td>Retrieve information about the QuickBooks company.</td>
</tr>
<tr>
<td>CreditMemoLineItems</td>
<td>Query QuickBooks Credit Memo Line Items.</td>
</tr>
<tr>
<td>CreditMemos</td>
<td>Query QuickBooks Credit Memos.</td>
</tr>
<tr>
<td>Customers</td>
<td>Query QuickBooks Customers.</td>
</tr>
<tr>
<td>Departments</td>
<td>Query QuickBooks Departments.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DepositLineItems</td>
<td>Query QuickBooks Deposit Line Items.</td>
</tr>
<tr>
<td>Deposits</td>
<td>Query QuickBooks Deposits.</td>
</tr>
<tr>
<td>Employees</td>
<td>Query QuickBooks Employees.</td>
</tr>
<tr>
<td>Entitlements</td>
<td>Retrieves QuickBooks Entitlements.</td>
</tr>
<tr>
<td>EstimateLineItems</td>
<td>Query QuickBooks Estimate Line Items.</td>
</tr>
<tr>
<td>EstimateLinkedTransactions</td>
<td>Query QuickBooks Estimate Line Items.</td>
</tr>
<tr>
<td>Estimates</td>
<td>Query QuickBooks Estimates.</td>
</tr>
<tr>
<td>InvoiceLineItems</td>
<td>Query QuickBooks Invoice Line Items.</td>
</tr>
<tr>
<td>InvoiceLinkedTransactions</td>
<td>Query QuickBooks Invoice Line Items.</td>
</tr>
<tr>
<td>Invoices</td>
<td>Query QuickBooks Invoices.</td>
</tr>
<tr>
<td>Items</td>
<td>Query QuickBooks Items.</td>
</tr>
<tr>
<td>JournalEntryLineItems</td>
<td>Query QuickBooks Journal Entry Line Items.</td>
</tr>
<tr>
<td>PaymentLineItems</td>
<td>Query QuickBooks Payment Line Items.</td>
</tr>
<tr>
<td>PaymentMethods</td>
<td>Query QuickBooks Payment Methods.</td>
</tr>
<tr>
<td>Payments</td>
<td>Query QuickBooks Payments.</td>
</tr>
<tr>
<td>Preferences</td>
<td>Query QuickBooks Preferences. The Preferences table contains settings for company-wide preferences, which affect all users.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>PurchaseLineItems</td>
<td>Query QuickBooks Purchase Line Items.</td>
</tr>
<tr>
<td>PurchaseOrderLineItems</td>
<td>Query QuickBooks Purchase Order Line Items.</td>
</tr>
<tr>
<td>PurchaseOrders</td>
<td>Query QuickBooks Purchase Orders.</td>
</tr>
<tr>
<td>Purchases</td>
<td>Query QuickBooks Purchases.</td>
</tr>
<tr>
<td>RefundReceiptLineItems</td>
<td>Query QuickBooks RefundReceiptLineItems.</td>
</tr>
<tr>
<td>RefundReceipts</td>
<td>Query QuickBooks RefundReceipts.</td>
</tr>
<tr>
<td>SalesReceiptLineItems</td>
<td>Query QuickBooks Sales Receipt Line Items.</td>
</tr>
<tr>
<td>SalesReceipts</td>
<td>Query QuickBooks Sales Receipts.</td>
</tr>
<tr>
<td>TaxCodes</td>
<td>Query QuickBooks Sales Tax Codes.</td>
</tr>
<tr>
<td>TaxRates</td>
<td>Query QuickBooks Tax Rates.</td>
</tr>
<tr>
<td>Terms</td>
<td>Query QuickBooks Terms.</td>
</tr>
<tr>
<td>TimeActivities</td>
<td>Query QuickBooks Time Activities.</td>
</tr>
<tr>
<td>Transfers</td>
<td>Query QuickBooks Transfers</td>
</tr>
<tr>
<td>VendorCredits</td>
<td>Query QuickBooks Vendor Credits.</td>
</tr>
<tr>
<td>Vendors</td>
<td>Query QuickBooks Vendors.</td>
</tr>
</tbody>
</table>
Connecting to SalesForce

1. The ElastiCube Manager enables easy and quick access to databases, tables and views contained within SalesForce. The steps below describe how to connect to this type of data source.

2. If you need to connect to your SalesForce Sandbox environment, read this article in our support forum.

3. **Note:** Sisense only supports SalesForce Enterprise and above.
   Before getting started you will need a SalesForce Security Token. To generate a token, open SalesForce and click Setup>'My Personal Information'>‘Reset Security Token’, and then click on the button labelled ‘Reset Security Token’. The token will be sent to your email address.

4. **Before you begin**

5. SalesForce can be customized in various ways, therefore its recommend to first review your deployment, and understand in which entity (account, contact etc.) and how the required data is stored. Once understood, connect to SalesForce and import a few tables to review the data. For a general outline of SalesForce entities see SalesForce Schema and Table Description.

6. Click Add Data in the top menu of the ElastiCube Manager.

7. Under the Web Services category, select SalesForce.
8. Enter the username and password to connect to SalesForce.

9. Enter the security token requested from SalesForce (see note above).

10. Click Connect to Server, then click OK.
11. All tables and views associated with SalesForce will appear in a new window.

12. To preview the data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the Preview checkbox.

13. Select the checkboxes next to each table or view you want to use.

14. Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.
15. Once all relevant tables are selected, click **Add**.
Connecting to ServiceNow

The Sisense ServiceNow connector is a standalone connector that allows you to import data from ServiceNow’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the ServiceNow APIs. To obtain a connection string, you will need to register a ServiceNow app.

Once you have connected to ServiceNow, you can import a variety of tables from the ServiceNow API.

This section describes how to install the ServiceNow connector, how to connect to ServiceNow with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the ServiceNow Connector

Sisense provides the ServiceNow connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the ServiceNow connector:

1. [Download](#) the ServiceNow installation file.
2. Open the installation file and click [Install](#).
3. After the installation process is complete, click [Close](#).
4. The ServiceNow connector is displayed in the ElastiCube Manager under [Add Data > Web Services](#).
Connecting to the ServiceNow REST API

To access ServiceNow’s REST API from the ElastiCube Manager, you must provide valid OAuth ServiceNow credentials through a connection string. These credentials are provided by ServiceNow when you create an application.

After you receive your credentials from ServiceNow, you can create the connection string and provide Sisense with it to connect to your data.

Registering an App

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. In the Navigator, click **System OAuth > Application Registry**.
2. Click **New** and then click **Create an OAuth API Endpoint for External Clients**.
3. Select the **Active** check box and enter the details for your app.

Authenticating through ServiceNow

After setting the following properties, you are ready to connect by providing the following details in a connection string:

- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.
- **OAuthClientId**: Set this to the Client Id in your app settings.
- **OAuthClientSecret**: Set this to the Client Secret in your app settings.
- **Password**: Set this to your password.
- **Username**: Set this to your username.
- **Instance**: Set this to your instance.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver completes the OAuth process.

### Adding ServiceNow Tables to your ElastiCube

Sisense uses connection strings to connect to ServiceNow and import data into the ElastiCube Manager. Each connection string contains authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

**To add ServiceNow data:**

1. In ElastiCube Manager, click **Add Data** and then, **ServiceNow**. The Connect to ServiceNow window is displayed.
2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. ServiceNow is displayed in the Select Database list.
4. Click **OK**. Sisense connects to ServiceNow and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

### ServiceNow Tables

ServiceNow’s RESTful APIs expose the following ServiceNow tables that you can import into the ElastiCube Manager through the Sisense ServiceNow connector:
## Available Tables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ast_contract</td>
<td>The ServiceNow table ast_contract.</td>
</tr>
<tr>
<td>ast_license_base</td>
<td>The ServiceNow table ast_license_base.</td>
</tr>
<tr>
<td>change_request</td>
<td>The ServiceNow table change_request.</td>
</tr>
<tr>
<td>cmdb_ci</td>
<td>The ServiceNow table cmdb_ci.</td>
</tr>
<tr>
<td>cmdb_metric</td>
<td>The ServiceNow table cmdb_metric.</td>
</tr>
<tr>
<td>cmn_building</td>
<td>The ServiceNow table cmn_building.</td>
</tr>
<tr>
<td>cmn_context_help</td>
<td>The ServiceNow table cmn_context_help.</td>
</tr>
<tr>
<td>cmn_cost_center</td>
<td>The ServiceNow table cmn_cost_center.</td>
</tr>
<tr>
<td>cmn_department</td>
<td>The ServiceNow table cmn_department.</td>
</tr>
<tr>
<td>cmn_location</td>
<td>The ServiceNow table cmn_location.</td>
</tr>
<tr>
<td>cmn_map_page</td>
<td>The ServiceNow table cmn_map_page.</td>
</tr>
<tr>
<td>cmn_notif_device</td>
<td>The ServiceNow table cmn_notif_device.</td>
</tr>
<tr>
<td>cmn_notif_device_variable</td>
<td>The ServiceNow table cmn_notif_device_variable.</td>
</tr>
<tr>
<td>cmn_notif_grmember</td>
<td>The ServiceNow table cmn_notif_group.</td>
</tr>
<tr>
<td>cmn_notif_group</td>
<td>The ServiceNow table cmn_notif_message.</td>
</tr>
<tr>
<td>cmn_notif_message</td>
<td>The ServiceNow table cmn_notif_message.</td>
</tr>
<tr>
<td>cmn_notif_service_provider</td>
<td>The ServiceNow table cmn_notif_service_provider.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>cmn_other_schedule</td>
<td>The ServiceNow table cmn_other_schedule.</td>
</tr>
<tr>
<td>cmn_relative_duration</td>
<td>The ServiceNow table cmn_relative_duration.</td>
</tr>
<tr>
<td>cmn_schedule</td>
<td>The ServiceNow table cmn_schedule.</td>
</tr>
<tr>
<td>cmn_schedule_blackout</td>
<td>The ServiceNow table cmn_schedule_blackout.</td>
</tr>
<tr>
<td>cmn_schedule_condition</td>
<td>The ServiceNow table cmn_schedule_condition.</td>
</tr>
<tr>
<td>cmn_schedule_maintenance</td>
<td>The ServiceNow table cmn_schedule_maintenance.</td>
</tr>
<tr>
<td>cmn_schedule_page</td>
<td>The ServiceNow table cmn_schedule_page.</td>
</tr>
<tr>
<td>cmn_schedule_span</td>
<td>The ServiceNow table cmn_schedule_span.</td>
</tr>
<tr>
<td>cmn_timeline_page</td>
<td>The ServiceNow table cmn_timeline_page.</td>
</tr>
<tr>
<td>cmn_timeline_page_style</td>
<td>The ServiceNow table cmn_timeline_page_style.</td>
</tr>
<tr>
<td>cmn_timeline_sub_item</td>
<td>The ServiceNow table cmn_timeline_sub_item.</td>
</tr>
<tr>
<td>diagrammer_action</td>
<td>The ServiceNow table diagrammer_action.</td>
</tr>
<tr>
<td>expert_panel</td>
<td>The ServiceNow table expert_panel.</td>
</tr>
<tr>
<td>item_option_new</td>
<td>The ServiceNow table item_option_new.</td>
</tr>
<tr>
<td>question</td>
<td>The ServiceNow table question.</td>
</tr>
<tr>
<td>sc_category</td>
<td>The ServiceNow table sc_category.</td>
</tr>
<tr>
<td>sc_cat_item</td>
<td>The ServiceNow table sc_cat_item.</td>
</tr>
<tr>
<td>sla</td>
<td>The ServiceNow table sla.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>sysauto</td>
<td>The ServiceNow table sysauto.</td>
</tr>
<tr>
<td>sysauto_script</td>
<td>The ServiceNow table sysauto_script.</td>
</tr>
<tr>
<td>syslog</td>
<td>The ServiceNow table syslog.</td>
</tr>
<tr>
<td>sysrule</td>
<td>The ServiceNow table sysrule.</td>
</tr>
<tr>
<td>system_db_object</td>
<td>The ServiceNow table system_db_object.</td>
</tr>
<tr>
<td>system_dictionary</td>
<td>The ServiceNow table system_dictionary.</td>
</tr>
<tr>
<td>system_documentation</td>
<td>The ServiceNow table system_documentation.</td>
</tr>
<tr>
<td>system_import_set_row</td>
<td>The ServiceNow table system_import_set_row.</td>
</tr>
<tr>
<td>system_script_client</td>
<td>The ServiceNow table system_script_client.</td>
</tr>
<tr>
<td>system_ui_policy</td>
<td>The ServiceNow table system_ui_policy.</td>
</tr>
<tr>
<td>system_ui_policy_action</td>
<td>The ServiceNow table system_ui_policy_action.</td>
</tr>
<tr>
<td>task</td>
<td>The ServiceNow table task.</td>
</tr>
<tr>
<td>v_field_creator</td>
<td>The ServiceNow table v_field_creator.</td>
</tr>
</tbody>
</table>
Connecting to Sisense ElastiCubes

ElastiCubes can also be connected to a data source using the Sisense ElastiCube connector or the Sisense ODBC, allowing you to import tables across different ElastiCubes. This can be useful for several use cases, such as:

- Separating custom SQL logic that is used for heavy data transformation from the main ElastiCube for easier management and shorter build times.
- Combining tables that are based on different refresh schedules. As every ElastiCube has its own build schedule, it is possible to import a table from an ElastiCube that doesn’t refresh as often.

This section describes how to connect to your Sisense ElastiCubes through both methods:

- Sisense ElastiCube Connector
- ODBC Driver

Sisense ElastiCube Connector

The native Sisense ElastiCube Connector enables you to import data from other running ElastiCubes and provides faster performance over the Sisense ODBC. The Sisense ElastiCube Connector does not support SSL connections, however, you can import ElastiCube through SSL connections via the ODBC driver described below.

Note: The first time you connect to an ElastiCube, the ElastiCube must be running. For subsequent connections, the connector automatically activates the ElastiCube. You can verify and activate your ElastiCubes from the Sisense Server Console in the ElastiCube Manager Admin.
To import data from ElastiCubes:

1. In ElastiCube Manager, click Add Data and then, Ecube Database. The Connect to ElastiCube window is displayed.

2. From the Database server location list, enter the address of your ElastiCube.
   OR
   If you have previously entered the address, select the relevant address.
3. In the **User Name** and **Password** fields, enter your Sisense credentials for the ElastiCube.

4. Click **Connect to Server**. The running ElastiCubes at the location you defined are displayed in the Select (Running) ECube list.

5. Select the relevant ElastiCube. The Add table from ElastiCube Tables is displayed.

![Add table from ElastiCube Tables](image)

6. Select the relevant tables to import and click **Add**. The tables are displayed in the ElastiCube Manager.
Sisense ODBC Driver

The following topics explain how you can import ElastiCube data from another ElastiCube.

Downloading and Connecting the Sisense ODBC Driver

1. Download and install the Sisense ODBC Driver.
2. In ElastiCube Manager, click Add Data and then, Generic ODBC Driver.
3. Select DSN. If a DSN file has already been created, select it in the dropdown list, and click Test Connection. If you need to add a DSN, see Adding a DSN. If your connection has been set up, you can click OK and review the tables generated by the Sisense ODBC driver.
Adding a DSN

If a DSN has not yet been created, you must add the DSN manually.

**Note:** To add a DSN you must run the Sisense ElastiCube Manager as an administrator.

To add a DSN:

1. Click **Add DSN**.

2. Select the System Data Source option. The created file will apply to all users in a specific machine only. Click **Next**.
3. Select the Sisense ODBC Driver and click **Next**.

4. Click **Finish**.

5. In the New Sisense Data Source window, do the following:
<table>
<thead>
<tr>
<th>Field</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Source Name</td>
<td>Enter your name for the DSN that is to be displayed in the DSN dropdown list.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter your description of the DSN.</td>
</tr>
<tr>
<td>Server</td>
<td>Enter the IP address of your ElastiCube server.</td>
</tr>
<tr>
<td>Use secure connection (SSL)</td>
<td>Select to enable a secure SSL connection.</td>
</tr>
<tr>
<td>ElastiCube</td>
<td>Select the ElastiCube you want to export.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>If this is your first time configuring a DSN for the Sisense ODBC, click the ElastiCube list. The Login to Sisense window is displayed.</td>
</tr>
<tr>
<td></td>
<td>Enter your credentials and click OK. Wait several seconds while Sisense returns a list of your ElastiCubes.</td>
</tr>
<tr>
<td></td>
<td>After the list is displayed in the ElastiCube list, select the ElastiCube you want to import</td>
</tr>
<tr>
<td>Log</td>
<td>(Optional) To configure logging behavior for the driver, click <strong>Logging Options</strong>. For more information, see Logging Options.</td>
</tr>
</tbody>
</table>

6. Click **Test**. A pop window is displayed that indicates the connection was successful.

7. Click **OK**.

8. In the ODBC Connectivity Properties window, click **Test Connection**.
9. Click **OK** to save and close the ODBC Connectivity Properties window.

**Logging Options**

You can configure logging options by clicking **Log** in the New Sisense Data Source window. This displays the Logging Options window.

The Sisense ODBC driver provides tracing functionality, which you can activate to help troubleshoot issues.

**Important:** Only enable logging long enough to capture an issue. Logging decreases performance and can consume a large quantity of disk space.

The driver allows you to set the amount of detail included in log files. The table below lists the logging levels provided by the Sisense ODBC Driver, in order from least verbose to most verbose.

In the Logging Options window, you can configure the following information:
## Field Description

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Level</td>
<td>Select the Log Level. There are seven possible options:</td>
</tr>
<tr>
<td></td>
<td>LOG_OFF: Disables all logging.</td>
</tr>
<tr>
<td></td>
<td>LOG_FATAL: Logs very severe error events that lead the driver to abort.</td>
</tr>
<tr>
<td></td>
<td>LOG_ERROR: Logs error events that might still allow the driver to continue running.</td>
</tr>
<tr>
<td></td>
<td>LOG_WARNING: Logs potentially harmful situations.</td>
</tr>
<tr>
<td></td>
<td>LOG_INFO: Logs general information that describes the progress of the driver.</td>
</tr>
<tr>
<td></td>
<td>LOG_DEBUG: Logs detailed information that is useful for debugging the driver.</td>
</tr>
<tr>
<td></td>
<td>LOG_TRACE: Logs more detailed information than the DEBUG level.</td>
</tr>
<tr>
<td>Log Path</td>
<td>Enter the full path to the folder where you want to save log files.</td>
</tr>
<tr>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>Click Browse and select the folder where you want to save log files.</td>
</tr>
<tr>
<td>Log Namespace</td>
<td>Enter the filename for your log.</td>
</tr>
<tr>
<td>Max Number Files</td>
<td>Enter the maximum number of logs that can be created before the oldest log files are overwritten by newer logs.</td>
</tr>
<tr>
<td>Max File Size (MB)</td>
<td>Enter the maximum number of megabytes your log can reach before the log is overwritten by a newer log.</td>
</tr>
</tbody>
</table>

### Adding ElastiCubes Tables to your Project

After setting up the DSN, the Add table from ElastiCube Tables window is displayed.
From this window, you add your ElastiCube tables to your ElastiCube Manager. In addition, you can view the SQL syntax in the Query Preview section and click Edit to customize it.

To add ElastiCube Tables to your Project:

1. Connect to your ElastiCube tables via the Sisense ODBC Tool.
2. Add your data source.
3. In the Add table from ElastiCube Tables window, select the table you want to add to the ElastiCube Manager.
4. Click Add. The selected tables are added to your ElastiCube Manager.
Connecting to SnowFlake

Through the ElastiCube Manager, you can connect and integrate your Snowflake data warehouse quickly and easily to generate and analyze your data. Snowflake provides an ODBC driver for connecting to Snowflake using ODBC-based client applications such as Sisense.

Downloading and Connecting the Snowflake ODBC Driver

1. Download and install the Snowflake ODBC Driver. For more information, click here.
2. In ElastiCube Manager, click Add Data and then, Generic ODBC Driver.
3. Select DSN. If a DSN file has already been created, select it in the dropdown list, and click Test Connection. If you need to add a DSN, see Adding a DSN. If your connection has been set up, you can click OK and review the tables generated by the Snowflake ODBC driver.

OR

Select Connection String (DSN-Less) and enter your Connection String. Click Test Connection. For more information, see Connecting without a DSN.
Adding a DSN

If a DSN has not yet been created, you must add the DSN manually.

**Note:** To add a DSN you must run the Sisense ElastiCube Manager as an administrator.

To add a DSN:

1. Click **Add DSN**.

2. Select the **System Data Source** option. The created file applies to all users in a specific machine only. Click **Next**.

3. Select the **Snowflake ODBC Driver**, and click **Next**.

4. Click **Finish**.
5. In the Snowflake ODBC Driver DSN Setup window, enter the following details:

![Image of Snowflake Configuration Dialog]

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Snowflake user name.</td>
</tr>
<tr>
<td>Password</td>
<td>Snowflake password.</td>
</tr>
<tr>
<td>Server</td>
<td>Specifies the domain name for your account provided to you by Snowflake.</td>
</tr>
<tr>
<td>Database</td>
<td>Specifies the default database to use for sessions initiated by the driver.</td>
</tr>
<tr>
<td>Schema</td>
<td>Specifies the default schema to use for sessions initiated by the driver.</td>
</tr>
<tr>
<td>Warehouse</td>
<td>Specifies the default warehouse to use for sessions initiated by the driver.</td>
</tr>
<tr>
<td>Role</td>
<td>Specifies the default role to use for sessions initiated by the driver. The specified role should be a role that has been assigned to the specified user for the driver. If the specified role has not been assigned to the user, the role is not used for sessions initiated by the driver.</td>
</tr>
<tr>
<td>Tracing</td>
<td>The level of detail to be logged in the driver trace files:</td>
</tr>
</tbody>
</table>

0 = Disable tracing
When entering parameters, note the following:

- Data Source, User and Server are the only parameters required to create a DSN.
- The Password field accepts a value, but does not store the value. This is a security precaution to ensure passwords are never stored directly in the driver.
- All other parameters in the dialog are optional.

6. Click **OK**.

### Adding Snowflake Tables to your Project

After setting up the DSN, the Add table from Snowflake Tables window is displayed.

From this window, you add your Snowflake tables to your ElastiCube Manager. In addition, you can view the SQL syntax in the Query Preview section and click **Edit** to customize it.

**To add Snowflake Tables to your Project:**

1. Connect to Snowflake via the Sisense ODBC Tool.
2. Add your data source.
3. In the Add table from Snowflake Tables window, select the table you want to add to the ElastiCube Manager.
4. Click **Add**. The selected tables are added to your ElastiCube Manager.
Connecting to Splunk

The Splunk SDK for C# v1.0.x is deprecated, and has been replaced by the Splunk SDK for C# 2.0. Unlike the Splunk SDK for C# 1.0.x, the Splunk SDK for C# 2.0 abides by .NET guidelines, as well as FxCop and StyleCop rules.

In addition, the API client in Splunk SDK for C# 2.0 is a Portable Class Library (PCL), and supports cross-platform development.

Version 2 of the SDK is incompatible with version 1, and applications built with Splunk SDK for C# version 1.0.x will not recompile using Splunk SDK for C# version 2.0. See Migrating from Splunk SDK for C# v1.0.x for more information.

The ElastiCube Manager enables easy and quick access to Splunk. The steps below detail how to connect to this type of data source.

1. Click Add data in the top menu of the ElastiCube Manager.
2. Under the Database Servers category, select Splunk.
3. You will be prompted to enter the following information:
4. **Database server location**: Enter the computer/server IP address which holds the Splunk instance.

5. Select either **Windows Authentication** if configured with the database or alternatively, **Use the Following User Name & Password**, and enter the database credentials.

6. Click **Connect to Server**.

7. A list of available Splunk instances will appear in the list box below.

8. Select the relevant Splunk instance you want to work with and click **OK**.

9. All saved searches associated with the Splunk instance will appear in a new window.

10. To preview data contained in a particular Splunk search, highlight the search in the list and in click in the **Preview** pane. To preview the search, select the **Preview** checkbox.
11. Select the checkbox next to each table or view you want to use.
12. Fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.
13. Once all relevant tables are selected, click **Add**.
Connecting to Stripe

The Sisense Stripe connector is a standalone connector that allows you to import data from Stripe’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Stripe APIs. To obtain a connection string, you will need to create a Stripe app.

Once you have connected to Stripe, you can import a variety of tables from the Stripe API.

This section describes how to install the Stripe connector, how to connect to Stripe with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Stripe Connector

Sisense provides the Stripe connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Stripe connector:

1. Download the Stripe installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Stripe connector is displayed in the ElastiCube Manager under Add Data > Web Services.

Connecting to the Stripe REST API

To access Stripe’s REST API from the ElastiCube Manager, you must provide valid Oauth Stripe credentials through a connection string.
These credentials are provided by Stripe when you create an application.

After you receive your credentials from Stripe, you can create the connection string and provide Sisense with it to connect to your data.

**Registering an App**

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log into your Stripe dashboard and click *Your Account > Account Settings > Connect > Platform Settings*.
2. Enter a name, description, and other information to be displayed to users when they log in to grant permissions to your app.
3. If you are making a desktop application, set the Redirect URL to [http://localhost:33333](http://localhost:33333) or a different port number of your choice.

   If you are making a Web application, set the Redirect URL to a page on your Web app you would like the user to be returned to after they have authorized your application.

**Authenticating through Stripe**

After setting the following properties, you are ready to connect:

- **OAuthClientId**: Set this to the client Id in the Connect section of your account settings.
- **OAuthClientSecret**: Set this to a secret key in the API Keys section of your account settings.
CallbackURL: Set this to the Redirect URL in the Connect section of your account settings.

InitiateOAuth: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver completes the OAuth process.

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding Stripe Tables to your ElastiCube

Sisense uses connection strings to connect to Stripe and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

To add Stripe data:

1. In ElastiCube Manager, click Add Data and then, Stripe. The Connect to Stripe window is displayed.
2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. Stripe is displayed in the Select Database list.
4. Click **OK**. Sisense connects to Stripe and displays a list of tables available for you to import.

5. Select the relevant tables and click **Add**.

6. The tables are displayed in the ElastiCube Manager.

**Stripe Tables**

Stripe’s RESTful APIs expose the following Stripe tables that you can import into the ElastiCube Manager through the Sisense Stripe connector:

**Available Tables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts</td>
<td>Create, update, delete, and query the Accounts you manage in Stripe.</td>
</tr>
<tr>
<td>BankAccounts</td>
<td>Create, update, delete, and query the available Bank Accounts in Stripe.</td>
</tr>
<tr>
<td>BankAccountTokens</td>
<td>Insert and query the available Bank Account Tokens in Stripe.</td>
</tr>
<tr>
<td>Cards</td>
<td>Create, update, and query the available Cards in Stripe.</td>
</tr>
<tr>
<td>CardTokens</td>
<td>Create and query the available Card Tokens in Stripe.</td>
</tr>
<tr>
<td>Charges</td>
<td>Create, update, and query the available Charges in Stripe.</td>
</tr>
<tr>
<td>Customers</td>
<td>Create, update, delete, and query the available Customers in Stripe.</td>
</tr>
<tr>
<td>Disputes</td>
<td>Update and query the available Disputes in Stripe.</td>
</tr>
<tr>
<td>Refunds</td>
<td>Query the available refunds in Stripe.</td>
</tr>
<tr>
<td>TransferReversals</td>
<td>Query the available categories in Stripe.</td>
</tr>
<tr>
<td>Transfers</td>
<td>Query the available transfers in Stripe.</td>
</tr>
</tbody>
</table>
Available Views

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AvailableBalance</td>
<td>Query the Available Balance in Stripe.</td>
</tr>
<tr>
<td>BalanceHistory</td>
<td>Query Balance History in Stripe.</td>
</tr>
<tr>
<td>CountrySpecs</td>
<td>Query the available Country Specs in Stripe.</td>
</tr>
<tr>
<td>Events</td>
<td>Query the available events in Stripe.</td>
</tr>
<tr>
<td>Orders</td>
<td>Query the available orders in Stripe.</td>
</tr>
<tr>
<td>PendingBalance</td>
<td>Query the available balance in Stripe.</td>
</tr>
<tr>
<td>Products</td>
<td>Query the available products in Stripe.</td>
</tr>
<tr>
<td>Skus</td>
<td>Query the available SKUs in Stripe.</td>
</tr>
</tbody>
</table>

Limitations

1. Not all fields can be filtered.
2. When a field cannot be filtered, you can not perform an accumulative build on that field.
Connecting to SQL Server

The ElastiCube Manager enables easy and quick access to databases, tables and views contained with Microsoft SQL Server databases. The steps below detail how to connect to this type of data source.

1. Click **Add data** on the top menu of the ElastiCube Manager.
2. Under **Database servers**, select **Microsoft SQL Server**.
3. The Connect to SQL Server window is displayed.
4. **Database server location**: Enter the computer/server IP address of the database. To connect to a database running on your own computer enter **localhost**.
5. Select either **Windows Authentication** if configured with the database or alternatively, **Use the Following User Name & Password**, and enter the database credentials.
6. (Optional) Select **Encrypt Connection** to configure the driver to encrypt all communication with the SQL Server instance before sending it over the network, and then select **Trust Server Certificate**.

7. Click **Connect to server**

8. From the **Select Database** dropdown list, select the database you want to work with, and click **OK**.

9. All tables and views associated with the database will appear in a new window.

![Table Selection and Preview](image)

10. To view a preview of data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the **Preview** checkbox. Enable the checkbox next to each table or view you would like to use.
11. Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** option. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** option.

12. If you want to customize the data before importing it into the ElastiCube, you can run a custom SQL query to manipulate the data. This can be useful, for example, when you want to import only a portion of the data, rather than all of the data.

13. Once all relevant tables are selected, click **Add**.
Connecting to Twitter

The Sisense Twitter connector is a standalone connector that allows you to import data from Twitter’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to Twitter’s API. To obtain a connection string, you will need to create a Twitter app.

Once you have connected to Twitter, you can import a variety of tables from the Twitter API.

This section describes how to install the Twitter connector, how to connect to Twitter with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Twitter Connector

Sisense provides the Twitter connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Twitter connector:

1. Download the Twitter installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The Twitter connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the Twitter REST API

To access Twitter’s REST API from Sisense, you must provide valid OAuth Twitter credentials. These credentials are provided by Twitter when you create an application.

Creating an App

You can follow the steps below to obtain the OAuth client credentials:

1. Log in to https://dev.twitter.com/apps.
2. Click Create New App.
3. Enter the name, description, and website to be displayed to users when they connect.
4. Define the callback URL setting. If you are making a Web app, set the callback URL to the URL you would like users to be returned to after they have granted your application privileges. If you are making a desktop application, set the callback URL to http://localhost/.

Once you have created the app, you will be redirected to a page with information about your app.
If you intend to communicate with Twitter only as the currently authenticated user, then you can obtain the OAuthAccessToken and OAuthAccessTokenSecret directly from this page on Twitter. The OAuthAccessToken and OAuthAccessTokenSecret are listed under the OAuth Settings in the Your Access Token section. You can then connect by setting these connection string properties and do not need to continue to the other steps.

Otherwise, if you need to generate access tokens for other user accounts besides the one you used to create the app on Twitter, use the consumer key and consumer secret in the following steps.

**Accessing Ads Data from Twitter**

Before requesting data from Twitter, you must apply for access to your data from Twitter by submitting this request form. As part of your request, you must provide your APP ID. Click here for instructions on how to find your APP ID.

After you have created a Twitter app, you can manage it here. This is useful if you need to set permissions so you can access the relevant data.

**Authenticating through Twitter**

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the consumer key in your app settings.
- **OAuthClientSecret**: Set this to the consumer secret in your app settings.
- **CallbackURL**: Set this to the callback URL you specified in your app settings.
**InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken and OAuthAccessTokenSecret.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

**Adding Twitter Tables to your ElastiCube**

Sisense uses connection strings to connect to Twitter and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

**To add Twitter data:**
1. In ElastiCube Manager, click **Add Data** and then, **Twitter**. The Connect to Twitter window is displayed.

   ![Connect to Twitter window]

2. In **Datasource Connection String**, enter your connection string.

3. Click **Connect to Server**. Twitter is displayed in the Select Database list.

4. Click **OK**. Sisense connects to Twitter and displays a list of tables available for you to import.

5. Select the relevant tables and click **Add**. The tables are displayed in the ElastiCube Manager.

### Twitter Tables

The Sisense Twitter connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DirectMessagesReceived</td>
<td>Query and delete direct messages received by the authenticated user.</td>
</tr>
<tr>
<td>DirectMessagesSent</td>
<td>Send direct messages and query messages sent by the authenticated user.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Favorites</td>
<td>Create, delete, and query a list of favorite tweets of the authenticated user and allow the user to favorite new tweets or remove existing favorites.</td>
</tr>
<tr>
<td>Following</td>
<td>Create, delete, and query a list of users that the current Twitter account is following, otherwise known as friends.</td>
</tr>
<tr>
<td>Tweets</td>
<td>Create, delete, and query status updates and tweets from the authenticated user.</td>
</tr>
<tr>
<td>AccountSettings</td>
<td>Query account settings about the currently authenticated user.</td>
</tr>
<tr>
<td>AdAccounts</td>
<td>Retrieve all of the advertising-enabled accounts the authenticating user has access to.</td>
</tr>
<tr>
<td>AdAvailableAudiences</td>
<td>Query available audiences for this account.</td>
</tr>
<tr>
<td>AdCampaigns</td>
<td>Retrieve details for some or all campaigns associated with the current account.</td>
</tr>
<tr>
<td>AdFundingInstruments</td>
<td>Retrieve some or all funding instruments associated with the account specified in the path.</td>
</tr>
<tr>
<td>AdInsights</td>
<td>Provide qualitative information about various Twitter audiences.</td>
</tr>
<tr>
<td>AdLineItems</td>
<td>Retrieve some or all funding instruments associated with the account specified in the path.</td>
</tr>
<tr>
<td>AdPromotedTweets</td>
<td>Retrieve all of the advertising-enabled tweets the authenticating user has access to.</td>
</tr>
<tr>
<td>AdStats</td>
<td>Query information about all available metrics for a certain entity.</td>
</tr>
<tr>
<td>Followers</td>
<td>Query a list of users following the current Twitter account.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>ListMembers</td>
<td>Query the members of a specified list.</td>
</tr>
<tr>
<td>Lists</td>
<td>Query Twitter list information based on a set of criteria.</td>
</tr>
<tr>
<td>ListSubscribers</td>
<td>Query the subscribers to a specified list.</td>
</tr>
<tr>
<td>Mentions</td>
<td>Query a list of retweets of the authenticated user.</td>
</tr>
<tr>
<td>Retweets</td>
<td>Query a list of retweets of the authenticated user.</td>
</tr>
<tr>
<td>Trends</td>
<td>Query the daily trending topics from Twitter.</td>
</tr>
<tr>
<td>Users</td>
<td>Query a list of users based on the SearchTerms, Id, or Screen_Name.</td>
</tr>
</tbody>
</table>
Connecting to Xero Accounting

The Sisense Xero connector is a standalone connector that allows you to import data from Xero’s API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the Xero APIs. To obtain a connection string, you will need to create a Xero app.

Once you have connected to Xero, you can import a variety of tables from the Xero API.

This section describes how to install the Xero connector, how to connect to Xero with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the Xero Connector

Sisense provides the Xero connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the Xero connector:

1. Download the Xero installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
   The Xero connector is displayed in the ElastiCube Manager under Add Data > Web Services.

Connecting to the Xero REST API

To access Xero’s REST API from the ElastiCube Manager, you must provide valid OAuth Xero credentials through a connection string.
These credentials are provided by Xero when you register an application.

After you receive your credentials from Xero, you can create the connection string and provide Sisense with it to connect to your data.

**Registering an App**

Follow the steps below to obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log in to the Xero Developer Portal.
2. Click **My Applications** > **Add Application**.
3. Select the **Public** option.
4. Enter a name for your application and the URL of your company. This information is displayed to users when they connect.
5. If you are making a Desktop application, set the Callback Domain to ‘localhost’.
   If you are making a Web application, set the Callback Domain to the domain name of the URL where the user returns with the token that verifies that they have granted your app access.
6. After you click **Save**, you are shown your OAuth credentials, the consumer key, and consumer secret.

**Authenticating through Xero**

After setting the following connection properties, you are ready to connect:

- **OAuthClientId**: Set this to the consumer key in your app settings.
- **OAuthClientSecret**: Set this to the consumer secret in your app settings.
XeroAppAuthentication: Set this to the type of your application. Allowed values: PUBLIC or PARTNER. Default: PUBLIC.

InitiateOAuth: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding Xero Tables to your ElastiCube

Sisense uses connection strings to connect to Xero and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

To add Xero data:

1. In ElastiCube Manager, click Add Data and then, Xero. The Connect to Xero window is displayed.
2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. Xero is displayed in the Select Database list.
4. Click OK. Sisense connects to Xero and displays a list of tables available for you to import.
5. Select the relevant tables and click Add. The tables are displayed in the ElastiCube Manager.
Xero Tables

Xero’s RESTful APIs expose the following Xero tables that you can import into the ElastiCube Manager through the Sisense Xero connector:

Available Tables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts</td>
<td>Create, delete, and query accounts for a Xero organisation.</td>
</tr>
<tr>
<td>BankTransactions</td>
<td>Create, update, delete, and query bank transactions for a Xero organisation.</td>
</tr>
<tr>
<td>BankTransfers</td>
<td>Usage information for the operation BankTransfers.rsd.</td>
</tr>
<tr>
<td>ContactGroups</td>
<td>Create, update, and query contact groups for a Xero organisation.</td>
</tr>
<tr>
<td>Contacts</td>
<td>Create, update, and query contacts for a Xero organisation.</td>
</tr>
<tr>
<td>CreditNotes</td>
<td>Create, update, delete, and query credit notes for a Xero organisation.</td>
</tr>
<tr>
<td>Employees</td>
<td>Create, update, and query employees for a Xero organisation.</td>
</tr>
<tr>
<td>ExpenseClaims</td>
<td>Create, update, and query expense claims for a Xero organisation.</td>
</tr>
<tr>
<td>Invoices</td>
<td>Create, update, delete, and query invoices for a Xero organisation.</td>
</tr>
<tr>
<td>Items</td>
<td>Create, update, delete, and query items for a Xero organisation.</td>
</tr>
<tr>
<td>LinkedTransactions</td>
<td>Create, update, and query LinkedTransactions for a Xero organisation.</td>
</tr>
<tr>
<td>ManualJournals</td>
<td>Create, update, and query manual journals for a Xero organisation.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Payments</td>
<td>Create and query payments for a Xero organisation.</td>
</tr>
<tr>
<td>PurchaseOrders</td>
<td>Create, update, delete, and query purchase orders for a Xero organisation.</td>
</tr>
<tr>
<td>Receipts</td>
<td>Create, update, delete, and query receipts for a Xero organisation.</td>
</tr>
<tr>
<td>TaxRates</td>
<td>Usage information for the operation TaxRates.rsd.</td>
</tr>
</tbody>
</table>

**Payroll US Data Model**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>Create, update, and query employees for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsBenefits</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsDeductions</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsEarnings</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsReimbursements</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsTimeOff</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayRuns</td>
<td>Create, update, and query payruns for a Xero organisation.</td>
</tr>
<tr>
<td>PaySchedules</td>
<td>Create, update, and query PaySchedules for a Xero organisation.</td>
</tr>
<tr>
<td>Paystubs</td>
<td>Create, update, and query pay stubs for a Xero organisation.</td>
</tr>
<tr>
<td>WorkLocations</td>
<td>Create, update, and query work locations for a Xero organisation.</td>
</tr>
</tbody>
</table>

**Payroll AUS Data Model**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>Create, update, and query employees for a Xero organisation.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>LeaveApplications</td>
<td>Create, update, and query Leave Applications for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsDeductions</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsEarnings</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsLeave</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayItemsReimbursements</td>
<td>Create, update, and query PayItems for a Xero organisation.</td>
</tr>
<tr>
<td>PayrollCalendars</td>
<td>Create, update, and query Payroll Calendars for a Xero organisation.</td>
</tr>
<tr>
<td>PayRuns</td>
<td>Create, update, and query payruns for a Xero organisation.</td>
</tr>
<tr>
<td>SuperFunds</td>
<td>Retrieve, add and update Payroll Super Funds in a Xero organisation.</td>
</tr>
</tbody>
</table>

**Available Views**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting Data Model</td>
<td></td>
</tr>
<tr>
<td>AgedPayablesByContact</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>AgedReceivablesByContact</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>BalanceSheet</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>BankSummary</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>BrandingThemes</td>
<td>Query branding themes for a Xero organisation.</td>
</tr>
<tr>
<td>BudgetSummary</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>Currencies</td>
<td>Query currencies for a Xero organisation.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Journals</td>
<td>Query the line items in journals for a Xero organisation.</td>
</tr>
<tr>
<td>Organisation</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>Overpayments</td>
<td>Create and query Overpayments for a Xero organisation.</td>
</tr>
<tr>
<td>Prepayments</td>
<td>Create and query Prepayments for a Xero organisation.</td>
</tr>
<tr>
<td>ProfitAndLoss</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>RepeatingInvoices</td>
<td>Usage information for the operation RepeatingInvoices.rsd.</td>
</tr>
<tr>
<td>TrackingCategories</td>
<td>Query tracking categories for a Xero organisation.</td>
</tr>
<tr>
<td>TrialBalance</td>
<td>Query organisation data for a Xero organisation.</td>
</tr>
<tr>
<td>Users</td>
<td>Query users for a Xero organisation.</td>
</tr>
</tbody>
</table>

**Payroll US Data Model**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TimeOffBalances</td>
<td>Retrieve, add and update an Employee's TimeOff balance in a Xero organisation.</td>
</tr>
<tr>
<td>Timesheets</td>
<td>Create, update, and query timesheets for a Xero organisation.</td>
</tr>
</tbody>
</table>

**Payroll AUS Data Model**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LeaveBalances</td>
<td>Retrieve, add and update an Employee's Leave balance in a Xero organisation.</td>
</tr>
</tbody>
</table>

**Limitations**

To access the AgedPayablesByContact and AgedReceivablesByContact tables, you need to specify a particular ContactID, the unique ID of the Contacts table, in the select query.
using a WHERE clause. This allows you to retrieve data for a specific contact. These are limitations of the Xero API, as these reports are specific to each contact. Here’s an example:

```sql
SELECT due, paid, total FROM AgedPayablesByContact WHERE ContactID='xyz'
SELECT duedate, reference FROM AgedRecievablesByContact WHERE ContactID='1234'
```

Due this limitation, you cannot build an ElastiCube with these tables without custom SQL.

**Daily Limit**

There is a daily limit of 1000 API calls against a single Xero organisation in a rolling 24-hour period.

In addition to the daily limit, a single access token can only be used up to 60 times in a rolling 60-second period.

**Encountering a Rate Limit**

If you encounter a rate limit, the Xero API will return an HTTP 503 (Service Unavailable) error, with the following message: “oauth_problem=rate limit exceeded”.

**Note:** If you encounter a rate limit, do not continue to make requests, as this may continue to add to your limitation. If necessary, you may need to queue requests.

**Token Limitations**

Each access token will only last for 30 minutes. If you want longer access to the organisation, you need the user to re-authorize your application.
Connecting to YouTube

The Sisense YouTube connector is a standalone connector that allows you to import data from the YouTube API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect to the YouTube API through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to YouTube’s API. To obtain a connection string, you will need to create a YouTube app.

Once you have connected to YouTube, you can import a variety of tables from the YouTube API.

This section describes how to install the YouTube connector, how to connect to YouTube with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the YouTube Connector

Sisense provides the YouTube connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the YouTube connector:

1. Download the YouTube installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The YouTube connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the YouTube REST API

To access YouTube’s REST API from the ElastiCube Manager, you must provide valid OAuth2 YouTube credentials through a connection string. These credentials are provided by YouTube when you create an application.

After you receive your credentials from YouTube, you can create the connection string and provide Sisense with it to connect to your data.

Creating an App

You can follow the procedure below to register an app and obtain the OAuth client credentials, the OAuthClientId and OAuthClientSecret:

1. Log in to the Google Developers Console.
2. Click Create Project or select an existing project.
3. In the API Manager, click Credentials > Create

   Credentials > OAuth Client Id and then click Configure Consent
Screen to customize the information displayed to users when they connect.

4. If you are connecting from a desktop application, click Other in the Application Type section. If you are connecting from a Web application, click the Web Application option. In the Authorized Redirect URIs box, enter the URL you want to be used as a trusted redirect URL, where the user will return with the token that verifies that they have granted your app access.

5. Click Create. The OAuthClientId and OAuthClientSecret are displayed.

6. Click Library and enable the YouTube Data API.

Authenticate to YouTube

After setting the following connection properties, you are ready to connect:

- **InitiateOAuth**: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.
- **OAuthClientId**: Set this to the Client Id in your app settings.
- **OAuthClientSecret**: Set this to the Client Secret in your app settings.
- **CallbackURL**: Set this to http://localhost.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver then completes the OAuth process:

1. Extracts the access token from the callback URL and authenticates requests.
2. Refreshes the access token when it expires.
3. Saves OAuth values in OAuthSettingsLocation to be persisted across connections.

Adding YouTube Tables to your ElastiCube

Sisense uses connection strings to connect to YouTube and import data into the ElastiCube Manager. Each connection string contains a authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.

To add YouTube data:

1. In ElastiCube Manager, click Add Data and then, YouTube. The Connect to YouTube window is displayed.

2. In Datasource Connection String, enter your connection string.
3. Click Connect to Server. YouTube is displayed in the Select Database list.
4. Click OK. Sisense connects to YouTube and displays a list of tables available for you to import.
5. Select the relevant tables and click Add.
6. The tables are displayed in the ElastiCube Manager.

**YouTube Tables**

The Sisense YouTube connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities</td>
<td>Query YouTube Activities. An Activity resource contains information about an action that a particular Channel, or User, has taken on YouTube.</td>
</tr>
<tr>
<td>Captions</td>
<td>Query YouTube Captions. A Caption resource represents a YouTube caption track.</td>
</tr>
<tr>
<td>Channels</td>
<td>Query YouTube Channels.</td>
</tr>
<tr>
<td>ChannelSections</td>
<td>Query YouTube ChannelSections. A ChannelSection contains information about a set of videos that a channel has chosen to feature.</td>
</tr>
<tr>
<td>Comments</td>
<td>Query YouTube Comments.</td>
</tr>
<tr>
<td>CommentThreads</td>
<td>Query YouTube CommentThreads. A CommentThread record contains information about a YouTube comment thread, a top-level comment and replies, if any exist, to that comment.</td>
</tr>
<tr>
<td>GuideCategories</td>
<td>Query YouTube GuideCategories. A GuideCategory resource identifies a category that YouTube algorithmically assigns based on a content of a channel or other indicators, such as the popularity of the channel.</td>
</tr>
<tr>
<td>Languages</td>
<td>Query YouTube i18nLanguages. An i18nLanguage resource identifies an application language that the YouTube website supports. The application language can also be referred to as a UI language.</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PlayListItems</td>
<td>Query YouTube PlayListItems. A PlayListItem resource identifies another YouTube entity, such as a Video, that is included in a PlayList. In addition, the PlayListItem record contains details about how that entity is used in that PlayList.</td>
</tr>
<tr>
<td>PlayLists</td>
<td>Query YouTube PlayLists. A PlayList is a collection of videos that can be viewed sequentially and shared with other users.</td>
</tr>
<tr>
<td>Regions</td>
<td>Query YouTube i18nRegions. An i18nRegion resource identifies a geographic area that a YouTube user can select as the preferred content region. The content region can also be referred to as a content locale.</td>
</tr>
<tr>
<td>Subscriptions</td>
<td>Query YouTube User Subscriptions. A Subscription notifies a User when new Videos are added to a Channel, or when another user takes one of several actions on YouTube, such as uploading a Video, rating a Video, or commenting on a Video.</td>
</tr>
<tr>
<td>VideoAbuseReportReasons</td>
<td>Query YouTube VideoAbuseReportReasons. A VideoAbuseReportReason resource contains information about a reason that a Video would be flagged for containing abusive content.</td>
</tr>
<tr>
<td>VideoCategories</td>
<td>Query YouTube VideoCategories. A VideoCategory resource identifies a category that has been or could be associated with uploaded Videos.</td>
</tr>
<tr>
<td>Videos</td>
<td>Query YouTube Videos.</td>
</tr>
</tbody>
</table>


Connecting to YouTube Analytics

The Sisense YouTube Analytics connector is a standalone connector that allows you to import data from the YouTube Analytics API into the ElastiCube Manager. After you have downloaded and installed the connector, you can connect to the YouTube Analytics API through a connection string you provide Sisense in the ElastiCube Manager. The connection string is used to authenticate users who connect to the YouTube Analytics API. To obtain a connection string, you will need to create a YouTube Analytics app.

Once you have connected to YouTube Analytics, you can import a variety of tables from the YouTube Analytics API.

This section describes how to install the YouTube Analytics connector, how to connect to YouTube Analytics with a connection string, and what tables you can import into the ElastiCube Manager.

Installing the YouTube Analytics Connector

Sisense provides the YouTube Analytics connector as a standalone connector that you can download and add to your list of default Sisense connectors.

To install the YouTube Analytics connector:

1. Download the YouTube Analytics installation file.
2. Open the installation file and click Install.
3. After the installation process is complete, click Close.
4. The YouTube Analytics connector is displayed in the ElastiCube Manager under Add Data > Web Services.
Connecting to the YouTube Analytics REST API

To access YouTube Analytics’ REST API from the ElastiCube Manager, you must provide valid OAuth YouTube Analytics credentials through a connection string. These credentials are provided by YouTube Analytics when you create an application.

After you receive your credentials from YouTube Analytics, you can create the connection string and provide Sisense with it to connect to your data.

Creating an App

You can follow the procedure below to register an app and obtain the OAuth client credentials, the Client Id and Client Secret:

1. Log in to the Google API Console.
2. Select a project or create a new one.
3. In the API Manager menu, click Credentials > Create

   **Credentials > OAuth Client Id > Other.**
4. Click **Create**. The OAuthClientId and OAuthClientSecret are displayed.

5. Click **Library** > YouTube Analytics API > Enable API.

**Authenticating through YouTube Analytics**

After setting the following properties, you are ready to connect:

- **OAuthClientId**: Set this to the Client Id in your app settings.
- **OAuthClientSecret**: Set this to the Client Secret in your app settings.
- **ChannelId**: Set this to the YouTube Analytics Channel (Profile). This can be set to the Id of the channel. If not specified, MINE will be used.
- **ContentOwnerId**: Set this to the Id of the content owner.
- **CallbackURL**: Set this to http://localhost.

When you connect the driver opens the OAuth endpoint in your default browser. Log in and grant permissions to the application. The driver completes the OAuth process.

**Adding YouTube Analytics Tables to your ElastiCube**

Sisense uses connection strings to connect to YouTube Analytics and import data into the ElastiCube Manager. Each connection string contains authentication parameters that the data source uses to verify your identity and what information you can export to Sisense. To learn more, see Connection String Parameters.
To add YouTube Analytics data:

1. In ElastiCube Manager, click **Add Data** and then, **YouTube Analytics**. The Connect to YouTube Analytics window is displayed.
2. In **Datasource Connection String**, enter your connection string.
3. Click **Connect to Server**. YouTube Analytics is displayed in the Select Database list.
4. Click **OK**. Sisense connects to YouTube Analytics and displays a list of tables available for you to import.
5. Select the relevant tables and click **Add**.
   The tables are displayed in the ElastiCube Manager.

### YouTube Analytics Tables

The Sisense YouTube Analytics connector allows you to import the following tables into the ElastiCube Manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupItems</td>
<td>Create, delete, and query Items that compose a Group.</td>
</tr>
<tr>
<td>Groups</td>
<td>Create, update, delete, and query YouTube Analytics Groups.</td>
</tr>
<tr>
<td>AdPerformanceReports</td>
<td>Query Ad Performance Reports. Ad Performance Reports provide impression-based metrics for ads that ran during video playbacks. These metrics account for each ad impression, and each video playback can yield multiple impressions. To access AdPerformanceReports, in the WHERE clause, you should specify at least the video, group or a supported combination of uploaderType and claimedStatus. Optionally, the following filters can be specified: country, continent, subcontinent</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>For dimensions, the 'adType' type is required. Optionally, 'day' dimension can be added. An example query similar to yours would be (notice, AdPerformanceReports view does not have a channel column, instead you have to use a video filter. This is a limitation of the YouTube Analytics API):</td>
</tr>
</tbody>
</table>
|                          | ```sql
SELECT AdType, Day, GrossRevenue, StartDate, EndDate FROM AdPerformanceReports WHERE video='vid123' and continent = '019'
``` |
| Demographics             | Query YouTubeAnalytics Demographics grouped by age groups and gender.                                                                      |
| Devices                  | Query YouTubeAnalytics Devices or Operating System statistics. This table allows you to aggregate viewing statistics based on the manner in which viewers reached your video content. For example, you can identify the number of views that occurred on mobile devices or game consoles. |
| EngagementReports        | Query Engagement Reports info. For example, how many times a user shared a video.                                                          |
| TimeBasedReports         | Query time-based info on views, subscribers, etc. For example, how many new subscribers were gained at a specific time.                      |
| TopVideos                | Query the TopVideos for a channel or the TopPlaylists if you are a content owner. You can also use this view to query playback detail and geographic filters. |
| TrafficSources           | Query TrafficSources. Statistics are based on the manner in which viewers reached your video and playlist content.                         |
Connecting to Zendesk

The ElastiCube Manager enables easy and quick access to tables and views contained within Zendesk databases.

Note: Only non-archived tickets are supported.

The steps below describe how to connect to this type of data source.

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Web Services category, select Zendesk.
3. You will be prompted to enter the following information:

   **Web Address:** Enter the web address where your Zendesk deployment is hosted, for example: `http://support.yourcompany.com`. **Note:** You must include `http://` in your web address.

   **Login details:** Either use your Windows login details if they are configured with Zendesk, or alternatively enter the username and password used to connect to Zendesk.
4. Click **Connect to Server**.

5. A list of available views will appear in the list box below.

6. Select the relevant view you want to work with and click **OK**. All tables associated with the Zendesk view will appear in a new window.

7. To preview data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the **Preview** checkbox.
8. Select the checkbox next to each table or view you want to use.

9. Existing relationships between tables can be automatically replicated in the ElastiCube by selecting the **Automatically create relationships from database** checkbox. Likewise fields with similar names can be linked by selecting the **Automatically create relationships for fields with the same name** checkbox.

10. Once all relevant tables are selected, click **Add**.

**Changing Connectivity Settings for Data Sources**

This section describes how to change the connectivity settings for an existing data source. You can update the source of the data, on both the database and table levels. For example, a database or data file may have been moved to a new location, or updated, and the ElastiCube needs to be updated accordingly.
1. In the top menu, Click ElastiCube, and under Build Settings, select Change Connectivity Settings…

2. A list of all existing data sources and associated data tables appear.

![ElastiCube Manager](image)

3. Hover over the data source to reveal the following options:
   - **Change Source Provider**: Click to select a data source connection type, for example, change MS SQL to an Oracle database. When done, click Close.
   - **Change Source Database**: Click to edit the login details to the database as well as connections to associated tables.

4. Hover over the data table to reveal the following options:
Change Source Provider: Click to change the data source connection type, for example, from MS SQL to an Oracle database.

Change Source Table: Click to change the source tables using the current connection settings.

Refresh: Refresh the tables’ fields based on current settings.

Note: The data source name, fields and field types must remain the same for existing widgets in the dashboard to be able to reference the data correctly.

5. To remove a data source, you must first delete all related tables from the ElastiCube schema. After deleting all tables, the data source will no longer appear.
Connection String Parameters

Sisense uses connection strings to connect to some data sources and import data into the ElastiCube Manager.

Connection strings have the following structure:

jdbc:DataSourceName:Property1=Value1;Property2=Value2;

The following is an example of a Exact connection string:

jdbc:exactonline:OAuthClientId=xxxxxxxxxxxxx;OAuthClientSecret=xxx xxxxxxxxxx;Region='United States';Division='xxx;InitiateOAuth=GETANDREFRESH;OAuthCallback URL=localhost:12345;

This page lists the mandatory and optional parameters required by the data source you want to connect to. Mandatory parameters must be defined and included in your connection string whereas optional parameters are only recommended by Sisense.

In addition, some parameters are required by specific data sources. This section describes specific parameters for the following web services::

- Exact
- Facebook
- HubSpot
- Quickbooks Online
- ServiceNow
- Xero
- YouTube Analytics

Mandatory Properties
OAuthClientId: The client ID assigned when you register your application with an OAuth authorization server.

OAuthClientSecret: Set this to the App Secret in your app settings.

CallbackURL: The OAuth callback URL to return to when authenticating. This value must match the callback URL you specify in your app settings. Set this to http://localhost.

InitiateOAuth: Set this to GETANDREFRESH. You can use InitiateOAuth to avoid repeating the OAuth exchange and manually setting the OAuthAccessToken connection property.

Timeout: The value in seconds until the timeout error is thrown, cancelling the operation. Set to 0 to disable time outs.

Optional Parameters

OAuthSettingsLocation: The location of the settings file where OAuth values are saved for each user when InitiateOAuth is set to GETANDREFRESH. See Switching between Accounts.

Logfile: Creates a log file. The value of this parameter is the location on your drive where the log file is to be created. To determine how much detail is included in the log file, see the parameter Verbosity below.

Verbosity: The verbosity level that determines the amount of detail included in the log file. Set the verbosity from 1–5.

1 will log the query, the number of rows returned by it, the start of execution and the time taken, and any errors.

2 will log everything included in Verbosity 1, cache queries, and HTTP headers.

3 will additionally log the body of the HTTP requests.
4 will additionally log transport-level communication with the data source. This includes SSL negotiation.

5 will additionally log communication with the data source and additional details that may be helpful in troubleshooting problems. This includes interface commands.

Switching between Accounts

When you connect to the Facebook data source, Sisense saves your OAuth values in the file OAuthsettings.txt file located at %Users\%AppData\Roaming\CData\Facebook Data Provider on your Sisense server. To connect to the Facebook data source with another user on the same machine, you must delete the OAuthsettings.txt file. Sisense will then generate a new file for that user.

Another option to support multiple users is to define the location and file name of an OAuthsettings file for each unique user in your connection string through the OAuthSettingsLocation parameter. When each user connects to the data source, Sisense generates the OAuth file with the file name you specify in the location you define. In the examples below, two users are allowed to access the Facebook data source and for each user, Sisense generates a file that contains that user’s OAuth values in the location defined in the string.

```
jdbc:facebook:OAuthSettingsLocation=C:\facebook\auth\john.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;
```

jdbc:facebook:OAuthSettingsLocation=C:\facebook\auth\sally.txt;OAuthClientId=11276856774486;OAuthClientSecret=064c70d78567jm2b7e7e4224fad;InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;

In the example above, to OAuth files are created, one for John and one for Sally in the location C:\facebook\auth. This is useful if you support many users who each need to access the Facebook data source.

**Data Source Parameters**

This section lists parameters that are required to be inside connection strings

**Exact**

Region: Set this to the region of the Exact Online service you want to connect to.

Division: Set this to the division of the Exact Online administration.

The following is an example of an Exact connection string:

jdbc:exactonline:OAuthClientId=xxxxxxxxxxxxx;OAuthClientSecret=xxxx
xxxxxxxx;Region='United
States';Division='xxx;InitiateOAuth=GETANDREFRESH;OAuthCallback
URL=localhost:12345;

**Facebook**

Rate Limitations
ThrottleSeconds: Indicates how many seconds to wait until sending another insight request when the ThrottleMaxPercent has been met.

ThrottleMaxPercent: The threshold set for throttling further insight requests. The defaults for ThrottleSeconds and ThrottleMaxPercent are 10 and 95.

RetryWaitTime: The amount of time in milliseconds to wait before retrying to query the Facebook API.

MaximumRequestRetries: The maximum amount of request retries.

The following is an example of a Facebook connection string:

```
jdbc:facebook:OAuthClientId=xxxxxxxxxxxxxxx;OAuthClientSecret=xxxxxxxxxxxxxxx;
InitiateOAuth=GETANDREFRESH;Version=2.8;CallbackURL=http://localhost/;Timeout=0;
```

Optional Parameters

- **Aggregate Format**: The format aggregate or collection columns should return in.
- **Authenticate As Page**: The name or Id of a page to authenticate as when making requests to Facebook.
- **Auto Cache**: The AutoCache property controls automatic caching of data.
- **Cache Connection**: The connection string for the cache database.
- **Cache Driver**: The database driver to be used to cache data.
- **Cache Location**: Specifies the path to the cache when caching to a file.
- **Cache Metadata**: Whether or not to cache the table metadata. The cache will be stored in memory unless CacheConnection or CacheLocation are set.

- **Callback URL**: The OAuth callback URL to return to when authenticating. This value must match the callback URL you specify in your app settings.

- **Firewall Password**: A password, if authentication is required to connect through a firewall.

- **Firewall Port**: The TCP port for the firewall FirewallServer — see the description of the FirewallServer option for details.

- **Firewall Server**: Specify a firewall name or IP address to authenticate requested connections, if necessary.

- **Firewall Type**: The type of firewall to connect through.

- **Firewall User**: The user name to authenticate with the firewall.

- **Initiate OAuth**: Set this property to initiate the process to obtain or refresh the OAuth access token when you connect.

- **Location**: A path to the directory that contains the schema files defining tables, views, and stored procedures.

- **Logfile**: A path to the log file.

- **Max Log File Size**: A string specifying the maximum size in bytes for a log file (ex: 10MB). When the limit is hit, a new log is created in the same folder with the date and time appended to the end.

- **OAuth Access Token**: The access token for connecting using OAuth.

- **OAuth Client Id**: The client Id assigned when you register your application with an OAuth authorization server.
- **OAuth Client Secret**: The client secret assigned when you register your application with an OAuth authorization server.

- **OAuth Settings Location**: The location of the settings file where OAuth values are saved when InitiateOAuth is set to GETANDREFRESH or REFRESH.

- **Offline**: Use offline mode to get the data from the cache instead of the live source.

- **Other**: The other parameters necessary to connect to a data source, such as username and password, when applicable.

- **Pagesize**: The maximum number of results to return per page from Facebook.

- **Proxy Auth**: Scheme The proxy server authorization scheme (default: BASIC).

- **Proxy Auto Detect**: This indicates whether to use the default system proxy settings or not. Set ProxyAutoDetect to FALSE to use custom proxy settings. This takes precedence over other proxy settings.

- **Proxy Password**: A password, if authenticating with a proxy server.

- **Proxy Port**: The TCP port for the proxy ProxyServer (default: 80).

- **Proxy Server**: If a proxy server is given, then the HTTP request is sent to the proxy instead of the specified server.

- **Proxy SSL Type**: The SSL type to use when connecting to the proxy server (default: AUTO).

- **Proxy User**: A user name, if authentication is to be used for the proxy.
- **Pseudo Columns**: Indicates whether or not to include pseudo columns as columns to the table.
- **Query Cache**: The time duration, in seconds, for which the in-memory cached data is reused.
- **Readonly**: You can use this property to enforce read-only access to Facebook from the provider.
- **RTK**: The runtime key used for licensing.
- **Search Terms**: Default SearchTerms if none are specified. Used for some tables, such as Users, where SearchTerms may be specified.
- **SSL Server Cert**: The certificate to be accepted from the server when connecting using TLS/SSL.
- **Support Enhanced SQL**: If set to true, the provider will cache the entire table in memory and issue the current query against the memory cache. Allows queries with aggregate functions that are otherwise unsupported. The entire memory cache is discarded after the query is executed, unlike QueryCache.
- **Tables**: Comma-separated list of tables to be listed. For example: Tables=TableA,TableB,TableC.
- **Target**: A default target if none is specified. Used for some tables, such as Comments, where a target may be specified.
- **Timeout**: The value in seconds until the timeout error is thrown, canceling the operation.
- **Verbosity**: The verbosity level that determines the amount of detail included in the log file.
- **Version**: The Facebook Graph API version to use.
HubSpot

- **HubId**: Set this to the Hub Id of the HubSpot account you are connecting to.

The following is an example of a HubSpot connection string:

```java
jdbc:hubspot:OAuthClientId=xxxxxxxxxxxxx;OAuthClientSecret=xxxxxxxxxx
InitiateOAuth=GETANDREFRESH;
HubId=xxxxxxxx;CallbackURL=http://localhost;Timeout=0;
```

Quickbooks Online

- **CompanyId**: Set this to the ID of the company you want to connect to.

The following is an example of a Quickbooks Online connection string:

```java
jdbc:quickbooksonline:OAuthClientId=xxxxxxxxxxx;OAuthClientSecret=xxxxxxxxxxx;
CompanyId=xxxxxxxxxxxxxx;
CallbackURL=http://localhost/;InitiateOAuth=GETANDREFRESH;Timeout=0
```

ServiceNow

- **Password**: Set this to your password.
- **Username**: Set this to your username.
- **Instance**: Set this to your instance.

The following is an example of a ServiceNow connection string:

```java
jdbc:servicenow:InitiateOAuth=GETANDREFRESH;Instance=xxxxxxxxxxxxx;
OAuthClientId=xxxxxxxxxxxxxx;
OAuthClientSecret=xxxxxxxxxxx;Username=xxxxxxxxxxxxx;Password=xxxxxxxxxxxxx;
```

Xero
- **XeroAppAuthentication**: Set this to the type of your application. Allowed values: PUBLIC or PARTNER. Default: PUBLIC.

The following is an example of a Xero connection string:

```
jdbc:xero:OAuthclientId=xxxxxxxxxxxxx;OAuthClientSecret=xxxxxxxxxxx
xxx;
InitiateOAuth=GETANDREFRESH;XeroAppAuthentication=PUBLIC;
```

**YouTube Analytics**

- **ChannelId**: Set this to the YouTube Analytics Channel (Profile). This can be set to the Id of the channel. If not specified, MINE will be used.

- **ContentOwnerId**: Set this to the Id of the content owner.

The following is an example of a YouTube Analytics connection string:

```
jdbc:youtubeanalytics:OAuthClientId=xxxxxxxxxxxxxxxxxxxxx;
OAuthClientSecret=xxxxxxxxxxxxxx;InitiateOAuth=GETANDREFRESH;callbackURL=http://localhost;
```
Working with Data

Searching for Tables and Fields

Through the ElastiCube Search tool, you can locate field tables and fields.

In the Search tool, the results returned are filtered by the characters you enter into the Search field. When you click any of the results, the table or field is highlighted in the ElastiCube Manager.

To find a table or field in your ElastiCube:

1. At the top-right of the schema, click the magnifying glass icon.
2. In the search box, begin typing the letters or name of the table/field you are searching. Results are displayed before the Search field.
3. Click on a result to highlight the relevant field or table.

Creating and Removing a Relationship between Tables

Relationships specify the connection between tables and enable you to pull data together in meaningful ways. For example, order information is more useful when you know which customer placed each order.

However you don't need to store both the customer and order information in the same table. Customer and order data can be stored in two related tables with a relationship specified between the two tables to view each order and its corresponding customer information.
In practical terms relationships allow you to query and combine data from multiple tables in your dashboard.

**To manually create a relationship between tables in the ElastiCube Manager:**

1. Locate the field within each table to specify the relationship. For example, two tables may both have customer ID.
2. Ensure both fields that you are using to create the relationship are of the same type, for example decimal fields.

   To check or change the field type, click the relevant field and a menu will appear listing the field type. Click on the drop down menu to change the field type.

   Make sure the data contained within the field is compatible with the field type. For example, text data needs to have a field type of text.

3. On the right side of the field click and hold down the ‘merge icon’ and simultaneously drag the link to the corresponding table until the mouse cursor is over the related field. The link will become green and a ‘Drop to merge’ message will appear when a relationship can be created. Let go the mouse button and a link between the two fields will appear.

**To remove an existing relationship:**

1. Click on any part of the existing relationship. The line will become highlighted.
2. An icon will appear, click **Click to remove current selection.**
### Item Name | Description
--- | ---
1. | Manually create relationship
2. | Remove existing relationship

#### Previewing Data from a Table

You can view the data contained in a table. This includes custom fields, tables and ETL processes.

**To review the underlying table data:**

1. Hover over the table name until the preference icons appear.
2. Click the Show table data icon (#1 in the image below).

**Note:** To view underlying table data, you will first need to build your ElastiCube.

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Show table data</td>
</tr>
<tr>
<td>2.</td>
<td>Add New Custom Field</td>
</tr>
<tr>
<td>3.</td>
<td>Duplicate Table</td>
</tr>
<tr>
<td>4.</td>
<td>Delete Table</td>
</tr>
<tr>
<td>5.</td>
<td>Additional Preferences</td>
</tr>
</tbody>
</table>

**Managing Tables and Fields**

The ElastiCube Manager makes it easy to view and modify table and field details.

This section describes the options available for tables and fields.

**Table Options**

**To review table metadata:**

- Hover over the information icon next to the table name. The following information is displayed:
  - Table name
  - Database Name
  - Server Address
  - Source Type (Excel, MySQL, Google AdWords, etc.)
  - Number of rows

**To rename a table:**

1. Double-click the header of the table that you want to rename.
2. Type in a new name or use the cursor keys to edit specific components of the existing table name.
3. Click away from the table to save any changes.

To duplicate a table:

1. Hover over the table name until the preference icons appear.
2. Click the duplicate table icon (#3 in the diagram below).

To delete a table:

Delete a table when a data source is no longer available or required. You will need to rebuild the ElastiCube for the changes to apply.

1. Hover over the table name until the preference icons appear.
2. Click the remove table icon (#4 in the diagram below).

To add a custom field to your table:

1. Place the mouse cursor above the table name until the preference icons appear.
2. Click the add new custom field icon (#2 in the diagram below).

To preview data:

1. Hover over the table name until the preference icons appear.
2. Click the preview icon (#1 in the diagram below).

To make your table invisible:

You can make your table invisible, for example, if you're using data from the table in another table, and do not need the table fields visible to the dashboard designer.

1. Hover over the table name until the preference icons appear.
2. Click the Additional Preferences icon (#5 in the diagram below).
3. Clear the **Visible** option.

<table>
<thead>
<tr>
<th>Image Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Preview</td>
</tr>
<tr>
<td>2.</td>
<td>Add New Custom Field</td>
</tr>
<tr>
<td>3.</td>
<td>Duplicate Table</td>
</tr>
<tr>
<td>4.</td>
<td>Delete Table</td>
</tr>
<tr>
<td>5.</td>
<td>Additional Preferences</td>
</tr>
</tbody>
</table>

**Note:** Tables with accumulative build settings are highlighted with a dark blue color.

**Field Options**

To view options available for fields, click on the field name or icon.

The following options are available:

- To edit the field name, click on the pencil icon.
- **Type:** Select the field type, for example, integer, date-time, or text.
- **Import:** Clear this option if you do not want the data associated with this field imported as part of the ElastiCube build.
- **Invisible:** Select this option if you want to import the data associated with this field, but do not want this field available to dashboard designers and viewers.
- **Indexed:** Indexes the field data for quicker processing in subsequent builds.
- **Duplicate:** Duplicates the field in the table. This is useful if you need the same field with some modifications.
Handling Relationship Cycles

Good relationships between tables are the key to pulling in data in logical ways. ElastiCubes are usually created from more than one table. To perform calculations on fields that reside in separate tables, you must define a relationship between the tables so the calculation mechanism knows how to navigate from one field to another.

When a single possible path exists between two fields, there is no issue. For example, performing a query involving the Customer Name and Amount field on the ElastiCube schema below can yield only one result, since there is only one possible path leading from the Customer Name field to the Amount field.

Relationship Cycles

In some cases, more than one path exists leading from one field to another. Sometimes this is due to poor database design, and other times it is just a realistic necessity due to the way the data is structured. In such cases, there is no absolute way to determine the required path to take to calculate results.

For example, in the ElastiCube schema below, the Customer Name and Amount fields now have multiple paths between them:

- Customer --- Customer ID field
  - Sales History (over the Customer ID field)
  - Commercial (over the Customer ID field)
  - Private (over the Customer ID field)
  - Private (over the Business ID field)
  - Sales History (over the Customer ID field)
  - Sales History (over the Customer ID field)
Automatically Dealing with Relationship Cycles

Theoretically, any one of these possible paths could be the correct one in terms of the results you are trying to calculate. When the calculation engine encounters numerous possible paths, it picks the shortest path, which will have less impact performance-wise on query processing. Below are some general guidelines.

- The calculation engine will always prefer paths that have no many-to-many relationships. If all possible paths contain many-to-many relationships, the path with the least number of this type of relationship is preferred.
- Similarly, the engine will prefer one-to-one relationships over one-to-many relationships.
- If at the end of the first selection process more than one possible path still exists, the engine will prefer the path containing the least number of tables.
- Finally, if numerous paths are still possible, one is picked at random.

Breaking Relationship Cycles in the ElastiCube Manager

To ensure the calculation engine takes the path you want it to take, the cycle must be broken. There are a few techniques to do this depending on the required results.

Removing Relationships

One option is to remove one of the relationships in the cycle. For example, removing the Customer ID relationship from the Sales History table will eliminate the cycle. This approach is only applicable when the removed relationship is not used by other queries.
Duplicating Table Elements

Duplicating table elements is another method to break relationship cycles. In the example below, the Sales History table was duplicated and renamed *Private Customers Sales History*. In addition, the Customer ID relationship was removed from the original Sales History table. This results in the creation of two separate Amount fields, one for commercial customers residing in the original Sales History table, and one for private customers residing in the new Private Customers Sales History. As the Customer ID relationship was removed from the original table, whichever field you use will determine the correct calculation path.

Breaking Relationship Cycles in the Sisense Web App

You can also use the Sisense web app to invoke a specific path to be used during query execution (as opposed to the solutions mentioned above that are defined on the schema level, in the ElastiCube Manager).

Each widget in Sisense has an associated data layout. If you have more than one path connecting corresponding fields between two tables, you can enforce a specific path by filtering the widget, and selecting just the field that you want to use. For example if the *Commerce* table is connected to *Brands* via the *Brand* and *Brand ID* fields, then add a filter to the widget and select *Brand ID* to use that path in the query.
Many-to-Many Relationships

In databases, a Many-to-Many relationship exists when the value in each field used to create a relationship between tables is included multiple times in each table.

The problem with Many-to-Many relationships is that it can cause duplications in the returned datasets, which can result in incorrect results and might consume excessive computing resources. This section provides solutions and workarounds to common scenarios with many-to-many relationships.

Example: A hotel may have a table with reservation data and a table with payment data. Both tables include the name of the guest. A guest can have multiple reservations under their name as well as multiple payments recorded on their name. If a relationship exists between the reservation and payment tables based on the guest's name, a many-to-many relationship is created, as the guest's name appears multiple times in each table.

Summary of relationship types

- **One-to-One relationship** - In this scenario both sides of the relationship have unique values for every row.

- **One-to-Many relationship** - In this scenario one side of the relationship will contain unique values for every row, but the other side of the relationship will contain duplicate values for any or all of the corresponding values in the first table.

- **Many-to-Many relationship** - In this scenario, both sides of the relationship will hold duplicated values, causing excessive calculations for every query run against it.
There are several methods to resolve and bypass a many-to-many relationship. The solution depends on the business model and the logic of the business questions at hand. The following solutions differ by business logic and the schema at hand; each solution can be applied to each schema respectively.

The following sections cover:

- Testing your schema to see if it includes many-to-many relationships
- Understanding which scenario best fits your current schema
- According to your schema logic, applying the respective solution

To check if a relationship is Many-to-Many, you need to check the cardinality of the relationship, and determine the number of unique and duplicate values on each side of the relationship.

**Testing if a Relationship is Many-to-Many**

Many-to-Many relationships occur when two tables are joined on a field containing duplicate values on both tables. For example the same guest may have multiple reservations and multiple payments at a hotel, thus joining on the guest between the reservation and payment table would result in a M2M relationship.

When testing, if you get the same value for both the unique and duplicate values, then there is no duplication, and this will either be a One-to-Many or a One-to-One relationship. If the number of duplicate values is larger than the number of unique values, then this side of the relationship has duplicated values, and you will need to investigate the other side of the relationship. If the other side of the relationship
yields unique values, this is a one-to-many relationship. If not, you have a many-to-many relationship.

Use the following SQL statement to test for potential M2M relationships:

1. In the Elasticube Manager, open the relevant ecube file.
2. Click Add Data > Custom SQL Expression.
3. Enter and adjust the SQL statement below.

```sql
SELECT [Do I have duplications?]
FROM (
    SELECT distinct_count(t1.col1)<>count(t1.col1) AS [Do I have duplications?]
    FROM [Table1] t1
UNION all
    SELECT distinct_count(t2.col2)<>count(t2.col2)
    FROM [Table2] t2)
AS temp
GROUP BY [Do I have duplications?]
```

4. In the top right of the expression editor window, click Parse SQL Expression. If the expression parses successfully, click Preview result table.

5. If the returned result is ‘True’ in both lines, a many-to-many relationship exists, and will need to be considered in the ElastiCube design.

If the two values are equal, all guest IDs appear only once, making all values unique. Even if the other side of the relationship has duplicate
values for guest ID, this is till a One-To-Many relationship, where the unique values are on the reservations side, and the duplicate values are on the Payments side.

If there are more than two tables connected to this relationship, that is, if there are more than two tables merged on the same field, a few more options exist. The solution for the single many-to-many relationship will be a sub-problem of this scenario. In this case, you'll need to run the test on every table to see the uniqueness or duplication of the merged fields.

Two Tables with One Relationship

This section describes two possible workarounds when you have a schema that includes two tables with one relationship:

- Two Separate One-to-Many Relationships
- Creating an Aggregated Table

Two Separate One-to-Many Relationships

The direct solution for such a problem is to break this relationship into two separate one-to-many relationships.
You can use the following diagram to understand the logic behind this testing:

1 - Create a custom SQL expression in the Elasticube. In the expression of this table select all the individual values for the identifier column from both sides. The expression should look like this:

```sql
SELECT * FROM
(SELECT DISTINCT r.GuestID, r.GuestName
FROM [Reservations] r
UNION
SELECT DISTINCT p.GuestID, p.GuestName
FROM [Payments] p) AS G
```

This query will take all Guest ID values from both tables, and using the UNION statement, will bring in only the unique values from both tables, making this a complete list of all distinct Guest ID values.
2 - Merge the Guest ID field from the new 'linking' table to the other two Guest ID fields from the other two tables, thus creating two One-To-Many relationships.

You can now use this Guest ID field as the rows or axes elements of a widget, pulling in the unique values from the new Guest Dimension, with measures from the two other tables. See image above.

Creating an Aggregated Table

In situations where you have more than one fact table (a Fact table is a primary table containing the measures or fields used for calculations in the dashboard) in the Elasticube, there are several situations when an aggregated table can resolve a many-to-many relationship.
Two fact tables

Assuming you want to segment your data according to a few different dimensions, creating relationships directly between these fields can and will create many-to-many relationships in one of two ways, according to the schema:

- Both tables don't hold unique values, and all values from one table are held in the second table. In this scenario either a linked dimension (as described in the first solution - Two Separate One-to-Many Relationships) or an aggregated table can be created which will hold all the unique values and the
desired calculations for one of the tables. To create an aggregate table, create a custom SQL expression and aggregate values from the table that includes all values; its own, and the subset present in the other table with the following expression:

```sql
SELECT i.OrderDateKey, i.ProductKey, sum(i.DiscountAmount), sum(i.SalesAmount), avg(i.UnitPriceDiscountPct)
FROM [FactInternetSales] i
GROUP BY i.OrderDateKey, i.ProductKey
```

This custom SQL expression will select the distinct OrderDateKeys and their corresponding ProductKeys from the FactInternetSales, grouped by these fields, together with single value aggregations for the different fields, in this case, Discount Amount, Sales Amount and the average unit Price discount. After merging the OrderDateKey and Product Key to the two other tables, you will be able to pull the values from this new table into the rows or axes panel of a widget in the Sisense Web Application with measures and additional aggregations from the two other tables.

**Note:** The non-aggregated table needs to be a subset in terms of the primary fields from the aggregated table.

- Both tables don’t include unique values, and there are different values for several fields in both the tables. Resolving this scenario incorporates both solutions mentioned above. In this scenario, create an aggregated table and a dimension table.
Two Fact tables with a date dimension table and an aggregative Products table

More than Two Tables with More than One Relationship

This section provides two possible workarounds when you have a schema that includes more than two tables with more than one relationship:

Options include:

- Using the Lookup function
Concatenating two tables into one

**Using the Lookup Function**

In most scenarios you will aggregate values according to a given ID from the unique side of the relationship to the duplicate side. However, in specific cases it will be vice versa.

For example, in the following scenario, in which we have three tables, and between them two one-to-many relationships, this can potentially create a many-to-many relationship, if you query the two leaf tables. This means that the query result table will have multiple rows which won't be distinguishable one from the other.

![Diagram showing two tables connected by one-to-many relationships]

**Two consecutive M-to-M relationships**

Using the Lookup Function, you can import values from a remote table by matching values in a different column. This will create a new column in the table where you want to perform an aggregation of a given field(s), with the matching value of the identifying field from the other table. Taking the example of tables T1, T2, and T3, we'd like to run a query that will display aggregations from the duplicate IDs from T1, with a measure from T3. If you run the query as is, you will get multiple values for the query's result set, and we will not be able to run this aggregation. To resolve this, use the Lookup function to import the values from T3 into T2 and then re-run the query only on tables T1 and T2. Using the lookup function, available in the 'Miscellaneous Functions' in the custom SQL editor, you can import
the values of 'M3' from the 'T3' table into the 'T2' table. Create a new custom column, and use the Lookup function to import the values of attribute. In this case, the Lookup function should look like this:

\[
\text{Lookup}([T3],[T3].[M3], [T2].id2,[T3].id2)
\]

Running this statement in table T2 will import the matching values of M3 from T3 according to the matching results in ID2 between the two tables.

\[
\text{LOOKUP(remote_table,remote_result_column,current_match_column, remote_match_column)}
\]

Matches the current value with another value from a remote table. The result will be the value in remote_result_column for which the corresponding remote_match_column equals the current_match_column.

*Two consecutive M-to-O relationships after Lookup fix*

**Concatenating Two Tables into One**

Assuming you have two separate tables with duplicate ID values in each, and each including different columns for each ID, you can create a new table including all values for every ID, and pull the aggregations from this new table.

Note that the two original tables; Table_1, Table_2 have different columns.
**Concatenating tables**

Using the following SQL statement, you can import the data from both tables, with the IDs and the columns respectively:

```
SELECT s.id AS id, s.m1, s.m2, ToInt(NULL) m3, ToInt(NULL) m4
FROM [Table 1] s
UNION
SELECT t.id, ToInt(NULL), ToInt(NULL), t.m3, t.m4
FROM [Table 2] t
```

This will create a table with five columns:

1. Id
2. M1 (from table_1)
3. M2 (from table_1)
4. M3 (from table_2)
5. M4 (from table_2)
The values missing from each table respectively will be NULL's which will result in the following table.

*Concatenated table - result set*
Chasm and Fan Traps

Chasm and fan traps should be avoided when building your ElastiCube schemas.

Chasm Traps

A chasm trap occurs when two “Many-to-One” joins converge on a single table, and the query includes measures from both leaf tables. As a result multiple rows are returned from the tables when processing the query.
If you were to calculate both measures (Qty and Value) simultaneously, like in the following example, the values for Customers will be multiplied due to the inner join between the leaf tables, and the results may be incorrect:

```
SELECT [Customers].CustomerName, 
       sum ([Orders].OrderValue) AS Value, 
       sum ([Sales].QuantitySold) AS Qty 
FROM [Customers] 
JOIN [Sales] ON [Customers].CustomerID=[Sales].CustomerID 
GROUP BY [Customers].CustomerName
```

<table>
<thead>
<tr>
<th>CustomerName</th>
<th>Value</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason</td>
<td>1800</td>
<td>180</td>
</tr>
<tr>
<td>Daniel</td>
<td>600</td>
<td>60</td>
</tr>
</tbody>
</table>

**Fan Traps**

A fan trap occurs when two “many-to-one” joins follow one another in master-detail form (OrderDetails), and the query includes a measure from both the leaf table (OrderDetails) and its immediate master (Orders).

If you try to aggregate both measures simultaneously (using the query below), you will probably get incorrect results:
The “Qty” measure, corresponding to the leaf measure table (OrderDetails) is calculated correctly, but the “Value” measure, corresponding to the measure held in its master (Orders), is not. This is because we get the “Value” of every OrderID, which may inflate the expected results.

The web application translation module separates the calculations, and unions the results by generating a query for each of the measures’ paths (path in terms of tables to go by). Then the web application translation module will group all the measures with the same tables’ paths into one query and union it with all the other “same path measures” with different paths.

The described “Chasm Trap” can be prevented like this:
And the “Fan Trap” will be prevented this way:

```sql
SELECT [Customers].CustomerName, 0 AS Value, sum ([OrderDetails].OrderQuantity) AS Qty
JOIN [OrderDetails] ON [Orders].OrderId=[OrderDetails].OrderId
GROUP BY
[Customers].CustomerName
UNION
SELECT [Customers].CustomerName, sum ([Orders].OrderValue) AS Value, 0 AS Qty
FROM [Orders]
JOIN [Customers] ON [Orders].CustomerID=[Customers].CustomerID
GROUP BY CustomerName
```

<table>
<thead>
<tr>
<th>CustomerName</th>
<th>Value</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Danell</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Mike</td>
<td>0</td>
<td>600</td>
</tr>
<tr>
<td>Danell</td>
<td>300</td>
<td>0</td>
</tr>
<tr>
<td>Mike</td>
<td>300</td>
<td>0</td>
</tr>
</tbody>
</table>
Transforming and Enriching Data

Adding a New Custom Field

The ElastiCube Manger makes it easy for you to add new fields to existing tables. This can be useful if you need to combine data from different existing fields, and when you need to cleanse and prepare data. The new fields also provide designers with additional fields to use as is, or as a basis for even more advanced calculations in their widgets. You can use SQL to customize the values contained within the custom fields.

To add a new field:

1. Hover over the table to which you want to add a field.
2. Place the mouse cursor above the table name until the preference icons appear.
3. Click the Add new custom field icon.
4. The new field will be added to the table, and the field’s settings window appears, with the following options:
   - **Name**: Click the field name in the settings window to rename or edit the field name.
   - **Type**: Select the field type from the drop-down list. Field types should be based on the data stored in the new field. For example text data must be set to *text* in the **Type** field, while date-time data must be set to **Date-Time**.
   - **Expression**: You can use SQL to customize the data contained in the new field. Click **Edit** to edit and view the field expression. See Defining and Editing Field Formula for further details on developing field expressions.
5. To delete a custom field, click the field and click **Remove**.
Field data can be converted to a different type using functions. For example, a number can be converted to a text field. See the function reference for more details.

**Defining and Editing Field Formulas**

In the ElastiCube Manager, you can use SQL expressions to define custom fields. The steps below explain how to edit a custom field expression.

1. Click the custom field in the table to display the custom field options, and click **Edit**.
2. In the Table Editor, you can enter SQL statements to access tables and fields that exist in the ElastiCube Manager schema. See also SQL Reference and Function Reference.
3. Once you complete an SQL statement, click **Parse SQL Expression** to validate the statement.
4. To view results based on the SQL statement, click the **Preview result** icon. **Note:** To preview the results, the ElastiCube should have been built at least once.
5. To save changes or save and exit, click on the top right icon.

**Tips:**

- Press Ctrl + Space to complete an SQL statement.
- To make it easier to access table fields, give the table name an alias and reference the alias to bring up the related fields. For example, Select A. From table as A.
- You can add comments in expressions by using the `/*...*/` for blocks.
Adding a New Custom Table

With the ElastiCube Manager, you can easily create custom tables, which combine existing data. This is useful for preparing and cleansing data. Follow the steps below to learn how to add custom tables using SQL.

To create a custom table:

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Under the Custom category, select Custom SQL Expression.
3. In the window that opens, enter the name of the custom table, and click .
4. In the Table Editor, you can enter SQL statements to access tables and fields that exist in the ElastiCube Manager schema. See also SQL Reference and Function Reference.
5. Once you complete an SQL statement, click on the Parse SQL Expression icon to validate the statement.
6. To view results based on the SQL statement, click the Preview result table icon .
   **Note:** You can save an incomplete or invalid SQL expression, however you will not be able to build the custom expression. At least one build including the relevant base table must be completed in order to preview results.
7. To save changes or save and exit, click on one of the Save icons.
   - Press Ctrl + Space to complete an SQL statement.
To make it easier to access table fields, give the table name an alias and reference the alias to bring up the related fields. For example `SELECT A. FROM A`.

You can add comments in expressions by using the ‘'--'’ for a single line or '/*' for blocks.

**Defining and Editing SQL Statements**

The ElastiCube Manger makes it easy to edit custom tables. You can use SQL to customize the fields contained within a custom table.

1. Click the custom table you want to edit or add an SQL expression.
2. Place the mouse cursor above the table name until the preference icons appear. Click the **Edit table SQL expression** icon.
3. The Table Editor will open where you can enter SQL statements to access tables and fields that exist in the ElastiCube Manager schema. See related topics for more details on SQL and Function References.
4. Once you complete an SQL statement click on the top right icon **Parse SQL Expression** to validate the statement.
5. To view results based on the SQL statement, click on the top right icon **Preview result table**. *(Note: At least one build including the relevant base table must have been completed in order to preview results.)*
6. To save changes or save and exit, click on the top right icon.

**Tips:**

- Press Ctrl + Space to complete an SQL statement.
To make it easier to access table fields, give the table name an alias, and reference the alias to bring up the related fields. For example, Select A. From table as A.

You can add comments in expressions by using the ‘--’ for a single line or /* */ for blocks.

A good reference on compatible SQL commands is available on Microsoft MSDN.

Previewing Results

You can preview results as follows:

To view results before connecting to a table:

1. Click Add Data in the top menu of the ElastiCube Manager.
2. Select the relevant connector.
3. Enter your login details and connect to the source data.
4. All tables and views associated with the database will appear in a new window. To preview data contained in a particular table, highlight the table or view in the list and click the preview pane below. To preview the table, select the Preview checkbox.

To view results in a Custom Table:

1. Click the custom table that you want to view.
2. Place the mouse cursor above the table name until the preference icons appear.
3. Click the Edit table SQL expression icon.
4. To view results based on the SQL statement, click on the top-right icon Preview result table.
Note: At least one build including the relevant base table must be completed in order to preview results.

To view results in a Custom Field:

1. Click the custom field until the fields setting menu opens and then click Edit.
2. On the top right icon Parse SQL Expression to validate the statement.
3. To view results based on the SQL statement click on the top right icon Preview result table. (Note: At least one build including relevant base table must be completed in order to preview results.)

SQL Reference

You can use SQL to create new tables and fields in the ElastiCube Manager.

SQL Structure

```
SELECT FieldName(s), Function(), * 
FROM TableName 1 
INNER JOIN \ LEFT JOIN \ RIGHT 
JOIN\FULL JOIN \ TableName 2 
ON TableName 1. JoinField 
= TableName 2. JoinField 
WHERE FieldName Condition 
AND OR FieldName Condition 
GROUP BY FieldName(s) 
ORDER BY FieldName(s) 
HAVING FieldName(s) Condition
```

SQL Example

```
SELECT CustomerName, 
ContactEmail, Count(Orders) 
FROM Customer 
INNER JOIN Order 
ON Customer.CustomerID = 
Order.CustomerID 
WHERE Order.OrderId BETWEEN 10 
AND 100 
AND Customer.CustomerName IN 
(‘John’, ‘Mary’, ‘David’) 
OR 
Customer.CustomerLastName LIKE ‘Harrison’ 
GROUP BY Customer.CustomerName 
ORDER BY 
Customer.CustomerLastName 
HAVING Count(Orders) > 3
```
### SELECT STATEMENT

<table>
<thead>
<tr>
<th>SELECT</th>
<th>SELECT column_name(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM table_name</td>
<td></td>
</tr>
<tr>
<td>SELECT *</td>
<td>SELECT *</td>
</tr>
<tr>
<td>FROM table_name</td>
<td></td>
</tr>
<tr>
<td>SELECT DISTINCT</td>
<td>SELECT DISTINCT column_name(s)</td>
</tr>
<tr>
<td>FROM table_name</td>
<td></td>
</tr>
</tbody>
</table>

### FUNCTIONS AFTER SELECT CLAUSE

<table>
<thead>
<tr>
<th>FUNCTIONS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG()</td>
<td>Returns the average value</td>
</tr>
<tr>
<td>COUNT()</td>
<td>Returns the number of rows</td>
</tr>
<tr>
<td>MAX()</td>
<td>Returns the largest value</td>
</tr>
<tr>
<td>MIN()</td>
<td>Returns the smallest value</td>
</tr>
<tr>
<td>SUM()</td>
<td>Returns the sum</td>
</tr>
</tbody>
</table>

### TABLE JOIN FUNCTIONS

<table>
<thead>
<tr>
<th>JOIN</th>
<th>SELECT column_name(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM table_name1 T1</td>
<td></td>
</tr>
<tr>
<td>INNER JOIN</td>
<td>INNER JOIN table_name2 T2</td>
</tr>
<tr>
<td>LEFT JOIN</td>
<td>LEFT JOIN table_name2 T2</td>
</tr>
<tr>
<td>RIGHT JOIN</td>
<td>RIGHT JOIN table_name2 T2</td>
</tr>
<tr>
<td>FULL JOIN</td>
<td>FULL JOIN table_name1 T1</td>
</tr>
</tbody>
</table>
| FULL JOIN table_name2 T2  
| ON T1.column_name=T2.column_name  
|  
| AS (alias)  
| SELECT column_name AS column_alias  
| FROM table_name  
|  
| WHERE  
| SELECT column_name(s)  
| FROM table_name  
| WHERE column_name operator value  
|  
| **FUNCTIONS AFTER THE WHERE CLAUSE**  
|  
| **AND / OR**  
| SELECT column_name(s)  
| FROM table_name  
| WHERE condition  
| AND|OR condition  
|  
| **BETWEEN**  
| SELECT column_name(s)  
| FROM table_name  
| WHERE column_name  
| BETWEEN value1 AND value2  
|  
| **IN**  
| SELECT column_name(s)  
| FROM table_name  
| WHERE column_name  
| IN (value1,value2,...)  
|  
| **LIKE**  
| SELECT column_name(s)  
| FROM table_name  
| WHERE column_name LIKE pattern  
|  
| **ORDERING AND GROUPING AFTER WHERE CONDITIONS**  
|  
| **GROUP BY**  
| SELECT column_name,  
| aggregate_function(column_name)  
| FROM table_name  
| WHERE column_name operator value  
| GROUP BY column_name  
|  

### ORDER BY
```sql
SELECT column_name(s)
FROM table_name
ORDER BY column_name [ASC|DESC]
```

### HAVING
```sql
SELECT column_name,
aggregate_function(column_name)
FROM table_name
WHERE column_name operator value
GROUP BY column_name
HAVING
aggregate_function(column_name) operator value
```

### CLAUSES TO COMBINE TABLES

<table>
<thead>
<tr>
<th>Clause</th>
<th>Syntax</th>
</tr>
</thead>
</table>
| UNION     | SELECT column_name(s) FROM table_name1
|           | UNION
|           | SELECT column_name(s) FROM table_name2 |
| UNION ALL | SELECT column_name(s) FROM table_name1
|           | UNION ALL
|           | SELECT column_name(s) FROM table_name2 |

### Function Reference

#### Mathematical Functions

You can use mathematical functions in custom tables and fields. See Adding a New Custom Table and Defining and Editing Field Formula for further details. Below are explanations of available mathematical functions.
**ACOS**(number)
Returns the angle, in radians, whose cosine is the given number. Also referred to as arccosine.

**ASIN**(number)
Returns the angle, in radians, whose sine is a given number. Also referred to as arcsine.

**ATAN**(number)
Returns the angle in radians whose tangent is a given number. Also referred to as arctangent.

**CEILING**(number)
Returns the smallest integer that is greater than, or equal to, the given number.

**COS**(number)
Returns the trigonometric cosine of a given angle, in radians.

**COSH**(number)
Returns the hyperbolic cosine of a given number.

**COT**(number)
Returns the hyperbolic sine of a given number.

**DIV**(number1, number2)
Returns the number of times number2 fits completely in number1.

**EXP**(number)
Returns the exponential value of a given number.

**FLOOR**(number)
Returns the largest integer less than or equal to the given numeric expression.
**ISINFINITY**(number)
Returns -1 if the number evaluates to negative infinity, 1 if it evaluates to positive infinity, and 0 otherwise.

**ISINTEGER**(number)
Returns whether a given number is a whole number.

**LOG**(number)
Returns the natural logarithm of a given number.

**LOG10**(number)
Returns the base-10 logarithm of the given float expression

**MAXVAL**(number1,number2)
Returns the highest of two numbers.

**MINVAL**(number1,number2)
Returns the smallest of two numbers.

**MOD**(number1,number2)
Returns the remainder of dividing number1 by number2 (modulo).

**PI()**
Returns the constant value of the mathematical PI.

**POWER**(number1,number2)
Returns the value of the given number raised to a specified power.

**RAND()**
Returns a random number between 0 and 32767

**RANK()**
Returns the rank (i.e. row number) of the current record in a table.

**RANKASC**(order_by_field)
Returns the row number ordered by given field in ascending manner.
You can also sort by multiple columns: `RANKASC([partitionA],[paritionB],[partitionN],[orderByField])`
Example: `RANKASC([EmployeeID],[CategoryID],[Quantity])`

`RANKDESC(order_by_field)`
Returns the row number ordered by given field in descending manner.
You can also sort by multiple columns: `RANKDESC([partitionA],[paritionB],[partitionN],[orderByField])`
Example: `RANKDESC([EmployeeID],[CategoryID],[Quantity])`

`ROUND(number,precision)`
Returns the given number, rounded to a specified precision.

`SIN(number)`
Returns the trigonometric sine of a given angle, in radians.

`SINH(number)`
Returns the hyperbolic sine of a given number.

`SQRT(number)`
Returns the square root of a given number.

`TAN(number)`
Returns the tangent of a given number.

`TANH(number)`
Returns the hyperbolic tan of a given number.

`TOBIGINT(string)`
Converts a string representing a valid BigInt value to BigInt type.
TODOUBLE(string)
Converts a string representing a valid double value to Double type.

TOINT(string)
Converts a string representing a valid Int value to Int type.

Date and Time Functions
You can use date and time functions in custom tables and fields. See Adding a New Custom Table and Defining and Editing Field Formula for further details. Below are explanations of available date and time functions.

ADDYEARS(datetime, number)
ADDQUARTERS(datetime, number)
ADDMONTHS(datetime, number)
ADDDAYS(datetime, number)
ADDHOURS(datetime, number)
ADDMINUTES(datetime, number)
ADDSECONDS(datetime, number)
Adds a given number of years|quarters|months|days|hours|minutes|seconds to a specified date/time. An example of when to use this is when the fiscal year is not the same as the Gregorian calendar’s beginning and end dates.

CREATEDATE(year,month,day)
Creates a timestamp from a given year, month and day. Time is set to midnight.

CURRENTDATE()
Returns the current date.
CURRENTTIME()
Returns the current time.

CURRENTTIMESTAMP()
Returns the current timestamp.

GETYEAR(datetime)
GETQUARTER(datetime)
GETMONTH(datetime)
GETDAY(datetime)
GETHOUR(datetime)
GETMINUTE(datetime)
GETSECOND(datetime)
Returns a number that represents the year|quarter|month|day|hour|minute|second in a given date/time.

DAYOFWEEK(datetime)
Returns the day, out of seven days in a week, represented by a given date/time.

DAYOFYEAR(datetime)
Returns the day, out of 365 days in a year, represented by a given date/time.

WEEKOFYEAR(datetime)
Returns the week, out of 52 weeks in a year, represented by a given date/time.

DAYNAME(number)
Returns the name of the day represented by the given number.
YEARDIFF(end,start)
QUARTERDIFF(end,start)
MONTHDIFF(end,start)
DAYDIFF(end,start)
HOURDIFF(end,start)
MINUTEDIFF(end,start)
SECONDDIFF(end,start)

Returns the difference in
years|quarters|months|days|hours|minutes|seconds

String and Text Functions

You can use string and text functions in custom tables and fields.
See Adding a New Custom Table and Defining and Editing Field
Formula for further details. Below are explanations of available string
and text functions.

ASCII(char)
Returns the Int ascii code of a given character.

CHAR(number)
Returns a character for a given ascii code.

CONCAT(string1,string2)
Concatenates string1 and string2.

INDEXOF(string1,string2,n)
Returns the index of the n-occurrence of string2 in string1.

INSERT(string1,string2,overrides,index)
Inserts string2 into string1 at a specified index, possibly overriding a
specified number characters in string1.
**INSERTSTR**(`string1`, `string2`, `index`)
 Inserts `string2` into `string1` at specified zero-based index.

**ISNULLOREMPTY**(`string`)
 Returns true if the string is null or empty.

**LEFT**(`string`, `length`)
 Returns a substring of a specified length, starting at the first character.

**LENGTH**(`string`)
 Returns the length of a given string.

**LOWER**(`string`)
 Returns a lowercase version of a given string.

**LTRIM**(`string`)
 Removes whitespaces from the start of the string.

**REMOTEAT**(`string`, `index`)
 Removes a character at a specified index from a given string.

**REMOVERANGE**(`string`, `index`, `count`)
 Removes a specified number of characters from a given string starting at a specified index.

**REPEAT**(`string`, `number`)
 Returns a concatenation of a string repeated a given number of time.

**REPLACEALL**(`string`, `oldstring`, `newstring`)
 Replaces all occurrences of old string with new string.

**RIGHT**(`string`, `length`)
 Returns a substring of a specified length, end with the last character.

**RTRIM**(`string`)
 Removes whitespaces from the end of the string.
**SOUNDEX**(string)
Returns a four-character (SOUNDEX) code to evaluate the similarity of two objects.

**STRBETWEEN**(string, startstring, endstring)
Returns the substring contained between startstring and endstring.

**STRPARTS**(string, delimiter, n)
Returns the string delimited by a specified delimiter. The search ends after the n-occurrence of the delimiter is found.

**SUBSTRING**(string, index, length)
Returns the substring of a specified length, starting at a specified index.

**TOSTRING**(object)
Converts a given value to a string.

**TRIM**(string)
Removes whitespaces from both ends of a string.

**UPPER**(string)
Returns an uppercase version of a given string.

**Logical Functions**
You can use logical functions in custom tables and fields. See Adding a New Custom Table and Defining and Editing Field Formula for further details. Below are explanations of available logical functions.

**IFBIGINT**(condition, true value, false value)
Returns the first value if the boolean evaluate is true, else returns the second value.
IFDATETIME(condition, true value, false value)
Returns the first value if the boolean evaluate is true, else returns the second value.

IFDOUBLE(condition, true value, false value)
Returns the first value if the boolean evaluate is true, else returns the second value.

IFINT(condition, true value, false value)
Returns the first value if the boolean evaluate is true, else returns the second value.

IFSTRING(condition, true value, false value)
Returns the first value if the boolean evaluate is true, else returns the second value.

INRANGE(value, start, end)
Returns true if a given value is between start and end.

ISNULL(value)
Returns true if a given value is null.

Web Functions

You can use web functions in custom tables and fields. See Adding a New Custom Table and Defining and Editing Field Formula for further details. Below are explanations of available web functions.

Note: In all circumstances, the URL must include ‘http://’. For example if the URL is www.sisense.com, the syntax should be GetFile ('http:// www.sisense.com')

DomainIs: true/false DomainIs (URL, compared domain)
Get whether the given urls domain matches the given domain. For

**GetFile:** string **GetFile** (url)
Extract the filename portion of the path in the given url and returns it.
The filename is everything after the last slash in the path.

**GetHost:** string **GetHost** (url)
Extract host from the given url, for example ‘www.wikipedia.org’ in ‘http://www.wikipedia.org’

**GetPassword:** string **GetPassword** (url)
Extract password from the given url.
Specified in the url following the user name, with leading colon (‘:’)
and trailing at sign (@), as in ‘http://user:password@host/’.

**GetPath:** string **GetPath** (url)
Extract path from the given url.
Path is the url portion following the host name, for example
’/wiki/Business_intelligence’ in ‘http://www.wikipedia.org/wiki/Business_Intelligence’

**GetPort:** string **GetPort** (url)
Extract port from the given url, parsed as integer, for example 123 in
’http://www.wikipedia.org:123/’

**GetQuery:** string **GetQuery**(url)
Extract the query from the given url.
Specified in the url after the ‘?’ and before (optional) the ‘#’ sign, for example ‘par=val’ in ‘http://www.wikipedia.org/?par=val#ref’.

**GetQueryParamValue** (url,param name): string **GetQueryParamValue** (url,param name)
Extract param value from the given url’s query, by the given param name.
Param/Value pairs when supplied, are delimited by an ampersand or a semicolon.

**GetRef:** string GetRef (url)
Extract ref from given url.
Specified in the url starting after last appearance of the ‘#’ sign, for example ‘ref’ in ‘http://www.wikipedia.org/?par=val#ref’

**GetScheme:** string GetScheme (url)
Extract scheme from given url.
Skips leading spaces and followed colon (‘:’) sign, for example ‘http://www.wikipedia.org/’

**GetUserName:** string GetUserName (url)
Extract user name from given url.
Specified in the url before the host name and delimited by an ‘@’ as in ‘http://user@host./’

**HasHost:** true\fast HasHost (url)
Get whether the given url specifies a host.

**HasPassword:** true\fast HasPassword (url)
Get whether the given url specifies a password.

**HasPath:** true\fast HasPath (url)
Get whether the given url specifies a path.

**HasPort:** true\fast HasPort (url)
Get whether the given url specifies a port.

**HasQuery:** true\fast HasQuery (url)
Get whether the given url specifies a query.
HasRef: true\fast HasRef (url)
Get whether the given url specifies a ref.

HasScheme: true\fast HasScheme (url)
Get whether the given url specifies a scheme.

HasUsername: true\fast HasUsername (url)
Get whether the given url specifies a user name.

HostIsIpAddress: true\fast HostIsIpAddress (url)
Get whether the given url host name is an ip address.

IsEmptyUrl: true\fast IsEmptyUrl (url)
Get whether the given url is empty.

IsFileUrl: true\fast IsFileUrl (url)
Get whether the given url is a file url.

IsSecuredUrl: true\fast IsSecuredUrl (url)
Get whether the given url scheme indicates a secured connection(https).

IsStandardScheme: true\fast IsStandardScheme (url)
Returns true if the scheme for the current url is a known 'standard' scheme.
Standard schemes have an authority and a path section (including file:).

IsValidUrl: true\fast IsValidUrl (url)
Get whether the given url has a valid form.

PathForRequest: true\fast PathForRequest (url)
Returns the path that should be sent to the server.
This is the path, parameter, and query portions of the url.
**Schemels:** true\fast Schemels (url)
Get whether the given url scheme portion matches the given scheme.

**Miscellaneous Functions**
You can use miscellaneous functions in custom tables and fields. See Adding a New Custom Table and Defining and Editing Field Formula for further details. The Miscellaneous Functions category currently includes the lookup function.

**LOOKUP**(remote_table,remote_result_column,current_match_column, remote_match_column)
The Lookup function imports a field from one table into another table, by matching two other corresponding fields from both tables. The result will be the value in remote_result_column for which the corresponding remote_match_column equals the current_match_column.

**Building Elasti Cubes for Advanced Business Scenarios**

**Introduction**
This section provides examples of more advanced scenarios, and the recommended methods for implementing the required business logic.

The examples are categorized into the following data manipulation methods: Integrating, Formatting and Enhancing.

**Integrating Data**
Integrate and merge data from different sources into a single ElastiCube structure by identifying common keys between the different tables. Proper planning is important for merging the data; on
the one hand, you need to avoid creating unnecessary relationships, and on the other hand, make sure you don’t have any many to many relationships. Examples include:

- **Creating a Common Date Selection**: Create a common date field from multiple date sets (from multiple data sources), and still keep the ability to use each original date field individually.

- **Financial Reporting**: Bring in an additional data source to help analyze data from transaction systems. For example, Financial GL data will include all transactions but may not have all the income statement or balance sheet reporting definitions.

- **Looking Up Values**: Look up a value from one table and bring it into another table. For example, knowing how much a marketing campaign costs versus the sales opportunity amount is an important KPI to measure.

**Reformatting Data**

Reformat field data to free space, and make fields more readable and usable. For example, convert a date field to numeric, or reduce the precision of real numbers. You can reformat fields within the ElastiCube using a custom SQL expression.

- **Numeric Representation of Date Fields**: Create a date table that is represented by a numeric representation instead of a date field to improve the query performance, as well as provide more flexibility, including the ability to filter a date range.

**Enhancing Data**

Enhance data by adding attributes/records that did not exist in the original data source.
Calculating derived facts: Derived Facts are additional facts that we calculate while importing or delivering the data.

Calendar vs. Fiscal Year: Align a fiscal calendar with a Gregorian calendar.

Time Zone Conversion: Use a source table to convert dates and times from different time zones into a uniform data set.

Currency Conversion: Convert one currency into another using custom fields and a currency exchange rate table.

Current vs. Previous Period for Specific Date Range: Compare data such as sales between a current period and a past period.

Calculating the Number of Open Orders per Day: Check open sales orders where the order has been placed but has not yet been delivered.

Slowly Changing Dimensions: Transactional data does not usually change, however the data that describes the associated dimensions may change. See how to manage dimensions that may be updated with new values within the data warehouse at different points in time.

Integrating Data

The following examples explain how to integrate and merge data from different sources into a single ElastiCube structure. This requires properly planning how to merge the data; to avoid creating unnecessary relationships, while avoiding many to many relationships. Examples in this section:

- Creating a Common Date Selection
- Financial Reporting
- Looking Up Values
Creating a Common Date Selection

Business Case

When pulling together data from multiple sources, you will have a number of different dates. Marketing has a Campaign Date, Sales has an Opportunity Date and Finance has a GL Date.

Modeling Challenge

This type of data leaves us with three sets of dates. Modeling it properly will allow you to select from one common date field while still leaving you the option to choose from one of the three date fields individually.

Solution

Create a custom table that retrieves a unique list of the dates used between the three tables.

Use the following syntax:

```
Select [GL Date] AS [Common Date]
FROM [GL Entries]
Union
Select [Marketing Campaign Date] AS [Common Date]
FROM [Marketing Campaigns]
Union
Select [Opportunity Date] AS [Common Date]
FROM [Sales Opportunities]
```

Link the four tables together:
Results

This gives us the common date field to use. This allows, for example, to select a month that will narrow down the selections across all three tables.
Financial Reporting

Business Case

Transactional systems are meant for handling transactions and not for reporting and analysis. For example, Financial GL data will include all the transactions but may not include all income statement or balance sheet reporting definitions.

Modeling Challenge

This data usually resides in other data sources or tables.

Solution

Here is what our sample GL entries look like. It is not very useful to analysis and reporting.
Another data source is needed to help define how the data will be analyzed and reported.

Start by bringing in another Data Source that contains details about the accounts and how they are categorized:

The two tables are linked on the account number. As there is one record in the GL Categories for multiple rows in the GL Entries, this is known as a One-to-Many Relationship.

The end results show that we can easily view the data in an organized fashion for analysis and reporting.
Looking Up Values

Business Case

Sometimes it is necessary to look up a value from one table and bring it into another table. For example, knowing how much a Marketing Campaign costs versus the Sales Opportunity amount.
Modeling Challenge

These two amounts typically reside in different systems. We need to look up the value from the Marketing system and bring it into the main Sales table.

Solution

In the Sales Opportunities table, create a custom field that will allow to look up a value from the Marketing Campaigns table based on the Marketing Campaign ID. You can do this using the lookup function.

Make the Marketing Campaigns table Invisible as you only need the one field in the Sales Opportunities table. As there is only One Marketing Campaign ID per Opportunity ID, this is known as a 1-to-1 relationship.

Reformatting Data

By reformatting a field, you can create a more readable, and more usable format for analysis, as well as less space consuming in some cases. For example, convert a date field to a numeric field. You can reformat fields within the ElastiCube using a custom SQL expression. An example:
Numeric Representation of Date fields

Business Case

Create a “Date” table using a numeric representation of a Date field instead of the Date field itself to improve query performances. In addition, a numeric representation of a Date can provide the ability of filtering the data by time range.

Solution

To convert a Date (“4/21/2012 12:36:56 AM”) to an integer (20120421), use the following syntax:

$$10000*\text{getyear(Date)}+100*\text{getmonth(Date)}+\text{getday(Date)}$$

To get the hours and minutes too, use a bigint numeric representation. So, "4/21/2012 12:36:56 AM" will become: 201204210036, using the following syntax:

$$\text{tobigint}(100000000*\text{getyear(DateTime)}*+\text{getmonth(DateTime)}*1000000+\text{getday(DateTime)}*10000+100*\text{gethour(DateTime)}+\text{getminute(DateTime)})$$

Enhancing Data

The following examples explain how to add attributes and/or records that did not exist in the data source. Examples include:

- Calculating Derived Facts
- Calendar vs. Fiscal Year
- Time Zone Conversion
- Currency Conversion
- Current vs. Previous Period for Specific Date Range
- Calculating the Number of Open Orders per Day
- Slowly Changing Dimensions
Calculating Derived Facts

Business Case

Derived Facts are additional facts that we calculate while importing or delivering the data. For example:

\[
\begin{align*}
\text{Amount} &= \text{Qty} \times \text{UnitPrice} \\
\text{Profit} &= \text{Amount} - \text{Cost} \\
\text{Inventory Ratio} &= \frac{\text{Sum(Qty Sold)}}{\text{Sum(Qty Ordered)}} \\
\text{AVG Price} &= \frac{\text{Sum(Qty \times UnitPrice)}}{\text{Sum(Qty)}}
\end{align*}
\]

Modeling Challenge

You must decide whether to calculate the derived facts “on demand”, meaning in the web application, or in advance in the ElastiCube. Take into consideration that calculating 'On Demand' Derived Facts in the web application can enable more dynamic filtering, while calculating them in the ElastiCube stage will save query time when retrieving the data, and enforce calculation consistency, especially with non-trivial facts. This is due to the fact that the dashboard designer/end users will receive consistent results for measures, instead of having to create the complex measures individually, by their own understanding.

Solution

In the following schema you can create a derived fact to calculate the inventory ratio per product.
Create a custom table using an SQL Expression that joins the “Order Details” table with the “Products” table and returns the division result of “Quantity” and “UnitOnOrder”, with the following Syntax:

```sql
SELECT
    [Products].ProductID,
    tofloat(sum(UnitsOnOrder))/tofloat(sum(Quantity)) AS InventoryRatio
FROM [Products] JOIN [Order Details]
ON [Products].ProductID=[Order Details].ProductID
GROUP BY [Products].ProductID
HAVING tofloat(sum(UnitsOnOrder))/tofloat(sum(Quantity))>0
```

The result table will give the desired results:
Connect the custom table to the rest of the tables:

<table>
<thead>
<tr>
<th>ProductID</th>
<th>InventoryRatio</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1.614731</td>
</tr>
<tr>
<td>31</td>
<td>2.555476</td>
</tr>
<tr>
<td>49</td>
<td>2.423077</td>
</tr>
<tr>
<td>74</td>
<td>0.8754209</td>
</tr>
<tr>
<td>2</td>
<td>1.66509</td>
</tr>
<tr>
<td>32</td>
<td>2.020202</td>
</tr>
<tr>
<td>21</td>
<td>1.535433</td>
</tr>
<tr>
<td>37</td>
<td>2.4</td>
</tr>
<tr>
<td>70</td>
<td>0.4773562</td>
</tr>
<tr>
<td>56</td>
<td>0.3958828</td>
</tr>
<tr>
<td>43</td>
<td>0.4827586</td>
</tr>
<tr>
<td>68</td>
<td>0.4255319</td>
</tr>
<tr>
<td>3</td>
<td>2.560976</td>
</tr>
<tr>
<td>64</td>
<td>3.243243</td>
</tr>
<tr>
<td>66</td>
<td>3.34728</td>
</tr>
<tr>
<td>45</td>
<td>1.929134</td>
</tr>
<tr>
<td>48</td>
<td>3.043478</td>
</tr>
</tbody>
</table>
Note: You can also add the “InventoryRatio” measure to the “Products” table using the Lookup() function by “ProductID”.

Calendar vs. Fiscal Year

Business Case
A large number of companies use a fiscal calendar that does not comply with the Gregorian 12-month calendar.

**Modeling Challenge**

This requires modeling the data properly so that the data can be reported or analyzed via the normal calendar or via the revised fiscal calendar.

**Solution**

In this example, let’s assume that the Fiscal Calendar starts on September 1st. So if we are in the calendar year of 2013, then the fiscal year of 2014 starts September 1st. To accomplish this, we create a custom field that takes the date field and adds four months to it.
When you create a pivot table in the web application, you will see that the new year (2014) starts in September using the Fiscal field.

<table>
<thead>
<tr>
<th>Days in Date</th>
<th>Calendar Year</th>
<th>Fiscal Year</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/29/2013</td>
<td>2013</td>
<td>2013</td>
<td>35,756</td>
</tr>
<tr>
<td>08/30/2013</td>
<td>2013</td>
<td>2013</td>
<td>3,687</td>
</tr>
<tr>
<td>08/31/2013</td>
<td>2013</td>
<td>2013</td>
<td>35,617</td>
</tr>
<tr>
<td>09/01/2013</td>
<td>2013</td>
<td>2014</td>
<td>1,108</td>
</tr>
<tr>
<td>09/02/2013</td>
<td>2013</td>
<td>2014</td>
<td>91,387</td>
</tr>
<tr>
<td>09/03/2013</td>
<td>2013</td>
<td>2014</td>
<td>11,330</td>
</tr>
<tr>
<td>09/04/2013</td>
<td>2013</td>
<td>2014</td>
<td>69,273</td>
</tr>
</tbody>
</table>

**Time Zone Conversion**

**Business Case**

In many cases, we need to generate reports based on data from different time zones.

**Modeling Challenge**

When working with different time zones, the challenge is to store all of the business transactions in an absolute time reference that does not change with the seasons, locations (for instance - GMT), or daylight saving. Therefore, the absolute transition time is a combination of location and date.

**Solution**

The aim is to add an “absolute time” field to every business transaction, based on its location and time.

Step 1 - Create a reference source table
Create a source table (database table / Excel / CSV) that contains the countries and cities that exist in the database, a numeric representation of timestamp range to determine if the transaction belongs to daylight savings time or not (see the this web site), and the UTC to allow the conversion to GMT.

For example:

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>DST_From</th>
<th>DST_To</th>
<th>UTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Seattle</td>
<td>20120311.2</td>
<td>20121103.1</td>
<td>-7</td>
</tr>
<tr>
<td>USA</td>
<td>Seattle</td>
<td>20121103.1</td>
<td>20130310.2</td>
<td>-8</td>
</tr>
<tr>
<td>USA</td>
<td>Seattle</td>
<td>20130310.2</td>
<td>20131027.1</td>
<td>-7</td>
</tr>
<tr>
<td>USA</td>
<td>Seattle</td>
<td>20131027.1</td>
<td>20140327.1</td>
<td>-7</td>
</tr>
<tr>
<td>UK</td>
<td>London</td>
<td>20120325.1</td>
<td>20121028.2</td>
<td>0</td>
</tr>
<tr>
<td>UK</td>
<td>London</td>
<td>20121028.2</td>
<td>20130330.1</td>
<td>1</td>
</tr>
<tr>
<td>UK</td>
<td>London</td>
<td>20130330.1</td>
<td>20131027.2</td>
<td>0</td>
</tr>
<tr>
<td>UK</td>
<td>London</td>
<td>20131027.2</td>
<td>20140330.1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Step 2 - Add a numeric representation of the OrderDate**

To associate the Order Date with its UTC, create a custom field of type “Decimal” with a numeric representation of the Date timestamp, using this SQL statement:

```
getyear(OrderDate)*10000+getmonth(OrderDate)*100+getday(OrderDate)+ToDouble(gethour(OrderDate))/100
```

The result table should look like this:
Step 3 - Join between the two tables

The third step includes creating a custom SQL expression that joins between the two tables and creating the “Absolute Time” custom field within it (“GMTDate”). This is to create a synchronization between all the transactions. The custom field will be created using the “add hours” function with the matching UTC value. See the following script:

```
SELECT
    [Orders].CustomerID,
    [Orders].EmployeeID,
    [Orders].Freight,
    [Orders].OrderDate,
    [Orders].OrderID,
    [Orders].ShipAddress,
    [Orders].ShipCity,
    [Orders].ShipCountry,
    AddHours(([Orders].OrderDate), [GMT Conversion.csv].UTC) AS GMTDate
FROM [Orders]
```
The result table will look like this:

<table>
<thead>
<tr>
<th>CustomerID</th>
<th>EmployerID</th>
<th>Freight</th>
<th>OrderDate</th>
<th>OrderID</th>
<th>ShipAddress</th>
<th>ShipCity</th>
<th>ShipCountry</th>
<th>GMTDate</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHITEC</td>
<td>5</td>
<td>4.56</td>
<td>7/31/2012 12:00:00 AM</td>
<td>10269</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>7/30/2012 4:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>5</td>
<td>4.56</td>
<td>7/31/2012 12:00:00 AM</td>
<td>10269</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>7/30/2012 5:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>5</td>
<td>4.56</td>
<td>7/31/2012 12:00:00 AM</td>
<td>10269</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>7/30/2012 6:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>5</td>
<td>4.56</td>
<td>7/31/2012 12:00:00 AM</td>
<td>10269</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>7/30/2012 7:00:00 PM</td>
</tr>
<tr>
<td>BGSTEV</td>
<td>7</td>
<td>22.77</td>
<td>8/26/2012 12:00:00 AM</td>
<td>10295</td>
<td>19th Beroy Circus</td>
<td>London</td>
<td>UK</td>
<td>8/26/2012 1:00:00 AM</td>
</tr>
<tr>
<td>BGSTEV</td>
<td>7</td>
<td>22.77</td>
<td>8/26/2012 12:00:00 AM</td>
<td>10295</td>
<td>19th Beroy Circus</td>
<td>London</td>
<td>UK</td>
<td>8/26/2012 2:00:00 AM</td>
</tr>
<tr>
<td>BGSTEV</td>
<td>7</td>
<td>22.77</td>
<td>8/26/2012 12:00:00 AM</td>
<td>10295</td>
<td>19th Beroy Circus</td>
<td>London</td>
<td>UK</td>
<td>8/26/2012 3:00:00 AM</td>
</tr>
<tr>
<td>BGSTEV</td>
<td>7</td>
<td>22.77</td>
<td>8/26/2012 12:00:00 AM</td>
<td>10295</td>
<td>19th Beroy Circus</td>
<td>London</td>
<td>UK</td>
<td>8/26/2012 4:00:00 AM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>4</td>
<td>23.29</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10344</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>10/31/2012 4:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>4</td>
<td>23.29</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10344</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>10/31/2012 5:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>4</td>
<td>23.29</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10344</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>10/31/2012 6:00:00 PM</td>
</tr>
<tr>
<td>WHITEC</td>
<td>4</td>
<td>23.29</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10344</td>
<td>1029 - 12th Ave, S.</td>
<td>Seattle</td>
<td>USA</td>
<td>10/31/2012 7:00:00 PM</td>
</tr>
<tr>
<td>SEVES</td>
<td>5</td>
<td>288.40</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10359</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>11/1/2012 1:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>5</td>
<td>288.40</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10359</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>11/1/2012 2:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>5</td>
<td>288.40</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10359</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>11/1/2012 3:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>5</td>
<td>288.40</td>
<td>11/1/2012 12:00:00 AM</td>
<td>10359</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>11/1/2012 4:00:00 AM</td>
</tr>
<tr>
<td>EASTC</td>
<td>1</td>
<td>71.97</td>
<td>11/26/2012 12:00:00 AM</td>
<td>10364</td>
<td>25 King George</td>
<td>London</td>
<td>UK</td>
<td>11/26/2012 1:00:00 AM</td>
</tr>
<tr>
<td>EASTC</td>
<td>1</td>
<td>71.97</td>
<td>11/26/2012 12:00:00 AM</td>
<td>10364</td>
<td>25 King George</td>
<td>London</td>
<td>UK</td>
<td>11/26/2012 2:00:00 AM</td>
</tr>
<tr>
<td>EASTC</td>
<td>1</td>
<td>71.97</td>
<td>11/26/2012 12:00:00 AM</td>
<td>10364</td>
<td>25 King George</td>
<td>London</td>
<td>UK</td>
<td>11/26/2012 3:00:00 AM</td>
</tr>
<tr>
<td>EASTC</td>
<td>1</td>
<td>71.97</td>
<td>11/26/2012 12:00:00 AM</td>
<td>10364</td>
<td>25 King George</td>
<td>London</td>
<td>UK</td>
<td>11/26/2012 4:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>1</td>
<td>22.21</td>
<td>12/9/2012 12:00:00 AM</td>
<td>10377</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/9/2012 1:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>1</td>
<td>22.21</td>
<td>12/9/2012 12:00:00 AM</td>
<td>10377</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/9/2012 2:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>1</td>
<td>22.21</td>
<td>12/9/2012 12:00:00 AM</td>
<td>10377</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/9/2012 3:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>1</td>
<td>22.21</td>
<td>12/9/2012 12:00:00 AM</td>
<td>10377</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/9/2012 4:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>2</td>
<td>34.86</td>
<td>12/19/2012 12:00:00 AM</td>
<td>10388</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/19/2012 1:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>2</td>
<td>34.86</td>
<td>12/19/2012 12:00:00 AM</td>
<td>10388</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/19/2012 2:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>2</td>
<td>34.86</td>
<td>12/19/2012 12:00:00 AM</td>
<td>10388</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/19/2012 3:00:00 AM</td>
</tr>
<tr>
<td>SEVES</td>
<td>2</td>
<td>34.86</td>
<td>12/19/2012 12:00:00 AM</td>
<td>10388</td>
<td>90 Walhurist Rd.</td>
<td>London</td>
<td>UK</td>
<td>12/19/2012 4:00:00 AM</td>
</tr>
</tbody>
</table>

**Step 4 - Make schema adjustments**

For the next step, do the following:

- Replace the current Orders table with the new one,
- Refer to the new “Absolute Time” custom field (“GMTDate”) as the leading date field
- Make the reference tables (“Orders” and “GMT Conversion.csv”) invisible.

**Currency Conversion**

**Business Case**
Most data for entities is recorded in their local reporting currency (ie $ for United States, £ for UK). Here we want to convert all the amounts to USD.

**Modeling Challenge**

This requires determining the Currency Rate of the region and then multiplying the value in local currency by the associated Exchange Rate by Month.

**Solution**

Create two custom fields in the GL Entries. The first will look up the Currency code of the region. This field will be used along with a month field to link to the Exchange Rates table.
The first field in the GL Entries is created using the lookup function to retrieve values from the Currency Codes table.

Lookup([Currency Codes],[Currency Code],Region,Region)

Then create a second Custom Field for the Month of the GL Date.

GetMonth([GL Date])

Next, link the fields together (note that both Month fields were set to Integer and the Currency Codes table to Invisible).

The Local Amount multiplied by the Exchange Rate gives the Converted USD Amount.
Current vs. Previous Period for Specific Date Range

Business Case

In many cases we would like to compare our business' performance last week, to the week before, or maybe we would like to see a percentage of sales growth for the current month/quarter compared to the previous month/quarter.

Modeling Challenge

Since we want the compared time range to be as flexible as possible, the solution has to include both layers - ElastiCube and web application.
Solution

1. Create a custom table in the ElastiCube to summarize the totals/counts per day for the source table:

   ```
   SELECT
     a.Date,
     sum(a.Revenue)AS value
   FROM [Accord 2011 Client List] AS a GROUP BY a.Date
   ```

2. Create a custom table in the ElastiCube with current vs. previous values, by adjusting the script below:

   ```
   SELECT
     curr.Date AS date,
     curr.value AS current,
     prev.value AS prev
   FROM [sum] curr
   LEFT JOIN [sum] AS prev
   ON curr.Date = addyears(prev.Date,1)
   UNION
   SELECT
     addyears(prev.Date,1) AS date,
     curr.value,
     prev.value
   FROM [sum] prev
   LEFT JOIN [sum] AS curr
   ON prev.Date = addyears(curr.Date,-1)
   ```

3. In the web application, add a 'date range picker' using the days from the custom table. Then add two new numeric indicators. In the first numeric picker add the 'sum of the current value', in the second numeric picker, add the 'sum of the previous value'.

4. In the date range picker, select the days of interest and you will see the current and previous values.

Calculating the Number of Open Orders per Day

Business Case

An open sales order is where the order has been placed but has not yet been delivered. If for example there is an order for 100 items and
against this order only 50 items have been delivered (it is partially delivered). A high level of open orders per day may indicate that something is wrong with orders handling.

**Modeling Challenge**

We cannot just count the number of orders per day because it will exclude orders that were open on a certain day and are already closed. Therefore, we will need to create a snapshot of the number of open orders per day.

**Solution**

1. Import an Excel file with all dates listed in the Orders table into the ElastiCube.
2. To improve query performance, convert all the date fields into numeric representations (for more information, see Numeric Representation of Date fields).
3. Create the following custom table:

   ```sql
   SELECT
     s.Dates,
     tm.Created_At,
     tm.Closed_At,
     tm.TicketId
   FROM [All Dates] s LEFT JOIN [Orders] tm
   ON s.DateInt >= tm.CreatedAtInt
   AND (tm.SolvedAt IS NULL OR s.DateInt <= tm.SolvedAtInt)
   ```

**Slowly Changing Dimensions**

**Business Case**

Transactional data typically does not change, however the data that describes the associated dimensions may change. This example demonstrates how to manage dimensions that may be updated with new values within the data warehouse at different points in time.
For example, a customer that was living in NYC and moved to LA earlier this year.

<table>
<thead>
<tr>
<th>Date</th>
<th>Customer</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/2011</td>
<td>John Smith</td>
<td>NYC</td>
</tr>
<tr>
<td>1/1/2013</td>
<td>John Smith</td>
<td>LA</td>
</tr>
</tbody>
</table>

**Modeling Challenge**

Following the example above, when the transactions were made last year, the customer was living in NYC. Later this year, the customer moved to LA.

If you decide to refer only to the last city and summarize revenue by city, the NYC transaction will be credited to LA only because the customer currently lives there.

If you connect the “Customer” field within the above table to the “Customer” field in the fact table, you will create a “Many to many” relationship because “Customer” is not a unique identifier of this table.

**Solution**

The solution is to change the level of granularity of the “Customer_City” table and add the “Date” field to the key -

1. Concatenation of the Slowly Changing Dimension table’s unique identifier (for example - Customer_ID + Date)
2. Creation of the same concatenated field in the transactions table.
3. Merge between the 2 keys.
4. This way, you can associate the [Customer_ID + Date] key of every transaction with the relevant customer city.
Building the ElastiCube

After defining a schema, you will need to 'build' your ElastiCube. This will import the data from your data sources that you added to your schema. You must complete at least once before the ElastiCube data can be used in a dashboard.

To build an ElastiCube:

1. Click ElastiCube in the top menu, and then Build the ElastiCube.

   or

   Within your schema, click Build in the top menu. Select Build the ElastiCube.

2. Define the following options:

   - **Target Server:** Select the Sisense server location that hosts the ElastiCube. Click Add Server to add a new location.
   
   - **Build Options:** Select which data to import. For more information, see Build Settings.
   
     - **Build Schema Changes:** Imports data into new tables and fields where a change has been made to the schema since the previous build.
   
     - **Build Entire ElastiCube:** Imports data for all tables with a default of overriding existing data in the ElastiCube. If tables and fields in your schema are set to import accumulative data, then an additional option **Delete existing Data** exists. If selected, all data will be replaced instead of accumulative data where relevant.
Click More Settings to reveal the following settings:

- **Build Logging**: Specifies the level of detail to store in the build log.
- **Sample data**: Specifies the limitation on the number of table rows to import.

3. Click Build to begin the import process.
4. A log panel at the bottom of the screen will detail each stage of the build. When the build is complete, the following message appears in the logs: *Build successfully ended.*

**Build Logs**

The build logs record all steps, activities and alerts occurring during a particular build.

These logs can be helpful in determining when the last build occurred, what changes were made, and the status of the ElastiCube.

1. Click **ElastiCube** on the top menu.
2. Click **Recent Logs**.
3. The logs will load and appear at the bottom of the screen.
4. To save the log, click the save icon below the logs panel.
Making Changes to an Existing ElastiCube

This section describes how to make changes in your ElastiCube.

To update an ElastiCube:

1. Open the ElastiCube Schema file using one of the following methods:
   - In the ElastiCube Manager, click File, and locate the ElastiCube Schema file (*.ecube), and double click to open.
   - In the Sisense Server Console, select the ElastiCube you want to open, and click Edit.

   The file will open displaying all associated tables, fields and relationships in the ElastiCube Manager.

2. You can now edit the ElastiCube. Hover over the table name to see editing options. Common actions include:
   - **Add Data**: See Connecting to Source Data.
   - Rename, edit, delete or copy tables. See Managing Tables.
   - **Add Custom Fields or Tables**: See Adding a New Custom Table and Adding a New Field.

3. To apply any changes, click ElastiCube > Build the ElastiCube... in the top panel of the ElastiCube Manager.
Build Settings and Data Accumulation Behavior

When you build your Elasticube, data is imported and accumulated based on the following settings:

- **Build Options**: Defines whether to import all data overriding any previous data, or import only data where a change has been made to the schema since the previous build.

- **Field Build Behavior**: Defines a specific integer or date field as an index in the table. The index column will be used to determine whether source records are new, and whether to accumulate data in the table based on a higher index value at the time of the build. New builds will only include values greater than the maximum existing value.

- **Table Build Behavior**: Defines the behavior on the table level. You can replace all data at the time of the build, or add only additional/accumulated data.
Build Options

There are two primary Build Options, **Build Schema Changes** and **Build Entire ElastiCube**.

To access Build Options, click **Build** in the main menu of the ElastiCube Manager. See also Building the ElastiCube.

**Build Schema Changes**: Updates the build only if changes were made to the schema since the previous build, and imports data only if new tables were added. Conditions for updating the build include:

- New, removed or changes to custom tables
- New, removed or changes to custom fields
- New or removed tables
- New or removed table relationships.
**Build Entire ElastiCube:** Imports data according to the build behavior defined. By default, Sisense replaces and overrides all existing data in the ElastiCube. While building entire ElastiCubes ensures you have an exact copy of the underlying data source, it can sometimes take a long time and be expensive on the database depending on the size of your data source. You can customize your builds to update only the tables and fields where data was accumulated since the last build. This is useful when you frequently need to refresh a large data source. For example, if you have a data source that is updated daily, rather than rebuild the entire ElastiCube daily, you can just import the new data added each day. This option can significantly reduce the amount of time it takes to complete build depending on the size of your ElastiCube.

While building the ElastiCube with schema changes or entire ElastiCube builds, you can continue to run queries. In the event that the build fails, Sisense restores the original version of the ElastiCube and attempts the build again. While Sisense restores the original ElastiCube, some downtime may occur while Sisense copies and pastes the ElastiCube on your drive. The downtime is the amount of time it takes to copy and paste the ElastiCube locally. If you require high availability for your data, Sisense provides this through ElastiCube Sets.

**Note:** When Sisense restores an ElastiCube a copy of the original ElastiCube is created. You should verify that your server can store multiple copies ElastiCubes until the restoration process is complete.

For more information on how to customize your builds, see Field Build Behavior and Table Build Behavior below.
Field Build Behavior

You can select a specific integer or date field that will be used to determine whether to accumulate data at the time of the build. The field will act as an index, and if the index value is greater in a subsequent build then data will be accumulated for the table.

To select the integer or date field within a table as the parameter to accumulate by, click on the field name, and then select **Is Accumulated by**.

**Note:** The source data must be ordered by the index.

Accumulation behavior for integers and for dates are as follows:

**Integer**

When you select an integer, only source rows with a value greater than the maximum index value in the ElastiCube table will be inserted. Existing data in the ElastiCube table will not be modified or deleted.
**Note:** Some data sources (for example, csv files) do not support accumulating data on the field level, and in such cases data will be duplicated. See **Accumulative Build Support** below.

The following image demonstrates this logic (when supported):

![Accumulate By Index - Integer](image)

After Load 1, the maximum index value is 3. In Load 2, the source index value of 2 is not inserted (since it is less than 3), but the source index value of 4 is inserted (since it is greater than 3).

**Date**

When accumulating by date, you can select one of the following options:

![Date Options](image)
**Last stored value:** This is identical to the integer index functionality. Only source rows where the index is greater than the ElastiCube table’s maximum date index value will be inserted. ElastiCube data is never removed or modified after it has been built.

**Note:** Some data sources (for example, CSV files) do not support accumulating data on the field level, and in such cases data will be duplicated. See **Accumulative Build Support** below.

**Last Days:** This option specifies the number of days preceding the build date to synchronize.

**Note:** Syncing “Since Last X days” requires the source data to be ordered by the date.

Synchronization consists of deleting all of the rows in the ElastiCube table where the index is in the specified range, and inserting all source rows where the index value is in the specified range. This option does allow for ElastiCube table data to be deleted or modified. The following example will demonstrate this logic using a three-day range.

### Accumulate By Index – Last 3 Days

<table>
<thead>
<tr>
<th>Source</th>
<th>Ecube Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/3/2014</td>
<td>5</td>
</tr>
<tr>
<td>12/4/2014</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Ecube Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/3/2014</td>
<td>5</td>
</tr>
<tr>
<td>12/4/2014</td>
<td>15</td>
</tr>
<tr>
<td>12/5/2014</td>
<td>2</td>
</tr>
</tbody>
</table>

In Load 1, the Ecube table started empty, so nothing was deleted. Both of the source rows are between 12/3/2014 and 12/5/2014 (the 3 day range), so they are inserted. In Load 2, all Elasticube table records are deleted, then inserted again.
with the date between 12/4/2014 and 12/6/2014 are removed. In the source table, the data for 12/3/2014 and 12/4/2014 have been updated. However, since 12/3/2014 is outside of our 3 day range, the Elasticube data for that date has not changed. Since 12/4/2014 is in the range, the original Elasticube table record for that day was removed and was replaced by the source table record for that day. 12/5/2014 data is new, so it was also inserted into the Elasticube table.

**Table Build Behavior**

A table’s Build Behavior lets you define whether to import and replace data for the entire table or bring in only accumulated data at the time of the ElastiCube build.

To select a table’s Build behavior, click the table’s header and then Additional Preferences.

The following options exist:

**Replace Data** (default): Replaces all data at the time of the build. This is recommended for dimension tables, for example: store attributes, or dimensions, which describe the objects in a fact table.
**Accumulate Data:** Adds additional data to existing table data, without making comparisons and without omitting data. This is recommended for detailed fact tables, for example: store quantitative information for analysis.

**Note:** If one of the fields in the table is set to accumulate data (see below), then data will be accumulated from the selected integer or date field, and not from the table.

**Ignore When Unchanged:** Does not import any data unless changes have occurred in the table schema. This is recommended with summary/snapshot fact tables and with data marts (smaller subsets of data, tailored for specific needs).

**Build Options Working Together with Table and Field Behavior**

The following table describes how data will be imported using different build options and table behavior combinations.

<table>
<thead>
<tr>
<th>Build Entire Elasticube</th>
<th>Replace Data</th>
<th>Accumulate Data</th>
<th>Ignore when unchanged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Replaces all data at the time of build.</td>
<td>Only adds additional data to existing table data. If a field in the table is marked as Accumulate by, then data is accumulated only for the selected field. Note: If enabled, an additional checkbox exists to delete all existing data during the build.</td>
<td>Ignores tables that have remained unchanged, unless changes have occurred in the table schema. Note: If enabled, an additional checkbox exists to delete all existing data during the build.</td>
</tr>
</tbody>
</table>
Replace Data | Accumulate Data | Ignore when unchanged
---|---|---
Build Schema Changes | All data remains unchanged during the build. | If a field in the table is marked as Accumulate by, then data is accumulated only for the selected field. | Ignores tables that have remained unchanged, unless changes have occurred in the table schema.

**Note:** Tables with accumulative build settings are highlighted with a dark blue color.

### Accumulative Build Support

The following list displays different data sources and their support for accumulating data on the table and field levels.

<table>
<thead>
<tr>
<th>Data Source Provider</th>
<th>Accumulate by Table</th>
<th>Accumulate by Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oracle</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MySQL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MS SQL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Source Provider</td>
<td>Accumulate by Table</td>
<td>Accumulate by Field</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>ODBC</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>OLEDB</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Hive</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MS Excel</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CSV file</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>MS Access</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Salesforce</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Google AdWords</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Google Analytics</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Google Spreadsheets</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Facebook</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>HubSpot</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DynamoDB</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ZenDesk</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Amazon Redshift</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Heroku Postgres</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DB2</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Teradata</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Source Provider</td>
<td>Accumulate by Table</td>
<td>Accumulate by Field</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>MongoDB (ODBC)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Managing ElastiCubes

Sisense Server Console

You can use the Sisense Server Console to perform various management tasks on your ElastiCubes, including:

- Scheduling data loads
- Importing and exporting data
- Attaching and detaching directories
- Starting and stopping an ElastiCube
- Changing the location of your ElastiCube data storage
- Cancelling running queries

To open the Sisense Server Console:

- Right-click the systems tray and double-click the console icon.
- or
- Click on the Windows start menu, and select All Programs > Sisense > Sisense Server Console.

ElastiCube data is stored in a default folder, which you can change in the Sisense Server Console.

Changing the Location of the ElastiCube Data Storage

To change the folder:

1. From the Windows start menu, open the Sisense Server Console.
2. In the top panel, click on the cog icon to view/change server preferences.
3. Click Browse next to Default server data folder.
4. Select the location of the folder where you want to store ElastiCube data, and click **OK**.

Cancelling Running Queries

You can cancel all running queries in your ElastiCube to free up resources. This is useful in cases where your ElastiCube is consuming too many resources, and as a result, causing the Sisense web app to be unresponsive.

To cancel all queries:

1. Click on the Windows start menu, and select **All Programs** > **Sisense** > **Sisense Server Console**.
2. Click the relevant ElastiCube to view the menu panel.
3. Click **Cancel All Queries**.
Scheduling Data Loads

After you build an ElastiCube, you can schedule future builds to automatically synchronize with the underlying data source to ensure all data is up to date.

By default, scheduled builds are Entire builds unless any table within the ElastiCube is set to Accumulative or a table is set to be ignored.

Your ElastiCube's build configuration determines how the scheduled build is to be performed.

Note: By default, scheduling is disabled.

Synchronization using the ElastiCube Manager

1. Open the ElastiCube Manager.
2. Open the relevant ElastiCube.
3. On the top menu select ElastiCube > Schedule Build Settings.
4. Select the relevant scheduling option:
   - **Disable**: Do not automatically build the ElastiCube (default)
   - **Time of Day**: Build the ElastiCube daily, at a specified time
   - **Days of Week**: Build the ElastiCube on specific weekdays at a specified time
   - **Day of Month**: Build the ElastiCube monthly, at a specified date
   - **Intervals**: Build the ElastiCube at specified intervals
5. Click **Update** to save the scheduling settings.

Synchronization using the Sisense Server Console

1. Open the Sisense Server Console.
2. Select the relevant ElastiCube.
3. Click the Schedule Synchronization menu item.
4. Select the relevant scheduling option:
   - **Disable**: Do not automatically build the ElastiCube (default)
   - **Time of Day**: Build the ElastiCube daily, at a specified time
   - **Days of Week**: Build the ElastiCube on specific weekdays at a specified time
   - **Day of Month**: Build the ElastiCube monthly, at a specified date
   - **Intervals**: Build the ElastiCube every specified time interval

5. Click **Update** to save scheduling settings.

**Importing and Exporting ElastiCube Data**

ElastiCube data can be transferred to different machines. This is useful when you are deploying on a new machine or need to transfer the data to a different server.

The transferred data is stored in a compressed ecdata file. The file contains all of the information contained in an ElastiCubeData folder (including the source data), and is used by the Sisense Server Console to build a new ElastiCube.

**To export data:**

1. Open the Sisense Server Console.
2. Click on the relevant ElastiCube.
3. Click the 'Stop' button to stop the specific ElastiCube (not the entire server).
4. Click **Export**. Enter a name for the file you are saving, and click **Save**.

**To import data:**

1. Open the Sisense Server Console.
2. Click on the import ecdata file icon.
3. Select the location of the ecdata file and click **Open**.

4. A window will appear showing the import progress. Once complete, the new ElastiCubes will be added to the list of existing ElastiCubes. Make sure the ElastiCube is running before accessing it.

**Note:** You can also transfer data by copying the folder where Sisense stores the data locally, instead of exporting and importing the compressed file.
Creating Dashboards

This section describes how to create a new dashboard.

There are two ways you can create dashboards, first, through the Sisense Web Application, and second, through the Sisense REST API.

The difference between these two methods is the Sisense Web Application provides a UI and how you populate the dashboard with widgets.

When creating a dashboard through the Sisense Web Application, you build an ElastiCube or select a data set, create a dashboard, and then populate it with widgets.

To create a dashboard through the REST API, you define the dashboard and then populate it with widgets that already exist through their widget IDs.

Creating a New Dashboard

Note: This section is for users with dashboard editing rights (usually with a user role of Designer, and as determined by the user license).

Tip! If you have dashboard editing rights, you should see the editing buttons in the top-right corner of the dashboard.
Note: Each Sisense Web Dashboard is based on the data selected from one or more ElastiCubes or data sets. The instructions below assume that the required ElastiCube(s) and data set(s) have already been created. You can also use the sample ElastiCubes that are installed with Sisense if you have not yet created your own.

To create a dashboard:

1. In the HOME page, click the ‘+’ symbol above the Dashboards list.
   OR
   Right-click on the folder menu and select New Dashboard.

The following window appears:
2. Click the name of the **Data Set** displayed to select the ElastiCube or data set you want to work with. ElastiCubes have the 📊 icon next to their name while data sets have the 📊 icon next to their name.

3. Click the name of the **TITLE**, and enter a name for the dashboard. This name will appear at the top of the dashboard, and in the **My DASHBOARDS** list.

4. Click **CREATE**.

You are then automatically guided through the process of creating your first Widget in the Widget Wizard, as described in Adding Widgets to a Dashboard.
Adding Widgets to a Dashboard

To create widgets quickly and intuitively, you can use the Widget Wizard. The Widget Wizard automatically guides you through a very simple process of creating a widget while offering the best recommendations for displaying the data that you select.

Almost always, simply accepting the wizard’s recommendations will help you create a great Widget. However, if you want more control over your Widget’s appearance and behavior, click the Advanced Configuration option in the bottom left of the wizard to access a rich variety of additional design options, as described in Using the Widget Designer.

Using the Widget Wizard

To add a widget to the dashboard:

If this is your first widget, click Select Data. The Sisense Data Browser opens, and from there you can select one of the fields (columns) from this dashboard’s ElastiCube. If you already have widgets in your dashboard, then click the button.

Note: To select data from a different ElastiCube, click from on the right side of the NEW WIDGET window, and select an ElastiCube.
You can add a title to your widget now or after creating your widget.

NEW WIDGET

Select Data

ADD TITLE

In the **Data Browser**, select a field to add to your widget. The field that you select is automatically displayed in a suggested widget. When only a single numeric field is selected, it is displayed as an INDICATOR Widget. A single descriptive field is displayed as a PIVOT Widget.

NEW WIDGET

Total Revenue Add Data

ADD TITLE

TOTAL REVENUE

14M
Single Numeric Field

But your widget is not really interesting yet, because it has only one field!

Repeat the step above to add more fields to the widget.

As you add fields, the relevant options are displayed as buttons to the left of your selection.
The fields that you select are listed across the top left of the wizard.

You can click on each visualization button to display the selected fields in that visualization/chart.

For example, the same Widget as above could be displayed as a PIE CHART:
Tip: Sisense provides its best recommendation for your widget design. However, if you want more control, you can click the Advanced Configuration option on the bottom left of the window to provide a rich variety of additional design options, as described in Using the Widget Designer.

Data Browser

In the Data Browser, you can select and add fields (columns) from an ElastiCube to your widget.
An icon appears to the left of each field to indicate its data type:

- **Date**
  - A

- **Alphanumeric string**
  - A

- **Numeric**
  - #

As you type into the Data Browser, the list is dynamically filtered to only show the fields that contain the text you typed.
Simply clicking a field to add it to the widget generally provides great results, however there are more options in the Data Browser.

- Hover over a field in the Data Browser and click More ... to display additional aggregation (quick functions) and filtering options.

- Click on the button to define formulas (free-form expressions) that define the field values and filters of a widget. A rich variety of functions are provided for you to use in the formula that you define.
Using the Widget Designer

The Widget Designer lets you fine-tune a widget's appearance and behavior.

Opening the Widget Designer

To display the Widget Designer:

- On the Dashboard, click the Pencil (Edit) button that appears in the top-right corner of a Widget.
Alternatively, while creating a new widget, in the Widget Wizard, click the **Advanced Configuration** option that appears at the bottom-left of each window. The Widget Designer is then displayed showing the widget in the same state as in the Widget Wizard preview.

**The Widget Designer – A Quick Tour**

The Widget Designer enables you to select the data to be included in a widget in addition to providing a variety of options for customizing the visualization used to show the data.
1. **Adding Data to the Widget (Data Panel):** Used for selecting the values that you want to appear in the widget and those needed for grouping the data. The options differ depending on the visualization (chart type).

2. **Adding a title to the dashboard:** Click *Set a Title* and type in a new title for the widget.
   You can also add a widget title directly from the dashboard without entering the widget designer.

3. **Previewing the Widget:** The center of the window displays the current design and content of the widget, which automatically changes each time you select a different option in this window.

4. **Selecting the Widget Visualization:** Enables you to change the visualization of the widget.

5. **Accessing More Options:** Displays a menu of additional options for the widget.

6. **Filtering the Widget (Filter Panel):** Lets you manage the filters that affect this widget. Learn more in the filtering page.
7. **Designing the Widget (Design Panel):** Provides a variety of options for fine-tuning the appearance of the Widget, including labels, legends, line types and more. Some of these options need to be turned on (ON) for you to configure them. The options differ depending on the visualization (chart type).

8. **Update on every change:** Selected – Data changes are automatically and dynamically updated in the display. Not selected – you have to click UPDATE to display your latest changes in the widget. Clearing this checkbox may be useful when you are working with very large datasets where query times might be slower.

**Fine-tuning a Widget**

- To get an overview of the different widgets available, click here.
- To learn more about adding data and fine-tuning the design of a specific widget, click on a widget from the list below.
  - INDICATOR
  - COLUMN CHART
  - LINE CHART
  - AREA CHART
  - BAR CHART
  - PIE CHART
  - POLAR CHART
  - SCATTER CHART
  - PIVOT
  - SUNBURST
  - TREEMAP
  - CALENDAR HEATMAP
  - TABLE
Choosing the Right Widget

The following guide will help you choose which widgets or charts to use in your dashboard. In addition to having lots of charts to choose from, you can also customize the design of each chart, as well as filter the data presented in the chart.

**Indicator**

Use the Indicator widget to display one or two numeric values as a number, gauge or ticker. You can also add additional titles and a color-coded indicator icon representing the value, such as a green up arrow or a red down arrow.

![Gauge Indicator](image1.png)  ![Numeric Indicator](image2.png)

**Line Chart**

The line chart is one of the most commonly used charts. You can use the line chart for various business cases, including:

Comparing data over time and viewing trends. Example: Analyze sales revenue for the past year.
Comparing changes over the same period of time for more than one group or category. Example: Analyze expenditures of different business units for the past year.

A line chart with a ‘break by’ category

**Column Chart**

The column chart can be used for comparing items and comparing data over time. The chart can include multiple values on both the X and Y axis, as well as a break down by categories displayed on the Y axis.

You can also combine the column chart with a line chart.
Column Chart

**Bar Chart**

Use the bar chart to compare many items. The bar chart typically presents categories or items (descriptive data) displayed along the Y axis, with their values displayed on the X axis. You can also break up the values by another category or groups.

Pie Chart

Use the Pie chart to display proportional data, and/or percentages.
Area Chart

An Area chart is very similar to a Line chart except that the areas under each line are filled in (colored), and it is possible to display them as stacked. We recommend this chart to display absolute or relative (stacked) values over a time period.

Polar Chart

Use the polar (radar) chart to compare multiple categories/variables with a spacial perspective in a radial chart.
Pivot Table

Pivot tables are one of the most useful widgets for visualizing data. You can quickly summarize and analyze large amounts of data. Make use of additional features such as color formatting and data bars to enhance the visual aspects.

Example using color formatting  
Example using data bars

Table

The Table widget displays a broader view of your data, presenting raw and non-aggregated data in columns, with as much fields and metrics as needed.
Scatter Chart

Use the SCATTER chart to display the distribution and relationship of two variables. The circles on the chart represent the categories being compared (circle color), and the size or numeric data (indicated by the circle size).

Example: Compare revenue and units sold by gender.
Use a scatter map to visualize geographical data as data points on a map.

You can visualize up to two sets of numeric data using circle color and size to represent your data.

![Scatter Map Example](image)

**Area Map**

Area Maps allow you to visualize geographical data as polygons on a map.

You can use your data to affect the color of the areas.

![Area Map Example](image)

**Sunburst Widget**

The Sunburst widget is similar to a pie chart but is multi-dimensional. Whereas a pie chart combines one field and one numeric value, the
Sunburst widget can display multiple rings, one for each field. Each ring in the Sunburst shows a breakdown of its parent ring slice.

**Treemap**

The Treemap is a multi-dimensional widget that displays hierarchical data in the form of nested rectangles. You can use this type of chart in different scenarios, for example, instead of a column chart when you want to compare many categories and sub-categories.
Calendar Heatmap

The Calendar Heatmap widget visualizes values over days in a calendar-like view, making it easy to identify daily patterns or anomalies.

You can choose to display the data in a number of ways including 1, 3, 6 or 12 months at a time. In addition, you can display a classic or week view.
Adding Text Widgets

Add text widgets to create titles and texts that stand out, and when you want to add more descriptive explanations to the dashboard and surrounding visualizations.

In the widget's settings, you can find plenty of options for creating different text styles. Some examples of what you can do include changing the font color, selecting a background color, adding hyperlinks, and defining the text alignment.

To add a text widget:

1. Click on the Text Widget icon in the top menu. A new Text Widget appears in your dashboard.
2. Type in your text.
3. Use the tools in the widget's toolbar to format your text. See some examples below.
4. When done, click outside of the widget area to save the text and formatting.

Examples

To select a font style:

1. Click anywhere in the relevant paragraph.
2. From the styles drop-down list, select one of the five predefined styles.

To add a hyperlink:

1. Select the word or text fragment to which you want to add a link.
2. Click on the hyperlink icon, and enter the hyperlink.
3. You can also select which text to display instead of the selected (linked) text, and whether to open the link in the same window, or in a new window.

To change the background color:

1. Click on the paint bucket icon to open the color palette.
2. Select a color from the palette, or enter a custom color (Hexadecimal format).

Additional Widget Design Options

This section describes how to edit the widget further using the following features:

- Selecting Colors in Widgets
- Renaming Fields in Widgets
- Adding a Description to a Widget
- Formatting Numbers in Widgets
- Changing a Widget’s Visualization
- Combining Two Types of Visualizations in a Widget
- Adding Drill hierarchies to a Widget

Selecting Colors in Widgets

Different field values are represented by different colors. The Widget Designer automatically assigns these colors and displays them in the widget legend that is displayed in the Widget Designer and in the dashboard.

The Widget Designer provides the following options for manipulating these colors:
Single Color: For selecting a specific color for all values
Range: For selecting a range of colors
Conditional: For defining colors based on conditional data.

Selecting a Specific Color – Color Tab

The following procedure describes how to assign a specific color to a data value that does not change. This color only applies to the widget in which it is defined.

To select a specific color:

1. Click on a color in the Widget Designer Data Panel to display a color picker window.
2. Select the Single Color tab.
3. Select a color and click OK.

Note: To select a custom color that does not exist in the palette, enter a hexadecimal value into the # Custom field.

Selecting a Range of Colors – Range Tab

The following procedure describes how to assign a range of colors to a field according to its value.

To select a color range:

1. Click on a color in the Widget Designer Data panel to display a color picker window.
2. Select the Range tab.
3. By default, the range configuration is set to 'Auto', which automatically assigns a color range.
   Select Manual to manually configure the color range, as follows:
- **Change Left/Right colors:** Click the color rectangles at the right and left to change the start and end color of the range.

- **Customize range:** By default, the color range is set to match the minimum and maximum values of the data. Instead, you can manually set a minimum value. All values that are below this value will be assigned to the color on the left. Accordingly, selecting a Max value means that all values larger than it will be assigned the color on the right. By default, the 'Middle' color is grey. All values larger than this will start gradually getting the right color. All values smaller than this will start gradually getting the left color. Changing the 'Middle' value controls which value the color grey is assigned to.

- **Coloring Method:** Selecting Min/Max will display the full color range. Selecting Min will display all the colors between the minimum and middle values, and higher than the middle value will be gray. Selecting Max will display all values between the middle value and the maximum value, while all other values will be displayed in gray.

- **Transition:** Select Steps to define a distinct number of colors in the range. Select Gradient for a linear color range.

**Defining Conditional Coloring – Conditional Tab**

Define colors based on the value of the field as defined by a logical expression.

In addition, for INDICATOR Widgets, you can also define whether an icon appears in the widget and select the icon’s color. For example, you can define a red arrow pointing downwards for a negative value.
To set conditional coloring:

1. Click on a color in the Widget Designer Data panel to display a color picker window.
2. Select the Conditional tab. Each row in this window represents a condition to which you can apply a value. If the condition is true, then that value is shown in the color that you select in this row. For example, one row can define that a negative value is displayed in red and another row can define that a positive value is green.
3. In each row, define an expression to be applied to the value of this field by selecting an operator and specifying a value, as shown below.
4. Select a color for the field.
5. If required, add and define additional condition rows by clicking + Add condition.
6. In the dashboard, these conditions are evaluated in the order in which they appear in this window—from top to bottom. The first condition that is true, determines the color. Reorder the condition rows as necessary by dragging them up or down.
7. Click OK.

Renaming Fields in Widgets

The names of fields in widgets are taken from the raw data. To make these names more comprehensible, you can rename the fields in your widget.
To rename a field in a widget:

1. In the Widget Designer, right-click on a field, for example, in the X-AXIS, Y-AXIS, VALUES, CATEGORIES areas and so on.
2. In the menu, select **Rename**.

**Note:** Renaming a field only affects how it is displayed in the current widget. This field’s name is not affected in the Data Browser or in other widgets in the dashboard.

**Adding a Description to a Widget**

You can add a textual description to widgets, which is handy when you need to add extra information or a note to dashboard viewers.

The description is visible when hovering over the "i" icon, when in view mode.

**Note:** If you want to add text that stands out with more formatting options, see Adding Text Widgets.

**To add a description:**

- Hover over the widget's "i" button when the dashboard is in edit mode, and click **Add Description**.

**Note:** You can also add the description from inside the Widget Designer screen, by using the "i" button next to the widget's title.

**To edit a description:**

1. Hover over the widget's "i" button when the dashboard is in edit mode, and click **Edit Description**.
2. Make your changes and click on the tick icon.
To delete a description:

1. Hover over the widget’s "i" button when the dashboard is in edit mode, and click Edit Description.
2. Click Reset.

Formatting Numbers in Widgets

You can change the way numbers are displayed and formatted in widgets. For example, you can display a number as a percentage, and you can define the number of decimal places.

To format numbers in a widget:

1. In the Widget Designer, for example, in the X-AXIS, Y-AXIS, VALUES, CATEGORIES areas and so on, hover over, and click 123.
   Select how the number, currency or percentage appears. The preview area at the bottom of this window shows a preview of how each option will appear in the widget.

Locale Settings

The formats for dates, times and numbers in your dashboards are based on your computer’s operating system or browser’s locale settings (depending on which browser you use).

The following locales are supported:

- Unites States
- United Kingdom
- Israel
- Canada
- South Africa
Notes

- You can override the default locale settings for all users, by updating a parameter via the Rest API.
- To use a locale file that is not included in the above list of countries, you can manually add a locale file in the following location: `C:\Program Files\Sisense\PrismWeb\client\resources\base\localization`. 
  Click here to access Locale files and view their codes.

Currency Settings

The default currency symbol used in the dashboard is the US dollar ($), however you can change the symbol by either selecting another symbol from the drop-down list, or by typing in a different symbol. The list of currency symbols will include common currency symbols, the currency defined in your browser’s locale settings, and the symbol that you added (if you did so).

After you select a different symbol, additional viewers will see the same symbol that you applied.
Changing a Widget’s Visualization

You can change the visualization of a widget (for example, from a LINE CHART to a PIE CHART). When you change the type, all relevant values and definitions are transferred to the new visualization.

To change a widget’s visualization:

1. Open the Widget Designer, as described in Opening the Widget Designer.
2. Click the Visualization selector, shown below, to display a drop-down menu of visualization options.
3. Select a different visualization, and click APPLY.

Combining Two Types of Visualizations in a Widget

In chart widgets (such as LINE CHARTS, AREA CHARTS, COLUMN CHARTS and BAR CHARTS), you can represent one or more selected field(s) using a different visualization than the visualization of the original widget.

For example, the following example shows a LINE CHART in which the Total Revenue is still represented as a LINE CHART (the default), but the Total Quantity is represented as a COLUMN CHART.

To select a different visualization for a field in the widget:

1. In the Widget Designer, in the VALUES area, right-click the field that you want to change.
2. Select Series Type from the menu. A menu of alternative visualization types is displayed.
3. Select the visualization to use for this field only.

**Tip:** If necessary, drag the field up or down in the Widget Designer to have a visualization brought to back or front.

**Note:** The chart keeps the same visualization type as was originally created. The Design panel still displays only the design options of the widget’s original visualization type.

### Adding Drill Hierarchies to Widgets

Dashboard viewers have the option to drill down in a widget, and get an in-depth view of a selected value.

While viewers can select a drill-down path from the complete list of fields, it’s easier to select a commonly needed drill hierarchy from a short list. This is especially true when there is a lot of data, and the viewer needs to remember specific fields, and select them each time.

As a designer, you can add predefined drill hierarchies to widgets.

**Note:** Your Sisense administrator must first create the drill hierarchies before you can select and add them in the widget designer.

**To enable drill hierarchies in a widget:**

1. In the Widget Designer, click on the menu of the value (dimension), and select **Hierarchies**...

2. Select the checkboxes next to the drill hierarchies that you want to make available to dashboard viewers.

   **Note:** Hierarchies with a lock icon will always appear in the widget. To unlock this option, please contact your Sisense administrator.
Disabling the Drill to Anywhere Option

As a designer, you can restrict viewers to predefined hierarchies only, by disabling the option to drill down freely to any field.

The drill-to-anywhere option is enabled by default for all users and widgets. You can disable the drill-to-anywhere option in the Sisense web app per widget (see below), or by user role in the REST API.

To disable the drill-to-anywhere option:

- In the widget menu, deselect the Enable Drill to Anywhere option.

As a result, the Choose Another…option is removed from the widget’s Drill options.

The left image below displays the widget with the option to drill to anywhere. The image on the right displays the widget with only predefined drill hierarchies.

Creating a Continuous Chart with Missing Date Values

If your data is missing date values, you can add the missing dates to your chart to create a continuous data flow. In addition, you can select whether to display missing dates as gaps in your chart, or include null values as zeros, to avoid gaps, and maintain a continuous data flow.

For example, if your chart begins June 8th and ends June 20th, but there is no value on June 13th, you can choose to include the missing date on the the x-axis. You can also choose whether to continue the graph (create zero values) or cut the graph where there are missing values.
The default chart is missing June 13th.

After selecting the Continuous option, the chart includes the missing date(s).

In addition, you can select to continue the line, by treating null (missing) values as zero values.

**To create a continuous chart:**

1. In the X-AXIS panel, click on the menu, and select **Continuous**.
2. To treat null values as zero values, click on the menu of the VALUES panel, and select **Treat Null as Zero**.
Managing Widgets

Editing a Widget

When you first create a new dashboard (as described in Creating a New Dashboard) or a new widget (as described in Adding Widgets to a Dashboard), the Widget Wizard automatically guides you through Sisense Web’s best recommendations for visualizing the data that you select.

Then, after a widget is created, you can fine-tune/edit it in the Widget Designer. The Widget Designer provides a variety of options for changing the widget’s appearance and behavior.

See Fine-tuning a Widget for more information.

Copying a Widget

You can create a copy of a widget within the same dashboard or another dashboard in your list. This is useful for saving the original widget in the dashboard before making changes. The new widget is separate from the original so no changes to the new widget affect the original widget.

To copy a Widget within the same dashboard:

> In Dashboard view, click the widget menu button in the top-right corner of the widget to be copied and select Duplicate.
If you are editing the widget, click the widget menu button in the top-right corner of the widget to be copied and select **Save A Copy**.

To copy a **Widget** to another dashboard:

Select the Header of the widget to be copied and drag it to the dashboard you want to copy it to.

**Note:** When you copy a widget to another dashboard whose data source is another ElastiCube, the Dashboard filters of the new dashboard will not affect the widget.
Deleting a Widget

To delete a Widget:

- Click the widget menu in the top-right corner of the Widget and select Delete. Confirm the deletion.
Customizing the Dashboard Layout

This section describes how to rearrange your dashboard layout. By default, widgets are arranged in a dashboard one underneath the other. When you add a new widget, it is added at the bottom of the dashboard.

You can drag widgets one on top of another to split them horizontally.

The dashboard can also be organized in columns. By default a dashboard is created with a single column, but you can add up to four columns. Each column can contain multiple widgets, but a widget cannot span more than one column.

You can rearrange the order of the widgets, reorganize the widgets in columns, add/remove widgets from columns, and resize columns/widgets.

**To move a widget:**

- Drag the widget while clicking on the top part of the widget.

Layout Mode and View Mode

A dashboard can be viewed in either Layout mode or in View mode.

**Layout Mode**

Layout mode is the default mode in which you can add new widgets and rearrange them on the dashboard, as described throughout this section.

![mode](image)
is displayed in the top-right corner of the screen when the dashboard is in Layout mode. Click this button to display View mode.
View Mode

View mode enables you to see what the dashboard looks like when a user is only viewing the dashboard. In View mode, the dashboard cannot be rearranged or edited.

Is displayed when the dashboard is in View mode. Click this button to display Layout mode.

Adding Dashboard Columns

To change the number of columns:

► Click on the dashboard's menu, and select Columns and the number of columns.

Moving a Widget on the dashboard

To move a widget to a different column or position:
1. Make sure that you are in Layout mode (default mode). The Layout mode indicator is displayed in the top-right corner of the window. If not, click to go from View Mode to Layout mode.

2. Drag and drop the widget into the desired position by dragging it by the top part of the widget.

Dragging a widget from one column to another:

The position of a widget can be split to contain multiple widgets within a single column by dragging one widget on top of another:
Placing Widgets Side-by-Side

You can place widgets side-by-side using one of the following methods:

- By putting each widget in a different column.

  or

- By dragging one widget on top of the other. Both these widgets will then be in the same column.

Resizing Widgets

Resizing the column height or width automatically resizes the widgets in the best possible way.

To resize a widget:

- Resize the dashboard column in which the widget is located by dragging the edge of the column right or left. All the widgets in
this same column are resized accordingly in an optimal manner.

> Resize the widget by dragging its edges right, left, up or down.

Refer to Ticker widgets for a description of how an INDICATOR Widget turns into a ticker type widget when you reduce its height.

### Adding Widget Titles

You can add titles to your widgets directly in the dashboard view.

If you already added a title when you created the widget in the widget designer, you can edit the title directly in the dashboard.

**To add a widget title from the dashboard:**

1. To add a title, click ADD TITLE at the top of the widget, and type in the title. If you are editing a title, click on the existing title, and type in the new title.

2. Click on the icon to save the title.

### Working with Ticker Widgets

If you resize the height of an INDICATOR Widget, then it automatically turns into a Ticker-type widget. An INDICATOR Widget that was a
numeric INDICATOR appears slightly different to an INDICATOR widget that was a gauge.

Regular Indicators

![GROWTH OF VISITORS](image)

13.2%

# of Visitors: 220K

Full size INDICATOR widget

Full size GAUGE widget

Ticker Indicators

| GROWTH OF VISITORS: 13.2% | # of Visitors: 220K |

| REVENUE: 2M | Growth: 0.2% |

INDICATOR widget after resizing down

GAUGE widget after resizing down

Changing the Dashboard’s Color Palette

You can easily change the color scheme of the dashboard to suit your professional or brand preferences.

Note: The following procedure explains how to change the existing palette by way of selecting a different predefined palette. If you want
to create a custom palette, it is possible using the REST API. To learn more about creating a custom palette using the REST API, see this [support article](#).

**To change the color palette:**

- Click the paint bucket icon in the top menu, and select the preferred color palette. The default palette is *Vivid*.

  **Note:** Three of the palettes are suitable for color blindness: *ColorBlind 1, 2, and 3*.

**Note:** When you change the color of an individual widget to a new color that is not one of the palette colors, the new color will be applied to the widget regardless of the applied palette. If you select a new color from one of the palette colors, then when changing the dashboard’s palette, the color will change according to the new palette.
Examples
Filtering Dashboards and Widgets

If you have dashboard editing rights, then you can define both dashboard filters and widget filters, as follows:

- **Dashboard Filters**: This type of filter affects all the widgets in the dashboard (except the widgets that you configured as independent). Designers can create dashboard filters and Viewers can view and interact with them.

- **Widget Filters**: A Designer can define which subset of data values is displayed in a widget. Viewers do not see these filters and cannot change them.

The following sections include procedures for:

- Creating dashboard filters
- Editing and deleting a dashboard filter
- Creating widget filters
- Creating dependent filters
- Working together with dashboard and widget filters
- Limiting Filters to Specific Values with Background Filters
- Locking filters
- Switching filters on and off
- Saving your default filters view

**Creating Dashboard Filters**

This section explains how to create a dashboard filter, using the different filtering options.

In this section you will learn how to:

- Create a dashboard filter
Create a list filter
Create a text filter
Create a numeric value filter
Create a top/bottom ranking filter
Create a time filter
Create advanced filtering criteria
Select how to update your dashboard during the design process

Creating a Dashboard Filter

To create a dashboard filter:

1. Click FILTER YOUR DASHBOARD in the dashboard’s right panel (if it’s your first filter), or + if you are adding another filter. The Add Filter dialog box is displayed.

2. (Optional) If you have multiple data sources, select the data source that contains the fields you want to filter. Filters applied
to fields from one data source do not affect fields from another
data source even on the same dashboard.

3. Select the field by which to filter.
4. Select the type of filter from the pane on the left, such
   as List, Criteria, Calendar or Ranking. The options provided in
   this window may vary according to the selected field type
   (Date, Numeric or Descriptive).
5. Select the required filtering details in the panel on the right to
   create one of the following types of filters:

   * Creating an Include/Exclude Filter
   * Creating a Text/Numeric/Date Filter
   * Creating a Top/Bottom Ranking Filter
   * Creating a Calendar Filter

   These are explained in depth below.

6. Click the Star Favorite button to save this filter. You can
give your starred filter a unique name by clicking in the text
field and editing the given name. This will be useful when you
need to quickly add a new filter (with same field type) or update
a filter to reflect the unique parameters that you defined in your
starred filter.

   Note: Your favorite filters are visible to shared users.
7. Click **OK** to filter the data in the Dashboard and add this filter to the FILTER panel on the right of the Dashboard. After a filter has been added to the Dashboard, it stays displayed on the Dashboard’s FILTER panel. Any changes that you make to the filter are immediately reflected in the Dashboard.

**Tip:** You can rearrange the filters in the Filters panel by dragging a filter above or below another filter.

**Creating an Include/Exclude Filter (List Filter)**

This type of filter enables you to define whether selected field values are included or excluded.

**To define a List filter:**

1. Follow steps 1 - 3 of Creating Dashboard Filters.
2. Select the **List** option in the left panel.

3. Select/clear the field values to be included/excluded in the Dashboard.

4. Click **OK** to filter the data in the Dashboard and add a List filter to the FILTER panel of the Dashboard.

**Selecting Single Selection or Multi Selection**

By default list filters are set to multi selection. To toggle between single and multi-selection click the button on the upper right of the list filter:
Multi Selection:

Creating a Text Filter

This type of filter enables you to filter according to text matching.

To define a Text filter:
1. Select the **Text** tab.

2. Follow steps 1–3 of Creating Dashboard Filters. Select a Textual field.

3. Select the operator, for example *Starts with* or *Containing*.

4. Type in the value by which to filter.

5. If you require additional conditions, click + **Add condition**.
   Select **AND** or **OR** to define how filter operators are combined.

---

**Creating a Numeric Value Filter**

This type of filter enables you to limit your dashboards to specific value ranges. For example:

- Keep only sales above 100$.
- Keep only product IDs between 1000020 and 1000030.
To define a Numeric filter:

1. Select the Values tab.
2. Follow steps 1–3 of Creating Dashboard Filters.
3. Select the operator, for example Equals or Greater than.
4. Type in the value by which to filter.
5. If you require additional conditions, click + Add condition.
   Select AND or OR to define how filter operators are combined.

Creating a Top/Bottom Ranking Filter

This type of filter enables you to select whether to include only the top/bottom ranking fields.

To define a Ranking filter:

1. Follow steps 1 - 3 of Defining Dashboards Filters.
2. Select the **Ranking** filter tab.

3. Select **Top** or **Bottom** and the number of items to include.

4. In the **By** field, select a field by which to rank the fields. A list of the fields that match these definitions is displayed so that you can verify that the results are as you expect.

5. Click **OK** to filter the data in the Dashboard and add a Ranking filter to the FILTER panel of the Dashboard.

**Creating a Time Filter**

There are two types of time filtering options:

**Calendar Filter**

This filter enables you to select custom date ranges from a calendar.
To define a Calendar filter:

1. Follow steps 1 - 3 of Creating Dashboard Filters. (Select a date field).
2. Select the Calendar filter tab.
3. Use the quick navigation menu to jump to a point in time.
4. Select a date range using any of the following methods:
   - Click on a start and end date.
   - Type in the dates, or use a shortcut such as Earliest Date or Today.

Note: Earliest Date and Latest Date refer to the earliest and latest dates with data.

Note: Unlike other filters that you define, viewers will be able to change the type of date filter, providing more flexibility for viewing date ranges. For example, from Time Frame to Calendar, etc.

Creating a Dynamic Time Filter

This filter enables you filter dashboards to preset dynamic time frames, such as ‘Last Year’, ‘Last 2 Years’, ‘2 Year ago’, etc.
To define a dynamic time filter:

1. Follow steps 1 - 3 of Creating Dashboard Filters. (Select a date field)
2. Select the **Time** filter tab.
3. Use the calendar to select a date range to filter by. Use the left calendar to select the starting date of the range, and the right calendar to select the end date.
4. Click **OK** to filter the data in the Dashboard and add a date filter to the FILTER panel of the Dashboard.

**Advanced Filtering Criteria**

If you require advanced filtering options that are not included in the provided settings (for dashboard or widget), you can add or edit filters in the **Advanced** section.

**To add or edit filtering criteria:**

1. Click **Advanced** in the left panel.
2. Add or edit filtering criteria. Click **Test** to see the results of your new/edited filter.
3. Click **OK** to add the filter.

**Example 1 – Adding an OR statement**

The example below shows an OR statement being used to display multiple names. After clicking **Test**, the matches are displayed to the right of the script.
Examples using JAQL Queries

Example 2 – Filtering by Measures

This option lets you filter dimensions by measures, returning only the filtered members and associated values.

In this example, all products with a total price equal or greater than 1 million will be returned.

The query:

```json
"datasource": "iapropsales",
"metadata": [
  {
    "dim": "product"
  },
  {
    "dim": "price",
    "agg": "sum",
    "filter": {
      "&gt;=": 1000000
    }
  }
]
```
Results include the relevant product names and price, for example:

- Product A, 1000000
- Product B, 1551246

Example 3 – Filtering by Dimension Attributes

This option lets you filter dimensions by filtered attributes of other dimensions, returning only the filtered values.

In this example, all customers that purchased Product A and Product B will be returned.

```json
{
  "datasource": "laptopsales",
  "metadata": [
    {
      "dim": "customers",
      "filter": {
        "attributes": [
          {
            "dim": "products",
            "filter": {
              "members": ["Product A",
                           "Product B"
                         ]
            }
          }
        }
      }
    }
  ]
}
```

Note that you can add as many nested filters as needed.

**Using Update on Every Change**

When this option is on, any changes you make to the dashboard filters are updated immediately, and the dashboard is refreshed to reflect the changes.
If you are working with large or complex data sets that result in longer refresh times, then switch off this option. Make all your changes, and click the Update button when you are ready to update your dashboard.

Note: This option is available for designers only. Sisense viewers can make changes that will update automatically on very change.
Editing and Deleting a Dashboard Filter

This section explains how to edit a dashboard filter and how to delete a dashboard filter.

Editing a Dashboard Filter

To edit a dashboard filter:

Do one of the following:

1. Make a different selection in the filter controls displayed in the FILTER panel on the right side of the dashboard, as shown below:

   ![Filter Controls Example]

   or

   ![Another Filter Controls Example]
2. Click on the pencil icon next to the filter name (shown above) in the dashboard to display the Filter Definition window, as described in Creating Dashboard Filters.

Deleting a Dashboard Filter

To delete a filter:

Click the bin icon. To temporarily disable a widget’s filter, you can toggle the filter on or off using the toggle switch. Delete the widget only if you do not need it any longer.
Creating Widget Filters

In the Widget Designer, you can define a filter for the data in a widget. For example, you can create a filter that only shows the fields of relevant countries. The filters are not visible in the dashboard, nor can they be edited directly from the dashboard.

This section includes the following procedures:

- Creating a widget filter
- Adding a widget filter to an existing field

Note about duplicate filtering: When creating a widget filter for a field that is already filtered in a dashboard filter, the widget filter will override the dashboard filter.

Example: You have a dashboard filter, filtering the months field, with the values January and February selected. At the same time you create a filter for a widget, also for months, but this time March and April are selected. When both filters are applied in the dashboard, you will see data for March and April in the widget, according to the widget’s filter.

If your widget is filtered using measured values, then the measured value will override any other widget or dashboard filters you have for the same fields.

Creating a Widget Filter

To add a widget filter:

1. Open (edit) this Widget in the Widget Designer, as described in Adding Widgets to a Dashboard.
2. Click the FILTERS tab in the widget designer.

3. The FILTERS panel is displayed showing the filters defined for this Widget. Click on the ADD FILTER button to display the Data Browser, which lists the fields in the ElastiCube. A Data Browser is displayed.
4. Click on a field in the Data Browser to add it as a filter. You can define multiple filters, each for a different field. These filters have an **AND** relationship between them. Each filter that you define appears on the **WIDGET FILTERS** panel on the right enabling you to easily edit it if needed. The procedure for defining a Widget filter is similar to the procedure for defining a Dashboard filter, as described in Creating Dashboard Filters. The difference is that the widget filter only affects its hosting widget, and is accessible only via the widget designer, not directly from the dashboard.

**Adding a Widget Filter to an Existing Field**

Adding a new widget filter, as described above, lets you use any field as a widget filter. Sometimes you want to directly filter a field that is already part of the widget and visible in the data panel on the left.

**To add a Widget Filter to an existing field:**

- Hover over the field you want to filter, and click the **FILTER** icon.
Creating Dependent Filters

Use Dependent Filters to combine multiple dashboard filters into a hierarchy of dependent filters that affect each other from parent, to child, to grandchild and so on. When a user filters the parent filter, fewer options will be available in the child filter.

Example Use Case

The following example shows how using a Dependent Filter helps a user easily focus information in a dashboard.

This example describes an online travel agency with 250,000 hotels in its database. An agent wants to find a specific hotel, but does not remember its name. To narrow the results, the agent can define a Dependent Filter. This Dependent Filter is comprised of four sub-dependent filters defined with the following hierarchy:

- **Destination**: Displays a list of States and Countries. In this example, the agent will select the Destination **Florida**.
City: Because Florida was selected, only Destinations in Florida are displayed in the child filter, such as: Miami, Orlando and Tampa. In this example, the agent will select the City Orlando.

Resort: Because Orlando was selected, only resorts in Orlando are displayed in the grandchild filter, such as Floridays, Buena Vista, Walt Disney World. In this example, the agent will select the Walt Disney World resort.

Hotel: Because Walt Disney World was selected, only the Hotels in Walt Disney World are displayed in the great-grandchild filter.

Note: By default, filters are not dependent. Dependent Filters can be defined only from selection type filters.

To define a Dashboard Dependent Filter:

1. The top level (most inclusive) filter of the Dependent Filter must first be defined in the usual manner (see Creating Dashboard Filters). This newly added filter then appears on the dashboard.

2. On the parent filter, click the + or click \( \equiv \rightarrow \text{Add a dependent filter.} \)

3. Define the child filter in the usual manner (see Creating Dashboard Filters). The number of available options for selection in the child filter are less because of the selections in
the parent filter. The child filter appears on the dashboard with a down arrow indicating the dependent filter and its parent above.

4. Repeat this step for each new child filter to create as many sub-levels of Dependent Filters as you need.

**Configuring How Filters Affect the Dashboard and Widgets**

This section explains how dashboard filters work together with widget filters, and how you can configure different filtering behaviors and their effects on the dashboard.

The following procedures are explained below:

- Configuring how dashboard filters affect a widget
- Defining how a widget behaves when filtered
- Defining how a selection on the widget affects the dashboard

**Configuring how Dashboard Filters Affect a Widget**
Dashboard filters affect all the widgets in the dashboard, except widgets that you have defined to be independent. An independent widget is not affected by dashboard filters.

**To make a widget filter-independent:**

1. Open (edit) this Widget in the Widget Designer, as described in Adding Widgets to a Dashboard. The top part of the **WIDGET FILTERS** panel on the right of the Widget Designer lists the Dashboard Filters that are defined for this Dashboard.

2. Turn off the Dashboard filters that you do not want to affect this Widget: The toggle on icon (default) indicates that the Widget is affected by this Dashboard filter. The toggle off icon indicates that the widget is not affected by this Dashboard filter. You also have the option to make this Widget independent of all current and future Dashboard Widgets by turning the **DASHBOARD FILTERS** option off, as shown below:
Defining how a widget behaves when filtered

When fields that are visible in a widget are filtered, it can be displayed in two ways – **SLICE/FILTER** or **HIGHLIGHT**. For example, let’s look at this column chart, which shows revenue for different age categories:

If the chart is set to **HIGHLIGHT** mode, filtering a subset of age categories will highlight them in the
If the chart is set to **SLICE/FILTER** mode, the same filter will remove all non-selected age categories from the chart:

To define the filter behavior mode:

- Select **Slice/Filter** or **Highlight** in the Filters panel on the right side of the dashboard.
Defining how a selection on the widget affects the dashboard

When making a selection on a widget, a filter is added to the dashboard with the selected part of the chart as the applied filter.

To disable this option for a widget, open the widget in editing mode, and from the menu options, disable Widget Affects Dashboard Filters.

Limiting Filters to Specific Values with Background Filters

As a designer, you can define which of the fields in a filter will be visible to viewers. After defining which fields will be included in the
filter, viewers will be able to use the updated and restricted filter to further filter the dashboard or widget using the available fields.

This can be useful in cases where viewers only require selected data, and then they do not have to search through a long list of fields, or for security purposes in cases where you do not want to expose all the data.

**Example 1 – Simple list filter**

A filter includes a list of 10 countries. As a designer, you can limit the filter to include only five specified countries. Viewers will see the filter as having only five countries to include or exclude in the filter.

**Example 2 – Conditional filter**

Another example requires having only the top 5 countries by population included in the available list of countries. In this case, viewers will only see five countries, however, the list of countries will depend on the population sizes and any changes that may affect which countries are in the top 5 at the given time.

**To create a background filter:**

- Create a background filter using one of the following methods:
  - In a filter without selected values, open the filter’s menu and click **Create background filter**. Define your filter settings, and click **OK**.
  - If you made changes to your filter (either by editing the filter or by selecting values directly in the filter), you can open the filter’s menu, and click **Set as background filter**.

The background filter is indicated by a filter icon.
Note: The icon is not visible to viewers.

To edit a background filter:

1. In the filter’s menu, click **Edit background filter**.
2. Update the filter settings, and click **OK**.

To remove a background filter:

- In the filter’s menu, click **Remove background filter**.

**Locking Filters**

As a designer, you can lock a filter, preventing viewers from making any changes. The viewer will be able to see the defined filter settings, but the filter will be disabled for editing.

To lock a filter:

1. Click on the filter menu.
2. Click **Lock**.

A lock icon appears to indicate that the filter is locked.

To unlock the filter, click on the menu, and select **Unlock**.
Restoring Filters

As a Designer, if you changed the dashboard’s filters, you can revert to the latest copy shared by the dashboard’s owner at any time. When you restore a dashboard, local changes to a dashboard by a Viewer are overridden and the default dashboard is restored for all users.

- Under the MY DASHBOARDS list, click on the menu of the dashboard and select **Restore Dashboard**.
Switching Filters On and Off

You can easily toggle filters on and off using the toggle switch. Use this option to compare states (with and without the filter), or to temporarily disable a filter, rather than deleting it.

Toggling a filter on or off in the dashboard affects the data in all the widgets, unless a widget is defined not to be affected by dashboard filters (see how dashboard and widget filters work together).

Saving Your Default Filters View

You can save the current state of your filters and their settings at any time. The current state includes the existing filters, their configuration, and the order in which they appear in the filters panel.

After making changes to any of the above settings, you will be able to restore your filters to their previously saved state.

To save your current set of filters:

- In the Filters menu, click Set as my default filters.

To restore a saved filters set:

- Click the restore icon next to the Filters menu.
Using Formulas

Formulas are custom calculations performed on one or more fields in the data. They offer an important way to analyze results and express business logic. This guide provides an overview to working with formulas along with important tips and examples. Sisense formula capabilities are designed around several principles:

- Create complex business calculations without IT or technical knowledge.
- Easily combine fields from different data sources together.
- Customize formulas to reflect specific criteria and conditions.
- Work with raw data without the need to summarize data sets before creating formulas.
- Instantly recalculate formulas based on any filter, variable or level of granularity.

The table below provides a reference to the main formula functions available in Sisense.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Function</th>
<th>Types and Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform calculation based on criteria</td>
<td>Measured value</td>
<td><strong>Value Filters</strong>: ≠, =, &gt;, &lt;, between</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Text Filters</strong>: Contains, Doesn't Contain, Doesn't End With, Doesn't Start With, Ends With, Start With, Equals, Not Equal</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>List Filter</strong>: Include, Exclude</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Ranking Filters</strong>: Top, Bottom Ranking</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time Filter</strong>: Date and Calendar</td>
</tr>
<tr>
<td>Combine data/apply simple mathematics</td>
<td>Aggregate functions</td>
<td><strong>Operator</strong>: +, -, *, /</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Aggregate</strong>: Sum()</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Average</strong>: Avg()</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Count</strong>: Count(), DupCount()</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Range</strong>: Max() / Min()</td>
</tr>
<tr>
<td>Summarize data</td>
<td>Statistical function</td>
<td><strong>Central Tendency</strong>: Median(), Model, Largest()</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Std Deviation and Variance</strong>: Stdev(), Stdevp(), Varp(), Var()</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Quartile and Percentile</strong>: Quartile(), Percentile()</td>
</tr>
</tbody>
</table>
The following sections explain how to create formulas, and describe the features of the formula editor.

- Using the Formula Editor
- Creating and Editing a Formula
- Reusing Formulas
- Using Quick Functions
- Creating Formulas Based on Criteria and Conditions (Filters)
- Building Formulas with Functions
- Function Reference

**Using the Formula Editor**

The Formula Editor is where you define formulas for your widgets.

If you are familiar with the Formula Editor, see the Quick Reference Guide. For a detailed guide with examples, continue reading below.

**To open the formula editor:**

- Do one of the following:
  - For a new widget, click **Select Data**, and then \( \text{\textbullet} \) to open the formula editor.
  - For an existing widget, click on the edit formula button \( \text{\textbullet} \) to open the formula editor.
The formula editor has two tabs, the **Data Browser** to select fields and the **Functions** tab to select formula operations. You can create a formula combining one or more *function, field* and *filters*. The diagram below highlights the main components of the formula panel.

1. **Functions** are operations which perform different calculations, for example a sum. Use the ‘Jump To’ menu or the search box to quickly find the formula you need.
2. Fields in the **Data Browser** are variables contained in the data set (ElastiCube). Clicking on a field in the data browser will include it as part of the formula.
3. **Filters** can be applied to restrict formulas based on criteria.
4. **Starring** is a way to save a formula for later use.
5. The formula editor window can be expanded by clicking the expand button at the top right.
Creating and Editing a Formula

The Data Browser enables you to define formulas (freeform expressions) that define the values and filters of a widget.

A rich variety of functions are provided for you to use in the formula that you define.

To define a formula:

1. Open the formula editor in the Data Browser:
   - For a new widget, click Select Data, and then \( \mathcal{fx} \) to open the formula editor.
   - For an existing widget, click on the edit formula button \( \mathcal{f} \) to open the formula editor.
The Data Browser then changes to display the FORMULA EDITOR, which has two tabs: Data Browser and Functions.

- **Data Browser** tab provides fields to choose from.
- **Functions** tab lists the functions that you can include in your formula by selecting them. You can read a description of each function in a tooltip by hovering over it.

2. Define the formula as follows:
   - From the **Data Browser** tab, select one or more fields.
   - From the **Functions** tab, select the required functions.
3. Type in the required parts of the formula. To see examples, see Formulas Based on Criteria and Conditions, and Functions to Build Formulas.

4. Click OK.

To edit a formula:

You can easily edit formulas using the right-click options. They include:

- **Rename**: Rename the formula, for example, give a name that represents a real-life task or expected result from the formula, or include in the name filters that you have added to the formula.
- **Filter**: Add filters to the formula.
- **Type**: Change the default aggregation method, for example, from *Sum* to *Average*.

The following image shows the right-click options.

![Right-click options for a formula](image-url)

The following image shows right-click options for a filtered formula.
Reusing Formulas

If you added a new formula, and marked it as a Favorite (starred), then it can easily be reused. Formulas are saved per ElastiCube.

To mark a formula as a Favorite:

1. While defining a formula, click the Favorite (Star) button.
2. Enter a name for this Formula.
3. Click OK.

To reuse a favorite formula:

- Favorite Formulas appear in the Data Browser under the title Formulas, as shown below. Simply select it to use it.
Note: To see the underlying building blocks of your favorite formula, right-click the favorite formula, and select Use Flattened Formula.

Using Quick Functions

Just like reusing formulas, quick functions is another feature to make working with formulas easier. The Widget Designer provides a variety of predefined commonly used functions that you can easily apply in the Data Browser when selecting a VALUE to be included in a Widget.

Quick Functions instantly add a time dimension to any existing value and formula. These functions include calculations for past values, change over time, contribution and running totals. Quick Functions
include all the Time Functions previously discussed but they can only be accessed by clicking on a formula that is already present in a widget.

A simple example of a Quick Function is a finance manager who is reviewing total costs per month but needs to track the accumulated annual costs. They can simply use a quick function to calculate the year to date total for costs.

To use a quick function:

1. Hover and click on the menu icon of a numeric field in the data panel of the widget designer, and select Quick Functions from the menu:
A list of commonly used functions is displayed.

2. Select a function. The widget will be updated immediately.

**Quickly Adding Aggregate Functions**

You can also add aggregate functions to your formula without opening the formula editor.

Click on the value icon to open a list of aggregate functions, and select the function to apply to your formula.

**Starring Formulas with Quick functions**
A more complex example uses starring with multiple quick functions. Let’s say a finance manager also wants to compare year to date costs to the same period for the previous year. They can first apply the *year to date function* to total cost and then save it to the formula repository. They can then add the saved year to date formula but apply another quick formula for *past values* which will perform the same calculation but on data from the previous year.

**Note:** Starred (favorite) formulas will be shared with other users.

**Using R in Formulas**

R is a software environment for statistical computing and graphics. Sisense supports the integration of R functions in your formulas.

You can write R code directly in the formula editor, and send fields as parameters. You can also combine R functionality with the regular functions to create advanced and tailored formulas.

Before you can integrate R into your formulas, you must have an R server set up in your organization.

This document will cover the following:

- Understanding How R works in Sisense
- Connecting Sisense to Your R Server
- Using R functions in Formulas
- Guidelines for using R code in Sisense
- Example 1: Simple R Function – Kmeans Clustering
- Example 2: R Logistic Regression via Sisense
- Example 3: Loading an Existing R Model
- Example 4: Building and Saving a R Model using Data from Sisense
Understanding How R works in Sisense

Within a widget, R code is used and assigned fields as parameters, the following happens:

1. The selected fields are sent fully to R as a list of arrays.
2. The R code is executed on the R server, referencing the fields as needed.
3. The numeric results from R are sent back to the widget for visualization.

Each request from the R server is done in a self-contained namespace, thus R variables and results cannot be reused across requests unless they are loaded from a saved location.

R calculations are computed in the R server, and not in the Sisense ElatsiCube, this means that for larger data sets results will not return as fast as regular widgets. Sisense recommends Revolution Analytics (Revolution R Open) for enhanced R performance.

Running R on Windows

If your R server is running on Windows you will be bound to the concurrency limitations the R distribution has on Windows. This means that concurrent requests to R may return wrong results. Sisense recommends using R on a Linux machine for production environment with concurrent user activity.

Connecting Sisense to Your R Server

To connect your Sisense instance to your R server:

1. Open the Sisense Server Console from the start menu.
2. Click on the Server Preferences icon to open the server settings.
3. In the **Rserve** field, enter the IP address of your R server, and select the checkbox to enable the connection.

You can test the connection by clicking on the **Test** button.

**Installing Rserve**

Sisense can only connect to a running Rserve instance. For more information about installing and running Rserve, [follow this link](#).

Please note that if you’re using RStudio, Rserve still has to be installed.

**Using R functions in Formulas**

Using R code in Sisense is achieved by using two dedicated formulas – RINT & RDOUBLE. Depending on the result type of your R code, use the appropriate function within the [formula editor](#).

For either formula, RINT or RDOUBLE, the return type has to be an exact match.
Multiple numeric field values can be passed as parameters to the R functions, which within your R code can be accessed via the ‘args’ argument (See K-means example below).

**Syntax:**

\[
\begin{align*}
\text{RINT(} & \{\text{recycle (true)}, \text{[<Ordering>], <R expression>,} \\
& \{\text{<numeric value 1>, ..., <numeric value n>}\} \}\text{)} \\
\text{RDOUBLE(} & \{\text{recycle (true)}, \text{[<Ordering>], <R expression>,} \\
& \{\text{<numeric value 1>, ..., <numeric value n>}\} \}\text{)}
\end{align*}
\]

Sisense does not support the use of a final ‘;’ in R statements. If you add a semi-colon at the end of your R statement, the code will fail.

**Parameters:**

- **Recycle true/false (default = true):** This is an optional parameter that controls whether the results from R should be recycled (cached), so that consequent queries will not have to be recalculated unless they or the data have changed. Generally, this behavior is automatically managed by the ElastiCube automatically for all functions. However, since R code might have non-deterministic components to it (such as
randomality functions or date-specific functions), the ElastiCube cannot rely on a data-set and function that hasn’t changed not to return a different result in multiple executions. By default, the Recycle value is set to true. Use ‘off’ if your R code contains randomness or other non-deterministic content.

**Ordering**: This is an optional parameter that defines the sort order in which numeric data is sent to R. The argument of the Ordering parameter can be an index in your data source or you can use the ORDERING() function to determine the order of your fields. This function arranges the values of the arguments into ascending or descending order, breaking ties by further arguments.
For example:

```r
ORDERING([Total Sales], -1*[COUNT Salesman], MIN(<Office Name>))
```

For more information about the ORDERING() function, click here.

**R expression**: Your R code needs to be passed here, wrapped in double quotes. R expects the return type to be an array with the same size as widget’s row count. Nulls will be used to make up for shorter arrays, and longer arrays will be trimmed.

**Use single quotes** to wrap strings within your R code when using the Rint/Rdouble functions, so that there will be no double-quote collision with the quotes wrapping your R code within the Rint/Rdouble function.

**Numeric Value Arguments**: Numeric values can be passed as arguments to your R code.
All arguments are passed to R as a 1-based list named “args”.

20
Each item in the list contains an array that represents the field. For example:

- `args[[1]]` will return an array which represents the first field that was used as an argument.
- `args[[2]][3]` will return the 3rd data value within the 2nd field that was used as an argument.

**Guidelines for using R code in Sisense**

In order for your R code to work well in Sisense you need to make sure of the following:

1. The resultset returned from R into Sisense has to be equal in size to the dataset that is sent to R as parameters.
2. The order of the resultset return from R into Sisense has to match the incoming order. No assumptions can be made about the incoming order – This means that you cannot assume that the incoming order matches the order you visually see in the widget.

**Example 1: Simple R Function – Kmeans Clustering**

**Description:** In the example below the Total Cost and Total Revenue fields from Sisense are being used to cluster data via a Kmeans function. The result will cluster the data based on the kmeans settings, in this case 4 clusters.

**Sisense Syntax:**

```r
RINT(TRUE, "m<- log(matrix(unlist(args), ncol = 2)); kmeans(m,4)$cluster", [Total Cost],[Total Revenue])
```
Result: The R expression will return a result from 1 to 4. The widgets color settings can be configured to color corresponding values based on if they equal 1, 2, 3 or 4.

Tip: You can save (star) the complex formula above, and use it again in additional formulas and charts.

In the chart’s BREAK BY/COLOR panel, you can change the color of the clusters as well as define the number of clusters and their break points.
Example 2: R Logistic Regression via Sisense

**Description:** In the example below website traffic data is used to predict if a conversion is likely to occur based on the source of web traffic. The following fields contained in the ElastiCube are passed to the R logistic model: Average Outcome (1=conversion, 0= no conversion), Average Time on Page, Average Pages (viewed) and Average Bounce Rate. This data is passed to a model to predict the outcome and likelihood the traffic will convert. [For the sake of illustration both the training and test data set are the same in the example]

**Sisense Syntax:**
```r
RDOUBLE(TRUE,"mydata<-data.frame(convert=vars[1],
time=vars[2], pages=vars[3], bounce=vars[4]);lrmodel <-
glm(convert ~ time + pages + bounce, data = mydata, family =
'binomial');prob <- predict(lrmodel, newdata = mydata, type =
'response')", [Average Outcome], [Average Time on Page],
[Average Pages], [Average Bounce Rate])
```

**Result:** The R expression will return a result from 0 to 1 showing the likelihood of a conversion occurring. Note a similar process can be applied to create a linear regression.
Predicted outcome of website conversion based on logistic regression.

**Example 3: Loading an Existing R Model**

**Description:** In the example below a saved logistic regression built on previous training data is called and used with new website traffic data to predict if a conversion occurs. The following fields contained in the ElastiCube are passed to the saved R logistic model: Average Outcome (1=conversion, 0= no conversion), Average Time on Page, Average Pages (viewed) and Average Bounce Rate. This data is passed to a model to predict the outcome and likelihood the traffic will convert.

**Sisense Syntax:**

```r
RDOUBLE(TRUE,"mydata<-data.frame(convert=ARGS[[1]],
time=ARGS[[2]], pages=ARGS[[3]],
bounce=ARGS[[4]]);
load('C:\rdata');
prob <- predict(lrmodel, newdata = mydata, type = 'response')", [Average Outcome],
[Average Time on Page], [Average Pages], [Average Bounce Rate])
```

**Result:** The R expression will return a result from 0 to 1 showing the likelihood of a conversion occurring based on the loaded R model in this case stored in ‘rdata’.

**Example 4: Building and Saving a R Model using Data from Sisense**

**Description:** In the example below a logistic regression to predict if a website conversion will occur is built using data from Sisense and then saved as an R model. The following fields contained in the ElastiCube are passed to create the R logistic model: Average Outcome (1=conversion, 0= no conversion), Average Time on Page, Average Pages (viewed) and Average Bounce Rate. This data is saved
as an rdata file and can be used on other data sets to predict outcomes.

**Sisense Syntax:**

```
RDOUBLE(TRUE,"mydata<-data.frame(convert=args[[1]],
time=args[[2]], pages=args[[3]], bounce=args[[4]]); lrmodel <-
glm(convert ~ time + pages + bounce, data = mydata, family =
'binomial'); save(lrmodel, file = 'C:\rdata');1", [Average
Outcome], [Average TimeonPage], [Average Pages], [Average
BounceRate])
```

**Result:** The R expression will use Sisense data to build and save a logistic model in the specified file in this case ‘rdata’.

**Creating Formulas Based on Criteria and Conditions (Filters)**

Often formulas must take into account specific criteria. To do this Sisense provides a feature called **Measured Value**, which like the SUMIF function in Excel, only performs a calculation when the values meet a set of criteria.

Criteria for Measured Values may be based on any logical operators in a filter.

**Measure Value Syntax:**

```
(Measure, Scope1, Scope2...ScopeN)
```

**Parameters**

- **Measure**: A field measure or formula.
- **Scope**: A filter including Value, Text, List, Ranking and Time filters.

**To filter the formula:**

1. In the Data Browser, create your formula from the Data Browser and Functions, as explained in [Using the Formula Editor](#).
2. Add the field (criteria) by which you want to filter the formula. Right-click the field and select Filter.

3. You can then filter the formula by listed items, text options, ranking, etc. When done, click OK.

A simple example of Measured Value is the use of a list filter. A marketing team may need to count leads generated for a specific region such as North America. Even if leads come from many different countries, the measured value calculates leads generated only when the lead originates from the United States or Canada.

<table>
<thead>
<tr>
<th>Country</th>
<th># Leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>15</td>
</tr>
<tr>
<td>France</td>
<td>20</td>
</tr>
<tr>
<td>Canada</td>
<td>5</td>
</tr>
<tr>
<td>UK</td>
<td>30</td>
</tr>
</tbody>
</table>

Example 1: Measured Value with List Filter
(Sum(Leads), (List Filter: Country = United States, Canada))

Result
15+5 = 20

The above example as defined in the formula editor.
A more sophisticated case is the use of a ranking filter, for example a sales team may want to track the contribution of best-selling products to total revenue. However, what constitutes a popular product may change over time. A measured value can be created for sales which includes a condition that only shows sales for the top products for any month. This simultaneously filters the data but also takes into account changes in what classifies as a top product over time.

The above example as defined in the formula editor.
Measured Values are a powerful feature to take into account business logic and quickly perform calculations only when a specific set of criteria is met.

**Note about duplicate filtering:** If your widget is filtered using measured values, then the measured value will override any other widget or dashboard filters you have for the same fields.

**Calculating Contributions Using the ALL Function**

The All() function returns the total amount for a dimension, and can be used for various use cases. In the following example, we will use the All function to calculate how much each country contributed towards the total cost of a campaign.

Our final widget includes the following information:
Step 1: The second column above represents a formula that sums up the total cost for all countries and does not represent the breakdown per country. The formula includes the calculation (total cost) followed by the all function (filter), followed by the dimension (country) in parenthesis. It looks like this:

\[
\left[ \text{Total Cost} \right]_{\text{all}}\left[ \text{Country} \right]
\]

We can save (star) the above formula and call it Total cost for Countries, which will be used in the next step.

Step 2: We can now use the above formula in another formula to calculate the contribution, like this:

\[
\text{SUM}\left[ \text{Cost} \right] / \text{Total cost for Countries}
\]

The result is the third column above (plus formatting the results as percentages).

**Building Formulas with Functions**

Functions are operations that perform common types of calculations, and can be used to build formulas. In this section you can read about
four types of functions. The functions’ syntax is explained and examples are provided.

**Combine Data: Aggregate Functions**

Aggregations are used to perform mathematical calculations on data. Although this is an essential function Sisense offers an advantage in the ability to run multiple aggregations on several fields simultaneously – this makes it easy to summarize data based on multiple factors.

An example **simple aggregation** is a sales manager who wants to calculate the average sales revenue for each sales rep. They can create a pivot table which shows the sales rep and their average sales revenue.

A more complex example is a **multi-pass aggregation** (or grouping) which is an aggregation that performs multiple calculations simultaneously. Following our first example let’s assume the sales manager wants to also see *average sales per day* for each sales rep. Instead of having to add an additional column for day in the pivot table the manager can create a multi-pass aggregation that first performs a sum of sales per day and then averages the results for each rep. This requires two fields – a day from a date field and the revenue field, as well as two aggregations, sum of sales and average. This result is the sales manager does not need to add a column for days in the pivot.
The above example as shown in the formula editor.

**Summarize Data: Statistical Functions**

Descriptive statistics provide meaningful summaries of data and help make more informed decisions. This is particularly important for large data sets where descriptive statistics can help to focus analysis.

An example of statistical functions is a marketing team that has a large data set on leads generated from various channels and want to understand where to focus their budget. Descriptive statistics can be used to summarize valuable insight about each channel such as the
central tendency or median leads generated along with standard deviations to assess typical lead volume.

**Accumulate Data: Running Total and Average**

Often to measure performance data must be viewed in a continuous and accumulative format over extended periods such as years, quarters or months. Sisense provides functions to create running totals and averages over standard or custom time periods.

For example, a support team has a goal to reduce the average monthly cost to resolve open issues. A *Year to Date Average* can be used to track progress towards reducing the average cost of support.

<table>
<thead>
<tr>
<th>Data</th>
<th>Results Example 1: YTDAvg(Cost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
<td>Cost</td>
</tr>
<tr>
<td>Jan</td>
<td>30</td>
</tr>
<tr>
<td>Feb</td>
<td>35</td>
</tr>
<tr>
<td>Mar</td>
<td>40</td>
</tr>
<tr>
<td>Apr</td>
<td>20</td>
</tr>
<tr>
<td>May</td>
<td>25</td>
</tr>
<tr>
<td>Jun</td>
<td>10</td>
</tr>
</tbody>
</table>

**Change over Time: Time Functions**

Time is critical for business decisions, Sisense time functions make it easy to compare outcomes at different points in time, determine
growth rates and calculate the time differences. Functions can be set for common time periods such as year, month or day as well as for custom periods.

Time Syntax: Function(Numeric Field) *

Parameters
Function:
PastYear(), PastQuarter(), PastMonth(), Growth(), GrowthRate(), Contribution(), YDiff(), ODiff(), MDiff(), DODiff(), MMDiff(), MnDiff(), SDiff(), Next(), Prev(), DiffPastYear(), DiffPastMonth(), DiffPastQuarter(), DiffPastDay()
Numeric Field: A numeric field or formula.

* To calculate time functions require a time filter applied on the dashboard or widget.

For example, an executive team wants to compare growth in revenue to the same period in the previous year. A Difference in Past Year function can be used to compare past values based on the current month to the same month in the previous year.
Function Reference

This page contains a list of all the functions you can use in Sisense’s formula editor.

Statistical Functions

Average

Avg(<numeric Field>)
Calculates the mean average of the given values.
For example – AVG(Score) will calculate the mean average of the given scores.

Avg(<group by field>, <aggregation>)
Calculates the average of the given aggregation grouped by another filed.
For example – Avg( Product, Total Sales) will calculates the average of the total sales per product.

Contribution

Contribution(<numeric field>)
Calculates the percentage of total.
For example – Contribution( Total Sales ) will calculate the percentage of total sales per group (for example per day or per product) out of total sales (for all days or all products).

Correlation

CORREL(<Numeric Field a>, <Numeric Field b>)
Returns the correlation coefficient of two numeric fields.
For example – CORREL(Revenue, Cost) will return the correlation between revenue and cost.
CORREL(<group by field>, <aggregation a>, <aggregation b>)

Returns the correlation coefficient of two fields aggregations grouped by another field.
For example –CORREL(Products, AVG(Revenue), AVG(Cost)) will return the correlation between the average of revenue and cost per product.

Count

Count(<Numeric Field>)

Counts the number of unique values within the given values.

Count All

DupCount(<Numeric Field>)

Returns the actual item count of the given list of items, including duplicates.

Covariance (Population)

COVARP(<Numeric Field a>, <Numeric Field b>)

Returns the population covariance of <Numeric Field a> and <Numeric Field b>.
For example –COVARP(Revenue, Cost) will return the population covariance of revenue and cost.

COVARP(<group by field>, <aggregation a>, <aggregation b>)

Returns the population covariance of two fields aggregations grouped by another field.
For example –COVARP(Products, AVG(Revenue), AVG(Cost)) will return the population covariance of the average revenue and the average cost per product.
**Covariance (Sample)**

\[ \text{COVAR(Numeric Field } a, \text{ Numeric Field } b) \]

Returns the sample covariance of \(<\text{Numeric Field } a>\) and \(<\text{Numeric Field } b>\).

For example – COVAR(Revenue, Cost) will return the sample covariance of revenue and cost.

\[ \text{COVAR(group by field, aggregation } a, \text{ aggregation } b) \]

Returns the sample covariance of two fields aggregations grouped by another field.

For example – COVAR(Products, AVG(Revenue), AVG(Cost)) will return the sample covariance of the average revenue and the average cost per product.

**Exponential Distribution**

\[ \text{EXPONDIST(numeric value}, \lambda, \text{ Cumulative (true/false)}) \]

Returns the exponential distribution for a given value and a supplied distribution parameter \(\lambda\). Cumulative: TRUE = Cumulative distribution function, FALSE = Probability density function. For example – EXPONDIST( Count(Leads), 2, False ) will return the exponential distribution density of the number of leads per country where \(\lambda\) is 2.

**Intercept**

\[ \text{INTERCEPT(field, numeric value)} \]

Returns the intercept of the linear regression line through a supplied series of x- and y- values.

For example – INTERCEPT(Date.Quarter, Total Sales) will return the
intercept of the regression line that represents the trend over quarter of the sum of sales.

**Largest**

\[
\text{LARGEST}(\text{Numeric Field}, k)
\]

Returns the k-th largest value in a field.

**Maximum**

\[
\text{Max}(<\text{Numeric Field}>)
\]

Returns the maximum value among the given values.

**Median**

\[
\text{MEDIAN}(\text{Numeric Field})
\]

Calculates the median of the given values. The median of a set of data is the middlemost number in the set. The median is also the number that is halfway into the set.

**Minimum**

\[
\text{Min}(<\text{Numeric Field}>)
\]

Returns the minimum value among the given values.

**Mode**

\[
\text{MODE}(\text{Numeric Field})
\]

Returns the most frequently occurring value from the column.

**Normal Distribution**

\[
\text{NORMDIST}(\text{Numeric Field}, \text{Mean}, \text{Standard Deviation}, \text{Cumulative (true/false)})
\]
Returns the standard normal distribution for a given value, a supplied distribution mean and standard deviation. Cumulative: TRUE = Cumulative Normal Distribution Function, FALSE = Normal Probability Density Function.

For example – NORMDIST(Score, (Mean(Score), All(Score)), (STDEV(Score), All(Score)), False) will return the normal probability density of a given score.

**Percentile**

PERCENTILE(<Numeric Field>, <k>)

Returns the k-th percentile value from the given field.

k is any number between 0..1 (inclusive).

**Poisson Distribution**

POISSONDIST( <numeric value>, <mean>, <Cumulative (true/false)> )

Returns the poisson distribution for a given value and a supplied distribution mean. Cumulative: TRUE = Cumulative distribution function, FALSE = Probability mass function.

For example – POISSONDIST( Score, (Mean(Score), All(Score)), (STDEV(Score), All(Score)), False ) will return the poisson probability density of a given number of sales.

**Quartile**

QUARTILE(<Numeric Field>, <k>)

Returns the k-th quartile for the given field.

- k = 0 returns the Minimum value
- k = 1 returns the first quartile (25th percentile)
- k = 2 returns the Median value (50th percentile)
- k = 3 returns the third quartile (75th percentile)
- k = 4 returns the Maximum value

**Rank**

\[
\text{RANK}(\text{numeric value}, \text{[DESC/ASC]}, \text{[Rank Type]}, \text{[<group by field 1>,... , <group by field n>])}
\]

Returns the rank of a value in a list of values.

[DESC/ASC] – Optional. By default sort order is descending.

[Rank Type] – Optional. By default the type is standard competition ranking (“1224” ranking). Support also modified competition ranking (“1334” ranking), dense ranking (“1223” ranking) and ordinal ranking (“1234” ranking).

[<Group by field 1>,... ,<Group by field n>] – Optional. Rank partitions fields.

For example – RANK(Total Cost, “ASC”, “1224”, Product, Years) will return the rank of the total annual cost per each product were sorted in ascending order.

**Skewness (Population)**

\[
\text{SKEWP}(\text{numeric value})
\]

Returns the skewness of the distribution of a given value in the population.

For example – SKEWP(Revenue) will return the skewness of the distribution of revenue in the population.

**Skewness (Sample)**

\[
\text{SKEW}(\text{numeric value})
\]
Returns the skewness of the distribution of a given value. For example – SKEW(Revenue) will return the skewness of the distribution of revenue.

**Slope**

SLOPE(<field>, <numeric value>)

Returns the slope of the linear regression line through a supplied series of x- and y-values. For example – SLOPE(Date.Quarter, Total Sales) will return the slope of the regression line that represent the trend over quarter of the sum of sales.

**Standard Deviation (Population)**

STDEVP(<Numeric Value>)

Returns the Standard Deviation of the given values (Population). Standard deviation is the square root of the average squared deviation from the mean. The standard deviation of a population gives researchers the amount of dispersion of data for an entire population of survey respondents.

**Standard Deviation (Sample)**

STDEV(<Numeric Value>)

Returns the Standard Deviation of the given values (Sample). Standard deviation is the square root of the average squared deviation from the mean. A standard deviation of a sample estimates the amount of dispersion in a given data set, based on a random sample.

**T Distribution**
TDIST( <numeric value x>,<degrees_freedom>, <Cumulative (true/false)>)

Returns the student’s T-distribution for a given value and a supplied number of degrees of freedom (must be ≥ 1). Cumulative: TRUE = Cumulative Distribution Function, FALSE = Probability Density Function.
For example –TDIST(Score, 3, TRUE) will return the student’s T-distribution of a given score, with 3 degrees of freedom.

Variance (Population)

VARP( <Numeric Value> )

Returns the Variance of the given values (Population). Variance (Sample) is the average squared deviation from the mean, based on an entire population of survey respondents.

Variance (Sample)

VAR( <Numeric Value> )

Returns the Variance of the given values (Sample). Variance (Sample) is the average squared deviation from the mean, based on a random sample of the population.

Mathematical Functions

Absolute

Abs(<Numeric value>)

Returns the absolute value of the given value.
For example –ABS(Cost), where the absolute result for the value ‘2’ or ‘-2’ is ‘2’.
Acos

ACOS(<numeric value>)

Returns the angle, in radians, whose cosine is the given numeric expression. Also referred to as arccosine.
For example –ACOS(Total Revenue) will return the angle, in radians, whose cosine is the given total revenue.

Asin

ASIN(<numeric value>)

Returns the angle, in radians, whose sine is the given numeric expression. Also referred to as arcsine.
For example –ASIN(Total Revenue) will return the angle, in radians, whose sine is the given total revenue.

Atan

ATAN(<numeric value>)

Returns the angle in radians whose tangent is the given numeric expression. Also referred to as arctangent.
For example –ATAN(Total Revenue) will return the angle in radians whose tangent is the given total revenue.

Ceiling

CEILING(<numeric value>)

Returns number rounded up, away from zero, to the nearest multiple of significance.
For example –CEILING(Cost), where the result of ‘83.2’ rounded up is ‘84’.
**Cos**

COS(<numeric value>)

Returns the trigonometric cosine of the given angle (in radians).
For example –COS(Average Angle) will return the trigonometric cosine of the average angle.

**Cosh**

COSH(<numeric value>)

Returns the hyperbolic cosine of the given value.
For example –COSH(Total Revenue) will return the hyperbolic cosine of the total revenue.

**Cot**

COT(<numeric value>)

Returns the trigonometric cotangent of the given angle (in radians).
For example –COT(Average Angle) will return the trigonometric cotangent of the average angle.

**Exp**

EXP(<numeric value>)

Returns the exponential value of the given value.
For example –EXP(Sales) will return the exponential value of sales.

**Floor**

FLOOR(<numeric value>)

Returns number rounded down, toward zero, to the nearest multiple of ‘1’.
For example – FLOOR(Revenue), where the result of ‘88.6‘ rounded down is ‘88’.

**Ln**

LN(<numeric value>)

Returns the base-e logarithm of the given value.
For example – LN(Cost) will return the base-e logarithm of cost.

**Log10**

LOG10(<numeric value>)

Returns the base-10 logarithm of the given value.
For example – LOG10(Revenue) will return the base-10 logarithm of revenue.

**Mod**

MOD(<numeric value>, divisor)

Returns the remainder after a number is divided by a divisor.
For example – MOD(Cost, 10), where the reminder of ‘255‘ divided by ‘10‘ is ‘5‘.

**Power**

Power(value, power)

Returns the results of the given value raised to a supplied power.
For example – POWER(Revenue, 2) will return revenue raised by the power of 2.

**Quotient**

QUOTIENT(<numeric value>, divisor)
Returns the integer portion of a division.
For example –QUOTIENT(Cost, 2), where the integer portion of ‘5’
divided by ‘2’ is ‘2’.

**Round**

ROUND(<numeric value>, num_digits)

Returns number rounded to a specified number of digits.
For example –ROUND(Revenue, 2) will return the revenue rounded to
two decimal places.

**Sin**

SIN(<numeric value>)

Returns the trigonometric sine of the given angle (in radians).
For example –SIN(Average Angle) will return the trigonometric sine of
the average angle.

**Sinh**

SINH(<numeric value>)

Returns the hyperbolic sine of the given value.
For example –SINH(Total Revenue) will return the hyperbolic sine of
the total revenue.

**Square root**

SQRT(<Numeric value>)

Returns the square root of the given value.
For example –SQRT(Cost) will return the square root of cost.

**Sum**

Sum(<Numeric Field>)
Calculates the total of the given values.

**Tan**

\[ \text{TAN}(\text{numeric value}) \]

Returns the trigonometric tangent of the given angle (in radians). For example, \(- \text{TAN}(\text{Average Angle})\) will return the trigonometric tangent of the average angle.

**Tanh**

\[ \text{TANH}(\text{numeric value}) \]

Returns the hyperbolic tangent of the given value. For example, \(- \text{TANH}(\text{Total Revenue})\) will return the hyperbolic tangent of the total revenue.

**Time Related Functions**

**Day Difference**

\[ \text{DDiff}(\text{Start Time}, \text{End Time}) \]

Returns the difference between \(<\text{Start Time}>\) and \(<\text{End Time}>\) in days.

**Growth**

\[ \text{Growth}(\text{Numeric Value}) \]

Calculates growth over time. The time dimension to be used is determined by the time resolution in the widget/dashboard. Formula: \((\text{current value} - \text{compared value}) / \text{compared value}\).

For example:

- If this month your value is 12, and last month it was 10, your Growth for this month is 20\%(0.2).

  \[ \text{Calculation:} \ (12 - 10) / 10 = 0.2 \]
If this year your value is 80, and last year it was 100, your growth for this year is -20% (.2).

Calculation: \( \frac{80 - 100}{100} = -0.2 \)

**Growth Rate**

\( \text{GrowthRate( <Numeric Value> )} \)

Calculates growth rate over time. The time dimension to be used is determined by the time resolution in the widget/dashboard.

For example:

- If this month your value is 12, and last month it was 10, your growth rate for this month is 12/10 = 120% (1.2).
  
  Calculation: \( \frac{12}{10} = 1.2 \)

- If this year your value is 80, and last year it was 100, your growth for this year is 80/100 = 80% (0.8).
  
  Calculation: \( \frac{80}{100} = 0.8 \)

**Hour Difference**

\( \text{HDiff( <Start Time>, <End Time> )} \)

Returns the difference between \(<\text{Start Time}>\) and \(<\text{End Time}>\) in hours.

**Prev**

\( \text{Prev( <Time Field> [, <N>] )} \)

Returns the Time period Member in \(<\text{Time Field}>\) which is \(<\text{N}>\) periods back from the current Member. This function only works as a scope function and not by itself.

For example—This formula will return the numeric value 2 months ago:

\( (<\text{Numeric Value}>, \text{Prev(<Month Field>, 2)}) \)
Minute Difference

\[ \text{MnDiff}( \text{<Start Time>}, \text{<End Time>} ) \]

Returns the difference between <Start Time> and <End Time> in minutes.

Month Difference

\[ \text{MDiff}( \text{<Start Time>}, \text{<End Time>} ) \]

Returns the difference between <Start Time> and <End Time> in months. Returns whole numbers.

Month to Date Average

\[ \text{MTDAvg}( \text{<Numeric Value>} ) \]

Returns the running average starting from the beginning of the month up to the current time period member.

The time dimension to be used is determined by the time resolution in the widget/dashboard.

Returns 0 if the active time resolution is quarters or years.

Month to Date Sum

\[ \text{MTDSum}( \text{<Numeric Value>} ) \]

Returns the running total starting from the beginning of the month up to the current time period member.

The time dimension to be used is determined by the time resolution in the widget/dashboard.

Returns 0 if the active time resolution is quarters or years.

Next

\[ \text{Next}( \text{<Time Field>} [, \text{<N>}] ) \]
Returns the Time period Member in `<Time Field>` which is N periods after the current Member. This function only works as a scope function and not by itself.

For example – This formula will return the numeric value 2 months ahead of now:

```
(<Numeric Value>, Next(<Month Field>, 2)
```

**Now**

```
Now(<Day from Date field>)
```

Returns the value for the current time period. Supports day, month, quarter or year. The `Now` function receives a date dimension and its level and returns all the members in that dimension which match the current query execution time.

Note: This function only works as a scope function and not by itself.

The following example will return the value for the current day.

```
([Total Sales], Now([Days in Datefield]))
```

**Past Year**

```
PastYear( <Numeric Value> )
```

Calculates the value for the same period in the past (previous) year. For example:

- If you’re looking at a specific day, you will see the value of the same day one year back.
- If you’re looking at a specific month, you will see the value of the same month one year back.
Calculates the value for the same period in the past (previous) quarter. For example:

- If you’re looking at a specific day, you will see the value of the same day one quarter back.
- If you’re looking at a specific month, you will see the value of the same month one quarter back.

**Past Month**

`PastMonth( <Numeric Value> )`

Calculates the value for the same period in the past (previous) month. For example:

- If you’re looking at a specific day, you will see the value of the same day one month back.

**Quarter Difference**

`QDiff( <Start Time>, <End Time> )`

Returns the difference between `<Start Time>` and `<End Time>` in quarters. Returns whole numbers.

**Quarter to Date Average**

`QTDAvg( <Numeric Value> )`

Returns the running average starting from the beginning of the quarter up to the current time period member. The time dimension to be used is determined by the time resolution in the widget/dashboard. Returns 0 if the active time resolution is years.
Quarter to Date Sum

QTDSum( <Numeric Value> )

Returns the running total starting from the beginning of the quarter up to the current time period member.
The time dimension to be used is determined by the time resolution in the widget/dashboard.
Returns 0 if the active time resolution is years.

Range

range( <Field1>, <Field2> )

Returns a graphical range selector for a data set where two members of the same dimension and level define the minimum and maximum values of the range.

Second Difference

SDiff( <Start Time>, <End Time> )

Returns the difference between <Start Time> and <End Time> in seconds.

Year Difference

YDiff( <Start Time>, <End Time> )

Returns the difference between <Start Time> and <End Time> in years. Returns whole numbers.

Year to Date Average

YTDAvg( <Numeric Value> )

Returns the running average starting from the beginning of the year up to the current time period member.
The time dimension to be used is determined by the time resolution in the widget/dashboard.

**Year to Date Sum**

YTDSum( <Numeric Value> )

Returns the running total starting from the beginning of the year up to the current time period member.
The time dimension to be used is determined by the time resolution in the widget/dashboard.

**Other**

**All**

All(<Field>)

Ignores the scope set on the dimension.

**Ordering**

ORDERING(<expression1>,<expression2>)

Returns the numeric order position of rows sorted into ascending or descending order, breaking ties with further arguments.

The expressions must be aggregated by applying the MIN/MAX functions as in the example below:

ORDERING(MIN([Sales Person Name]), MIN([Days in Transaction_Date]), -1*Sum([Sales]))

**Rdouble**

RDOUBLE(<R expression>, <numeric value 1>, [<numeric value 2>, ..., <numeric value n>] )

Returns a numeric result for a given R expression and a list of numeric values (use ‘args[[i]]’ in the R expression to reference numeric values
parameters).
The R expression is passed to the running Rserve.

The optional ordering expression determines the order in which the rows are sent to R. The argument of the Ordering parameter can be an index in your data source or you can use the ORDERING() function to determine the order of the field. For more information about the ORDERING() function, click here.

For example –

```
RDOUBLE("m <- log(matrix(unlist(args), ncol=2));
kmeans(m,3)$cluster", [Total Cost], [Total Revenue]) will return the k-means cluster (R expression) of the args: [Total Cost] and [Total Revenue].
```

```
RDOUBLE(<recycle>, <R expression>, <numeric value 1>,
[<numeric value 2>, ..., <numeric value n>] )
```

- recycle = TRUE (default) – Results will be cached for unchanged functions and data.
- recycle = FALSE – Results will not be cached. Use this option if your R code contains randomality.

**Rint**

```
RINT(<R expression>, <numeric value 1>, [<numeric value 2>, ...
,<numeric value n>] )
```

Returns an integer result for a given R expression and a list of numeric values (use ‘args[[i]]’ in the R expression to reference numeric values parameters).
The R expression is passed to the running Rserve.

The optional ordering expression determines the order in which the rows are sent to R. The argument of the Ordering parameter can be an index in your data source or you can use the ORDERING() function
to determine the order of the field. For more information about the ORDERING() function, click here.

For example –RINT(“m <- log(matrix(unlist(args), ncol=2)); kmeans(m,3)$cluster”, [Total Cost], [Total Revenue]) will return the k-means cluster (R expression) of the args: [Total Cost] and [Total Revenue].

RINT(<recycle>, <R expression>, <numeric value 1>, [<numeric value 2>, ..., <numeric value n>] )

recycle = TRUE (default) – Results will be cached for unchanged functions and data.
recycle = FALSE – Results will not be cached. Use this option if your R code contains randomness.

**Changing a Dashboard's ElastiCube**

From your dashboard, you can change your dashboard’s data source. This is useful when you have recently changed your server and you need to reassign your dashboard’s ElastiCube or in cases where you have deleted an ElastiCube Set and you want to reassign the dashboards in that set to your remaining ElastiCubes.

Dashboards can also support multiple data sources, which means you can have widgets built on several data sources within a single dashboard. For example, if you have widgets from an ElastiCube on a dashboard, you can add a data set to the dashboard and create widgets built on that data set’s live data source. The widgets from both data sources continue to function independently of each other in the same dashboard. In addition, filters applied to fields from each data source, do not affect the fields from another data source. For more information about filtering, click here.
To change your dashboard’s ElastiCube:

1. In the top-left corner of your dashboard, click the ElastiCube link.

2. Hover over Change Data Source and select the new data source.
   The source is added to your list. You now add new widgets from any of your data sources to the dashboard.
Embedding Dashboards and Widgets

You can embed Sisense dashboards and widgets in non-Sisense environments, such as in your own websites or applications by concatenating parameters to the URL of your dashboard or widget.

In addition, you can customize what aspects of the dashboard and widget are displayed in your environment.

For example, if you want to remove the Sisense header from the dashboard, you can concatenate the “?embed=true&h=false” parameter in the URL of the dashboard to hide the header.

mysite.com/app/main#/dashboards/5541dc7a80a4e2181e00011a?embed=true&h=false

In this example, the “embed=true” embeds the dashboard into your environment. When you embed a dashboard or widget, viewers can only view the dashboard or widget and do not have any editing privileges. The “h=false” parameter hides the Sisense header allowing you to whitelabel the dashboard.

This article provides a full list of the parameters you can concatenate, their functionality, and examples.

The tutorial below shows how you can embed dashboards and widgets in your environment.

Embedding Dashboards

To embed a dashboard, add “?embed=true” to the URL of the dashboard, and refresh the page. If your dashboard is within a folder,
then first delete “?folder=” and everything that follows, before adding “?embed=true”.

This will open the dashboard without the surrounding Sisense environment.

For example:

Dashboard URL:

`mysite.com/app/main#/dashboards/5541dc7a80a4e2181e00011a`

Embedded URL:

`mysite.com/app/main#/dashboards/5541dc7a80a4e2181e00011a?embed=true`

Dashboard URL for dashboard within folder:

`mysite.com/app/main#/dashboards/550952417404b2981a000029?folder=550955a27404b2981a00003b`

Embedded URL for dashboard within folder:

`http://localhost:8081/app/main#/dashboards/550952417404b2981a000029?folder=550955a27404b2981a00003b`

You can use this URL to embed the dashboard in an iframe, for example:

```html
<iframe id="ifm" name="ifm" width="100%" height="100%" frameborder="0" src="http://mysite.com/app/main#/dashboards/536f2b70d093e26c28000d5?embed=true" scrolling="auto"></iframe>
```

**Dashboard Embedding Configuration Options**

You can control which aspects of the Sisense environment are available when embedding by concatenating the following parameters to the embedded URL:
Show/Hide the left navigation panel
Parameter: “h” (left)
Default: false
Example: ?embed=true&l=true

Show/Hide the right filter panel
Parameter: “r” (right)
Default: true
Example: ?embed=true&r=false

Show/Hide the toolbar
Parameter: “t” (toolbar)
Default: false
Example: ?embed=true&t=true

Show/Hide the environment header
Parameter: “l” (header)
Default: false
Example: ?embed=true&h=true
Embedding Widgets

To embed a single widget, add “?embed=true” to the URL of the widget when it edit mode.

This will open the widget without the surrounding Sisense environment.

For example:

Dashboard

**URL:** http://mysite.com/app/main#/dashboards/536f3a54d093e26c28000114/widgets/536f3a54d093e26c2800011b

**Embedded URL:** http://mysite.com/app/main#/dashboards/536f3a54d093e26c28000114/widgets/536f3a54d093e26c2800011b?embed=true

You can use this URL to embed the widget in and iframe, for example:

```html
<iframe id="ifm" name="ifm" width="100%" height="100%" frameborder="0"
src="http://mysite.com/app/main#/dashboards/536f3a54d093e26c28000114/widgets/536f3a54d093e26c2800011b?embed=true"
scrolling="auto"></iframe>
```
Widget Embedding Configuration Options

You can control which aspects of the Sisense environment are available when embedding by concatenating the following parameters to the embedded URL:

**Show/Hide the left data panel**

Parameter: "l" (left)

Default: false

Example: ?embed=true&l=true

**Show/Hide the right design panel**

Parameter: "r" (right)

Default: false

Example: ?embed=true&r=false

**Show/Hide the toolbar**

Parameter: "t" (toolbar)

Default: false

Example: ?embed=true&t=true

**Show/Hide the environment header**

Parameter: "h" (header)

Default: false

Example: ?embed=true&h=true
Authentication in Embedded Dashboards and Widgets

All Sisense dashboards and widgets require authentication. When embedding dashboards and widgets outside of the Sisense environment, usually the use case is to not enforce the Sisense environment authentication, but rather use SSO (Single Sign On) with existing corporate authentication.
Using Dashboards

The following sections describe how to explore and interact with your dashboards:

- Viewing dashboards
- Using dashboards on mobile devices
- Filtering dashboards
- Drilling down in a dashboard to get an in-depth view for a specific field
- Making selections and focusing in on an area in the widget
- Zooming in and out of charts
- Resizing the x-axis to display labels
- Downloading a dashboard to PDF
- Downloading a dashboard as an image
- Exporting widgets to CSV/Excel
- Downloading a widget as an image
Viewing Dashboards

You can view dashboards that you created and dashboards that were shared with you. A dashboard that was shared with you appears with this icon in the Dashboards list.

You may receive an email with a link or you may simply see a new dashboard in your Dashboards list on the HOME page.

To view a dashboard:

- Click on the link in the email. If you do not have a Sisense account, you will be automatically guided through the activation process.
  OR
- Browse to your Sisense Web page, log in and click the name of the dashboard in the Dashboards list on the HOME page.
Interacting with Filters as a Viewer

Viewers can interact with filters for analyzing data. Through the Filters pane, you can modify filters in a dashboard and change the way values are sorted in a visualization. This is useful for focusing on data displayed in dashboards that have been shared by the dashboard’s owner.

As a Viewer, you can select and deselect filter visuals on a dashboard. Each time you interact with a filter, for example by selecting or entering a value, the filter is immediately applied to your dashboard. After you have configured the relevant filters, you can save it as your default filters view.

Viewers can interact with filters as follows:

- Make a different selection in the filter controls displayed in the FILTER panel on the right side of the dashboard, as shown below:
OR

- Click on the pencil icon next to the filter name (shown above) in the dashboard to display the Filter Definition window.
In addition, Viewers can perform the following procedures:

- Switching Filters On and Off
- Saving your Default Filters View

To create you must be a Designer.
Drilling Down in a Widget

You can drill down in most widgets to get an in-depth view of a selected value.

In the following example, the pie chart on the left shows a breakdown by gender. This is the original chart as created by the dashboard's designer. On the right side, the chart shows a breakdown or drill down showing age groups of the 'female' segment from the original pie chart.

With Sisense you can drill down from any field to any field, unless disabled by the dashboard's designer.

To drill down into a chart:

1. Right-click on the item in the widget into which you want to drill down.
2. To manually select the drill hierarchy path, select **Drill Into**, and then in the In the Data Browser, select the field into which to drill down. If you have already drilled into this chart, then you will have shortcuts to previously selected fields, or select **Choose Another Field** to select a different field for the first time.
or

Select a predefined drill hierarchy (if available).

To drill up to a higher level, click on a breadcrumb. To drill all the way up, click on the X icon.
Making Selections in a Widget

You can click on a specific portion of a widget to select it. Doing so filters the dashboard according to the selected data by adding a filter to the dashboard’s FILTERS panel.

You can also use the selection to drill down in the widget (see Drilling Down in a Widget).

To select an item in a widget for filtering:

1. Left-click an item in a widget to automatically select it and add a dashboard filter according to the selection.
2. For multiple selection, use the Ctrl key. When released, a menu will appear. Click SELECT.
3. In chart widgets, you can drag and draw the area to be selected, as shown below:
Zooming In/Out in Charts

When a widget contains more data than can comfortably be displayed in one view, a zoom bar may be displayed under the widget. The zoom bar enables you to scroll right and left and to zoom in/out of different parts of the widget.

The dark gray vertical bars to the left and right of the scroll bar represent what is shown in the widget:

To zoom into an area of the chart:

- Drag the bars closer together and position them immediately to the right and left of the area to be displayed.

To zoom out:

- Drag the bars further apart.
Resizing the X-AXIS to Expose Labels

The x-axis on the chart can be resized to reveal long or hidden labels.

Drag the x-axis up or down to reveal more or less of the labels.
Creating PDF Reports

When you need to take copies of your dashboards with you for meetings or sharing with others, you can generate a PDF report of your dashboard.

By clicking the icon on your dashboard, you can customize your dashboard’s appearance through the PDF Report Settings page. After you have defined how your dashboard is to be displayed, you can download your dashboard locally as a PDF.

To create a PDF report:

1. From your dashboard menu, click the PDF icon PDF.

The PDF Report Settings page is displayed.
2. Customize how your dashboard is displayed in the PDF. For more information, see Customizing PDF Reports.

3. Click 🔗. The dashboard is downloaded locally as a PDF file.

### Customizing PDF Reports

If you need to share dashboards with other users, or create a hardcopy for yourself, Sisense allows you to send an email report to your users or export your dashboard to PDF. Dashboards in email reports or PDFs though look different compared to online dashboard as they serve different purposes. Through the Sisense PDF Report Settings, you can customize and create nicely formatted email reports and PDFs according to your requirements. The Sisense PDF Report Settings allow you to define both the content and design of your report quickly and easily.

From the PDF Report Settings page, you have two modes, Edit mode, for customizing your PDF, and View mode, for seeing how the
dashboard will be displayed in the PDF. In Edit Mode, all the settings you can apply to your report are displayed in the left menu.

In Edit mode, you can set the size of your report, your dashboard’s orientation, its layout, and what is displayed in the header and footer on your report.

After you have customized your report, you can save the settings and use them when sharing reports, or download the report as a PDF.

**To customize a PDF report:**

1. In your dashboard’s menu, click PDF. The PDF Report Settings page is displayed.
2. Toggle the mode to **Edit Mode**.
3. Edit the dashboard by selecting any of the following options:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Size</td>
<td>The size of the email report in the PDF.</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Orientation</td>
<td>The orientation of the dashboard in the PDF, landscape or portrait. Landscape orientations display the dashboard horizontally while portrait orientations display the dashboard vertically.</td>
</tr>
<tr>
<td>Header</td>
<td>The design and content of your report’s header. The header is displayed on the top of each page or your PDF report. From the Header list, you can define how your header is to be displayed: Compact, Medium, Large, or No Header. After you have set the design, you can determine what information is included in the header. Title: Select to display the dashboard name at the top of the PDF. Dashboard As Of: Select to display the ElastiCube name and last build time at the top of the PDF. Dataset Name: Select to display the name of the ElastiCube that contains the dashboard’s data. Dashboard Filters: Select to display dashboard filter selections.</td>
</tr>
</tbody>
</table>

4. Click **Save** to save your settings when sharing reports or **download** to download your report.
Downloading a Dashboard as an Image

You can download the dashboard as an image. This can be useful for including the dashboard in a presentation, web site, etc.

To download the image:

1. Click the download button at the top right of the screen, and click Download Image.

2. You can also define the following additional settings:
   - **Show Dashboard Title**: Turning this on will display the dashboard name at the top of the PDF.
   - **Show Dashboard Filters**: Turning this on will display a summary of the dashboard filter selections at the top of the PDF.
   - **Show ElastiCube Info**: Turning this on will display the ElastiCube name and last build time at the top of the PDF.
Download Dashboard

File Type
- PNG (Better Quality)

Size (Width)
- Current (1334 Pixels)

Data
- Show Dashboard Title
- Show Dashboard Filters
- Show ElasticCube Info

Download  Cancel
Exporting Widgets to CSV/Excel

You can export widgets in the CSV format. This is also useful for using with Excel.

Only the displayed (filtered) data is exported according to the currently selected filters.

To export a widget to csv:

- In dashboard view, click on the widget's menu, and select **Download > CSV File**.
- In edit widget view, click on the download icon, and select **Download CSV**.
Downloading a Widget as an Image

You can download a widget as an image (png format).

To download the widget as an image:

- In dashboard view, click on the widget's menu, and select **Download > Image**.
- In edit widget view, click on the download icon, and select **Download Image**.

When viewing the dashboard

![Dashboard View]

When viewing the widget

![Widget View]

**Tip:** The image size will reflect the size of the widget on the screen when you download it. To create a larger image, we recommend...
enlarging the widget space in the dashboard, or to open the widget in edit view, to get the bigger picture.
Managing and Sharing Dashboards

Organizing Dashboards

This chapter describes how to manage and share Dashboards.

This chapter is only for Sisense users who have dashboard editing rights (Designers).

Organizing Dashboards in Folders

You can organize your dashboards into folders and sub-folders within any of your folders to improve how your viewers navigate the Dashboard list.

To create a folder:

1. In the Dashboard list, click + and select **New Folder**.

   ![Dashboard list with New Folder option]

   The new folder is added to the dashboards list.

2. Hover over the new folder and click **Rename** to name the folder.

   To create additional sub-folders within your folders, hover over the folder and select **New Folder** and repeat Step 2.
Locating a Dashboard

You can quickly and easily locate dashboards without having to navigate through your entire list of dashboards. When you enter any characters in the Search field, the list of dashboards is filtered according to the characters found within your dashboard titles.

To locate a dashboard:

1. In the Dashboard list, click to display the Search field.

2. In the Search field, enter the title of your dashboard. Any dashboards that contain the characters you entered are displayed.

Deleting a Dashboard

To delete a Dashboard:

- Click on the menu button of the Dashboard to be deleted in the list in the HOME page, and select Delete.

OR
Click the Dashboard Menu button and select **Delete Dashboard**.

**Copying a Dashboard**

Copying a dashboard (even one that was shared with you) creates a new copy of the dashboard with a different name. This new dashboard is totally separate from the original and you are its owner, meaning that you have full editing rights. When you copy a dashboard, the new dashboard is added below the copied dashboard in your Dashboard list with the same name plus a number in the order it was created.

For example, Tutorial(1) and Tutorial(2) are copies of Tutorial, while Tutorial(2)(1) is a copy of Tutorial(2):

![Dashboard List](image)

**To copy a Dashboard:**

- Right-click the dashboard’s name in the Dashboard list in the HOME page and select **Make a Copy**.
Exporting and Importing Dashboards

Sisense supports exporting and importing of dashboards. This is useful for copying dashboards between separate Sisense installations, and also for making backups.

Dashboards are exported as files with a ‘dash’ extension, which can then be imported.

Exporting a Dashboard

To export a dashboard, do one of the following:

Option #1

In the Dashboard list on the left of the Sisense environment, click the dashboard’s menu and click Export Dashboard.

Option #2

Open the dashboard’s menu and click Export Dashboard.
Both of these methods will prompt you to choose a name for the exported dash file and save it to disk.

**Importing a Dashboard**

To import a dashboard:

1. Hover over Dashboards list in the home page and click the ‘+’ symbol. Select Import Dashboard from the menu. You can also right-click anywhere in the dashboards list, or click on the menu of one of your existing folders to import a dashboard into a folder.

2. Select your exported dash file. The dashboard will be added to your list of dashboards or folder. You can drag it from there to your desired location in the tree.
Sharing Dashboards

Owners can share dashboards that they have created with other Sisense users (Viewers and Designers). An owner is any Designer who has created a dashboard. When you share a dashboard, you can define whether the recipient has editing rights:

- Designers have editing rights.
- Viewers have viewing/filtering rights.

After you share a dashboard, or for any dashboard shared with you, in the Dashboards list the icon appears next to the dashboard.

You can hover over the dashboard in the Dashboards list to view ownership details.

When you share your dashboard, you can configure Sisense to send periodic email notifications containing the dashboard inside the email’s body to your dashboard’s recipients.
Working with Shared Dashboards

A dashboard recipient can edit the dashboard if you grant them permission, but the changes they make in the dashboard do not affect your copy of the dashboard. The recipient’s changes are automatically performed on a separate copy of the dashboard (to which only they have access).

Dashboard recipients can revert to your latest shared copy at any time by right-clicking the dashboard’s name in the Dashboards list on the left of the Sisense environment and selecting Restore Dashboard.

When you share a dashboard that’s contained within a folder, the dashboard is shared using the same structure (under the same folder).

When a Designer shares a dashboard with you, you become a recipient and all of the above applies to you.

To share a Dashboard:
In the heading of your dashboard, click the Share button.

OR

In the Dashboards list, select Share for the dashboard you want to share.

Enter the emails or groups of users with whom to share the dashboard. Selecting Everyone specifies that this dashboard is shared with all Sisense users and user groups.

The contact information of the people you add is listed in the center of the window and is displayed the next time you open this window.

If a person does not have a Sisense account, they receive a link that guides them through the activation process.

Sisense users are defined by your Sisense administrator, as described in Managing Dashboard Users.
In the dropdown menu next to each user/user group select whether the user is a designer with editing rights (Can edit) or a viewer (Can view).

Toggle the Email Reports button next to each user/user group on/off to define whether the user receives scheduled email reports of the dashboard. Read more on email reports below.

The Dashboard URL field at the bottom displays a direct link to this dashboard that you can copy/paste.

Click Save.

**Publishing Dashboards to Recipients**

When an owner modifies a dashboard, for example, by adding a new widget, the dashboard is not automatically updated for recipients. The owner of a dashboard must publish their updated dashboard to update the dashboards of their recipients and the dashboard recipients must refresh the dashboard before any of the owner’s changes are applied.

**To publish a dashboard to your recipients:**

- In the heading of your dashboard, click **REPUBLISH**.
  
  OR
  
  In the Dashboards list, right-click the dashboard’s name and select **EDIT > REPUBLISH**.

**Updating a Shared Dashboard**

When a recipient modifies a shared dashboard, those changes remain local unless the recipient updates their dashboard to match the
dashboard of the owner. If the recipient updates their shared dashboard to match the dashboard of the owner, any of their local changes to the dashboard are overwritten. Sisense recommends that recipients save any local versions of a shared dashboard as a new dashboard before updating a dashboard.

To update a shared dashboard:

1. In the heading of your dashboard, click ➔ Restore Dashboard.
   OR
   In the Dashboards list, right-click the dashboard's name and select ➔ Restore Dashboard.
2. Click YES to confirm that you want to update the shared dashboard.

Changing Ownership of a Dashboard

The owner of a dashboard can transfer ownership of the dashboard to an Admin or another Designer. Transferring ownership of dashboards can be useful when the original owner leaves your company and you do not want to lose their dashboards.

When you transfer ownership, the dashboard remains as a shared dashboard within your Dashboards list, and you become a dashboard recipient. As a dashboard recipient, you are limited to how you can modify the dashboard as described in Working with Shared Dashboards.

To transfer ownership of a dashboard:
1. In the heading of the dashboard you want to transfer ownership of, click the **Share** button.
   OR
   In the Dashboards list, select ➔ **Share** of the dashboard.
   The Share window is displayed.

2. Enter the name of the Admin or Designer you want to transfer ownership to.
3. In the User Privilege list of the user you want to make an owner, select Make Owner.

4. Click Save. A Warning message is displayed.

5. Click OK to confirm that you want to transfer ownership to the user.

Sending Dashboard Email Reports

After you share your dashboard, you can configure the Sisense Scheduler to send periodic email reports containing a static version of the dashboard that can be clicked to access the dashboard or PDFs containing images of your dashboard.

From your dashboard, you can configure how many emails the Scheduler sends and when.

To test how the report is to be displayed to your shared users, in the Shared Dashboard window, click the Send me a report now link, which generates an email report sent to your email address immediately.
To schedule email notifications:

1. In your dashboard, click the Share icon to display the Share window.

2. In the Shared Dashboard window, click the tab.

3. Select the type of report you want to send. There are two types of email reports you can send:
   - **Email Report**: The email report is attached as an image file.
   - **PDF Attachment**: The email report is attached as a PDF. You can define how the dashboard is to be displayed in the PDF through the PDF Report Settings page by clicking Edit/View PDF Report. For more information, see Customizing PDF Reports.

4. In the Schedule area, select the frequency for sending email notifications. You can select one of the following options:
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every ElastiCube update, no more than X emails per day</td>
<td>Select to send a report each time you update the ElastiCube up to the amount of emails you define in the Number box. In the Number box, type or select the amount of emails that can be sent a day, regardless of the amount of builds.</td>
</tr>
<tr>
<td>Daily</td>
<td>Select to send one email report according to the time you define. In the Everyday box, select the days the scheduled report is to be sent. You can select multiple days by clicking the day. Select the Hour and the Time Zone that the email is to be sent on the days you selected.</td>
</tr>
</tbody>
</table>

5. Click **Save**.
Sisense Pulse and Alerting

Sisense Pulse is a centralized location where you can stay on top of your most important KPIs across multiple dashboards or manage your data and build alerts.

For example, you can consolidate and monitor important aspects of your business by adding Indicator widgets from various dashboards to the Sisense Pulse page.

Then, you can create alerts to notify you when certain thresholds are met or anomalies in your data are detected. Sisense Pulse provides you with access to your most important data and notifies you when to take action.

The following sections describe Sisense alerts and managing alerts and KPIs in your Sisense Pulse page.
Sisense Alerts

Sisense offers two types of alerts you can define, data alerts and system alerts.

Data alerts are triggered by changes to your data. Sisense provides several options for defining the type of changes that trigger data alerts including threshold based alerts, automatic anomaly detection, and Always which is triggered by any change to your data. For example, if you have an Indicator widget that represents total sales, Sisense can notify you when a threshold you defined is met or exceeded.

System alerts can be configured to be sent following build attempts.

When creating an alert, you can customize your notifications, the channel through which they are sent, and how often a notification is sent following a data or system event.

After you create an alert, the alert is added to the Sisense Pulse page where you can manage the alert and its notifications. For example, you can delete alerts or enable and disable notifications.

If you want to make a similar alerts, for example, alerts with different notifications for different groups of users, you can duplicate the alert and modify its settings.

When an alert is triggered, you and your users are notified through the channel you defined when creating the alert and through the Pulse Feed. The Pulse Feed is displayed in the Sisense Web Application and shows a list of your most recent triggered alerts.
Creating Data Alerts

Data alerts are triggered by conditions you define for your Indicator widgets. For example, if you have an Indicator widget that represents your company’s revenue, you can define an alert that notifies you when this revenue reaches or falls below a certain threshold. When creating data alerts, you define the condition that triggers the alert. Sisense provides three alert conditions that can trigger an alert:

**Threshold**

Sisense notifies you when a threshold is reached following a build. This condition is useful for monitoring metrics that follow a regular, cyclical schedule.

**Automatic**

Sisense automatically notifies you when the Sisense alert engine identifies an anomaly in your data based on machine learning algorithms. The Sisense algorithm actively learns from your data and eliminates noise to identify anomalies in your data. Sisense’s anomaly detection is based on a smoothing algorithm that takes the latest values into account. The more times an ElastiCube is built, the more accurate Sisense becomes at identifying any anomalies and notifying you.

**Always**

Sisense notifies you any time there is a change to your widget’s data. This condition is useful for metrics that do not frequently change.
In addition, you can configure advanced settings that determine who receives the alert and what channel the alert is sent through. For more information see Advanced Settings.

To create a Data alert:

1. From a indicator widget’s menu, select Add To Pulse.
2. The Add to Pulse window is displayed.

   **Add to Pulse**

   **Name**
   
   Total Quantity

   **Condition**
   
   - Automatic
   - Threshold
   - Feed

   We will monitor this value for you and let you know when there are irregularities.

   Advanced

3. In the **Name** field, enter a meaningful name that represents your alert.

   In the Alert Condition area, select the condition that triggers the alerts.

   **Threshold**: Sisense defines the threshold value as the current value displayed in the widget. You can increase or decrease this value and define the equality and relational operators that determine when the threshold is met.
Add to Pulse

Name
KPI

Alert Condition

You will be notified when the value is:

Greater than
0.072920551856

Advanced

Automatic: Sisense automatically identifies anomalies in your data and alerts you.

Alert Condition

The system will monitor this value and notify you when anomalies are detected.
Always: Sisense notifies you every time the data changes.

4. Click **ADD** to create the alert. The alert is added to Sisense Pulse.
   
   For additional advanced configuration options, see Advanced Settings.

Creating Build Alerts

Administrators can set build alerts to notify themselves or other users when a build fails or succeeds. Build alerts are created from the Sisense Web Application and are sent following an ElastiCube build.

Build alerts allow you to monitor the status of ElastiCube builds.

Administrators can create build alerts from the Admin section of the Sisense Web Application. After a build alert is created, it is added to Sisense Pulse from where you can manage it.

To create a build alert:

1. In the Sisense Web Application, select **Admin > ElastiCubes > Add Build Alert.**
OR

From the ElastiCube menu, Add Build Alert.

The Add Build Alert window is displayed.
2. In the **Name** field, enter a name for the alert.

```
Add Build Alert

Name: [Enter name...]

Server: [LocalHost]

ElastiCube: [Sample Healthcare]

Notify when:

- [ ] Build failed
- [ ] Build succeeded
- [x] Build succeeded after failure
```

3. From the **Server** list, select the server where the ElastiCube is hosted.

4. From the **ElastiCube** list, select the ElastiCube(s) that triggers an alert following a build.

5. Select when to notify you following a build. There are three conditions that when met, can trigger an alert:
   - **Build failed**: The alert is sent after the ElastiCube build fails.
   - **Build succeeded**: The alert is sent after the ElastiCube is built successfully.
   - **Build succeeded after failure**: The alert is sent following a successful build after the ElastiCube previously failed to build.

6. Click **SAVE**. The Alert is added to your Sisense Pulse page.
7. For additional advanced configuration options, see Advanced Settings.

Advanced Settings

By default, when an alert is triggered, you are notified via your email address registered with Sisense.

Through the Advanced Settings options, you can notify additional users when an alert is triggered, notify them across multiple channels, and customize the message displayed in the notification.

The following pages describe the functionality available in the Advanced Settings options:

- Notifying Additional Users
- Setting Notification Channels
- Customizing Notification Messages
- Configuring Additional Options

Notifying Additional Users

When an alert is triggered, Administrators and Designers can notify additional Sisense users and groups by configuring the alert’s advanced settings. Viewers cannot share alerts with additional users.

Users who are notified receive a notification through Sisense Pulse and any other additional channels you define.
To notify additional users:

1. For Build Alerts, select the tab.

For Data Alerts, select Advanced Options > .

Add to Pulse

Name
Total Revenue

Condition

Automatic
Threshold
Feed

We will monitor this value for you and let you know when there are irregularities.
2. Enter the email address, Sisense username, or group name of the users you want to notify when an alert is triggered. Entering Everyone specifies that all Sisense users and user groups associated with your account are notified. The contact information of the people you add is listed in the center of the window and is displayed the next time you open this window.

3. Click Add to add the alert to Pulse.

### Setting Notification Channels

By default, your users are notified via their email addresses registered with Sisense. In addition, Sisense supports a variety of workflows by sending notifications across multiple applications and services. For example, your users can receive notifications through the Sisense mobile application, Zapier, Slack, and other 3rd services via webhooks.

To define how users are notified:

1. For Build Alerts, select the 📣 tab.
For Data Alerts, select Advanced Options > ⌁.

2. In the Notifications area, select the relevant channel for your notification. The default channel, Email, is already selected. You can select one or more of the following channels:
   - Email
   - Mobile
   - Slack
   - Zapier
   - Webhook
3. Click Save.

**Sisense Mobile App**

The Sisense Mobile app enables users to view Sisense dashboards through their mobile devices. You or your users can receive notifications through the Sisense Mobile app. After selecting the users you want to notify, any users with a Sisense user account and the Sisense Mobile app will receive a notification when an alert is triggered.
Slack

Slack is a real-time team collaboration messaging platform that allows you to receive incoming Webhooks from external sources such as Sisense. To send notifications through Slack, you need to enter the URL and optionally, your Slack channel or username, where the notification is to be displayed.

You can obtain these details by adding the Incoming WebHooks app into your Slack configuration.

To obtain a Webhook URL and channel from Slack:

1. Add the Incoming WebHooks app to Slack. You can find this app in Slack’s App Directory.
2. In the Incoming WebHooks app page, click Add Configuration.
3. After you add the Incoming WebHooks app, you can select which channel to post the notifications to. The channel name is optional and displays the notification in the channel associated with your WebHook URL. In the Post to Channel area, select the channel where the notification is to be displayed and click Add Incoming WebHooks integration.

4. In the Setup Instructions the Webhook URL is displayed. Copy the Webhook URL.

5. In Sisense when sending notifications through Slack, in the URL field, enter the URL copied in the previous step and in the #channel/@username field, enter the channel name if you have defined one.
Zapier

Zapier is an online service that lets you create automated actions connecting disparate business apps and services such as Sisense. To receive notifications through Zapier, you must create a Zap and provide Sisense with the relevant URL when configuring your alerts’ notifications.

When an alert is triggered, Sisense sends the notification to the Webhook you define in Zapier.

To obtain a Webhook URL from Zapier:

1. Log in to Zapier and click **Make a Zap**. The Trigger App page is displayed.

2. From the Trigger App page select Webhooks. The Connect to Webhooks by Zapier page is displayed.
3. In Step 1 > Set Up Webhook, click **Copy to clipboard** to copy the Webhook URL you need to provide to Sisense.

4. In Sisense, when sending notifications through Zapier, in the **URL** field, enter the URL copied in the previous step.

**Webhooks**

Webhooks are a system of automated notifications that indicate that an event occurred, in this case an alert being triggered. To send notifications through additional 3rd party channels, you can select **Webhook** and enter the Webhook name and URL.

Your Webhook server listens for incoming messages from Sisense across the URL specified in the URL field.
When Sisense sends notifications to your custom Webhook, they are sent within a JSON payload. Your Webhook provider must interpret the payload and display the notification to your users. The following are examples of notifications sent in a JSON payload and a description of the contents of the payload:

### Data Events

```json
{ type: 'kpi',
  name: 'Total Sales',
  message: 'Hello World',
  originDashboardLink: '58128745677f52dc0f000019',
  measure: 'Revenue',
  value: 39759625.51502721,
  condition: 'none',
  filters:
    [ { asDimension: false,
        title: 'Category',
        value: 'Include all',
        jaql: [Object],
        panel: 'scope' },
      { asDimension: false,
        title: 'Gender',
        value: 'Include all',
        jaql: [Object],
        panel: 'scope' } ]
}
```

### Build Events

```json
{ type: 'build',
  name: 'Success Event',
  measure: null,
  value: 1,
  condition: 'none',
  filters: null
}
```

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>String</td>
<td>Type of alert. 'kpi' for data events and 'build' for build events.</td>
</tr>
<tr>
<td>Name</td>
<td>String</td>
<td>Name of the alert.</td>
</tr>
<tr>
<td>Message</td>
<td>String</td>
<td>Notification message.</td>
</tr>
</tbody>
</table>
Name | Type | Description
--- | --- | ---
originDashboardLink | String | Dashboard ID provided by Sisense. You can find the dashboard ID from the URL of the dashboard. For example, the ID of the dashboard below if:

http://localhost:8081/app/main#/dashboards/573b4322048e5e382a000001

value | Double | For data events when a threshold condition is applied, this is the value of the threshold.

For build events, the value is 0 for failed builds and 1 for successful builds.

condition | String | Type of condition that generated the alert.

filters | Object | Object that defines filters applied to the dashboard.

**Customizing Notification Messages**

By default, the following message is provided in your email alert notifications:

*Hi,*

*The latest value in the KPI that you are monitoring is:*

*Value*
You can provide customized messages for your notifications when configuring your alert through the alert’s Advanced Settings.

The message you provide replaces the string: The latest value in the KPI that you are monitoring is:

For example, if your message is “The last value of my KPI is:” the message in your alert’s notification will be:

Hi,

The last value of my KPI is:

Value

To customize your notification’s text:
1. For Build Alerts, select the 📣 tab.

For Data Alerts, select Advanced Options > 📣.

Add to Pulse

Name
Total Revenue

Condition

Automatic
Threshold
Feed

We will monitor this value for you and let you know when there are irregularities.

2. In the Message area, enter your custom text.
3. Click **Save**. The next time a notification is sent, your custom message is displayed in the notification.

4. You can modify your alert notifications further including customizing the text and images displayed. For more information, see Rebranding Sisense Automated Emails.

**Configuring Additional Options**

You can configure how often and when a notification is sent after an event is triggered. For example, you can limit the amount of notification sent to one when a data alert is triggered. This is useful if you build your ElastiCubes frequently, but do not need multiple notifications.

To configure additional options:

1. When adding or editing a widget to Pulse, in the Advanced Options window, select > **Additional Options**.

2. Select any of the following options:

   For data alerts:
Select **Notify only once after a condition is met** to limit how many notifications are sent to notification after an event occurs. Select **Notify when a condition is no longer met** to notify users after the event is no longer triggered.

**For build alerts:**
Select **Notify once when there is a status change** to notify users only once when the latest build status is different than the previous build status.

3. Click **Add** to save the alert.

**Sisense Pulse**

Sisense Pulse can be personalized to your needs so you can stay on top of your most important KPIs across all your dashboards and your latest ElastiCube builds. By adding important KPIs from your dashboards to Sisense Pulse, you can get a comprehensive picture of your data from a single location.

Sisense Pulse contains tiles that display information from your dashboards and the status of your ElastiCube builds.

Within Sisense Pulse, there are two types of tiles, data tiles that display your Indicator widgets’ current status and recent history and build tiles that display the latest status of your ElastiCube builds.

You can access Sisense Pulse from the menu bar of the Sisense Web Application.

By hovering over the header of any tile in Sisense Pulse, you can view additional options that provide more information.
The icon opens a new tab in your browser. For data tiles the dashboard where the related Indicator widget originated is displayed and for build tiles the ElastiCubes page in the Admin area is displayed.

The icon is a tooltip that describes the tile in more detail. For data tiles the tooltip describes who added the tile to Pulse and when it was added. Build tile tooltips describe when the tile was created, which ElastiCube is being monitored, and under what conditions an alert is triggered when alerts are enabled.

The icon displays a menu for managing tiles in Sisense Pulse. For more information regarding managing tiles in Sisense Pulse, see Managing Tiles in Sisense Pulse.

**Adding Tiles to Sisense Pulse**

To keep track of your important KPIs and ElastiCube builds, you add the relevant data and build tiles to Sisense Pulse.

The flow for adding tiles to Sisense Pulse is the same for creating alerts for Indicator widgets and ElastiCube builds. For more information about these flows, see the following topics:

For data tiles, see Creating Data Alerts.

For build tiles, see Creating Build Alerts.

Each of these flows adds tiles to Sisense Pulse and creates an alert. If you want to monitor your data and ElastiCube builds without alerts, see Deactivating Notifications.
Managing Tiles in Sisense Pulse

After you have created alerts or added tiles to Sisense Pulse, you can manage those tiles from Sisense Pulse. Through the Sisense Pulse page, you can duplicate alerts and modify them, disable notifications, and delete alerts.

Duplicating Tiles in Sisense Pulse

You can create copies of alerts and modify them to quickly generate new alerts with different notification messages or notify various groups across separate channels.

For example, if you want to notify Group 1 via email and Group 2 via Slack when the same event occurs, you can duplicate an alert and modify the notification channel.

To duplicate a tile:

1. In the Sisense Web Application, select Pulse.
2. In the relevant alert’s menu, select **Duplicate**. A copy of the alert is created and the Add to Pulse window is displayed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy of Average Cost</td>
<td>Average Cost</td>
</tr>
</tbody>
</table>

You can modify the alert’s settings from the Add to Pulse window.

3. You can modify the alert’s settings from the Add to Pulse window.

**Deactivating Your Notifications**

Each time you add a tile to Sisense Pulse or create an alert, by default, you will receive notifications when the event is triggered. If you want to just monitor KPIs from Sisense Pulse, or you do not want to receive any notifications, you can disable notifications from being sent by toggling the notifications. When you toggle the notifications, you no longer receive notifications when an alert is triggered, however, other users with whom the alert was shared will continue to be notified. See Deactivating Notifications for All Users to turn off notifications for everyone associated with an alert.
To deactivate notifications:

1. In the Sisense Web Application, select **Pulse**.

From the Tile menu of the relevant alert, toggle **Receive Notifications**.

Deactivating Notifications for All Users

If you have added an alert that is no longer relevant or you want to deactivate the alert for all users, you can turn off the alert.

When you turn off an alert, no users are notified when the event that triggers the alert occurs.

To deactivate notifications for all users:

1. In the Sisense Web Application, select **Pulse**.
2. From the Tile menu of the relevant alert, select **Turn Off**. A confirmation dialog box is displayed.
3. Click **Yes** to confirm that you want to turn off all notifications for the alert. The alert is turned off.
4. Alerts that have been turned off appear in the Pulse page as shaded tiles. You can reactivate the alert by selecting Turn On from the Tile menu.

Deleting Tiles in Sisense Pulse

When a tile is no longer needed, you can delete the tile through the Sisense Pulse page.

Deleting an alert removes it from the Sisense Pulse page and users are no longer notified.

To delete an alert:

1. In the Sisense Web Application, select Pulse.
2. In the relevant alert’s menu, select Delete.

Removing Sisense Pulse

You can remove the Sisense Pulse through the Sisense REST API. Removing Sisense Pulse removes the Pulse page from the Sisense Web Application and deactivates all the alerts defined in Sisense Pulse.

1. To remove Sisense Pulse:
2. Access the Sisense REST API.

3. In version 1.0 of the REST API, select the PATCH Dashboard endpoint, /features/{key}/toggle.

4. In the Authorization field, enter your Sisense authorization key. The value of this field is the user's API token, preceded by the keyword Bearer (with a space between it and the token). For information about how to retrieve this key, see Using the REST API.

5. In the key field, enter the name of the feature to be enabled or disabled. In the case of Sisense Pulse, the key is alert. You can retrieve the available features that you can toggle from the GET /features endpoint.
6. In the `toggleFeature` field, set the active key value as true or false to enable (true) or disable (false) a feature.

7. Click **RUN** to toggle the alert.
Administration

Managing Dashboard Users

This section describes how to add and manage Sisense users that can access Sisense dashboards.

You can add users using the following methods:

- Add new users by entering them one by one or in bulk.
- Add new users from your Active Directory database.

To access the user management settings:

- Click **ADMIN** in the top-right corner and select the **USERS** tab on the left. By default, the only available user after installing Sisense is the user that installed Sisense. By default, this user is an Admin.

Adding a New User

To add a new user:

1. Click the **ADD USERS** button. If a connection with Active Directory also exists, an additional **ADD ACTIVE DIRECTORY**
**USERS** option is available. Click it to select a user from Active Directory.

2. Fill in the user’s details in the window.
3. Select the **Role** of the user:
   - **Sisense Viewers** can view, explore, drill down, make selections and filter the Dashboards that Designers share with them. Viewers only need a standard web browser; no plugins or downloads. They cannot create new Dashboards or edit existing ones.
- **Sisense Designers** create, design, edit and share Dashboards. Sisense Designers determine whether the user with whom they share a Dashboard has editing rights (is a Designer) or only viewing rights (Viewer).

- **Sisense Admin**: Admins have all the rights of Designers and Viewers. In addition, only admin users can access the MANAGE section which enables them to manage ElastiCubes, users, user groups and more. Sisense supports multiple Admin users.

4. Click **SAVE**. The user then receives an email from Sisense that redirects the user to activate his/her account and set a password.

**To manually set a password for the new user:**

Set the **Define Password** option to **ON** and enter a password before saving.

In this case, the user receives an invitation email. You must personally notify the user of the password that you set for him/her.

**Adding Multiple Users**

**To add multiple users:**
1. Click the **ADD MANY** option at the top right of the Add users window.

   In the displayed text box, paste a comma separated list of emails and click **NEXT**.

   The next screen enables you to assign Viewer or Designer rights to the users that you entered and to verify that the user count and permissions match your license.

2. After you click **ADD**, each user receives an activation email.

**Editing an Existing User**

**To edit an existing user:**

1. Click **ADMIN** in the upper right corner and select the **USERS** tab on the left.

2. Click the Pencil button on the right of the user’s entry in the list.

**Deleting a User**

**To delete an existing user:**

1. Click **ADMIN** in the upper right corner and select the **USERS** tab on the left.

2. Click the Trash button at the right of the user’s entry in the list.
Managing User Groups

This section describes how to add and use user groups in Sisense.

How Do User Groups Work?

- When building and sharing dashboards, wherever you can select a user, you can also select a user group. For example, you can share a dashboard with an entire user group at once.
- When you add an additional user to an existing user group, then that user is automatically awarded the permissions of that user group.
- When users are added in Active Directory to a previously imported Active Directory user group, then those users are automatically added to the corresponding Sisense user group.
- User groups can only contain users. They do not support nested user groups.
- Additional users cannot be added to a user group that was imported from Active Directory.

You can add users to a user group using the following methods:

- Add existing Sisense users to a user group
- Add a user group from Active Directory

Accessing User Group Management

You can add, edit and delete user groups, and assign users to them.

To access the user group settings:

- Click ADMIN in the top-right corner and select the GROUPS tab on the left. A list of the previously defined user groups is displayed. The Origin column displays Sisense or Active
Directory to indicate whether the user group was defined in Sisense or imported from Active Directory.

If no user groups have yet been defined, the following message is displayed: No Groups Found
Adding a New User Group

The following procedure describes how to add a new user group by selecting users from existing users in Sisense.

See Adding a User Group from Active Directory for a description of how to add a user group from Active Directory.

To add a new user group:

1. Click **ADMIN** in the top-right corner and select the **GROUPS** tab on the left.
2. Click **ADD GROUP**.
3. In a **Group Name** field, enter the name for this user group.
4. In the **Group Users** field select each of the users that belong to this group. To add each user, start typing in the user’s name. An
auto-complete list is displayed showing the users that already exist in Sisense. Select a user name to add to the group.

**Note:** If you want, you can leave the group empty and add members to it later.

3. Click **Save**.
Adding Users to an Existing User Group

The following procedure describes how to add one or more users to an existing user group.

To add multiple users to a user group:

1. Click **ADMIN** in the top-right corner and select the **USERS** tab on the left.
2. Select the checkboxes next to the users' names for the users that you want to add to the user group.
3. Click **ADD TO GROUP**.

![User Group Add Interface](image)

Add 2 Users to Group

john@sisense.com, larry@sisense.com

Type to search for existing Groups, or to create a new one.  

CANCEL
4. Type in the field at the bottom of the window to select an existing user group or to create a new one.

5. Click ADD.

Editing an Existing User Group

To edit an existing user group:

1. Click ADMIN in the upper right corner and select the GROUPS tab on the left.

2. Click the Pencil button on the right of the user group’s entry in the list.

Note: To remove a user from the Group, hover over the user name in the list and click the Trash button.

Deleting a User Group

When a user group that was entered in Sisense is deleted, its users are not deleted. They remain active users in Sisense.

When a user group that was imported from Active Directory is deleted, a prompt is displayed asking whether you want to also delete all the users in this user group from Sisense.

To delete an existing user group:

1. Click ADMIN in the upper right corner and select the GROUPS tab on the left.
2. Click the Trash button at the right of the user group’s entry in the list.

Managing User Sessions

When a user signs into the Sisense Web Application, a session cookie is stored in their browser. The session cookie allows the user to remain logged in and authenticated even after ending a session by closing the browser.

For security reasons, you may want to logout your users or end their session when they close the browser. Through the Sisense REST API, you can add an additional property, sessionOnlyCookie, to the POST, /api/settings/security of REST API v.9.

When the Boolean value of sessionOnlyCookie is true, the login page does not display the “Remember Me” checkbox in the user’s browser and logging in to Sisense generates a session cookie.

When the user logs out or closes their browser, the session ends and they must log in again to access Sisense.
The following is an example of a cURL command in which the Remember Me button is no longer displayed in the Login page.

<pre>
</pre>

**Customizing User Roles**

This section describes how to customize the permissions given to the Sisense user roles (designer and viewer), using Sisense’s REST API. At the bottom of the page, you can find a video tutorial demonstrating the following procedure.

**A reminder about default roles**

Sisense users are assigned one of the following default roles:

- Administrators
- Designers: Can create, design, edit and share dashboards.
- Viewers: Can view, explore, drill down, and filter the dashboards that designers have shared with them.

**Note:** The API uses a previous terminology for Designers and Viewers. When entering the role name into the operation parameters, use Contributor (for Designer), and Consumer (for Viewer).

**Customizing roles**

You can customize the three default roles with Sisense’s REST API, by defining which permissions to enable or disable for each role. For example, you can prevent a user from drilling into widgets, or exporting data to a csv file. On the other hand, you may want to let viewers change the widget type and format the style.
The following table lists all the actions that you can customize using the API. *True* and *False* indicate values that you can change. *Never* indicates values that you cannot change.

### Dashboards

<table>
<thead>
<tr>
<th>Action</th>
<th>Admin</th>
<th>Designer</th>
<th>Viewer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>create</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Create a new dashboard.</td>
</tr>
<tr>
<td>duplicate</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Duplicate an existing dashboard.</td>
</tr>
<tr>
<td>toggle_edit_mode</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Select between Layout and View modes in the dashboard. Layout mode is the default mode in which you can add new widgets and rearrange them on the dashboard. In View mode, the dashboard cannot be rearranged or edited.</td>
</tr>
<tr>
<td>edit_script</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Edit a dashboard using the Sisense JavaScript API.</td>
</tr>
<tr>
<td>export_dash</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Export a dashboard as a .dash file that can be imported back into Sisense.</td>
</tr>
<tr>
<td>Dashboards</td>
<td>Admin</td>
<td>Designer</td>
<td>Viewer</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>export_jpg</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Download a widget as an image in PNG format. The downloaded image represents the current view.</td>
</tr>
<tr>
<td>export_pdf</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Export the dashboard to PDF format. The exported file includes the current view.</td>
</tr>
<tr>
<td>restore</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Revert changes made in the dashboard to the latest dashboard that was shared.</td>
</tr>
<tr>
<td>import</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Import a .dash file into the Sisense Web Application.</td>
</tr>
<tr>
<td>select_palette</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Change the selected color palette.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Filters</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>create</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Create a new filter.</td>
</tr>
<tr>
<td>on_off</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Switch filters on or off.</td>
</tr>
<tr>
<td>Dashboards</td>
<td>Admin</td>
<td>Designer</td>
<td>Viewer</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>toggle_expansion</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Enable the expansion of filter settings to see more filter parameters.</td>
</tr>
<tr>
<td>modify_type</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Include in the filter options 'Ranking' and 'Starred', in addition to 'List' and 'Text'.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Widgets</th>
<th>Admin</th>
<th>Designer</th>
<th>Viewer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>create</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Create a new widget.</td>
</tr>
<tr>
<td>delete</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Delete a widget.</td>
</tr>
<tr>
<td>rename</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Rename a widget.</td>
</tr>
<tr>
<td>duplicate</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Duplicate a widget.</td>
</tr>
<tr>
<td>edit_script</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Edit a widget using the JavaScript API.</td>
</tr>
<tr>
<td>change_type</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Change the chart type.</td>
</tr>
<tr>
<td>export_csv</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Export a widget's data to a CSV file.</td>
</tr>
<tr>
<td>Widgets</td>
<td>Admin</td>
<td>Designer</td>
<td>Viewer</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>export_png</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Download a widget as an image in the PNG format. The downloaded image represents the current view.</td>
</tr>
<tr>
<td>modify_selection_mode</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Enable the option to change the filter behavior between 'Slice' (only filtered items are included in the chart) and 'Highlight' (filters items are highlighted).</td>
</tr>
<tr>
<td>drill_to_anywhere</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Enable the option to drill down into a field to get an in-depth view of a selected value. If False, the user can only drill down with predefined drill hierarchies (if defined).</td>
</tr>
</tbody>
</table>

**Items**

<table>
<thead>
<tr>
<th>reorder</th>
<th>True</th>
<th>True</th>
<th>False</th>
<th>Reorder the fields and values in the data panel and their representation in the chart.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widgets</td>
<td>Admin</td>
<td>Designer</td>
<td>Viewer</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>----------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>modify_type</td>
<td>True</td>
<td>True</td>
<td>Never</td>
<td>Enables the option to edit values and categories in the data panel.</td>
</tr>
<tr>
<td>on_off</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Enable the option to turn fields on or off in the widget.</td>
</tr>
<tr>
<td>Filters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on_off</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Switch filters on or off.</td>
</tr>
<tr>
<td>toggle_expansion</td>
<td>True</td>
<td>True</td>
<td>True</td>
<td>Enable the expansion of filter settings to display more filter parameters.</td>
</tr>
<tr>
<td>modify_type</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Include in the filter options 'Ranking' and 'Starred', in addition to 'List' and 'Text'.</td>
</tr>
<tr>
<td>use_starred</td>
<td>True</td>
<td>True</td>
<td>False</td>
<td>Enables the option to star (bookmark as favorite) a filter selection.</td>
</tr>
</tbody>
</table>

1. To change permissions for a user role:
2. In the Sisense web app, click **ADMIN** at the top right of the screen, and then REST API in the left menu.

3. Click REST API Reference to view the API documentation.

4. Click on /roles to access the different API operations.

5. Find the operation that you require (see examples below), and type in the required parameters in the operation. You can click on Model Schema to see and add example code for the parameters.

   When changing a permission for a role, you must use the Path parameter, which defines the permission you want to update and its relative path in the hierarchy that appears in the table above. For example, to change the ‘Create’ setting for dashboard filters, enter `dashboards/filters/`. For creating dashboards, enter `/dashboards`. See the reference table above.
for more settings.

<table>
<thead>
<tr>
<th>Dashboards</th>
<th>Admin</th>
<th>Designer</th>
</tr>
</thead>
<tbody>
<tr>
<td>create</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>duplicate</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>toggle_edit_mode</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>edit_script</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>export_dash</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>export_jpeg</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>export_pdf</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>restore</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>import</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>select_palette</td>
<td>true</td>
<td>true</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Filters</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>create</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>path</td>
<td></td>
<td>dashboards/filters/</td>
</tr>
<tr>
<td>on/off</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>filter_expansion</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>filter_type</td>
<td>true</td>
<td>true</td>
</tr>
</tbody>
</table>

6. Click **RUN** to apply the changes.
7. Here are some examples of what you can do.

**See all permissions for all roles**

Method: **Get /roles**

**Parameters**
includeManifest – Use the default setting (true)
compiledRoles – Use the default setting (true)

Example API Call
/api/roles?includeManifest=true&compiledRoles=true

See all settings for a specific role

Method: GET /roles/{idOrName}

Parameters

idOrName – The role name can be one of the following: admin, contributor, consumer.
compiledRole – Use the default setting (true)

Example API Call
/api/roles/consumer?compiledRole=true

Change a specific setting for a specific role

Method: PUT /roles/{idOrName}/manifest/{path}

Parameters

idOrName – The role name can be one of the following: admin, contributor, consumer.
Path – Enter the path to the setting that you want to change as it appears in the hierarchy. Do not include the setting in the path. Example: To change the ‘Create’ setting for dashboard filters, enter dashboards/filters/. For creating dashboards, enter /dashboards. See the reference table above for more settings.
Manifest – Defines whether to enable or disable the setting. For example, to enable ‘create’, type in: {"create": true}
Example API Call

/api/roles/viewer/manifest/dashboards/filters

**Note:** You can use POST to do the same action, but for POST all other options will be reset to their default settings.

**Restore a specific setting for a specific role**

Method: **DELETE** /roles/{idOrName}/manifest/{path}

**Parameters**

- **idOrName** — The role name can be one of the following: admin, contributor, consumer.
- **Path** — Enter the full path of the setting you want to change, as it appears in the hierarchy. Example: dashboards/filters/modify_type. See the reference table above for more settings.

Example API Call

/api/roles/viewer/manifest/dashboards/filters/modify_type

**Restore all settings for a specific role**

Method: **DELETE** /roles/{idOrName}/manifest/{path}

**Parameters**
- **idOrName** – The role name can be one of the following: admin, contributor, consumer.
- **Path** – /
  Enter just a slash to restore all settings.

**Example API Call**

/api/roles/viewer/manifest/

The following video tutorial demonstrates the above procedure.
Integrating Active Directory

Sisense supports integrating Active Directory users and groups with your current Sisense users, so that you can share dashboards and email reports with any of your users. This works in parallel with Sisense’s existing User Management, so you can continue to add users and user groups that are not part of the Active Directory domain.

To enable Sisense to identify your Active Directory users, you import your Active Directory users and groups into Sisense. When you import an Active Directory user, Sisense automatically creates a Sisense user. When you import an Active Directory group, Sisense does not automatically create a Sisense user for each member. The first time a member of an Active Directory group logs into Sisense, then Sisense automatically creates a Sisense user. Active Directory users that do not log in, are not assigned a Sisense user until their first login.

This section describes how to configure Active Directory in Sisense, and how to import users and user groups from Active Directory.

Adding an Active Directory Domain to Sisense

From the Active Directory page, you can add Active Directory domains to your Sisense configuration. Each Active Directory domain you add to your Sisense configuration is added to the Active Directory list displayed in the Active Directory page. The first time you open the Active Directory page, the Add Domain link is displayed, which you can click to begin adding Active Directory domains.
After you have added your first Active Directory domain, it is displayed in the Active Directory list.

From the Active Directory list, you can add additional Active Directory domains. Each Active Directory domain you add to Sisense enables you to share your dashboards and reports with users from any of the domains as well as Sisense users not part an Active Directory.

You can filter the list of the Active Directory domains by entering the name of the relevant domain in the Search field.

**To add an Active Directory:**
1. Click **ADMIN** in the upper right corner and select the **ACTIVE DIRECTORY** tab on the left.

2. In the Active Directory page, click **Add Domain**.

3. In the Add Domain window, fill in the Active Directory configuration fields to point to your Active Directory instance:
   - **Name**: The name of your Active Directory domain. This name is used to locate your Active Directory domain in Sisense when you have multiple domains.
   - **Connection String**: The full path to your Active Directory domain. Example: `ldap://dc.domain.com`
   - **Base DN**: The Active Directory location from where a server searches for users. Enter the domain by its distinguished name (DN) with its domain components (DC) connected by commas. For example: For the domain `domain.sisense.test`, use `DC=domain, DC=sisense, DC=test`.

   **Note**: If you have a hierarchy of user groups in your organization, you can define the hierarchy in your string as follows:

   If your domain is `domain.sisense.com/OU1/OU2`, then use `OU=OU2, OU=OU1, DC=domain, DC=sisense, DC=com`.

   Only users and user groups from OU3 will be available. Users/groups under OU1 will not be available.
Username: Enter the username with domain.
Example: domain\username

Password: Enter the password for your Active Directory instance.

4. Click TEST to verify that your configuration successfully connects to your Active Directory domain.

5. In the Sync Data field, select the frequency that Sisense automatically synchronizes with the users and groups in this Active Directory domain.

6. Click SAVE.

Editing Active Directory Domain Settings

To edit an Active Directory domain:

1. From the Active Directory list, select for the Active Directory settings you want to edit. The Edit Active Directory window is displayed.

2. In the Edit Active Directory window, edit the relevant fields.
   See Adding an Active Directory in Sisense for more information about each field.

3. Click Save.

Disabling an Active Directory Domain

Supports allows you to disable Active Directory domains in Sisense.

An Active Directory domain that has been disabled is still displayed in the Active Directory list, however, users from this domain will not be able to log in to Sisense, and you will not be able to share dashboards or reports with them.
Disabled Active Directory domains have the status Disabled in the Status column in the Active Directory list.

To disable an Active Directory domain:

- From the Active Directory list, select  > **Disable** for the Active Directory domain you want to disable. The Active Directory domain is disabled.
- You can enable the Active Directory domain by selecting  > **Enable**.

Deleting an Active Directory

You can delete an Active Directory domain from your configuration. When you delete an Active Directory domain, the users included in that domain are no longer displayed when sharing dashboards or reports. Deleted Active Directory domains cannot be restored, however you can add the Active Directory domain again from the Active Directory page.

To delete an Active Directory domain:

1. From the Active Directory list, select  for the Active Directory settings you want to delete. The Delete Active Directory window is displayed.
2. Click **Delete**. The Active Directory domain settings are removed from Sisense.

Adding a User from Active Directory

Once a connection with Active Directory has been established, an additional **Import from External Server** option is added to the **ADD USERS** button in the **USER** tab.
The user’s username and email will be added from Active Directory.

**Note:** You can add a user from Active Directory, even if you have not imported that user’s user group from Active Directory.

See Managing Dashboard Users for general information about working with users/user groups in Sisense.

**Adding a User Group from Active Directory**

Once a connection with Active Directory has been established, an additional **IMPORT FROM ACTIVE DIRECTORY** option is added to the **ADD GROUP** button in the **GROUPS** tab.

The following procedure describes how to import a list of users from a group in Active Directory to Sisense.

Users that are added in this way only appear in the Sisense users list after each user logs in to Sisense. In this way, your Sisense license slots are only consumed by users who actually log in to Sisense.

**To add a user group from Active Directory:**

1. Click **ADMIN** in the upper right corner and select the **GROUPS** tab on the left.
2. Click the **ADD GROUP** button and then select the **FROM ACTIVE DIRECTORY** option from the menu.

3. In the **Search Active Directory Group** field start typing in the name of the desired Active Directory Group. An auto-complete dropdown menu is displayed from which you can select a user group.

If an Active Directory user group has already been imported into Sisense, the words **Group already selected** appear next to it, as shown above. You can add multiple Active Directory groups, by selecting one group after another. The groups appear in this window as follows:

4. Select the default Role for the members of this user group: Viewer or Designer. It will be assigned to new users from this group, when the users are created. Subsequently, user’s role can be changed in the Sisense Users list.
Changes to a group’s default role will affect users created after that time, but will not affect existing users.

5. Click **ADD**.
Introduction to SSO

Single Sign-On (SSO) is a mechanism that allows a system to authenticate users and subsequently tell Sisense that the user has been authenticated. The user is then allowed to access Sisense without being prompted to enter separate login credentials.

The SSO security mechanism allows Sisense to trust the login requests it gets from your corporate authentication system, and grant access to the users that have been authenticated by it. An SSO session begins when the authenticated user requests a secured resource from Sisense while logged into your site or application. The user’s browser sends an HTTP request to Sisense that includes a cookie which contains session and authentication information. This information is then used for session validation.

Users who already have Sisense accounts can continue to access Sisense through the Sisense Login page with their current accounts. To prevent users from directly logging in to Sisense instead of your login page, your Sisense administrator can change the passwords of your current users forcing them to log in with your company’s credentials in your company’s login page.

Sisense recommends that administrators always keep a Sisense password, so that the administrator can access Sisense in case the SSO server is not available.

Sisense SSO supports two SSO protocols for securing the exchange of user authentication data, JSON Web Token (JWT) and SSO via SAML 2.0 (Security Assertion Markup Language). For more information, see SSO via JWT or SSO via SAML 2.0.
**SSO via JWT**

JWT is a technique that can be used for single sign-on (SSO) between a your site and Sisense. JWT is a token that represents your users credentials wrapped in a single query string. In addition, Sisense uses the jti parameter (see below), which adds a unique ID to the token that prevents the token from being used more than once, thus preventing attacks on the system (also known as replay attacks).

The Sisense SSO via JWT authentication flow is explained in the following diagram:

**SSO Authentication Flow**

The following is a diagram of the SSO authentication flow from your site or application to Sisense.

1. Your user requests a resource from Sisense, typically a dashboard.
2. Sisense recognizes that no authenticated cookie is present. If you have enabled SSO in Sisense, the SSO handler redirects
the user to your Remote Login URL defined in the Sisense Web Application.

3. Your user is challenged to authenticate their account.
4. Your Remote Login application authenticates your user and generates a JWT (JSON Web Token).
5. You redirect the user back to Sisense with the encoded JWT in a query string. Sisense sets a cookie that authenticates the user’s session until they end it or you log them out via the Sisense REST API. For more information see Logging Users Out.
6. Sisense provides the authenticated user with the request resource.

A common scenario that illustrates SSO is when an unauthenticated user navigates to your site in which Sisense is embedded via an iFrame. Sisense redirects this user to your SSO script. Your script authenticates the user through your login process and builds a JWT request with all the relevant credentials wrapped together. You then redirect the customer back to Sisense with the JWT payload. Sisense then decodes the user details from the JWT payload and then grants the user a session.
Configuring SSO in Sisense

While SSO is highly customizable, there are generally four steps you should complete when configuring SSO:

**Note:** Configuring SSO requires technical expertise and should be conducted by an administrator or developer with SSO experience.

- **Enabling SSO in Sisense:** Through the Sisense Web Application, an administrator can enable SSO in Sisense and define the relevant Login and Logout URLs.
- **Creating a JWT:** After you authenticate a user, you generate a JWT with the user’s credentials to Sisense, so Sisense knows this user is allowed to access resources from Sisense through your site.
- **Configure Sisense as a sub-domain:** When authenticating users, you should configure SSO as a sub-domain.
- **Logging Users Out:** A can access Sisense so long as a session is maintained. To end a session, the user’s cookie that Sisense provides must be deleted. To delete this cookie, you can use the Sisense REST API.

**Enabling SSO in Sisense**

For Sisense to recognize that your users should be authenticated through SSO, you must enable SSO in the Sisense Web Application. In the SSO menu of the Admin page of the Sisense Web Application, you define the URL where Sisense redirects users to authenticate on your side and where Sisense redirects users after they log out from Sisense.
When you access the SSO menu of the Admin page, Sisense displays the Shared Secret key. The Shared Key is a JWT encryption public key used to encrypt the JWT payload. It is generated once when the SSO configuration is saved. You include this key in the JWT payload when redirecting the user back to Sisense after authenticating them on your side.

To access and set up SSO:

1. Log into Sisense, and click **ADMIN** in the top-right corner of the screen. Click **SINGLE SIGN ON** in the left menu.

2. Fill in the following SSO configuration fields:
   - **Remote Login URL**: This is the URL that Sisense will invoke to attempt remote authentication. In that endpoint the participating application user authentication script is triggered and the JWT payload is generated.
   - **Remote Logout URL**: This is the URL that users will be redirected to after they log out from Sisense (i.e. the participating application’s home page).

3. Click **SAVE**.
Creating a JWT

Your script builds a JWT request that contains the user data.

The table below provides a list and descriptions of the attributes your JWT should contain.

In addition, several samples are provided below in various languages.

| Attribute | Mandatory | Description | |
|-----------|-----------|-------------|
| iat | Yes | Issued at the time the token was generated. This is used to help ensure that a given token gets used shortly after it is generated. The value must be the number of seconds since UNIX epoch. Sisense allows up to five minutes clock skew. **Note:** The date must be an integer and not a float. |
| sub | Yes | Email of the user being signed in, used to uniquely identify the user in Sisense. If the user does not exist in Sisense, it will be created with default viewer privileges. |
| jti | Yes* | A unique string added to the token that is used to prevent replay attacks, by making sure the token is used only once. |
| exp | No | Expiration time of the token. After that time the token becomes invalid, and the user will be redirected again to the remote login URL for re-authentication. If not present, the token will expire within one week. The value must be the number of seconds since UNIX epoch. |

* You can set this attribute as optional in the Sisense REST API v1.0 through the POST settings/SSO endpoint.
SSO Code Samples

C#
Java
Javascript
PHP
Ruby
Python

return_to URL

When Sisense redirects a user to your login script, Sisense passes a return_to parameter in the URL. This parameter contains the page that Sisense will return the user to after the authentication succeeds. For example:

1. A customer visits your site opens a dashboard embedded through an iFrame.
2. Sisense recognizes that the user is not authenticated.
3. Sisense redirects the user to:


All your script needs to do, is take the return_to value from the invoked URL and pass it back to Sisense when submitting the JWT token. In other words, upon authentication on your side, your script redirects the user to:

Configuring Sisense as a Sub-Domain with SSO

To authenticate your users locally and allow them to access Sisense, your first step should be to configure Sisense as a sub-domain of your web application and embed Sisense into your web application with SSO.

**Note:** Sisense also works when embedded in cross-domain iFrames.

To configure Sisense as a Sub-Domain:

1. In IIS Management Console, add your website to IIS.

2. In the *Add Website* window, in the field *Site Name*, enter the site name.
   
   **Note:** You can not leverage SSO when you enter a DNS
address with an underscore “_” with Internet Explorer.

3. In **Physical path**, enter the subdomain directory.

4. Under the Binding area, in **Host name**, change the existing SisenseWeb site binding to use **sisense.example.website.com** as host name on **port 80**.

5. Open the file **C:\Windows\System32\drivers\etc\hosts** and add mapping for the sites:
   - 192.168.5.148 sisense.examplewebsite.com
   - 192.168.5.148 example.website.com

6. Sign in to the Sisense Web Application at **sisense.examplewebsite.com** and configure the SSO as
7. Place the following SSO script in the server location corresponding to the Remote Login URL in the server’s root directory. The SSO script can be implemented in any server-side language. This example uses Python. Example code has been attached for C# and Python.

Python script example
C# script example

In index.html from examplewebsite.com, the IFrame source is the Sisense dashboard URL.

index.html from examplewebsite.com:

<html>
<head>
<title>Example Website</title>
</head>
<body>
<p>&lt;b&gt;examplewebsite.com&lt;/b&gt; - &lt;b&gt;SSO&lt;/b&gt; login with embedded dashboard from &lt;b&gt;sisense.examplewebsite.com&lt;/b&gt;&lt;/p&gt;
&lt;iframe width="100%" height="100%" src='http://sisense.examplewebsite.com/app/main#/dashboards/53b29843751b655443000018?embed=true' /&gt;
</body>
&lt;/html&gt;

Navigate to examplewebsite.com and you should see the specific dashboard you embedded.
Logging Users Out

When a user is logged in, anyone using that browser can access the session, or users may encounter an issue where they remain logged in until the Sisense cookie is cleared.

Users are logged out when the session ends. A session ends when the user closes their browser or according to the value of the attribute exp you send in the JWT payload.

You can log the user out through the Sisense REST API.

To manually log a user out, access version .9 of the REST API. Through the Auth method, you can issue a get request to log out specific users.

<table>
<thead>
<tr>
<th>HTTP Status Code</th>
<th>Reason</th>
<th>Response Model</th>
<th>Headers</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>Invalid ID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>403</td>
<td>Forbidden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While the logout REST API can delete the SSO authentication cookie, it can only delete it when the call is made from within the Sisense domain. Scripts on different pages can access each other only if the pages that executed them are at locations with the same protocol.

If you have embedded Sisense in an iFrame and you want to log out the user from your application and Sisense, you can use the window.postMessage method to call the logout when the users asks to logout from your application. This method overcomes any cross-origin communication limitations. Sisense has created a plugin that
implements a listener, which calls the Logout API when the postMessage method() is called. For more information, click here.
SSO via SAML 2.0

The Sisense SAML authentication process is based on the SAML 2.0 protocol, and is explained in the following diagrams:

**Phase 1**

The first phase of this process begins when a user requests a resource from Sisense via their browser (1). The browser generates a resource request to the Sisense server. The server processes this request (2), and for unauthenticated users, returns a special save-hash page to save the requested hash data.

After the browser loads the save-hash page from the Sisense server, it runs a script, which loads the requested resource hash from the URL and sends it to the Sisense Server (3).

At the end of this phase, the Sisense Server converts the requested resource URL and sends it to the browser as a part of the redirect to IdP Server command (4).
Phase 2

The second phase of the authentication process starts after the browser retrieves the redirect command from the Sisense Server, and sends the authentication request to the IdP Server (1) as described in the diagram below.

![Sisense SAML auth workflow (2nd phase)](image)

The base URL for this request is taken from the Remote Login URL field of the Single Sign On Admin page in the Sisense Web Application.

The requested resource address is passed to this request as a RelayState parameter. All other data is provided as a SAMLRequest parameter.

The next step of this phase depends on the user authentication state and the IdP implementation.

If the current user isn’t logged in as an IdP user, the IdP server redirects the browser to your Login page (2), where the user enters their IdP credentials. After logging in, the IdP Server sends the
browser the Auto-Sign-In page with encoded data about the currently logged-in user (4).

After this document is loaded in the user’s browser, it runs a script which creates the POST-query to the Sisense Server API, and passes the SAML response to this query (1). At this time, the third phase of the authentication process begins.

Phase 3

The Sisense Server handles the POST-query (2), decrypts it with the certificate specified in the Public X.509 Certificate field defined in the Single Sign On Admin page. The Sisense Server uses the decrypted User ID as a key to locate the Sisense user in the internal database.

If a user is not found in the system, Sisense creates a new user (3).

When Sisense creates a new user, Sisense analyzes the “memberOf” field to locate one or more groups related to the logged-in user.

If the “memberOf” field is empty, the user is assigned the role: “Viewer”. If the “memberOf” field contains one or more groups, and
the groups were previously defined in Sisense, the newly created users’ Role is taken from the groups’ default role. When multiple Sisense Groups are found, the user is assigned the role with the maximum privileges.

After a user is created in the system, an administrator can modify the user role, if needed.

Below, is an example of an SAML XML where the “Test” group is specified:

```xml
<saml:Attribute
    NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:basic"
    Name="memberOf">
    <saml:AttributeValue
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:type="xs:string">
        Test
    </saml:AttributeValue>
</saml:Attribute>
```

After the user is located or created, a new session is initialized, and the Sisense Server redirects the user browser to the requested resource (4).

**Enabling SSO via SAML in Sisense**

After you have configured your SAML server, sign in to Sisense as an Administrator and follow the instructions below.
To enable SAML in Sisense:

1. In the Sisense Web Application, click Admin and select Single Sign On.

2. In the Single Sign On page, select SAML 2.0.

3. In the Remote Login URL field, enter the SAML Login endpoint. Sisense redirects the user to this field when they sign in. This value should be provided by the IdP Service.

4. In the Remote Logout URL field, enter the SAML Logout endpoint. Sisense redirects the user to this field when they sign out. This value should be provided by the IdP Service.

5. In the Public X.509 Certificate field, enter your public key for your SAML configuration. This value should be provided by the IdP Service.

6. Click Save. SSO via SAML 2.0 is configured.

Sisense Default Role Set-Up

When an authenticated user is not found in the Sisense database, a new account is created. The user role is specified based on the user group/groups default role.
To define a group’s role:

1. In the Sisense Web Application, click **Admin** and select **Groups**.

2. Click **Add Group**. The Create a New Group window is displayed.
3. In the Create a New Group window, select the default role of the group.

4. Click Save.

**Note:** Changes to the group’s default role are applied when new users are created, and do not affect existing users. After a user is created in the system, an administrator can modify the user role, if needed.
ElastiCube Management

Adding and Removing ElastiCube Servers

This section describes how to manage your ElastiCubes.

By default, the Sisense Web Application is connected to the ElastiCube server that is installed with it on the same machine.

By default, all ElastiCubes on that machine are accessible to all dashboard users, and are visible under LOCALHOST.

Opening an ElastiCube in the ElastiCube Manager

You have a number of ways to open your ElastiCube in the ElastiCube Manager:

- From Sisense web app:
  - Click **ElastiCube Manager** in the top menu (1).
  - If you have an open dashboard, click on the ElastiCube name next to the dashboard name. Select **View in ElastiCube’s Page** (2) to open the ElastiCube management page in the web app. In the **ElastiCubes** page, select the ElastiCube and click **Open**. To open the ElastiCube of the open dashboard, click **Open in ElastiCube Manager** (3).
From Windows: From the Start menu, open Sisense ElastiCube Manager.

**Adding Another ElastiCube Server**

**To add another ElastiCube Server to Sisense:**

1. Click **ADMIN** in the upper right corner and select the **ELASTICUBES** tab on the left.
2. Click **ADD SERVER**.

3. Select whether this ElastiCube Server is intended for Admins only. This selection also applies to all new ElastiCubes that will be added to this ElastiCube Server. A user that has access to an ElastiCube Server can access all the ElastiCubes on it.
4. Add the IP of the ElastiCube Server to which you want to connect and click **ADD SERVER**. The new ElastiCube Server is added to the list with all its ElastiCubes.
5. Click **SAVE**. Once a new ElastiCube Server has been added, its ElastiCubes immediately become available to all designers (by
default) when they create a new Dashboard.
To define which users are allowed to access the data of an ElastiCube Server, see Assigning Rights to an ElastiCube Server.
To define which users are allowed to access each specific ElastiCube, see Assigning Rights to an Elasticube.

Removing an ElastiCube Server

To remove an ElastiCube server from the list:

- Hover over its title and click the Trash button.

**Note:** The LOCAL MACHINE server cannot be removed.
Querying ElastiCubes during Builds

Sisense ElastiCube Sets are collections of ElastiCubes with identical schemas that allow you to query running ElastiCubes within the ElastiCube Set while other ElastiCubes are building.

Note: From Sisense V6.5 onwards, you can query ElastiCubes during accumulative builds without ElastiCube Sets. However, to ensure that your users can query ElastiCubes after a failed build, you can implement ElastiCube Sets to handle your queries while Sisense rebuilds the failed ElastiCube.

Grouping ElastiCubes into ElastiCube sets has several benefits:

Allowing viewers to query the most up-to-date cubes within an ElastiCube Set.

Reducing server load during builds by using multiple nodes in which only the non-building node is queried.

Achieving data redundancy by running builds interchangeably across multiple nodes.

To maximize availability and reduce build and dashboard response times, administrators can distribute resource allocation across multiple Sisense nodes. By adding ElastiCubes across multiple servers to a single ElastiCube Set, administrators can configure ElastiCube Sets to run builds interchangeably via the Sisense Orchestrator Service so the most up-to-date and complete ElastiCubes are queried.

The Sisense Orchestrator Service is an automated service that can be configured to synchronize builds across the ElastiCube Set. If you change your schemas within any of the ElastiCubes, you must
manually change the schemas in all of the ElastiCubes and rebuild the cube entirely.

This page provides the following information:

1. Instructions on Creating and Deleting ElastiCube Sets.
2. A walkthrough for how you can create a set and configure the Sisense Orchestrator Service. See Working with ElastiCube Sets.
3. (Optional) Instructions on how to implement and configure the Sisense Orchestrator Service. See Activating the Sisense Orchestrator Service.
4. How to update an ElastiCube within an ElastiCube Set.

Creating ElastiCube Sets

From the Admin page, Administrators can create ElastiCube Sets. ElastiCube Sets require at least two ElastiCubes. The administrator can add multiple ElastiCubes to a set, however, ElastiCubes can only be part of a single ElastiCube Set at a time. After an administrator creates an ElastiCube Set or adds an ElastiCube to an existing set, the ElastiCube is disabled in the original server and no further actions can be performed outside of the set.

Sisense recommends that you develop ElastiCubes in a Dev environment or separate ElastiCube to ensure they work before adding them to an ElastiCube Set.

To create an ElastiCube Set:

1. Click Admin in the upper right corner and select the ELASTICUBES tab on the left.
2. Hover over the ElastiCube you want to add to the ElastiCube Set and click on the menu that appears. Click **Create ElastiCube Set**.

3. In the Create ElastiCube Set window, enter a name for the set and select the ElastiCubes you want to include in the set.

4. Click **Create**.
5. In the Existing Dashboards popup message, indicate if you want to associate your ElastiCube’s dashboards with the ElastiCube Set or maintain the association with the original ElastiCube.

**Existing Dashboards in added ElastiCubes**

- Connect existing dashboards to new ElastiCube Set
- Leave existing dashboards with their current ElastiCube

6. Click OK. The ElastiCube Set is created and displayed in the Admin page.

<table>
<thead>
<tr>
<th>Server</th>
<th>ElastiCube</th>
</tr>
</thead>
<tbody>
<tr>
<td>LocalHost</td>
<td>Elastic Cube A</td>
</tr>
<tr>
<td>LocalHost</td>
<td>Sample</td>
</tr>
<tr>
<td>LocalHost</td>
<td>Sample Healthcare</td>
</tr>
</tbody>
</table>

After you have created an ElastiCube Set, you can configure the ElastiCube Set’s Hierarchies, Access Rights, and Data Security.

**Adding ElastiCubes to ElastiCube Sets**

After you have created an ElastiCube Set, you can add more ElastiCubes to the set.

When you add an ElastiCube to an existing ElastiCube Set, any dashboards associated with that ElastiCube are passed on to the ElastiCube Set.
To add an ElastiCube to the ElastiCube Set:

1. Click Admin in the upper right corner and select the ELASTICUBES tab on the left.

2. Hover over the ElastiCube you want to add to the ElastiCube Set and click on the menu that appears. Click Add to ElastiCube Set and select the set that you want to add the ElastiCube to.

OR

In the ElastiCube Set table, click and select the ElastiCubes to be added to the set. Click Save after you have
selected the relevant ElastiCubes.

Create ElastiCube Set

ElastiCube Set Name
ElastiCube Set

ElastiCubes

Sample

- [ ] Sample
- [ ] Sample Healthcare
- [ ] Elastic Cube A

1 ElastiCube Selected

CREATE CANCEL

3. The ElastiCube is added to the ElastiCube Set and displayed in the ElastiCube Set table on the Admin page.

Deleting ElastiCube Sets

Administrators can delete ElastiCube Sets. Deleting an ElastiCube Set removes the set from the Admin page and any dashboards associated with that set.

To delete an ElastiCube Set:

1. Hover over its title and click the Trash icon.
2. Click **Delete** to confirm that you want to delete the ElastiCube Set.

### Working with ElastiCube Sets

This section describes how to create your first ElastiCube Set and configure it for high availability.

In this example, let’s assume that you have an ElastiCube, ElastiCube A, and you want to add it to a set to ensure that the data can always be queried, even during a build.

The first step is to create a copy of ElastiCube A. The ElastiCubes can have different names, but the schemas must be identical.

**Note:** If your ElastiCubes are located on a single node, the ElastiCubes cannot have the same name.

In the ElastiCube Manager, we will save a new version of ElastiCube A as ElastiCube B. In Sisense, you can see both ElastiCubes are identical (Select Admin > ELASTICUBES)

![ElastiCube Manager](image)

Now, let’s create an ElastiCube Set that contains both ElastiCubes. Click ➕ > **Create ElastiCube Set**. For more information, see Creating ElastiCube Sets.
Select the ElastiCubes to be added to the set. For this set, we will select ElastiCube A and B, which have different names, but identical schemas.

### Create ElastiCube Set

ElastiCube Set Name

ElastiCube Set Example

ElastiCubes

**Search ElastiCubes...**

- **✓** Elastic Cube A 39.42MB
- **✓** Elastic Cube B 39.42MB

2 ElastiCubes Selected

Click **Create** and confirm that you want to create a new set with these ElastiCubes. The set and its ElastiCubes are now displayed at the top of the Admin page.

<table>
<thead>
<tr>
<th>ElastiCube Example</th>
<th>Manage Hierarchies</th>
<th>Access Rights</th>
<th>Data Security</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Server</strong></td>
<td><strong>ElastiCube</strong></td>
<td><strong>Status</strong></td>
<td><strong>Created On</strong></td>
</tr>
<tr>
<td>LocalHost</td>
<td>Elastic Cube A</td>
<td>Running</td>
<td>3/2/16 9:11 AM</td>
</tr>
</tbody>
</table>

Now that the set is built, it’s time to schedule automatic builds with the Sisense Orchestrator Service. This service automatically builds the ElastiCubes according to your preferences. For example, you can
schedule the builds to run every 10 minutes or at midnight when queries are at their fewest.

To schedule automatic builds, first you should disable any scheduled builds you have for the ElastiCubes. In the ElastiCube Manager in the top menu, select **ElastiCube > Schedule Build Settings** for each ElastiCube with a scheduled build, then select **Disable > Update**.

Now that all the ElastiCubes’ scheduled builds are disabled, it’s time to configure the Sisense Orchestrator Service to build the ElastiCubes within the set. To configure the Sisense Orchestrator Service, you must modify the Config.JSON file that was installed when you installed the latest version of Sisense. This file defines how the ElastiCube Set is being built, the order of the build, and how frequently a build occurs.

This file is located in the Sisense.Orchestration Config folder (/Sisense.Orchestration/Config/) of your Sisense Installation folder.
For this set, let’s assume that you want to schedule an accumulative build for midnight. Within the `elastiCubes` object, we listed both ElastiCubes to be built by the Sisense Orchestrator Service. The order of the ElastiCube builds is in the order of oldest to newest. Next, in the `timer` object, we listed the hour when the build is to take place. The value is defined in Cron format, so midnight equals 0 minutes 0 hours “0 0 * * *”.

Finally, we define the flow of the build. We want an accumulative build, but if for some reason this fails, we want to run an entire build as a back-up. Remember, when an accumulative build fails, the ElastiCube needs to be completely rebuilt to ensure that the data is intact. In the `build` object, we define the type of builds to be initiated and their order. The order of the values determines what build type is initiated first. In this example, the value is “FullUpdateExisting”, “Full”, which means run an accumulative build first and if that fails, run a full build. For a complete explanation on how to define the rest of the objects list in the Config.JSON file, see Activating the Sisense Orchestrator Service.

Now, save the file and Sisense automatically begins to run the builds according to the schedule defined in the timer object.

```json
{
  "servers": {
    "localhost": {
      "ip": "localhost",
      "port": "8081",
      "apiKey": "eyJ0eXAiHDHDHsXKSSZJdnUzI1NiJ9.eyJ1c2VyIjoiNTY1N332RW2eygL0uVLufGYC-8vY"
    }
  }
}
```
The Sisense Orchestrator Service automatically builds the ElastiCubes within the set, but if the schema changes, you must manually rebuild each ElastiCube within the set so the schemas match across all the ElastiCubes. While working with the schemas of an ElastiCube that is part of an ElastiCube Set, you should stop the Sisense Orchestrator Service.

To stop the Sisense Orchestrator Service, open Windows Services, select Sisense.Orchestrator, and click ■.
After the ElastiCubes are rebuilt, restart the Sisense Orchestrator Service by selecting Sisense.Orchestrator and click .

The ElastiCube Set is now configured and running ElastiCubes can be queried while the other ElastiCubes are being built.

**Activating the Sisense Orchestrator Service**

The Sisense Orchestrator Service automates the build process for ElastiCube Sets and determines how frequently the build process occurs.

To activate the Sisense Orchestrator Service, you must create and save a JSON file called config.json in the Sisense.Orchestration Config folder (/Sisense.Orchestration/Config/) of your Sisense Installation folder. This file defines how the ElastiCube Set is being built, the order of the build, and how frequently a build occurs.
After you save the file, the Sisense Orchestrator Service automatically begins to build ElastiCubes in your ElastiCube Set as defined by you in the config.json file. You can review the progress of the build in the /Sisense.Orchestration/Logs folder in a log file whose file name you define in the JSON file.

**Note:** During this phase it is recommended to stop the Sisense Orchestrator Service while importing data and reactivate it after the importing process is completed.

The objects that you must include in the config.json file and their descriptions are provided in the table below:

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servers</td>
<td>The servers block contains a server object that defines each server that hosts an ElastiCube within your ElastiCube Set. Each server must include a server name, IP, port, and a unique API key. For example, if you have two different servers, each server must be represented as a separate object with its own name, IP, and port.</td>
</tr>
<tr>
<td>ServerName</td>
<td>Your server’s name. The value of this key is used when associating the ElastiCube Set with a server in the value of the Tasks key.</td>
</tr>
<tr>
<td>IP</td>
<td>The IP address of your server.</td>
</tr>
<tr>
<td>Port</td>
<td>The port of your web server.</td>
</tr>
<tr>
<td>API</td>
<td>The access token used to identify your requests to the Sisense web server. For more information about the access token, see Retrieving a Token.</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td><strong>Value</strong></td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tasks</td>
<td>The Tasks object contains an array of ElastiCube objects. This object can contain multiple ElastiCube objects, but a minimum of two are required for a set.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the plan. The value of this parameter is the filename of the log file for the Sisense Orchestrator Service.</td>
</tr>
<tr>
<td>ElastiCubes</td>
<td>The ElastiCube object that holds an array of ElastiCubes. Each ElastiCube must include the name of its server and the name of the cube as defined in the Elastic Manager.</td>
</tr>
<tr>
<td>Server</td>
<td>The name of the server that hosts the ElastiCube.</td>
</tr>
<tr>
<td>Cube</td>
<td>The name of the cube to be included in the set.</td>
</tr>
<tr>
<td>Timer</td>
<td>The frequency of builds in Cron format.</td>
</tr>
<tr>
<td></td>
<td>Some examples:</td>
</tr>
<tr>
<td></td>
<td>-To run a build each night at midnight, enter the value &quot;0 0 * * *&quot;</td>
</tr>
<tr>
<td></td>
<td>-To run a build every hour, enter the value &quot;0 * * * *&quot;</td>
</tr>
<tr>
<td></td>
<td>See the full Cron format reference <a href="#">here</a>.</td>
</tr>
<tr>
<td>Build</td>
<td>The Build object contains two keys, Queue and Flow, which determine the order in which the build is completed and the type of build.</td>
</tr>
<tr>
<td>Queue</td>
<td>The value of this key is the type of build Sisense should attempt and in what order. There are two possible values delimited by a comma:</td>
</tr>
<tr>
<td></td>
<td><strong>FullUpdateExisting</strong>: Attempts an accumulative build.</td>
</tr>
<tr>
<td></td>
<td><strong>Full</strong>: Attempts an entire build.</td>
</tr>
<tr>
<td>Key</td>
<td>Value</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Sisense recommends the following value:</td>
</tr>
<tr>
<td></td>
<td>&quot; FullUpdateExisting&quot;, &quot;Full&quot;</td>
</tr>
<tr>
<td></td>
<td>In this example, Sisense attempts to do an accumulative build first, and if it fails, Sisense attempts an entire build. If the build fails for all builds, Sisense retries again according to the next scheduled build.</td>
</tr>
<tr>
<td>Flow</td>
<td>Determines the order of the build. A build occurs according to the value of Timer. For example, if your builds are scheduled for midnight, then the Orchestator begins to build the ElastiCubes at midnight according to the order you define below.</td>
</tr>
<tr>
<td></td>
<td><strong>Single</strong>: Builds a single cube, then waits for the next time a build is scheduled according to the value of Timer. The cube to be built is a cube that previously failed or the cube with the oldest build.</td>
</tr>
<tr>
<td></td>
<td><strong>Sync</strong>: Builds the cubes with the oldest build first and then the remaining cubes in the order of oldest to newest until all ElastiCubes are updated.</td>
</tr>
<tr>
<td></td>
<td><strong>All</strong>: Builds the cube with the oldest build first and then the remaining cubes asynchronously.</td>
</tr>
<tr>
<td>Email</td>
<td>This object determines what triggers activate Sisense to send an email to users you define in the Emails block</td>
</tr>
<tr>
<td>When</td>
<td>Indicates when an email alert is triggered. Email alerts can be triggered for the following scenarios:</td>
</tr>
<tr>
<td></td>
<td><strong>None</strong>: No email is ever sent.</td>
</tr>
<tr>
<td></td>
<td><strong>Build</strong>: An email is sent when a build is complete.</td>
</tr>
<tr>
<td></td>
<td><strong>Fail</strong>: An email is sent when a build fails.</td>
</tr>
<tr>
<td>Emails</td>
<td>This object defines who receives an email and their email address when an email is triggered according to the events you define in the Email object.</td>
</tr>
</tbody>
</table>
### Key | Value
--- | ---
Email | The email address where emails are to be sent depending on the value of the When key.
Name | The name of the recipient of the email.
LogLevel | The type of info returned in the log. The possible values you can enter are Info and Error.

**Example:**

The following is an example of a config.json file. In this example, the ElastiCube Set contains two ElastiCubes, ElastiCube1 and ElastiCube2, hosted on the two different servers, Server1 and Server2. The ElastiCubes, even though they are located on separate servers, are connected through the Tasks object. The Sisense Orchestration Service attempts to build the ElastiCube Set every 10 minutes. If the build fails, Sisense sends an email to JohnDoe@sisense.com.

```
{
  "servers": {
    "Server1": {
      "ip": "localhost",
      "port": "80",
      "apiKey": "eyJ0eXAiHDHDHsXKSSZJdnUzI1NiJ9.eyJ1c2VyIjoiNTY1N332RWZeygl0uVlufGYC-8vY"
    },
    "Server2": {
      "ip": "192.168.5.134",
      "port": "8081",
      "apiKey": "dgfhbgSSSdSSZJdnUzI1NiJ9.eyJ1c2SDFSDFSDFSDFSFGSSDFVfasddgdeygL0uVlufDFeY"
    }
  },
  "tasks": {
```
Overcoming Build Failures in ElastiCube Sets

In Sisense, if an accumulative build fails, you must rebuild the ElastiCube that failed entirely to ensure the validity of the ElastiCube.

If you use the Sisense Orchestrator Service, Sisense recommends that you define the value of the Queue key as “FullUpdateExisting, Full”

"queue": ["FullUpdateExisting","Full"]

In this configuration, the Sisense Orchestrator Service attempts to build the set using accumulative builds and in the event of a failure, a full build is initiated.
Retrieving a Token

As part of the config.json file, you must provide a token that Sisense uses for authenticating your ElastiCube Sets.

You can retrieve this token through Sisense’s API documentation. After you retrieve the token, save it as the value of apiKey in the config.json file.

To retrieve a token:

1. In Sisense, access the API documentation, select Admin > REST API > REST API Reference.

2. In the REST API Reference site, select Version 1.0 in the top-right corner of the page.

3. Open the authentication method.
4. Enter your login credentials and click Run. The access_token is displayed in the Response Body below.

5. Copy the token and paste it into the value of apiKey in the config.json file.

Updating ElastiCubes within an ElastiCube Set

The Sisense Orchestrator Service automatically updates your data across ElastiCubes within an ElastiCube Set. If you want to modify the schema, for example, by adding new tables, you must manually
rebuild the ElastiCubes and then import that ElastiCube to the other machines hosting your ElastiCube Set.

While rebuilding your ElastiCube, you should deactivate the Sisense Orchestrator Service to prevent it from updating the ElastiCubes with different schemas.

After the schemas are identical for all the ElastiCubes across the ElastiCube Set, you can reactivate the Sisense Orchestrator Service to automatically update your ElastiCubes.

To update an ElastiCube within ElastiCube Set:

1. Stop the Sisense Orchestrator Service. Open Windows Services, select Sisense.Orchestrator, and click  

2. Apply your schema changes to the ElastiCube and run a full build.

3. Export the ElastiCube and import it on your other machines. For more information, see Importing and Exporting Elasticube Data.
4. In Windows Services, restart the Sisense Orchestrator Service by selecting Sisense.Orchestrator and clicking .
High Availability in Sisense

Overview

Sisense provides flexible design choices for supporting high availability (HA) and scalability for your Sisense configuration. To configure Sisense for high availability or optimized performance by scaling out Sisense servers, you must build in redundancy, thus reducing potential downtime or bottlenecks.

**Note:** High availability must be enabled in your license. For more information, please contact your Sisense representative or submit a request to Sisense Support through our community website.

In a simple configuration, you interface with the Sisense Web Application that interacts with the ElastiCube.

This configuration represents the Sisense full stack solution. At least one instance of each of the following components must be active to
enable you update your data and allow your users to query that data from the dashboard:

**Sisense Web Server**

The Sisense Web Server hosts the Sisense Web Application that provides the user interface and hosts the API endpoints. If the Sisense Web Server fails, your users cannot access the Sisense Web Application to view dashboards or use the Sisense APIs.

**MongoDB**

MongoDB is installed with Sisense and supports the Sisense Web Application. The MongoDB contains dashboard, filters, and user information necessary for ensuring data consistency across all web servers. In addition, MongoDB is used for authentication when you make calls to Sisense’s APIs. If the MongoDB fails the Sisense Web Application will fail.

**ElastiCube Server**

The ElastiCube Server is installed locally on your computer and provides access to ElastiCubes. If access to the ElastiCube Server fails, queries from the Sisense Web Application will fail.

**Understanding High Availability in Sisense**

While Sisense is fully-functional in an environment without high availability, a multi-node configuration is necessary for scalability to support large amounts of concurrent users and redundancy in case of a failure of one of the Sisense components.
In a multi-node configuration, Sisense components are replicated. Replicating each of these components provides redundancy and fault tolerance against the failure of any single component. The replicated components are combined into nodes. There are two types of nodes, a build node and query nodes. The query nodes, which handle user queries from the Sisense Web Application, are replicated to support high availability. The build node is typically not replicated as its failure only prevents building new ElastiCubes not issuing queries from the Sisense Web Application.
**Build Node**

The build node is responsible for building ElastiCubes and distributing the build to query nodes via the Sisense Orchestrator Service. The Sisense Orchestrator Service is an automated service that you configure on the build node to synchronize and distribute builds to the query nodes. For more information, see Distributing ElastiCube Builds to Query Nodes.

**Query Nodes**

Query nodes are responsible for supporting queries from Sisense users. These nodes contain a web server, MongoDB, and an ElastiCube server. ElastiCubes are distributed by the build node to the query node. The query nodes’ ElastiCubes are combined into ElastiCube Sets to support high availability by separating the web and ElastiCube servers across multiple query nodes. If a build node is distributing a build to one ElastiCube server, Sisense automatically directs any queries to the other ElastiCubes in the ElastiCube Set.

The query node can be configured as a single application stack where each node hosts a Sisense Web Application, ElastiCube Manager, and a MongoDB. In this configuration, if the machine hosting the components fails, the whole query node will fail. Queries will then be redirected to the next available query node. Another option is to host each component of the query node separately in a distributed application stack. In this configuration, if a component of the query node fails, the rest of the query node is not affected. For an example of a single application stack, see Scenario 1 and for an example of a distributed application stack, see Scenario 2.
Load Balancer

In addition to query and build nodes, to support a high availability configuration, you must handle load balancing on your side prior to directing traffic to one of your Sisense nodes. Load balancing spreads requests across multiple query nodes according to an algorithm you define and the current status of the query node.

When implementing ElastiCube Sets, Sisense’s query nodes operate in active-active mode. This means that each of the query nodes is active and can handle requests when the node is not building and its components are available. For example, traffic could be spread 50-50 across two web servers and if a component fails, a load balancer should redirect traffic to the other available web server.

The URL of your load balancer should be provided as an Alias in the Admin section of the Sisense Web Application. This directs Sisense to send traffic to your load balancer, which then sends the traffic to the relevant server.

Within an ElastiCube set, you can define how queries are routed to the available ElastiCubes. For more information, see Routing Queries in ElastiCube Sets.
Creating a High Availability Environment

There are many possible configurations you can implement to support high availability. What determines the type of configuration you choose based on three parameters:

1. **Redundancy**: Which components require redundancy?
2. **Concurrency**: How many users do you need to support?
3. **Resources**: How many systems can you add and maintain to your configuration?

Regardless of which configuration you choose, there are three steps to achieving high availability in Sisense:

1. **Install Sisense** on each machine in the build and query nodes. The Sisense installation includes the Sisense Web Application, ElastiCube server, and the MongoDB.
2. **Replicate the MongoDB instance** on the build node and distribute it to each of the query nodes. For more information, see Replicating MongoDB.
3. **Configure the Sisense Orchestrator Service** on the build node to distribute the latest ElastiCube builds to each of the query nodes. For more information, see Distributing ElastiCube Builds to Query Nodes below.

Distributing ElastiCube Builds to Query Nodes

The Sisense Orchestrator Service is an automated service that distributes builds and balances queries across an ElastiCube Set. The Sisense Orchestrator Service is installed during the default installation of Sisense. To distribute ElastiCube builds across all query nodes, you must configure the Sisense Orchestrator Service. When an ElastiCube
is building, or receiving a build from the build node, the Sisense Orchestrator Service redirects requests to another available ElastiCube in the set.

Note: After configuring the Sisense Orchestrator Service, the directory C:\ProgramData\SiSense\PrismServer\ElastiCubeData\ and the relevant ElastiCube folders within it must be shared with permissions for ‘Everyone’ so Sisense can build or update the ElastiCubes in those folders.

The Sisense Orchestrator Service is defined in a JSON file called config.json in the Sisense.Orchestration Config folder (Sisense/Sisense.Orchestration/Config/) of your Sisense Installation folder of your build node.

The config.json file has three main objects that you must define. The first object is the ElastiCube object that defines which ElastiCube is to be built on the build node and which ElastiCubes are located on query nodes. The second object is the Tasks object that determines how and when the build ElastiCube is to be distributed to the query nodes. The final object that you must define is the Schedule object that defines when an ElastiCube is to be built and distributed.

To distribute your ElastiCube builds through the Sisense Orchestrator Service, you define and save the config.json file. After saving the file, the Sisense Orchestrator Service automatically begins to build ElastiCubes in your ElastiCube Set. You can review the progress of the build in the /Sisense.Orchestration/Logs folder in a log file whose file name you define in the JSON file.
**Note:** Sisense recommends stopping the Sisense Orchestrator Service while importing data and reactivating it after the importing process is completed.

The objects that you must include in the config.json file and their descriptions are provided in the table below:

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>The General object contains two objects, logLevel and emails that define what types of logs Sisense generates and where to send them to.</td>
</tr>
<tr>
<td>LogLevel</td>
<td>The type of info returned in the log. The possible values you can enter are Info, debug, and Error.</td>
</tr>
<tr>
<td>Emails</td>
<td>This object defines who receives an email and their email address when an email is triggered according to the events you define in the mail object.</td>
</tr>
<tr>
<td>Email</td>
<td>The email address where emails are to be sent depending on the value of the When key.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the recipient of the email.</td>
</tr>
<tr>
<td>Cubes</td>
<td>The cubes object contains all your ElastiCubes in your configuration and their location. As the Sisense Orchestrator Service is installed on the build node, the build cubes are local, so you must define the name of the ElastiCube. For ElastiCubes on a query node, you must define the ElastiCube name, URL of the remote server, and its directory.</td>
</tr>
<tr>
<td>Build ElastiCubes</td>
<td>The Build ElastiCube object defines the ElastiCubes that will be used as Build ElastiCubes nodes.</td>
</tr>
<tr>
<td>ecube</td>
<td>The name of the ElastiCube.</td>
</tr>
<tr>
<td>Key</td>
<td>Value</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Query ElastiCubes</td>
<td>The Query ElastiCube object defines the name of the remote ElastiCube, its URL address, and directory.</td>
</tr>
<tr>
<td>ecube</td>
<td>The name of the ElastiCube.</td>
</tr>
<tr>
<td>URL</td>
<td>The URL address of the ElastiCube server. If the URL is to a secure address, the value should include the username and password credentials. For example, &quot;ssh://username:password@10.50.1.128:/C/ecubes&quot;. See Scenario 1 for an example.</td>
</tr>
<tr>
<td>localPath</td>
<td>Directory of the ElastiCubes.</td>
</tr>
<tr>
<td>Tasks</td>
<td>The Tasks object contains a task array that defines which ElastiCube should be built, the type of build, and to which ElastiCubes the build should be distributed to. Currently, Sisense only supports one Task object.</td>
</tr>
<tr>
<td>Task</td>
<td>The name of the task array. Currently, you can define only one task. Defining multiple tasks in the config.json file may cause builds to fail.</td>
</tr>
<tr>
<td>Build</td>
<td>The build object defines the ElastiCube to be built and distributed.</td>
</tr>
<tr>
<td>Cube</td>
<td>The name of the cube to be be built.</td>
</tr>
<tr>
<td>Queue</td>
<td>The value of this key is the type of build Sisense should attempt and in what order. There are two possible values delimited by a comma:</td>
</tr>
<tr>
<td>accumulate</td>
<td>Attempts an accumulative build.</td>
</tr>
<tr>
<td>entire</td>
<td>Attempts an entire build.</td>
</tr>
<tr>
<td>schemaChanges</td>
<td>Attempts to update the build only if changes were made to the schema since the previous build.</td>
</tr>
</tbody>
</table>

Sisense recommends the following value: "accumulate","entire"

In this example, Sisense attempts to do an accumulative build first, and if it
<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>Key Value fails, Sisense attempts an entire build. If the build fails for all builds, Sisense retries again according to the next scheduled build.</td>
</tr>
<tr>
<td>Distribute</td>
<td>Determines which cubes the latest build should be distributed to. The value should be the ElastiCube name for your ElastiCubes on your query nodes. For example, [&quot;cube1, cube2, cube3&quot;]. You can add multiple ElastiCubes delimited by a comma separator.</td>
</tr>
<tr>
<td>Reattach</td>
<td>Reattach is an object that contains two objects, DeleteOldDbfarm and Cube.</td>
</tr>
<tr>
<td>DeleteOldDbfarm</td>
<td>A boolean value that determines if an old ElastiCube is to be deleted after it has been updated.</td>
</tr>
<tr>
<td>Cube</td>
<td>The name of the ElastiCube to be reattached or not.</td>
</tr>
<tr>
<td>Mail</td>
<td>Indicates when an email alert is triggered. Email alerts can be triggered for the following scenarios:</td>
</tr>
<tr>
<td></td>
<td><strong>None</strong>: No email is ever sent.</td>
</tr>
<tr>
<td></td>
<td><strong>Build</strong>: An email is sent when a build is complete regardless if the build was successful or not.</td>
</tr>
<tr>
<td></td>
<td><strong>Fail</strong>: An email is sent when a build fails.</td>
</tr>
<tr>
<td>Scheduler</td>
<td>The Scheduler object contains an array of tasks that define when a task is to be task is to be initiated.</td>
</tr>
<tr>
<td>Task</td>
<td>Defines which task to perform and the order. Currently, Sisense only supports one task.</td>
</tr>
<tr>
<td>Schedule</td>
<td>The time that a task is to be initiated in Cron format. Some examples: -To run a build each night at midnight, enter the value &quot;0 0 * * * *&quot; -To run a build every hour, enter the value &quot;0 * * * * *&quot; See the full Cron format reference here.</td>
</tr>
</tbody>
</table>
### Key

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>A boolean value that indicates if the task is to be executed or not.</td>
</tr>
</tbody>
</table>

### Use Cases

The following section presents two use cases and an example config.json file that demonstrates how to support these use cases. For assistance with additional HA configurations, contact your Customer Service Manager.

**Scenario 1 – Single Stack**

In this example, there is one build node and two query nodes. Each query node is hosted on a separate machine while the components that make up the query node are hosted on the same machine as a single application stack.
In this example, the build cube is called “BuildTest1”. This ElastiCube is distributed to two ElastiCube servers defined in the cube1 and cube2 objects. The build cube is distributed first to cube1 and then to cube2 as defined in the tasks object. The first time the Sisense Orchestrator Service tries to build the BuildTest1 ElastiCube, it attempts an accumulative build and if that fails, an entire build. After each build is replicated, the previous version of the ElastiCube is deleted as specified in the reattach object. This task takes place hourly. If the distribution fails, Sisense sends an email to johndoe@sisense.com with a debug log attached.

```json
{
  "general": {
    "logLevel": "INFO",
    "emails": [{
      "email": "johndoe@sisense.com",
      "name": "John Doe"
    }]
  },
  "cubes": {
    "localCubeBuildTest1": {
      "ecube": "BuildTest1"
    },
    "cube1": {
      "ecube": "BuildTest1",
      "url": "\\\10.49.1.68\\ecubes",
      "localPath": "d:\\ecubes"
    },
    "cube2": {
      "ecube": "BuildTest1",
      "url": "\\\10.70.0.32\\ecubes",
      "localPath": "e:\\ecubes"
    },
    "cube3": {
      "ecube": "BuildTest1",
      "url": "ssh://administrator:Password@10.70.1.133:/C/ecubes",
      "localPath": "e:\\ecubes"
    }
  }
}``


```json
}
,
"tasks":{
 "task1": [
  {
   "build": {
    "cube": ["localCubeBuildTest1"],
    "queue": ["accumulate","entire"] }
   },
   {
    "distribute": ["cube1","cube2","cube3"] },
   {
    "reattach": {
     "deleteOldDbfarm":true,
     "cube":["cube1","cube2","cube3"] }
   },
   {
    "mail":"build"  
  } ] },
"scheduler":{
 "task": "task1",
 "schedule": "0 * * * *",
 "enabled": true
} }
```

**Scenario 2 – Distributed Stack**

In this example, there are three query nodes in which each component is located in a different remote location. This scenario, while costly to implement, demonstrates a distributed application stack configuration where each component is replicated and located on a separate server independent of the other components. If any component fails, the rest of the architecture remains intact. For example, the web server is on one server, the ElastiCubes are stored on another server, and the MongoDB is located on another server.
The build cube in this example is called "BuildTest1". This ElastiCube is distributed to three remote ElastiCube servers defined in the cube1, cube2, and cube3 objects. The build cube is distributed first to cube1, then cube2, and then cube3 as defined in the tasks object. The URLs are standard URLs for cube1 and cube2 while the URL for cube3 is secured through SSH. When the URL is secured, you must provide the URL and the required credentials to access it.

The first time the Sisense Orchestrator Service tries to build the BuildTest1 ElastiCube, it attempts an accumulative build and if that fails, an entire build. If both builds fail, Sisense attempts to update the schema only. After each build is replicated, the previous version of the ElastiCube is deleted as specified in the reattach object. This task
takes place at 14:15 on the 1st of every month. After a build is successful, Sisense sends an email to johndoe@sisense.com.

```json
{
  "general":{
    "logLevel":"DEBUG",
    "emails":{[
      "email": "johndoe@sisense.com",
      "name": "John Doe"
    ]}
  },
  "cubes":{
    "localCubeBuildTest1":{
      "ecube": "BuildTest1"
    },
    "cube1":{
      "ecube": "BuildTest1",
      "url": "\\10.49.1.68\ecubes",
      "localPath":"d:\ecubes"
    },
    "cube2":{
      "ecube": "BuildTest1",
      "url": "\\10.70.0.32\ecubes",
      "localPath":"e:\ecubes"
    },
    "cube3":{
      "ecube": "BuildTest1",
      "url": "ssh://administrator:Password@10.70.1.133:/C/ecubes",
      "localPath":"e:\ecubes"
    }
  },
  "tasks":{
    "task1":{
      "build":{
        "cube": ["localCubeBuildTest1"],
        "queue": ["accumulate","entire","schemachanges"]
      }
    }
  }
}
```
Add Query Nodes

In some configurations, replicating components can improve performance by scaling out and preventing any potential bottlenecks. Each component you replicate must be added to the ElastiCube Set and the config.json file. You can continue to add query nodes according to your requirement so long as the nodes are included in the config.json file.

To add a query node:

2. In the Sisense Web Application, click Admin in the upper-right corner and select the ELASTICUBES tab on the left.

3. Hover over the ElastiCube you want to add to the ElastiCube Set and click on the menu that appears. Click Add to ElastiCube Set and select the set that you want to add the ElastiCube to.

OR
In the ElastiCube Set table, click and select the ElastiCubes to be added to the set. Click Save after you have selected the relevant ElastiCubes.

4. Edit the config.json located at Sisense/Sisense.Orchestration/Config/ and add the new ElastiCube to the Cubes object.

5. Save the config.json file.

6. Restart the Sisense Orchestration Service.

Remove Query Nodes

You can remove query nodes by removing them from the ElastiCube Set and the config.json file.

To remove a query node:

2. In the Sisense Web Application, click Admin in the upper-right corner and select the ELASTICUBES tab on the left.

3. In the ElastiCube Set table, click \( \checkmark \) and clear the checkboxes of the ElastiCubes to be removed. Click Save after you have selected the relevant ElastiCubes.

4. Edit the config.json located at Sisense/Sisense.Orchestration/Config/ and delete the relevant ElastiCubes from the Cubes object.

5. Save the config.json file.

6. Restart the Sisense Orchestrator Service.

**Limitations**

If your user queries a query node (Query Node 1), then the build node begins to replace a build on that node (Query Node 1), there are two scenarios in which the data may be inconsistent.

1. When generating PDFs or Images, the widgets may not match the dashboard depending.
2. In a Pivot widget, the subtotal value may not match the expected value.

This occurs because the widgets exported to PDF or subtotal values inside Pivot widgets run new queries against the node. If the data was originally taken from query node 1, then subsequently queries were run against another query node (Query Node 2), the data may have changed leading to inconsistent results.
Replicating MongoDB

When you install Sisense, a MongoDB instance is installed locally on your machine that contains metadata for ElastiCubes, dashboards, and users. The goal of the replica set is to ensure that each MongoDB has the same information about ElastiCubes, dashboards, and filters. If a MongoDB fails on one query server, the next available MongoDB can replace it. To maintain consistency throughout your configuration and support high availability, each MongoDB instance must be identical with the other MongoDB instances in your configuration.

Each MongoDB instance is part of a replica set. A replica set is a group of MongoDB instances that have the same Sisense data. There are two types of nodes within a replica set. The primary node, which supports write operations and the secondary nodes, which replicate the primary MongoDB’s operations log and syncs the data to reflect that of the primary MongoDB.

The primary and secondary MongoDB nodes can be hosted on the build or query nodes in a high availability configuration or on their own servers.

There are four steps to support high availability for the MongoDB in Sisense:

1. Preparing to set up replica set.
2. Setting up replica nodes.
3. Creating a replica set.
4. Connecting Sisense to the replica set.

Prerequisites

1. Servers in which port 27018 is open.
2. RoboMongo installed on a machine that has access to those servers on port 27018 (any node can be on one of the servers).

3. MongoDB installed on the machine. By default, this is installed when Sisense is installed. If Sisense is not installed, download MongoDB version 2.4.5 zip on the secondary servers from [here](#).

**Preparing to Set up a Replica Set**

For each machine that you have installed Sisense, you must stop the Sisense-related services from running to prepare the main MongoDB instance that will be replicated to the other secondary nodes.

This procedure assumes your primary node has Sisense installed.

**To prepare each server node in your replica set:**

1. Log in to the machine that hosts Sisense.

2. Depending on your Sisense installation:
   - **Full IIS**: Open the IIS Manager and stop the website SisenseWeb.
   - **IIS Express**: Open Windows Services and stop the service Sisense.WebExpress.

3. In Windows Services, stop the service named Monitoring Agent_service and the service Sisense.Repository.
4. For the server that will be the primary node, backup the Sisense MongoDB instance by copying this directory and saving to another location:

   C:\ProgramData\Sisense\PrismWeb\DB\Prod

   You can delete the backup copy after you have verified that everything is running as expected.

5. For each secondary server where Sisense is installed, backup the contents of the directory below including the MongoDB instance.

   C:\ProgramData\Sisense\PrismWeb\DB\Prod

**Setting Up the Replica Nodes**

For each node in your replica set, you must have a MongoDB configuration file. The configuration file contains information about the MongoDB such as its open port and the name of the replica set the MongoDB instance belongs to.

When Sisense is installed on the node, this configuration file is created for you. You must add the line replSet=replica_set to the configuration file. This line is used to identify the node as part of the replica set.

For nodes in which Sisense is not installed, you must create this configuration file as described in the procedure below.

**To set up a node:**

**When Sisense is installed:**

1. In the directory, ‘C:\Program Files\Sisense\Infra\MongoDB\MongoDB.conf’, backup the MongoDB configuration.
2. In the original MongoDB.conf file, add the line `replSet = replica_set`.

   - `dbpath=C:\ProgramData\Sisense\PrismWeb\DB\Prod`  
   - `logpath=C:\ProgramData\Sisense\PrismWeb\DB\Logs\sisenseRepository.log`  
   - `port=27018`  
   - `noauth=true`  
   - `smallfiles=true`  
   - `replSet=replica_set`  

3. In Windows Services, restart the Sisense.Repository service.

When Sisense is not installed:

1. If Sisense is not installed, MongoDB must be downloaded as described in the Prerequisites. Extract the MongoDB zip to a directory called `c:\Sisense`.

   After extracting the file you should see an executable `mongod.exe`.

2. In the directory `c:\Sisense\bin\`, create a file named `MongoDB.conf` as shown below:

   - `dbpath=C:\Sisense\DB\Prod`  
   - `logpath=C:\Sisense\DB\Logs\PrismWeb.log`  
   - `port=27018`  
   - `noauth=true`  
   - `smallfiles=true`  
   - `replSet=replica_set`  

3. In the directory `c:\Sisense\`, create the following directories as listed below: `DB` with two subdirectories
named Log and Prod within it.

4. In the Windows Command Prompt, run the following command to install MongoDB as a Windows service:

   ```
   C:\Sisense\bin\mongod.exe --config C:\Sisense\MongoDB.conf --install
   ```

5. In Windows Services, start the MongoDB service.

6. Verify that the MongoDB service is running and that its startup type is automatic.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Status</th>
<th>Startup Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>MongoDB</td>
<td></td>
<td>Running</td>
<td>Automatic</td>
</tr>
</tbody>
</table>

**Creating a Replica Set**

After you have prepared the MongoDB configuration file for each of your nodes, you must create a replica set with these nodes. With a replica set, each member has the same Sisense data but is otherwise independent. If the primary becomes unavailable, the replica set holds an election to select a new primary from one of the secondary nodes.

**To create replica set:**
1. Open Robomongo and select **Open Shell** to connect to the primary node.

![Robomongo Connection](image)

2. In the new shell, run the command `rs.initiate()` to create a replica set.

3. Run the following commands:
   ```
   cfg = rs.conf()
   cfg.members[0].host = "XX.XX.XX.XX:27018" (Enter your IP address of the primary node and the MongoDB port, by default 27018).
   rs.reconfig(cfg)
   ```

4. Run the command `rs.add("XX.XX.XX.XX:27018")`, where the XX is the IP address of your secondary node. Run this command to add the unique IP address for each secondary node. For example:
   ```
   rs.initiate()
   cfg = rs.conf()
   cfg.members[0].host = "10.50.1.199:27018"
   rs.reconfig(cfg)
   rs.add("10.20.1.196:27018")
   rs.add("10.20.1.197:27018")
   ```

5. Run the command `rs.status()` to verify that the replica set was configured properly. Run this command every couple of minutes to check the progress until stateStr of the secondaries
Connecting Sisense to the Replica Set

After you have configured the replica set, you must connect it to Sisense to support your high availability configuration.

Repeat the procedure below for each machine with Sisense installed.

To connect Sisense to a replica set:

6. In the directory "C:\Program Files\Sisense\PrismWeb\App_Data\Configurations\" backup the file db.config.

7. In the original db.config file, modify the line:

   `<add name="MongoProvider"
   connectionString="MongoDB://localhost:27018/?safe=true" />

   To read:

   `<add name="MongoProvider"

   in the directory "C:\Program Files\Sisense\PrismWeb\App_Data\Configurations\" backup the file db.config.

7. In the original db.config file, modify the line:

   `<add name="MongoProvider"

   in the directory "C:\Program Files\Sisense\PrismWeb\App_Data\Configurations\" backup the file db.config.

7. In the original db.config file, modify the line:

   `<add name="MongoProvider"

   in the directory "C:\Program Files\Sisense\PrismWeb\App_Data\Configurations\" backup the file db.config.
Where XX.XX.XX.XX:27018 is the IP address and port for each MongoDB instance in your replica set separated by a comma.

8. In this directory “C:\Program Files\Sisense\PrismWeb\vnext\config”, backup the file default.yaml.

9. In the original default.yaml file, at the bottom add the following:

```yaml
replica_set:
  name: 'replica_set'
servers:
  - host: XX.XX.X.XX
    port: 27018
    dbpath: 'C:\ProgramData\Sisense\PrismWeb\DB\Prod'
  - host: XX.XX.X.XX
    port: 27018
    dbpath: 'C:\Sisense\DB\Prod'
  - host: XX.XX.X.XX
    port: 27018
    dbpath: 'C:\Sisense\DB\Prod'
```

The dbpath line should be

`C:\ProgramData\Sisense\PrismWeb\DB\Prod` on nodes in which Sisense is installed and `C:\Sisense\DB\Prod` when Sisense is not installed.

10. In the directory “C:\Program Files\Sisense\Monitoring\Agent\logstash\bin\”, backup the file InfraAgent.exe.config.

11. In the original InfraAgent.exe.config file, change the value of the `run_shipper_key` to `false`.

```xml
<add key="queue_name" value="MonitorQueue" />
<add key="run_shipper_outer" value="false" />
<add key="sisenseWebsiteName" value="SisenseWeb" />
```

12. In the directory “C:\Program Files\Sisense\Monitoring\Agent\logstash\bin\”, backup the file InfraAgent.exe.config.
13. In the original InfraAgent.exe.config file, change the value of the mongo_url key to the IP address of your primary node.

```xml
<add key="queryServerPort" value="41112" />
<add key="mongo_url" value="mongodb://localhost" />
<add key="mongo_port" value="27017" />
```

14. In the directory “C:\Program Files\Sisense\Monitoring Agent\logstash\bin\configs\”, backup the file shipperInner.conf.

15. In the original shipperInner.conf file, change the value of the “monitor” uri to the IP Address of the primary node.


17. Depending on your Sisense installation,

   - **Full IIS**: Open the IIS Manager and start the website SisenseWeb.
   - **IIS Express**: Open Windows Services and start the service Sisense.WebExpress.

**Routing Queries in ElastiCube Sets**

When a user queries an ElastiCube that is part of an ElastiCube Set, Sisense routes the query to a single ElastiCube with the latest ElastiCube build. By default, ElastiCube Sets operate in active-passive mode. In active-passive mode, one ElastiCube, by default the ElastiCube with the latest build, handles incoming queries. This ElastiCube is active while the remaining ElastiCubes are on standby in passive mode.
Sisense also supports active-active mode where queries are spread across available ElastiCubes within an ElastiCube Set. In active-active mode, each ElastiCube that is not currently building can handle queries.

You can modify how queries are routed to ElastiCubes within ElastiCube Sets by selecting one of the following routing strategies:

**Single:** (Default). ElastiCubes operate in active-passive mode where the ElastiCube with the freshest data receives all the queries while the remaining ElastiCubes are on standby.

**Multiple ElastiCubes – Latest Data:** ElastiCubes operate in active-active mode where queries are spread across all ElastiCubes with the latest data.

**Multiple ElastiCubes – Optimized Performance:** ElastiCubes operate in active-active mode where queries are spread across the largest group of ElastiCubes with identical data.

**To set a query routing strategy:**

1. Click **Admin** in the upper-right corner and select the **ELASTICUBES** tab on the left.
2. In the ElastiCube Set table, click **pencil** for the relevant ElastiCube Set.

3. From the Routing Strategy list, select the relevant strategy.

4. Click **Save**.
Security

Sisense Security Architecture

Sisense is built around a robust and flexible security architecture that is both comprehensive and intuitive. This architecture has been designed to ensure security processes are enforced while scaling to enterprise deployments of Sisense. This includes the ability to secure dashboards and data as well as implement custom security requirements that suit your organization. This section provides a general overview of the main security features.

Security is based around three levels associated with sets of security features. The diagram below maps this security architecture on a system, data and object level.

System Level Security

System-level security encompasses security features for role-based settings and integration options. This includes user and server management, connection to an active directory, Single Sign-On (SSO) implementation, and use of the security REST API.

User Management

You can assign three primary roles to Sisense users:

- **Viewers**: Can view dashboards
- **Designers**: Can create and edit dashboards
Administrators: Can create users and user groups, set up Active Directory, and more.

These roles can be defined on either a user or group level to determine sharing, access and security.

ElastiCube Server Access Rights

You can assign access rights to different ElastiCube servers for individual users, groups or to everyone. These settings allow the management of different environments such as a testing and production server, or servers for specific projects or departments. See also ElastiCube Server and ElastiCube Security.

Active Directory

Connect existing users and groups from your organization’s Active Directory to define security and sharing properties and reduce deployment time. This removes ‘password fatigue’ as users can rely on existing credentials while organizational policies around security credentials such as updates can be enforced. See also Integrating Active Directory.

Single Sign-On (SSO)

SSO facilitates seamless integration between Sisense and other systems in your organization while offering standardization of authentication policies across your organization. This can improve user productivity by avoiding password fatigue and reduce support overhead. See also Configuring SSO.

REST API
The Security REST API provide access to parameters to integrate and automate restrictions and access control based on existing settings and standards. Specify access rights and security to dashboards, ElastiCubes and data. Manage users via the API to create, edit and assign new users or groups. [Click here](#) to visit the API documentation site.

**Object Level Security**

Object security defines access rights for different users and groups to various components within Sisense. The two main objects are dashboards and ElastiCubes.

**Dashboards**

You can share dashboards on either a user or group level. The sharing options include the configuration of access rights for all users as well as whether users defined as designers may edit the dashboard. The sharing options also include subscription settings that define which users and groups will receive email reports. See also [Sharing Dashboards](#).

**ElastiCubes**

You can define access rights to different ElastiCubes on a user or group level. This enables flexibility to create ElastiCubes for specific user or group needs while offering strict access control. See also [Assigning Access Rights to an ElastiCube](#).

**Data Level Security**

Data access must provide data to people only to the extent that they need to complete their jobs. Data Level Security provides the
necessary control to enforce varying degrees of data visibility and access to support the separation of duties. A single dashboard can be shared with many users, but each viewer sees only data relevant to their needs. This reduces both development time and provides for security.

**Security on the Row Level**

You can grant user and group permissions to specific rows in the data. For each ElastiCube, you can apply multiple rules to enforce granular access control.

**Row Level Defaults**

Control which data is accessible for users or groups that do not have explicit security rules. For example, enable new employees to access a restricted data set until they are added to relevant groups. You can set defaults to include everything, nothing or view based on a security rule.

See more in Data Security below.

**Security Levels**

Sisense provides three levels of security:

- ElastiCube Server Security
- ElastiCube Security
- Data Security

**ElastiCube Server and ElastiCube Security**

*What is ElastiCube Server and ElastiCube Security?*
Sisense enables you to define access rights to control which users can access which ElastiCubes, whether they are creating new dashboards or trying to access shared dashboards.

**ElastiCube Server Security – Use Case Example**

You may already have access to an ElastiCube Server named *Production*. As an administrator, you want to create a *Staging* environment with its own ElastiCube Server; and you do not want other users to be exposed to it. In this case, you can set the ElastiCube Server rights to allow only you to access it.

**ElastiCube Security – Use Case Example**

You may have an ElastiCube named *Marketing* and only want the CEO and Marketing team to have access to it. You can grant rights only to them using ElastiCube Security, thus denying anyone else access.

**How Does ElastiCube Security Work?**

- You can define that users/user groups have access to either:
  - An entire ElastiCube Server, including all the ElastiCubes on the ElastiCube Server.
  - Only to specific ElastiCubes.

- By default, all users are allowed to access the data of all ElastiCube Servers and ElastiCubes. Once you start assigning users/user groups access rights to an ElastiCube Server/ElastiCube, then only the users/user groups that you assign can access that ElastiCube Server/ElastiCube.
Access to ElastiCube Servers/ElastiCubes is by *Grant* rules. There are no *Deny* rule options.

When no access rights have been defined for a specific ElastiCube, then that ElastiCube inherits its access rights from the ElastiCube Server settings.

When a user attempts to access a Dashboard using a direct link and that dashboard is based on an ElastiCube to which that user does not have access rights, a security message is displayed.

When access rights are defined for a specific ElastiCube, then those access rights override the ElastiCube Server access rights. This means that a user can access an ElastiCube to which he/she is assigned access, even if that user has not been assigned access rights to the ElastiCube server on which that ElastiCube is stored.

**Assigning Access Rights to an ElastiCube Server**

By default, when you add an ElastiCube server (as described in Manage ElastiCubes), **all** users are allowed to access it.

A user that has access to an ElastiCube server can access all the ElastiCubes on it.

Once you start assigning users/user groups access rights to the ElastiCube server, then only the users/user groups that you assign can access the data of the ElastiCube Server.

**To assign access rights to access an ElastiCube Server:**

1. Click ADMIN in the upper right corner and select the ELASTICUBES tab in the menu.
2. To define that an ElastiCube Server can only be accessed by specific users/user groups, hover over the list of ElastiCubes under the server name, and click Access Rights next to the server name.

3. Enter the users/user groups that you want to give access to this ElastiCube Server.

4. Click SAVE.

Assigning Access Rights to an ElastiCube

By default, all users are allowed to access each ElastiCube.

You can define which users are allowed to access each specific ElastiCube. You can assign a user access to an ElastiCube even when the user does not have access to the entire ElastiCube server.

Once you start assigning specific users/user groups access rights to this ElastiCube, then only the users/user groups that you assign can access the ElastiCube.

To assign access rights to an ElastiCube:

1. Click ADMIN in the upper right corner and select the ELASTICUBES tab in the menu.

2. In the ElastiCube’s menu on the right, click Access Rights. By default this list is empty, meaning that all users have access
rights to this ElastiCube.

3. Enter the users/user groups allowed to access this ElastiCube. If for example you add your own name, then only you will have access to the ElastiCube.

4. Click SAVE.

**Data Security**

Data security in Sisense can be divided into two types, data encryption and data access. Data communication is related to how data is secured by Sisense while be imported into Sisense and written on your server’s disk.

When data is imported into Sisense, the protocol used depends on the protocols supported by the data source. Sisense supports
importing data over SSL, if the source supports it. Sisense supports
SSL for data Retrieval, for example, when viewing data in dashboards.

Configuration data, such as account credentials and authorization
profiles, are encrypted prior to being written to the disk. The
encryption technology used by Sisense includes:
1. SHA-256
2. TripleDES
3. AES-256

For data at rest, Sisense supports OS based disk encryption, Windows
file system encryption  Transparent Data Encryption (TDE). When
using Windows transparent encryption, the key pair (private/public) is
bound to the user identity..

The second type of data security is data access. This type of data
security refers to who can access your data after its imported
into Sisense and displayed in a dashboard.

**What is Data Access Security?**

Sisense enables you to define Data Security Rules that control which
users can access which portions of the raw data in an ElastiCube,
down to row granularity. For example:

Each widget only shows the data permitted by the Data Security Rules
that apply, including totals, averages and so on.

The data browsers used while building dashboards and widgets only
show the data permitted by the Data Security Rules that apply.

You can define a single dashboard that automatically displays
different results for each user (or user group), based on the rows that
user is permitted to see.
Use Case Example

A Sales Order table has a column representing the salesperson that closed a deal.

You created a quarterly performance dashboard for your salespeople, but want each of them to see only their own data.

You do not want any of them to be exposed to data that represents the performance of others.

How Does Data Access Security Work?

Each ElastiCube contains tables and each table contains fields. A Data Security Rule defines that a specific user can only see any data of an entire row of a table, if a specific field in that row has a specific value(s).

For example, in a Sales widget a salesperson (for example, Dan) will only see the sales amounts from the rows of a Sales ElastiCube whose Salesperson field contains the value Dan (rows 1 and 4).

Sales Table

<table>
<thead>
<tr>
<th>#</th>
<th>Salesperson</th>
<th>Product</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dan</td>
<td>HD-TV</td>
<td>$100</td>
</tr>
<tr>
<td>2</td>
<td>Matthew</td>
<td>TV</td>
<td>$300</td>
</tr>
<tr>
<td>3</td>
<td>Amber</td>
<td>Media Center</td>
<td>$700</td>
</tr>
<tr>
<td>4</td>
<td>Dan</td>
<td>Player</td>
<td>$200</td>
</tr>
<tr>
<td>5</td>
<td>Matthew</td>
<td>Air Conditioner</td>
<td>$600</td>
</tr>
</tbody>
</table>

Dan will not see any part of a row in the ElastiCube that does not contain the value Dan in the Salesperson field, nor will any amounts from this row be included in totals.
**Note:** The entire row of data is not seen by the relevant user even when the field to which the rule applies does not appear in the widget.

If a widget that shows the amount spent per product is shared with Dan, then he will only see **HD-TV** and **Player** and the sales total will be **300$**.

**Defining Data Access Security for an ElastiCube**

Each Data Security Rule applies to a specific field in an ElastiCube and to specific user(s)/user group(s). It enables you to define the values that must be contained in a specific field to enable that entire row of data to be available to a user.

**To access Data Security:**

1. Click **ADMIN** in the upper right corner and select the **ELASTICUBES** tab in the menu.
2. In the ElastiCube’s menu on the right, click **Data Security**.
3. 
4. If no data security rules have yet been defined for this ElastiCube, then the following message is displayed:
5. Click the **ADD FIELD** button to display a list of the fields in this ElastiCube.

   ![ElastiCube Fields](image)

6. Select a field. For example, **Brand**. The following window is then displayed in which you can define rules.

   **Note:** You cannot select date type fields.
The left side of this table enables you to define which users/user groups can access this data. Click + Add Restriction and start typing into the Restricted User/Groups field to get a drop-down list.

Add as many users/user groups, as necessary.

The right side of this window enables you to define which values the specified users/user groups are permitted to see.

Start typing into the Values field to get a drop-down list.
In this example, **Everyone** can only view rows that have **Addimantor Worldwide in the Brand** field.

Multiple values can be selected.

The value of numeric type fields must be typed into this field, as no auto-complete option appears for numeric type fields.

Alternatively, you can select:

- **Everything**: To specify that the selected users/user groups can see this data no matter what the value is in this field.
- **Nothing**: To specify that the selected users/user groups cannot see this data no matter what the value is in this field.

For example, you can define that the following Users/User Groups must have the following values in the Product Category column to enable them to see their data row in a widget.

<table>
<thead>
<tr>
<th>#</th>
<th>User/User Group</th>
<th>Product Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management</td>
<td>Everything</td>
</tr>
<tr>
<td>2</td>
<td>Bob</td>
<td>Apple Mac Desktops</td>
</tr>
<tr>
<td>3</td>
<td>Don</td>
<td>Calculators, Camera Flashes</td>
</tr>
<tr>
<td>4</td>
<td>Everyone else</td>
<td>Nothing</td>
</tr>
</tbody>
</table>

This means that management can see the data of all Product Categories, Don can only see the data of Calculators and Camera
Flashes, Bob can only see the data of Apple Mac Desktops, and Everyone else won’t see anything.

How Does Data Level Security Work for Tables with Relationships?

Tables in an ElastiCube may have a relationship between them.

As described above, each widget only shows any data of an entire row of a table, if a specific field in that row has a specific value.

In addition, a widget may further restrict the data shown to a specific user when a rule is defined for a table that has a relationship to a table that has a field in the widget.

This means that a widget only shows the data permitted by the **combined** Data Security Rules assigned to all the tables that have **any field in the widget**.

As described above, the entire data row is restricted even when the field to which the rule applies does not appear in the widget. The entire row of data is also restricted even when the field of the relationship between the two tables does not appear in the widget.

**Use Case Example — Expanding Upon the Example Above**
The Sales table has a column that has a relationship with a Deal Contacts table that holds the contacts that were involved in each deal.

You created a Deal Contacts widget for your salespersons.

As described in the example above, the Sales table has a Data Security Rule that maps each user to his/her matching field value, so that each sales person only sees their own data.

Even though the Deal Contacts table does not have any Data Security Rules defined for it, the Deal Contacts widget only enables each sales person to see the contacts associated with their own sales, because of the Data Security Rule assigned to the Sales table.
White Labeling Sisense

Sisense enables you to rebrand (white label) the Sisense Web Application into your native application or site by using the Sisense REST API to replace existing icons and images with your own.

In addition, you can rebrand the automated emails Sisense sends to match your company’s branding.

White labeling must be enabled in your license. To enable this feature, please contact your Sisense representative or open a request through our Help Center.

Rebranding Sisense

You can rebrand the Sisense Web Application and the automated emails sent by Sisense through Sisense’s REST API.

There are two steps to rebranding the Sisense Web Application. The first step is to place your branded content into the Sisense `branding` directory where Sisense is installed. For a list of the files you can rebrand and their specific dimensions, see White Labeling Configuration Options.

The second step is to access the the Sisense REST API, where you can embed your content directly into Sisense and modify text displayed to customers.

To rebrand the Sisense Web Application:

1. Create a subfolder with your brand name in this directory (on the machine where Sisense is installed): “C:\Program Files\Sisense\PrismWeb\Resources\<YourBrand>“.
Put your branded files in this directory. The following files are supported:

- Desktop Logo (for example: Logo-Desktop.png) — This is the main icon that is visible at the top left of the Sisense Web Application.
- Tablet Logo (for example: Logo-Tablet.png)
- Mobile Logo (for example: Logo-Mobile.png)
- Favicon (for example: favicon.ico)

**Note:** Optimal dimensions for logo images: 92x26

2. In the Sisense Web Application, click **ADMIN** at the top right, and then **REST API**, followed by **REST API Reference**.

3. Click **/branding** and then click the POST operation **/branding**.

To get the required JSON format for the request, click the sample model schema to place the sample text in the body
parameter.

4. Replace the sample values with your required values. For an explanation of each parameter and how it modifies the Sisense Web Application, see White Labeling Configuration Options.

5. Click **RUN**. Refresh the Sisense Web Application page to view your changes.

   **Note:** You can change just some of the parameters by leaving out those you do not want to update.

**White Labeling Configuration Options**

The following table provides a list of the features you can rebrand within the Sisense Web Application and the JAQL code that must be modified to rebrand it. Click the thumbnail image of the feature to see the default branding provided by Sisense and where your branding will appear.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Page Title and Favicon**  | The page title that appears in the browser tab/page and the Sisense favicon.  
Note:  
1. Image must be in URI format (web address)  
2. .ico format is preferred  
You can modify these images by updating the values of the following JAQL parameters in the REST API:  
“favicon” : “/resources/branding/fav.ico”  
”pageTitle”: “Sisense”, |
| **Sisense Logo**            | The Sisense logo can be replaced with your own. You need to supply two sizes of the logo, for each device (Desktop / Tablet / Mobile). These logos affect the following screens:  
- Login Screen  
- Account Activation Screen  
- ‘Forgot Password’ Screen  
Below is a table with the ideal logo dimensions (pixels):  
<table>
<thead>
<tr>
<th>Small</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop</td>
<td>92×26</td>
</tr>
<tr>
<td>Tablet</td>
<td>92×24</td>
</tr>
</tbody>
</table>
Important Notes:

1. Images must be in URI format (web address)
2. No spaces are allowed in the address of the images
3. Transparent .png format is preferred

```
"logo":{
  "desktop":{
    "small":"/resources/branding/logoDesktopSmall.png",
    "large":"/resources/branding/logoDesktopLarge.png"
  },
  "phone":{
    "small":"/resources/branding/logoPhoneSmall.png",
    "large":"/resources/branding/logoPhoneLarge.png"
  },
  "tablet":{
    "small":"/resources/branding/logoTabletSmall.png",
    "large":"/resources/branding/logoTabletLarge.png"
  }
}
```
| **Homepage** | The home screen when your users log into Sisense.  
**Note**: The prefix http:// or https:// must be included.  
| **Login Page** | The Login page title and subtitles.  
“loginTitle” : “WELCOME TO SISENSE”, “loginSubtitle” : “Sign in & start exploring” |
| **Copyright Text** | The copyright text that appears in Sisense.  
“copyrightText” : “copyright © 2014 sisense inc. All rights reserved”, |
| **Activation Titles** | The titles on the activation page for new users signing in to Sisense.  
“activationTitle” :  
“Welcome”, “activationSubtitle” :  
“Welcome”, |
| Contact Us | The Contact Us text is displayed when you request a password and enter your email on the Recover Password page. This text displays a message and provides a link to your Support services.

```
"contactUsText": "For further assistance, please contact our success management team!: <a href='mailto:support@sisense.com'>support@sisense.com</a>",
```
|
| User Support | The User Support text is displayed in the top right corner of the Sisense Web Application.

By default, the links redirect customers to the Sisense user forums and documentation site. You can modify these URLs to redirect users to your user forums or documentation. This is useful for example when providing OEM services or if you have special forums or instructions to display to your users.

```
"documentationUrl": "string",
"forumUrl": "string"
```

Replace the string with the URL to the relevant locations to redirect your users to your support sites.
|
| Emails | The sender information and subject line text displayed in automated emails. |
For further customization, see *Rebranding Sisense Automated Emails*.

**Note:** Branded emails (for example, using the `senderEmail` and `senderName` parameters) will be used for new user/group invitation emails and password recovery emails. When sharing a dashboard report, or for subscription emails, the email will be sent without the original name and email of the dashboard’s creator.

```json
  "emails": {
    "senderEmail": "sys-admin@company.com",
    "senderName": "sys-admin",
    "templates_directory": "/resources/branding/emails",
    "passwordRecoverySubject": "Sisense password recovery",
    "newUserInviteSubject": "Sisense account activation",
    "shareWithNewUserSubject": "A Dashboard has been shared with you:",
    "shareWithExistingUserSubject": "A Dashboard has been shared with you:"
  }
```
Rebranding Sisense Automated Emails

Sisense automated emails are sent to users according to predefined scenarios. When a predefined scenario such as a build alert is triggered, an automated email is sent to the relevant Sisense users.

You can customize these emails to match your company’s branding.

This page describes the Sisense automated emails and how you can replace them with your own so each time a predefined scenario is triggered, Sisense sends your customized emails to your Sisense users.

Sisense Automated Emails

You can rebrand the following automatic emails:

- **Build Alert**: Email sent each time a build alert is triggered.
- **Dashboard Errors Reports**: Email sent when a dashboard report fails.
- **Dashboard Errors Reports Bulk Fail**: Email sent when a large amount of email reports fail.
- **Dashboard Reports**: Email sent to the recipient of a shared dashboard when you share a dashboard.
- **Empty Dashboard Report**: Email sent to an administrator when an empty dashboard report is sent.
- **KPI Alert**: Email sent each time a KPI alert is triggered.
- **New User Invitation**: Email sent to a new user invited to Sisense.
- **Password Recovery**: Email sent to a user who requested a new password.
- **Share With**: Email sent to the recipient of a shared dashboard.
Transfer Ownership: Email sent to a user who received ownership of a dashboard from another owner.

User Created: Email sent to a user when a user is created.

User Created AD: Email sent when a user is created in Sisense after being added from Active Directory.

For each automated email, Sisense provides an email template in the format of EJS and LESS files. These files are located within template folders inside the Template Parent folder located at:

```
...ProgramFiles\Sisense\PrismWeb\vnext\src\features\emails\templates
```

LESS Files

All templates contain the style.less file that refers to a stylesheet that defines the branding used in Sisense’s automated emails. The content of every style.less is as follows:

```
@import '../styles.less';
```

The stylesheet referred to by all the email templates is called styles.less located at:

```
...\ProgramFiles\Sisense\PrismWeb\vnext\src\features\emails\templates
```

By replacing the content of the styles.less file with your own CSS, you can redefine the branding used in all of the email templates to your custom branding.

EJS Files

Each template folder contains an EJS file, which contains HTML and JavaScript that describe the content of the email.
You can use any text/HTML editor to modify the HTML.ejs files according to your needs.

The following is an example of an HTML.ejs file.

```html
<% include ../header %>
<tr>
  <td>
    <div class="contentText">
      <p class="userText" style="margin:0;">%= i18nContent.hi % <%= newOwnerUserName %>,</p>
      <p class="generalInfo" style="margin:0;">%= i18nContent.generalInfo %</p>
    </div>
  </td>
</tr>
<% include ../footer %>
```

Each EJS file has three sections, a header, body, and footer; each of which describes various areas in the email your users receive.

Section 1 is the Header section defined in the EJS file as `<%include ../header %`. This is a reference to the header.ejs file located at:

`...\Program Files\Sisense\PrismWeb\Resources\branding\emails`

The header.ejs file defines the title and image used in the header section of each email template. You can modify the header by
replacing the header.ejs file with or replace the <%%include ../header %>
tag from each template with your own HTML and JavaScript.

Section 2 is the Body section, which contains the content displayed in the email your users receive. There are two types of content displayed in automated emails, tokens and strings. Tokens refer to Sisense variables such as the Sisense username or dashboard owner’s name. For example, the <%% newOwnerUserName %> token displays the new owner of a dashboard’s Sisense username in the automated email.

```html
<tr>
  <td>
    <div class="contentText">
      <p class="userText" style="margin: 0;">%= i18nContent.hi %<%= newOwnerUserName %></p>
      <p class="generalInfo" style="margin: 0;">%= i18nContent.generalInfo %</p>
    </div>
  </td>
</tr>
```

When you replace the HTML.ejs file with your own files, you can still use the Sisense tokens. For more information about tokens you can add to your automated emails, see Applying Sisense Tokens.

In addition, each template contains an object such as i18nContent.hi that displays strings predefined by Sisense. These strings cannot be modified, however, you can remove and replace the object with your own content.

The final section, Section 3 contains the footer. Like the header, the footer, <%%include ../footer %>, is a reference to a footer.ejs file located at:

`...\Program Files\Sisense\PrismWeb\Resources\branding\emails`
The footer.ejs file defines the copyright text and image used in the footer section of each email template. You can modify the footer by replacing the footer.ejs file with or replace the <%%include ../footer %> tag from each template with your own HTML and JavaScript.

Images that are displayed in the Header and Footer are stored in the following location:

```plaintext
...\Program Files\Sisense\PrismWeb\vnext\src\features\emails\templates\images
```

You can replace these with your own images by maintaining the same file names used, however, it is recommended to replace the content of the Header and Footer sections altogether with your own content.

**Replacing Sisense Automated Emails**

If you prefer to implement your own email templates for Sisense’s predefined scenarios, you can replace Sisense’s emails with your own through the Sisense REST API.

**Note:** Rebranding Sisense emails must be enabled for your license. Contact your Account Manager for more information.

For each automated email, Sisense provides an email template in the format of EJS and LESS files. These files are located within template folders inside the Template Parent folder located at:

```plaintext
...\Program Files\Sisense\PrismWeb\vnext\src\features\emails\templates
```

Some template folders may contain an html-org.ejs file. These files are legacy templates and are maintained for backwards compatibility. Newer developments should only modify or replace the html.ejs files.
After you have prepared your new automated emails, through the /branding endpoint of the REST API, you can configure Sisense to send the customized automated emails when the relevant event is triggered.

To define the location of your branded emails:

1. Copy the contents of the directory:
   
   ```
   ...Program
   Files\Sisense\PrismWeb\vnext\src\features\emails\templates
   ```

2. Paste all the folders in the following directory:
   
   ```
   ...Program
   Files\Sisense\PrismWeb\Resources\branding\emails
   ```
   You will modify the templates in this folder and configure Sisense to send them instead of the original Sisense automated emails.

3. For each template you want to modify, change the contents of html.ejs files and styles.less as described in Sisense Automated Emails.

4. Access the Sisense REST API.
5. In version .9 of the REST API, select the POST /branding.

6. In the email object define the following information:
   
   **Note:** If you have already rebranded your Sisense Web Application, copy the current settings through the GET /branding endpoint and paste them into the POST /branding endpoint modifying or adding the emails object. If you only modify the emails object, the remaining objects and keys are set to their default Sisense and will overwrite any existing settings.

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>senderEmail</td>
<td>The email address from which the automated email is to be sent. When you define the senderEmail value, you must verify your domain in Sisense’s Mandrill email service. Click <a href="#">here</a> for more information.</td>
</tr>
<tr>
<td>senderName</td>
<td>The directory location of your template folders. Sisense accepts /resources/branding/emails as a custom location for automated email templates. This directory is located on your Sisense server at ...Program Files\Sisense\PrismWeb\Resources\branding\emails</td>
</tr>
<tr>
<td>Key</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>templates_directory</td>
<td>Create, update, delete, and query YouTube Analytics Groups.</td>
</tr>
<tr>
<td>passwordRecoverySubject</td>
<td>The subject line of the password recovery email.</td>
</tr>
<tr>
<td>newUserInviteSubject</td>
<td>The subject line of the new user email.</td>
</tr>
<tr>
<td>createdUserSubject</td>
<td>The subject line of the new user invite email.</td>
</tr>
<tr>
<td>shareWithNewUserSubject</td>
<td>The subject line of the shared dashboard with a new user email.</td>
</tr>
<tr>
<td>shareWithExistingUserSubject</td>
<td>Query time-based info on views, subscribers, etc. For example, how many new subscribers were gained at a specific time.</td>
</tr>
<tr>
<td>transferOwnership</td>
<td>The subject line of the dashboard transfer ownership email.</td>
</tr>
</tbody>
</table>

For example:

```
"emails": {
  "senderEmail": "sys-admin@company.com",
  "senderName": "sys-admin",
  "templates_directory": "/resources/branding/emails",
  "passwordRecoverySubject": "Recover Password",
  "newUserInviteSubject": "new User Account Activation",
  "shareWithNewUserSubject": "A Dashboard has been shared with you:",
  "shareWithExistingUserSubject": "A Dashboard has been shared with you:"
},
```

7. **Click Run.** The next time an automated email is sent, your templates are sent instead of Sisense’s predefined emails.
Applying Sisense Tokens

Most Sisense automated emails include tokens that you can apply to your automated emails. When the email is sent, Sisense populates the token with the relevant value. For example, the `<% user %>` token represents the Sisense’s username.

Each template has tokens defined by Sisense that you can apply listed below. Tokens from one automated email cannot be applied to another. Applying tokens to other automated emails, for example adding `<% user %>` to the KPI alert email results build_alert: Sent when a build alert is triggered.

*No Template Tokens Available*

**Dashboard_errors_report**: Sent when a Dashboard email report fails.

*Template Tokens Available*

`<% user %>`

`<% errors[i].user %>`

`<% errors[i].error %>`

`<% errors[i].widgetFailed %>`

`<% errors[i].widgetCount %>`

**Dashboard_errors_report_bulk_fail**: Sent when a Dashboard email report sent to a large amount of users fails.

*Template Tokens Available*

`<% user %>`
Dashboard_report: An automated email that contains a dashboard report sent to users.

Template Tokens Available

<% errors[i].user %>
<% errors.groups[i] %>

Empty_dashboard_report: An automated email that contains an empty dashboard report sent to users.

Template Tokens Available

<% url %>
<% images[i] %>

Kpi_alert: Sent to shared users when a KPI alert is triggered.

Template Tokens Available

<% measure %>
<% value %>
<% message %>

New_user_invitation: Sent to a new user that you have invited to join.

Template Tokens Available

<% owner %>

* The folder for this template contains a file called HTML-ORG.ejs. This file is for older versions of Sisense and is maintained for backward compatibility.
**Password_recovery**: Sent when a user requests their password from the Forgot Password page.

*Template Tokens Available*

<% user %>

* The folder for this template contains a file called HTML-ORG.ejs. This file is for older versions of Sisense and is maintained for backward compatibility.

**Share_with**: Sent to a new recipient of a dashboard when the dashboard is shared with them.

*Template Tokens Available*

<% user %>

* The folder for this template contains a file called HTML-ORG.ejs. This file is for older versions of Sisense and is maintained for backward compatibility.

**transfer_ownership**: Sent to the new owner of a dashboard when ownership is transferred.

*Template Tokens Available*

<% newOwnerUserName %>

<% oldOwnerUserName %>

<% sharingDashboardName %>

**User_created**: Sent to the recipients of new Sisense accounts.

*Template Tokens Available*

<% user %>
**User_created_ad**: Sent when a user is created in Sisense after being added from Active Directory

*Template Tokens Available*

<% user %>
Displaying Custom URLs

You can display your company’s URL in the address of your Sisense dashboards by defining an alias URL from the Sisense Admin page. This is useful when you are providing OEM services and you want to mask Sisense’s URLs and branding.

To implement an alias URL in Sisense:

1. Click **ADMIN** in the top menu, and then **SYSTEM CONFIGURATION** in the left menu.
2. Click **EDIT** to enable the **Alias** field.
3. In the **Alias** field, enter the web server’s alias or IP address. This is especially important when you have configured your IIS with a domain name (alias), but when you share a dashboard, the IP address and/or the incorrect port is sent instead. Reports will be sent from the alias entered in this field.
4. Click **SAVE**.

Internationalization and Localization

Sisense supports localization and internationalization by displaying your users’ native language in the Sisense Web Application. You can select the language displayed in the Sisense Web Application from a list of languages provided by Sisense or display your own translation. Each time you select a language, the Sisense Web Application interface is displayed in that language.

When you change the default language displayed in the Sisense Web Application, words that are part of the Sisense framework such as
menu items, buttons, and messages are displayed in the selected language. Words specific to your dashboard, such as table names, field names, and filters, are not automatically translated when you select a new language to display. These words are called metadata and you can provide your own translation of these terms and display those translations to your users through a Dashboard script.

For instructions on how to change the language displayed in the Sisense Web Application, see Changing the Sisense Web Application’s Language.

For instructions on how to translate your metadata, see Translating Sisense Metadata.
Changing the Sisense Web Application’s Language

Sisense supports multiple languages in the Sisense Web Application making it easier to extract meaningful insights from your data in your users’ local language.

The following images display two interfaces, one in English and the other in Spanish.

What has been Translated?

Sisense has translated text that your users might see including menu names, buttons, messages, and other elements in the Sisense Web Application. Translating the Sisense Web Application does not affect your data or how it is displayed.

The Sisense Web Application has been localized to the following languages:

- Chinese (Simple)
- French (France)
Note, the following content is not being localized:

- Built-in Javascript editor
- ElastiCube Manager and Server Console
- Sisense documentation and online help
- REST API and documentation
- Sisense automated emails

Note: You can use your own translation of Sisense automated emails by defining your own.

Changing your Default Language

From the System Configuration page, you can select the default language for the Sisense Web Application. After selecting a new language, each string with a translation is displayed in that language. Some words and concepts, such as ElastiCube, are still displayed in English.

If you have defined a custom translation, the name of the language as defined in the settings.json is displayed in this list. See Embedding Custom Languages below for more information.
Sisense’s default language is English. After changing the system language, you can revert back to the English or any other language by selecting it from the list.

**To modify your default language:**

1. In the Sisense Web Application, click **ADMIN** in the top menu, and then **SYSTEM CONFIGURATION** in the left menu.
2. Click **EDIT**.
3. Select the relevant language. After selecting the language, the UI is immediately translated.
4. Click **Save**. The Sisense Web Application is translated in the selected language.

**Embedding Customized Languages**

Sisense enables you to display your own translations in the Sisense Web Application by replacing the values of strings in any language you choose.

You can embed customized languages by modifying configuration and resource files replacing the string values according to your requirements.

For example, in the homepage of the Sisense Web Application, the word “Explore” is displayed. In the resource file home.js, you can modify the value of this string to display your own text as shown below.
In addition to modifying the resource files, you must modify the settings.json file and specify your language’s name and update the version. In this example, the language has been changed to “test” and the version increased from 1.0.0 to 1.0.1.

{ “displayName”: “test”, “version”: “1.0.1” }

The value of “displayName” is displayed as your language’s name in Default Language list on the System Configuration page. In the example below, the displayed was set to Test.
Upgrading Sisense may replace the bundled translation files. If you wish to modify a bundled language, copy all of the translation files to a new directory, and change the copied versions to prevent your translation from being overwritten.

**To customize the Sisense Web Application’s language:**

1. Navigate to the directory “..\Sisense\PrismWeb\translations\”
2. In the translations directory, copy the en-us default directory, paste it in the translation directory and rename it.
3. In the new directory, open each resource file and translate the strings into the desired language saving each file after your changes are made.
4. Open the settings.json file and replace the following key values:
   - `displayName`: Enter the name of the language.
   - `version`: Enter the name of the new version. Currently, the version is 1.0.0. For each version, increase this value, for example, 1.0.1.
5. Save the changes in a file called settings.json in your new language folder.
6. In the Sisense Web Application, click **ADMIN** in the top menu, and then **SYSTEM CONFIGURATION** in the left menu.
7. Click **Edit**.
8. Select your customized translation from the list. The Sisense Web Application is displayed in your customized translation.
9. Click **Save**.

**Translating Sisense Metadata**
Sisense enables you to translate metadata in your users’ native language. Sisense metadata is displayed in your users’ dashboards and includes the following:

- ElastiCube fields
- ElastiCube tables
- Widget Titles
- Dashboard Names
- Folder Names
- Saved formulas
- Default and custom hierarchies
- Customized renamed field titles

The following images display two interfaces with metadata, one in English and the other in Russian.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Бренд</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrubanower Holdings Corp.</td>
<td>Thrubanower Holdings Corp.</td>
</tr>
<tr>
<td>Undimedar WorldWide</td>
<td>Undimedar WorldWide</td>
</tr>
<tr>
<td>Reseller</td>
<td>Reseller</td>
</tr>
<tr>
<td>APPLES</td>
<td>APPLES</td>
</tr>
<tr>
<td>WHITEBERRY</td>
<td>WHITEBERRY</td>
</tr>
<tr>
<td>MICRON</td>
<td>MICRON</td>
</tr>
<tr>
<td>Unerommazz Direct</td>
<td>Unerommazz Direct</td>
</tr>
<tr>
<td>LONY</td>
<td>LONY</td>
</tr>
<tr>
<td>POKIA</td>
<td>POKIA</td>
</tr>
<tr>
<td>NG</td>
<td>NG</td>
</tr>
<tr>
<td>Qwihupistor Holdings Group</td>
<td>Qwihupistor Holdings Group</td>
</tr>
</tbody>
</table>

English | Russian
As fields such as ElastiCube names and tables are defined by you, these fields are not translated when changing the default language of the Sisense Web Application.

You can translate your metadata by modifying the default values using a JavaScript plugin. Through the plugin, you define the new values to be displayed. You may also include additional logic to determine which users or user groups the translated values should be displayed to.

When you create a JavaScript plugin, you should create a folder for the plugin and place it inside the plugins folder in the following location:

...\Program Files\Sisense\PrismWeb\plugins\n
If the \plugins\ folder does not exist, create it and then create a new folder within the \plugins\ folder with the relevant files.

You can download an example of a Metadata Translation plugin [here](#).

Extract the enclosed folder into the plugins folder, .\Program Files\Sisense\PrismWeb\plugins\.

This file contains a folder called Metadata and two files:

**plugin.json**: The plugin.json file contains the name of the plugin and a link to the file that describes the plugin’s functionality, in this example, run.js.

**run.js**: The run.js file contains the plugin’s functionality and describes which metadata is to be translated and how it is to be translated.

This example, and any metadata translation JavaScript file you write should include three parts:
1. **Provider Function**: These functions provide the mapping context contained in the Mapping object.

2. **Event Subscription**: This event is triggered when a datasource changes, and calls the Provider function.

3. **Mapping Object**: Contains key/value pairs with your default and translated metadata.

**Provider Functions**

The code sample below is an example of two Provider functions, the first is a global provider function for folder and dashboard aliasing. The second is the datasource provider function for translating ElastiCube and formula names. You can replace the parameters in this example to provide the mapping context you define in the Mapping object.

**Global Provider**

```javascript
function (resolve, reject) {
    // an ajax request or any other logic.
    setTimeout(function () {
        resolve(globalAliasing);
    }, 0);
};
```

The following table describe the Provider function and its arguments:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resolve</td>
<td>A callback function which should be called with the provided aliasing context object or without any parameter if aliases shouldn't be provided for the datasource.</td>
</tr>
<tr>
<td>reject</td>
<td>A callback function to be called in case of error, so the system can properly handle it.</td>
</tr>
</tbody>
</table>

**Datasource Provider**
function (datasourceId, resolve, reject) {
    // an ajax request or any other logic.
    setTimeout(function () {
        resolve(datasourceAliasing);
    }, 0);
}

The following table describe the Provider function and its arguments:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>datasourceId</td>
<td>An object that represents the ID of the datasource with the following properties:</td>
</tr>
<tr>
<td></td>
<td>1. address</td>
</tr>
<tr>
<td></td>
<td>2. database</td>
</tr>
<tr>
<td></td>
<td>3. fullname</td>
</tr>
<tr>
<td></td>
<td>4. ID</td>
</tr>
<tr>
<td></td>
<td>5. title</td>
</tr>
<tr>
<td>resolve</td>
<td>A callback function which should be called with the provided aliasing context object or without any parameter if aliases shouldn’t be provided for the datasource.</td>
</tr>
<tr>
<td>reject</td>
<td>A callback function to be called in case of error, so the system can properly handle it.</td>
</tr>
</tbody>
</table>

**Event Subscription**

To trigger the Provider functions, your plugin should include a handler for a global event ‘beforealiascontextinit’.

In the example below, datasourceProviderFunction and globalAliasingProvider are the Provider functions. The timeout parameter is optional and configures the amount of time in milliseconds which the system waits for the aliasing context to be resolved by the provider function. By default the system uses a timeout of 2000 ms
prism.on("beforealiascontextinit", function (ev, args) {
    var timeout = 2000;
    args.register(datasourceProviderFunction,
    globalAliasingProvider, timeout);
});

**Mapping Object**

The translation context is a simple JavaScript object which contains key value pairs for tables, columns, hierarchies, formulas and custom item titles, all case-insensitive.

The sample below is a skeleton of a Mapping object that defines what metadata is to be translated and its new value.

```javascript
/**
 * tables - aliases for table names
 * "tables": {
 * "table_name_1": "alias_1",
 * "table_name_2": "alias_2",
 * }
 * columns - aliases for column names in scope of table
 * "columns": {
 * "table_name_1": {
 * "column_name_1": "alias_for_column_name_1"
 * "column_name_2": "alias_for_column_name_2"
 * "column_name_3": "alias_for_column_name_3"
 * },
 * "table_name_2": {
 * "column_name_1": "alias_for_column_name_1"
 * "column_name_2": "alias_for_column_name_2"
 * "column_name_3": "alias_for_column_name_3"
 * }
 * "titles": {
 * "Custom title": "Alias",
 *}
 ```
* "Sample Revenue": "Sample Profit"
* },
* formulas - aliases for custom formula titles
* "formulas": {
  * "Custom title": "Alias"
* },
* hierarchies - aliases for hierarchy titles
* "hierarchies": {
  * "Custom title": "Alias"
  * }
*/

var datasourceAliasing = {
  "tables": {
    "brand": "бренд",
    "category": "категория",
    "country": "страна",
    "commerce": "коммерция"
  },
  "formulas": {
    "Revenue": "Чистый доход"
  },
  "hierarchies": {
    "Category by Brand and Age Range": "Категория через Бренд и Год"
  },
  "titles": {
    "CUSTOM REVENUE": "ДОХОДЫ"
  },
  "columns": {
    "Brand": {
      "Brand": "Бренд",
      "Brand ID": "Бренд Id"
    },
    "Category": {
      "Category": "Категория",
      "Category ID": "Id Категории"
    },
    "Commerce": {
"Age Range": "Возрастные диапазоны",
"Brand ID": "Id Бренда",
"Category ID": "Id Категории",
"Condition": "Состояние",
"Cost": "Затраты",
"Country ID": "Id Страны",
"Date": "Дата",
"Gender": "Пол",
"Quantity": "Количество",
"Revenue": "Доходы",
"Visit ID": "Id Посетителя"
},
"Country": {
"Country ID": "Id Страны",
"Country": "Страна"
}
};
/**
 * Global object example
 * folder - aliases for folder names
 * "folder": {
 * "folder_name_1": "alias_1",
 * "folder_name_2": "alias_2",
 * }
 * dashboards- aliases for dashboard names
 * "dashboards- ": {
 * "dashboard_name_1": "alias_1",
 * "dashboard_name_2": "alias_2",
 * }
 */
var globalAliasing = {
"folders": {
"New Folder": "Folder renamed",
"my folder": "my folder renamed",
"Any name": "любое название"
},
"dashboards": {

System Configuration

The System Configuration settings let you define the web server’s alias, the first day of the week, SSL security, and email settings.

To update one or more System Configuration settings:

1. Click **ADMIN** in the top menu, and then **SYSTEM CONFIGURATION** in the left menu.

2. Click **EDIT** and update one or more of the following settings:

   - **First Day of the Week**: Select the first day of the week so all of your Sisense users’ queries will be calculated according to the day you define. By default, the first day of the week is Monday when querying an ElastiCube. Sisense defines Monday as the first day according to ISO 8601. This means that when selecting filters such as Week 1, Week 2, etc., the first day of the week is not that defined by first day of that year, but rather the first Monday of the year. Each week starts on a Monday and ends on a Sunday for 52-53 full weeks in a year.

   **Note**: Changing the first day of week after using a dashboard or widget filter/drill with Weeks filter in use might lead to bad results. To resolve the issue, the Weeks filter should be removed and added again.

   - **Default Language**: Select the language to be displayed in the Sisense Web Application. If you have defined a custom
translation, the name of the language as defined in the settings.json is displayed in this list. Select it to display your custom translation.

- **Alias:** Define the web server’s alias or IP address. This is especially important when you have configured your IIS with a domain name (alias), but when you share a dashboard, the IP address and/or the incorrect port is sent instead. Reports will be sent from the alias entered in this field.

- **SSL:** Enable SSL if you have configured your web environment with SSL security (https) and certificates. This will enable https in the URLs of shared dashboards.

- **SEND EMAILS:** You can disable sending emails. This will disable emails sent when sharing dashboards as well as any scheduled email reports.

3. When done, click **SAVE.**

### Setting Up a Custom Email Server

Sisense uses Mandrill by MailChimp to send automated emails such as dashboard reports or password reset emails. Custom email servers allow all our email transactions to be completely managed on your side.

Through the Sisense REST API, you can send an HTTP POST request to issue Sisense emails through your own custom email server instead of the default Sisense email server. The REST API exposes properties that you can configure for the custom email servers such as security, timeout, and logging properties.

**To set up a custom email server:**
1. In the Sisense Web Application, click **ADMIN** at the top right, and then **REST API**, followed by **REST API Reference**.
2. In the top-right corner of the page, select version 1.0 of the REST API.
3. Select **Settings**, then **POST /settings/email_server**.
4. In the body of your call, define the values of the following keys:

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>enable</td>
<td>If True, allows access to the custom email server instead of the default Sisense email server.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> This property is different from the enable property found in version .9 of the REST API POST /settings/system request. In .9, enable activates Sisense emails. In version 1.0, enable sends Sisense emails through your custom server.</td>
</tr>
<tr>
<td>host</td>
<td>The hostname or IP address to connect to. By default, this is 'localhost'.</td>
</tr>
<tr>
<td>port</td>
<td>The port to connect to (defaults to 25 or 465).</td>
</tr>
<tr>
<td>secure</td>
<td>When you send an email, some email servers check if secure transport (TLS) is available for that address or domain.</td>
</tr>
<tr>
<td></td>
<td>This value determines if the connection should use TLS (if True) or not (if False). The default value is false.</td>
</tr>
<tr>
<td></td>
<td>The connection may be upgraded to TLS if the email server requires it.</td>
</tr>
<tr>
<td>ignoreTLS</td>
<td>If this is True and secure is False, TLS will not be used even if the email server attempts to upgrade the connection to TLS-secure.</td>
</tr>
<tr>
<td></td>
<td>This field should be set to True when connecting to a non-secure SMTP server.</td>
</tr>
</tbody>
</table>
### Key | Value
---|---
**requireTLS** | If this is True and secure is False, it forces the connection to be upgraded to TLS-secure even if the email server does not advertise support for TLS.

**connectionTimeout** | How many milliseconds to wait for the connection to establish.

**greetingTimeout** | How many milliseconds to wait for the greeting after connection is established.

**socketTimeout** | How many milliseconds of inactivity to allow.

**user** | The user name of the user.

As non-secure or restricted SMTP servers do not require authentication, do not include this field when connecting to a non-secure SMTP server.

**pass** | The user’s password for the email server.

As non-secure or restricted SMTP servers do not require authentication, do not include this field when connecting to a non-secure SMTP server.

**logger** | If set to True, Sisense logs events such as which server you connected to.

If the value is not defined or is False, then nothing is logged.

**debug** | If set to True, then Sisense logs SMTP traffic. When False, Sisense logs only transaction events.

Debug logs record everything and may increase in size quickly and impact performance. You should only set activate debug logging when troubleshooting a specific issue and then reset the logging level back to info.

5. Click **Run**.
Limitations

- When authenticating an HTTP request, Sisense only supports the basic authentication through the Authorization method using plain text.
- No Errors are displayed in the UI.

Troubleshooting a Custom Email Server

Sisense does not provide a UI for troubleshooting an issue with your custom email server. To troubleshoot any issue with your custom email server, activate logging through the `logger` and `debug` keys in the REST API. When `logger` and `debug` are set to True, Sisense generates logs that are saved in the following directory:

`c:\Program Files\Sisense\PrismWeb\vnext\iisnode`

After troubleshooting the issue, the debug logger should be disabled as the logs can grow in size rapidly and this may impact performance.
Managing Drill Hierarchies

Dashboard viewers can drill down in most widgets to get an in-depth view of a selected value. To make it easier for viewers to select drill-down paths, dashboard designers can add predefined drill hierarchies to their widgets.

As an administrator, you can create a pool of drill hierarchies, from which dashboard designers can select the drill hierarchies they want to include in the widgets they build.

This section describes how to create and manage the drill hierarchies that you want to make available for designers.

To create a drill-down hierarchy:

1. Click **ADMIN** in the top-right corner of the Sisense web app. In the left menu, select **ELASTICUBES**.
2. Hover over the relevant ElastiCube, and from the menu on the right, select **Manage Hierarchies**.
3. If this is the first hierarchy you are adding, select **Add Hierarchy**. If you already have hierarchies, click **Add Hierarchy** in the top-right corner.

4. Select the field. This will be the first field in the drill hierarchy, and the same field used in the widget.

5. Click **Add Field** to add the next level in the drill hierarchy. Repeat this step for as many levels as you need.

Additional options include:

**Always include with field:** Select this checkbox to always include the drill hierarchy in the widget for this field.

**Editing the Hierarchy name:** To edit the name of the drill hierarchy, click on the pencil icon, and type in the name. Click on the tick icon to confirm the change.

**Editing the field name:** To edit the name of a field in the hierarchy, hover over the field name and click on the menu > **Rename**. Type in the name, and click on the tick icon to confirm the change.
6. Add as many hierarchies as you need for the ElastiCube. When done, dashboard designers will have access to the hierarchies in the widget designer, and will be able to select and add them to the widget.

To change a field in a hierarchy:

- Hover over the field in the hierarchy, and click on the menu that appears. Click Change and select a different field.

To delete a hierarchy:
Migrating Sisense across Environments

Many users that implement Sisense maintain copies of their dashboards locally or across multiple environments for a variety of reasons. With multiple instances of Sisense, you can test and verify your data’s accuracy before publishing dashboards to a production environment where accuracy is critical. You can save external copies of dashboards for disaster recovery. OEMs can support a master server and separate servers for each of their customers, copying the relevant dashboards from the master server to the appropriate customer server. Sisense enables Administrators and Designers to maintain multiple copies of their dashboards and migrate them quickly and easily across multiple environments.

There are two options for migrating dashboards from the Sisense Web Application. The first option is to export your dashboards into a .dash file locally, and then import the dashboards into the relevant environments. This option is useful if you do not have access to the server, for example, if you are an OEM providing dashboards to your customers. For more information about exporting dashboards, see Exporting Sisense Dashboards.

The second option is to copy the dashboard to another server from the Sisense Web Application. In this scenario, you can copy dashboards from one environment directly to another environment after the Administrator of the target server provides access to the source server. The target server can only accept files from servers available on the Trusted Server List. For example, if you have two machines with Sisense installed, on the server where you want to

Click on the bin to the right of the hierarchy.
copy dashboards to, you can provide access to the source server by adding the source server’s IP address to my list of allowed servers.

After providing access, an Administrator or Designer can copy the dashboard directly to the target server. If the dashboard already exists on the target server, the Administrator or Designer will be notified and can overwrite the existing dashboard or create a duplicate dashboard on the target server.

The option you choose depends on which methodology is convenient for you and what you need to achieve. The end result is the same.

There are several thing you should remember when copying a dashboard to another server. First, copied dashboards and their widgets keep their IDs. This ensures that any users with bookmarks of the dashboard or its widgets can continue using the same bookmarks.

Second, when copying a dashboard, the dashboard’s filters and scripts on the target server are overwritten. The filters and scripts from the source are used instead. If your data source is not the same in each environment, you will need to manually adjust the data source after copying the dashboards. If plug-ins are installed on the original
server, these plug-ins will not work on the dashboard unless they are also installed on the target server.

Third, changes to your dashboards are not reflected on the same dashboard in another environment. To modify a remote dashboard you can either modify it on the remote server, or modify it in your source server, and repeat the migration process. Once you have completed your changes, you will need to republish the dashboard.

**Copying Dashboards between Sisense Servers**

Administrators and Designers with access to a remote Sisense server can copy dashboards from one Sisense server to another from the Sisense Web Application. When you copy a dashboard or a folder to a remote server, all the dashboards, including those in the selected folders are duplicated into the main Dashboard list in the target server. Folders are not duplicated on the target server.

Before copying a dashboard to a target server, the Administrator of the target server must provide access to target server. The procedure below explains how to provide access to another server and then how to copy a dashboard from the source server to the target server through the Sisense Web Application.

**To copy your dashboard to another Sisense server:**

**Note:** Some of the dialog boxes may be considered as pop-ups by your ad blockers. Make sure that Sisense is whitelisted or that your ad blocker is disabled when performing this procedure.

1. On the target server, the Administrator needs to provide access for the source server to the target server. On the target Sisense server, select Admin > Trusted Server List.
The Trusted Server List page is displayed.

2. In the Trusted Server List page, click **Add Server**. The Create a New Server Access dialog box is displayed.

![Add Server Dialog Box]

3. In the **Server** field, enter the IP address or hostname of the source server that contains the original dashboard.

4. In the **Name** field, enter a name for the source server. This is an optional identifier to help you keep track of your servers.

5. Click **OK**. The server is added to the list and now has copy access to the target server.

On the source server, from the Dashboard list, click the dashboard’s menu and click **Copy to Server**.
OR

To copy multiple dashboards, in the Dashboards list, click the Select Dashboards button to display checkboxes next to the dashboard and folders, which allows you to select multiple dashboard to be exported. Then, select the relevant dashboards and folders to be exported and click. The Copy Dashboards to Server dialog box is displayed.

6. In the Copy Dashboards to Server dialog box, enter the following information:
   
   **Server**: The URL or Hostname of the remote server. Sisense supports SSL connections so dashboards can be transferred
securely when SSL is activated.

**Republish dashboards after copying:** Select to automatically republish the dashboard on the target server after the selected dashboards are copied. Republishing a dashboard refreshes the dashboard definitions (widget types, titles, scripts etc.) for each of the users who share the dashboard.

7. Click **OK**.

The selected dashboards are copied to the remote server and displayed in the Dashboard’s list.
Viewing Dashboards on Mobile Devices

You can easily view your Sisense dashboards on the go.

On a mobile phone you can use Sisense’s native mobile app or a browser to view your dashboards. Widgets appear one below the other in a view-only scrollable list.

On tablets, you can use a browser and experience the same full viewer mode as experienced on a desktop computer, so you will be able to change dashboard filters and drill into fields.

Using the Sisense Mobile App

You can download the Sisense mobile app for Android mobile phones or iPhones.

Note: The app only works on mobile phones. For tablets, see Using Sisense in a Mobile Phone or Tablet Browser.

Supported Phones and Operating Systems

- iPhone – Requires iOS 8 or later, Supported iPhone 5 device or higher.
- Android – Requires Android versions 4.3 or later.

Get Sisense Mobile

To download the Sisense Mobile App for your device, click the relevant link below according to your version of Sisense.
The latest version of the Sisense Mobile app supported by Sisense V6.5 offers improved performance and the ability to receive mobile notifications from Sisense Pulse.

Sisense V6.5 and later.

Download on the App Store

Android App on Google Play
Working with the Mobile App

1. Tap the Sisense app icon to open the application.

2. If this is your first time logging in, type in the server address and then enter your username and password to log in. The server address should include the server IP or domain name (alias). If you are not using the default port (80) you will need to add the port as well, for example: xx.xxx.xx.xx:8081. When working with SSL security protocol, please use the ‘https’ prefix.

3. If this is not your first time logging in, you will be prompted to enter your username and password. You can also tap server to enter the Sisense server address or choose the server from a list, and then sign in.

4. When you receive a notification from Sisense Pulse to your mobile device, tap the notification to open the dashboard from where the alert originated.

5. To open a dashboard, tap the dashboard’s name or tap a folder name, and then on the relevant dashboard.
Recently used dashboards appear above the full list of dashboards (MY DASHBOARDS) for a quicker navigation.

6. To search for a dashboard, tap the magnifying glass icon and type in the name of the dashboard. On iPhone devices, tap **Search**, and then tap the dashboard name.

7. In the dashboard, drag the dashboard up or down to view the widgets.

8. To get additional information on the presented dashboard, tap on the dashboard name (iPhone) or click on the ‘i’ sign at the top right (Android).

9. Within a widget, you can tap on a value to see more details about the selected value. For example, tap on a slice in a pie chart to see the absolute value in addition to the percentage.

10. To select a different dashboard, tap the menu icon.

11. To filter a dashboard, you can tap the 🔍 icon. This displays the list of available filters. Tap the relevant filter to open all of its available options. Tap any of the filter options to apply the
You can sign out by tapping **Sign Out** at the bottom of the Dashboards page.

### Using Sisense in a Mobile Phone or Tablet Browser

The Sisense web app is built around a responsive design that automatically optimizes viewing for mobile phones and tablets. Sisense runs in any HTML5-supported browser.

On mobile phones, widgets appear one below the other in a view-only scrollable list.

On tablets, you get to see the same view as experienced on a desktop. Also, full viewer mode is supported, so you can change dashboard filters and drill into fields.
To easily access your dashboards, we recommend adding a shortcut to Sisense on your phone’s screen.

**For iPhone:**

1. Open Safari and browse to your Sisense web app.
2. Tap on the Share icon at the bottom of the screen.
3. Tap Add to Home Screen.
4. Edit the name of the icon, for example: *Sisense*, and tap Add in the top-right corner.

**For Android:**

1. Open your browser and browse to the Sisense web app.
2. Depending on your browser, you can do one of the following:
   - In your browser’s menu, tap **Add to home screen**.
   - In your browser, add the page to your bookmarks (for example, in Chrome, click the ⭐ icon). Edit the bookmark’s name, for example *Sisense*. 

www.sisense.com
Access your widget tray, tap and drag **Bookmark** to your home screen, and select the Sisense bookmark.