The Standard for Data Visualization and Analysis

# Version 9 User Guide

SentinelVisualizer.com

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# Chapter 1: Welcome to Sentinel Visualizer

*Sentinel Visualizer sets a new standard for data visualization and analysis. Sentinel Visualizer provides a comprehensive set of tools to help you leverage your data and to turn that data into valuable information. The power of link analysis, exploited through visualization and analysis software, can yield incredible insights into data that you cannot reach with traditional analysis methods. This User Guide provides both introductory concepts and detailed information about the features and functionality of Sentinel Visualizer.*

## Sentinel Visualizer System

Sentinel Visualizer is a cost-effective, commercial-off-the-shelf platform that offers cutting-edge technologies based on a standard, non-proprietary database management system. The appeal of Sentinel Visualizer can best be described in these key areas:

| Feature | Benefit |
|---|---|
| Full Featured Link Analysis | Link analysis allows you to visually and intuitively find patterns, meanings, and trends in data that aren't possible with traditional rows and columns. |
| Advanced Visualizations | View complex data relationships in formats that allow rapid information discovery. With 2D and 3D network diagrams, timelines, and Geospatial tools, Sentinel Visualizer provides the latest generation in visual display of complex data. |
| Flexible, Purpose-Designed Database | You can import, store, and manage large amounts of data that describe objects and their connections in a Microsoft SQL Server database. |
| Multi-user Design | By storing data in a consistent format in a scalable multi-user database, organizations can break down data silos and share data. |
| Advanced Analytics | Our proprietary Entity Metrics tools distill complex networks into manageable, ranked information with Social Network Analysis, Temporal Views, and user-tunable algorithms. |
| Collaboration and Sharing | Sentinel Visualizer enables group and mission collaboration among team members, regardless of whether all team members are using the Sentinel Visualizer software. |

# Sentinel Visualizer Editions

Sentinel Visualizer is available in several editions offering different features. The About screen under Help from the main menu shows which version is installed.

### Standard and Professional Editions

The Standard and Professional editions support single-user databases that are installed and run from your computer. You cannot connect to multi-user databases with these editions. The Professional version adds geospatial features with Google Earth integration and integration with ArcGIS/Shapefiles.

### Premium Edition

The Premium edition includes all the features of the Professional edition, plus the capability to connect to networked multi-user databases stored on Microsoft SQL Server or on the cloud.

### Enterprise Edition

Introduced in version 6, the Enterprise edition includes all the features of the Premium edition, while also allowing Administrative users to define granular read/write rights for each user (login). It also tracks the functions that each user performs in the software, with optional reporting.

- With Enterprise, an administrator can define individual and groups of User IDs that are authorized to retrieve one or more saved diagrams, on a diagram-by-diagram basis.
- Without Enterprise, a saved diagram is “public” and available to everyone, or “private” and only available to the User ID who created and saved the diagram.

### Reader Edition

The Reader edition is a free version that lets you view (not edit) charts that were created by a licensed version of Sentinel Visualizer (any Edition). With the Reader, the User can view a link chart (SVX file), drill-down to the details of entities and relationships, and more. See here for more details: https://SentinelVisualizer.com/LinkAnalysis/reader.

# About this User Guide

This User Guide is designed to provide information to successfully use Sentinel Visualizer in your organization. This chapter provides an initial overview. These are the following chapters:

- **Chapter 2: New Features in Version 9** – New features added in Version 9

- **Chapter 3: Getting Started** – A quick introduction to the main form of Sentinel Visualizer, the menus, and Home page.
- **Chapter 4: Entities** – Entity data and details, and how to view, add, edit, and delete them.
- **Chapter 5: Entity Search** – Basic and advanced entity searching.
- **Chapter 6: Relationships** – See how relationships connect entity data for powerful visualization and analysis capabilities.
- **Chapter 7: Relationship Search** – Basic and advanced entity searching.
- **Chapter 8: Selecting Dates and Rich Text Editing** – Shared resources across entities and relationships to select dates and edit notes and documents.
- **Chapter 9: Dataset Builder** – Query and send the output to a variety of formats
- **Chapter 10: Reports** – See how to select, preview, print, and export reports.
- **Chapter 11: Visualizer** – Powerful visualization and analysis capabilities, options, and how to print, export, and save your work.
- **Chapter 12: Visualizer Layouts, Transform and Zoom** – Apply automatic layouts to your entities and relationships diagram, adjust them with transformations, and zoom in and out.
- **Chapter 13: Visualizer Tool Panels** – Learn how to use the Tool Panels on the right side of the Visualizer diagram to perform filters, gradient, links, add items and shapes, and more.
- **Chapter 14: Entity Metrics** – Understand how Sentinel Visualizer applies Social Network Analysis and other techniques to provide automated real-time analysis.
- **Chapter 15: Timeline and Time Range Filter** – See how to view temporal data using a Timeline View.
- **Chapter 16: Geospatial Tools** – Learn how to the use the Geospatial Tools to show entity information on a map.
- **Chapter 17: Three-Dimensional Viewer** – See how to use the 3D viewer to visually navigate through complex networks in three dimensions.
- **Chapter 18: Creating and Opening Databases** – See how to create a new database and open existing databases.
- **Chapter 19: Importing Data** – Learn how to import external data into a Sentinel Visualizer database.
- **Chapter 20: Configuring and Managing Your Database** – Learn how to add your own data types and lookups and configure and maintain your database.
- **Chapter 21: Multi-User Shared Databases** – Learn how to set up Microsoft SQL Server to work with Sentinel Visualizer and create shared databases.
- **Chapter 22: Compare, Merge and Clone Entities --** Learn how to compare entity data, merge entities, and clone entities.
- **Chapter 23: Query Builder** – The Query Builder lets you ask more specific questions than the Dataset Builder.
- **Chapter 24: Additional Tools** – Tools menu for restoring defaults and web search, and launching Sentinel Visualizer Command line options

# Chapter 2: New Features in Version 9

*Version 9 is the most significant update of Sentinel Visualizer. It includes many new features across the entire application with many new features with improved functionality usability.*

## New Feature Summary

Many features are added in version 9:

- Improved startup experience and user interface
- Reorganized Home Page and top menu
- Improved, Simplified and Consistent Search options
    - Easily see and select the last used entities and relationships on the home, entity search and relationship search pages
    - Dataset Builder makes it easy to see and select all entities and relationships, just entities, just linked entities, and just unlinked entities. Also easily select entities and/or relationships based on their type
    - The new Advanced Dataset Builder makes it easy to select entities and relationships based on a wide range of characteristics and links between them.
    - Identical options are available when searching entities, relationships and filtering them in the Visualizer diagram.
    - Search text inside embedded documents such as Word and PDF files
    - Search text in rich text fields like Entity Briefs and document notes.
- Visualizer Improvements
    - Many new Visualizer layout options including shapes such as circles, ellipses, spirals, triangles, squares, and rectangles.
    - Transform the diagram by rotating and flipping the axes. Rotate in 90-degree increments or any degree around the center or a specific entity.
    - Resize and skew your diagram horizontally and/or vertically
    - Add text (labels), circles, boxes, and arrows on the diagram with options to change their colors, borders, and fills.
    - Gradient colors are set separately for entities and relationships
    - Select and filter to the entities in a network or clique.

    - Multilevel Undo and Redo
    - Disconnect an entity from the diagram (remove its links to other entities)
    - Improved performance
    - Retail version can open Reader file from another database
    - Get links between entities to add entities to connect all your selected entities.
    - Saving diagrams with styles so that they are retrieved with those settings
- Lookup Table Management
    - Export and import lookup values between databases
    - Delete unused lookup values in the current database
    - Simplified metadata lookup value entry and coloring
- Reports formatted more consistently and available for all the data or just the data in the current Visualizer diagram.
- Import wizard improvements to automatically handle missing lookup values and update existing data.
- Database Settings for managing security.
- Database has referential integrity among its tables.

# Improved User Experience

## Opening Databases

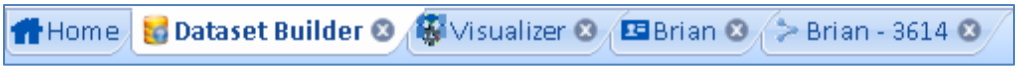
- The last database is automatically loaded and does not prompt if you previously checked to remember its login.
- After creating a new database, it is automatically opened.
- The status bar in the lower left shows the number of entities and relationships in the currently opened database:

*The number of Entities and Relationships in the current database.*

## Home Page Enhancements

The Home page (renamed from Start page) displays a list of most recently used (MRU) entities and relationships to perform actions on them.

Each tab has shortened names with a close icon like web browsers:




## Forms and Grids Remember Your Last Settings

Form to add new lookup values or specify other settings now preserve your last selections.

When viewing data in a grid, you may adjust column widths, click on columns to sort them, and other options which are preserved the next time you display the same grid. These settings can also be reset under the Tools menu.

### User Interface Enhancements

Icons and images are updated throughout the program to be more consistent across all the toolbars and screens. Consistent layout of fields on entity and relationship edit, search, dataset builder, and filters. Labels are above their text boxes to better support language localization.

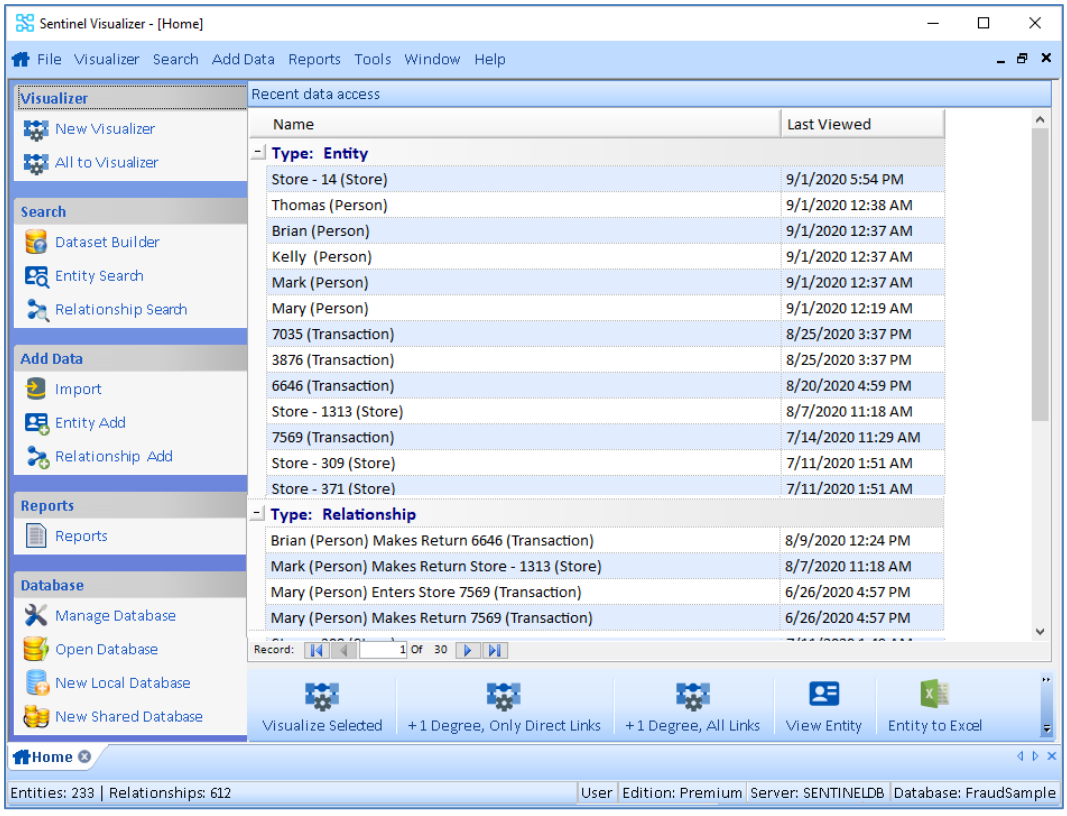
### Interruptible and Smoother Exit

When closing the database or exiting the application, the forms close more smoothly. When a form prompts to be saved, you can cancel and stop the entire exit process.

## Improved Home Page

### Most Recently Used (MRU) Entities and Relationships

When you select an entity or relationship to add to the Visualizer or view its details, it gets added to the MRU list. The list is displayed on the Home page and search forms to make it easy to perform actions on your move common items.

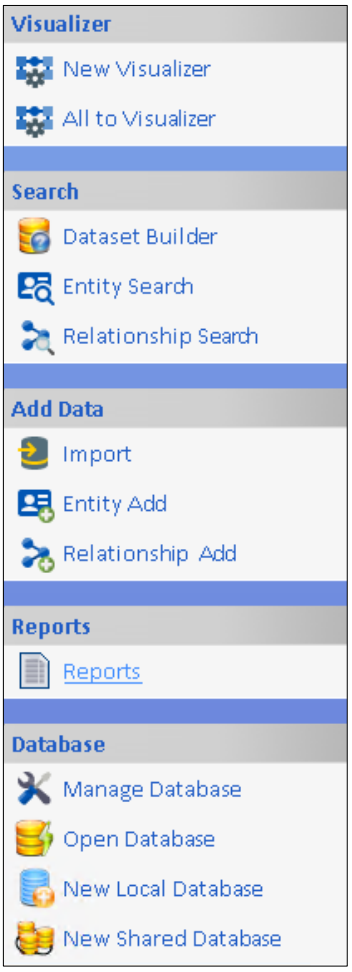



You can select one or more items to send them to the Visualizer, view their details, or export their information to Excel:

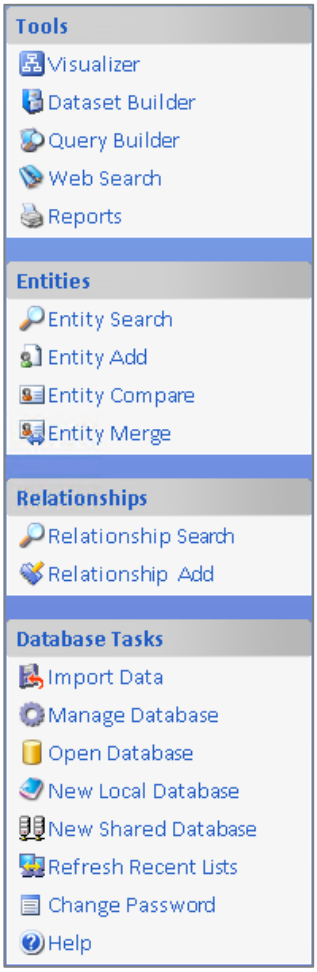
### Reorganized Left Panel

Left border options are simplified and reorganized for priority such as [All to Visualizer] to send all your data to the Visualizer with one click:

*Version 9*




*Version 8*

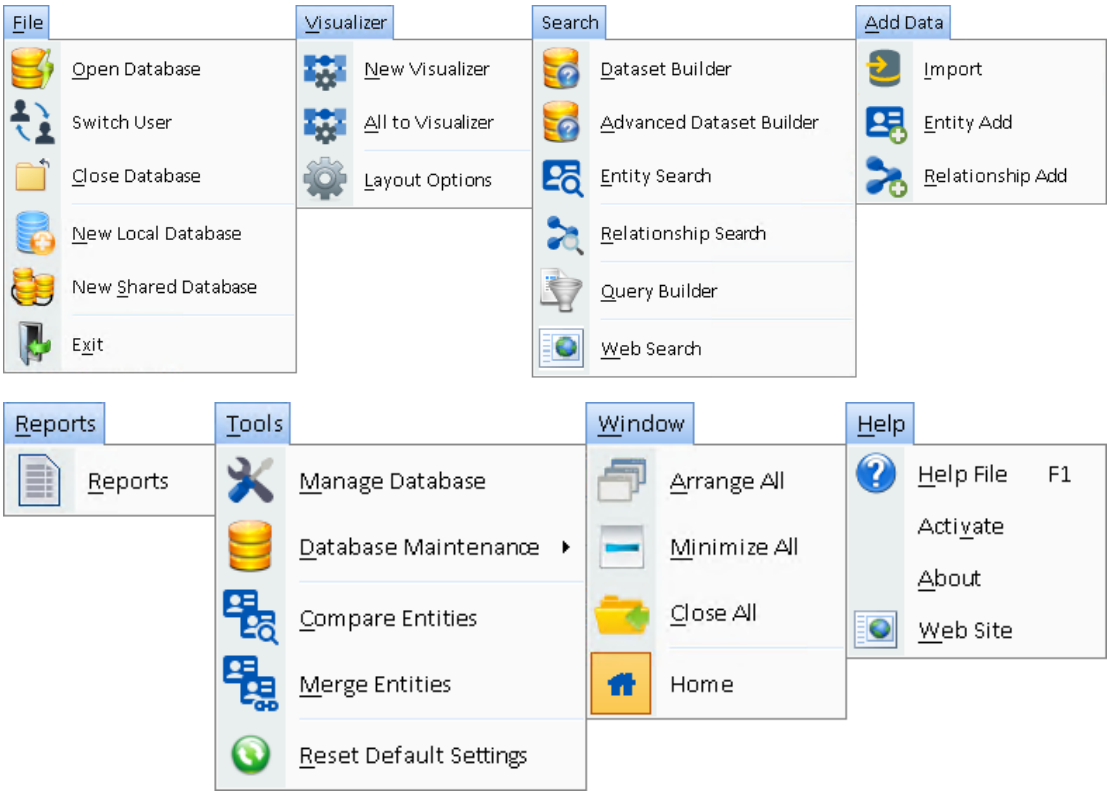



## Send All Data to Visualizer

One of the most popular new features is the left border link “All to Visualizer” that sends all the data from your database directly to the Visualizer diagram. This replaces the cumbersome 5 step process through the dataset builder in version 8.

## Reorganized Top Menu

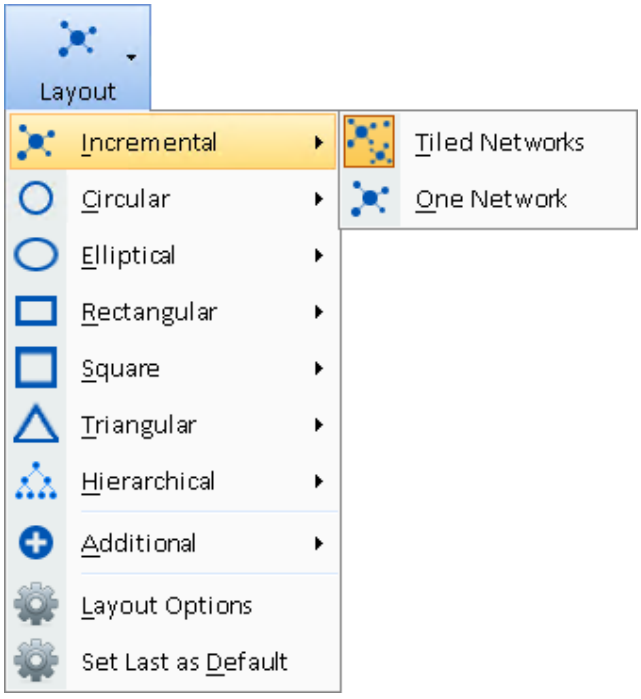
The top menu is reorganized to match left border with additional options such as Visualizer Layout Options, the new Search, Advanced Dataset Builder and Tools, Restore Default Settings:



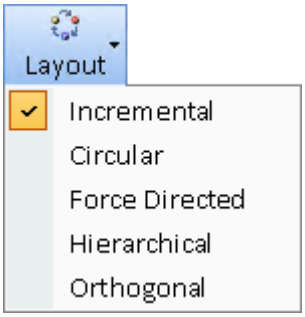

## New Visualizer Layouts and Enhancements

Version 9 offers many new layouts and variations among them so you can quickly change how your entities are displayed:

***Version 9***



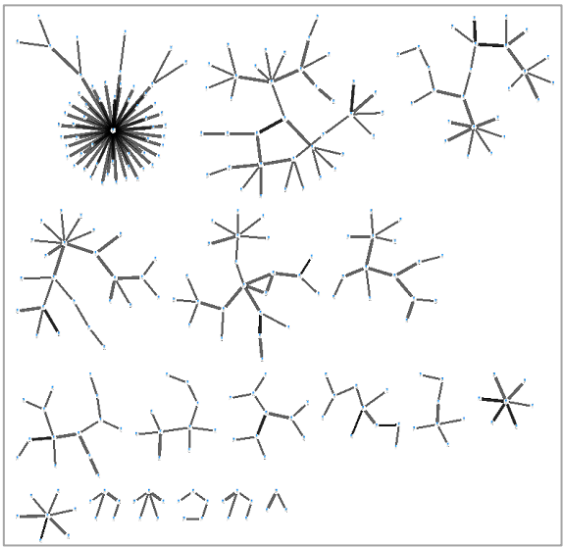

***Version 8***



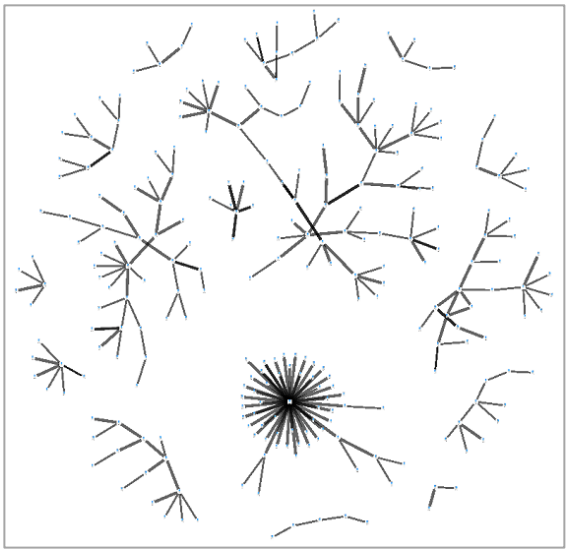
## Incremental Layouts Tiled or One Network

If the data on the Visualizer includes multiple, disconnected sets of entities (networks), the layout now tiles each network more efficiently. They are sorted by tallest to shortest heights, and “word-wrap” around the largest (first) network. Incremental layouts can tile each network separately or put them all in one block around a central point.

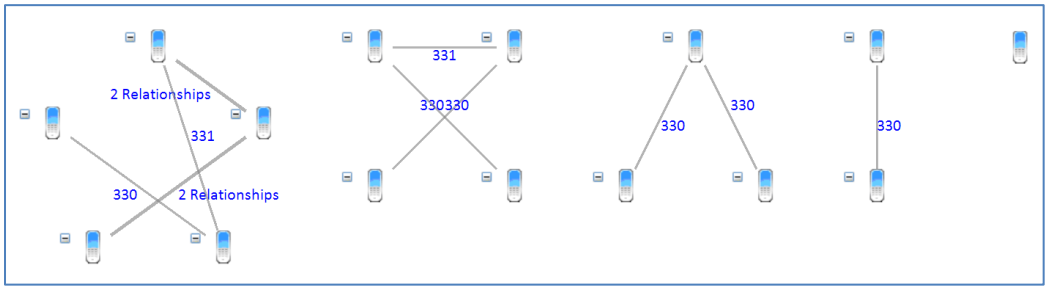
***Tiled Networks***



***One Network***



For small networks of 5 or fewer entities, standard layouts are used for consistency:



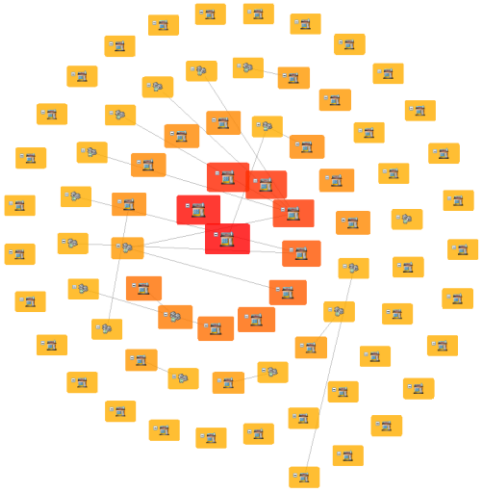

For more details, see **Incremental Layout** on page 132.

## Geometric Shape Layouts

New geometric layouts offer circular, elliptical, spiral, rectangle, square and triangle shapes. Entity order is for selected entities first then sorted based on the selected gradient option.

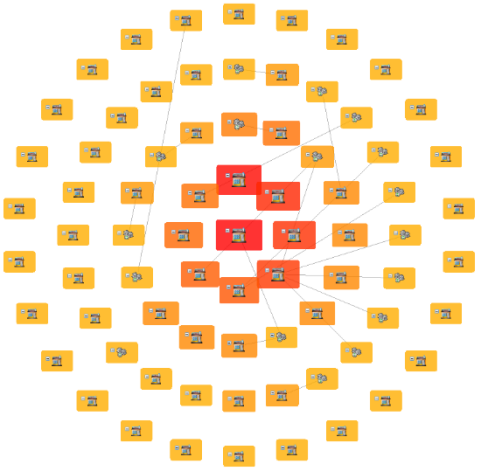
### *Circular Spiral*

Entities are sorted from the center and grow out in a spiral (with gradient on Lines Out):



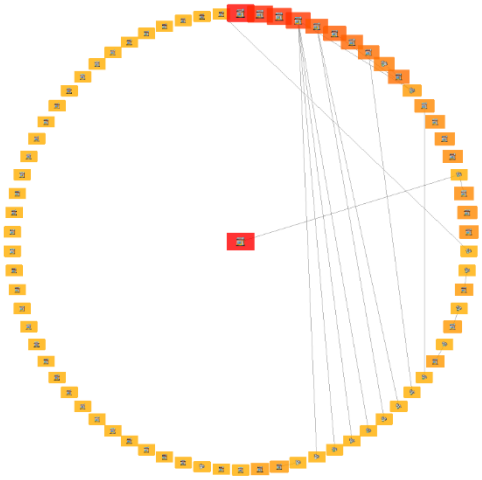
### *Circular Concentric*

Entities are placed in larger circles from the center out:



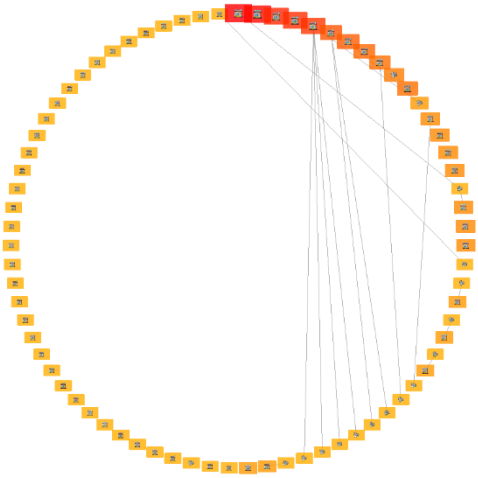
### *Circle with Center*

All the entities are in one big circle with the first one in the center:



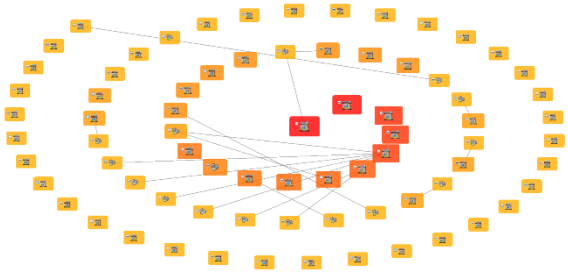
### *One Circle*

All the entities in one circle:



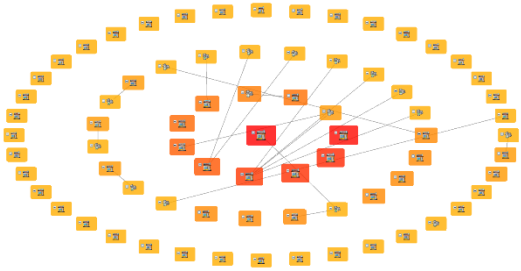
### *Elliptical Spiral*

Entities are sorted from the center and grow out in a spiral:



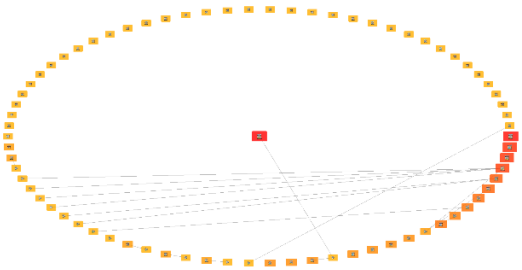
### *Elliptical Concentric*

Entities are placed in larger ellipses from the center out:



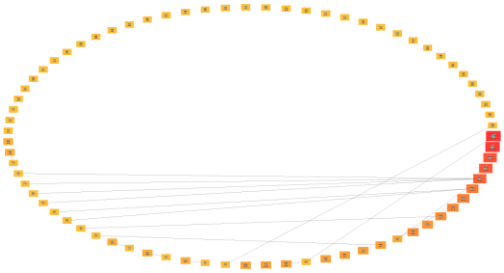
### *Ellipse with Center*

All the entities are in one big ellipse with the first one in the center:



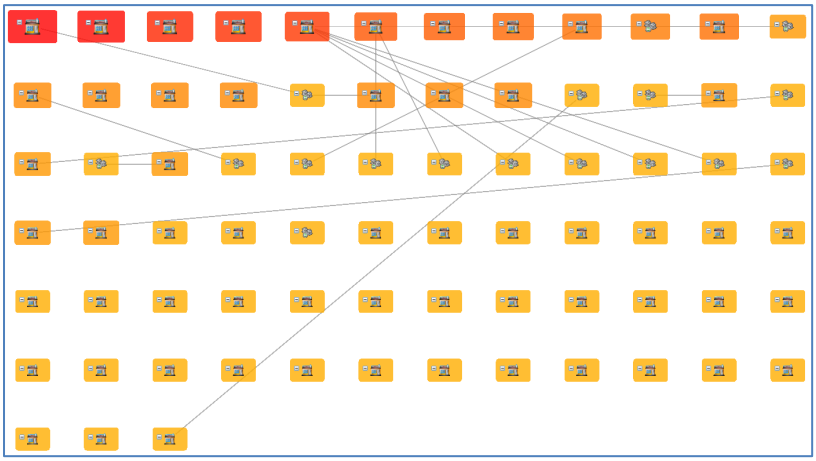
### *One Ellipse*

All the entities in one ellipse:

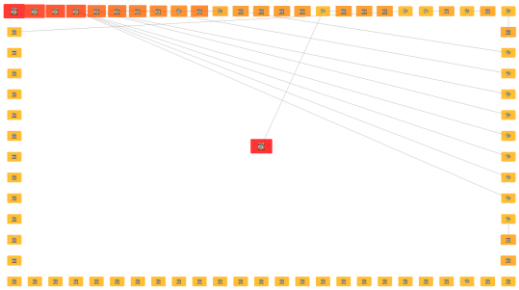
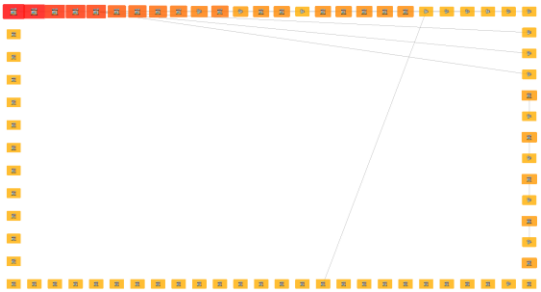


## *Rectangular Layouts*

The Rectangular layout option arranges entities in a rectangle that fills your Visualizer window starting from the top left corner.



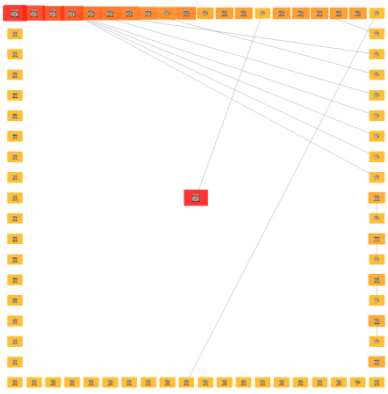
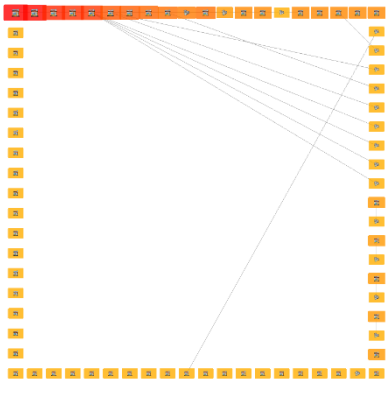
*Filled Rectangle*

| *Rectangle with Center* | *One Rectangle* |
| --- | --- |
| All the entities are in one big rectangle with the first one in the center: | All the entities in one ellipse: |
|  |  |

## Square Layout

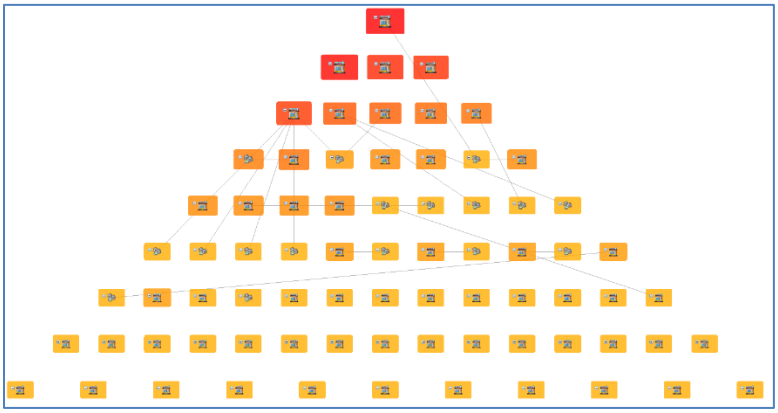
The Square layout option is similar to Rectangular except the entities are in a square.

*Filled Square Layout*

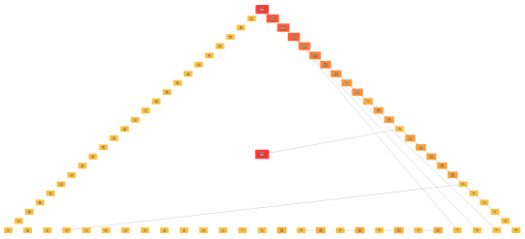
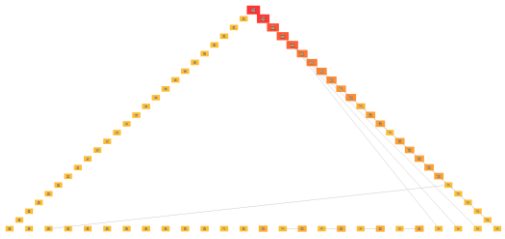
| *Square with Center* | *One Square* |
| --- | --- |
| All the entities are in one big square with the first one in the center: | All the entities in one square: |
|  |  |

### *Triangular Layout*

The Triangular layout organizes the entities in a triangle that fills the Visualizer window.



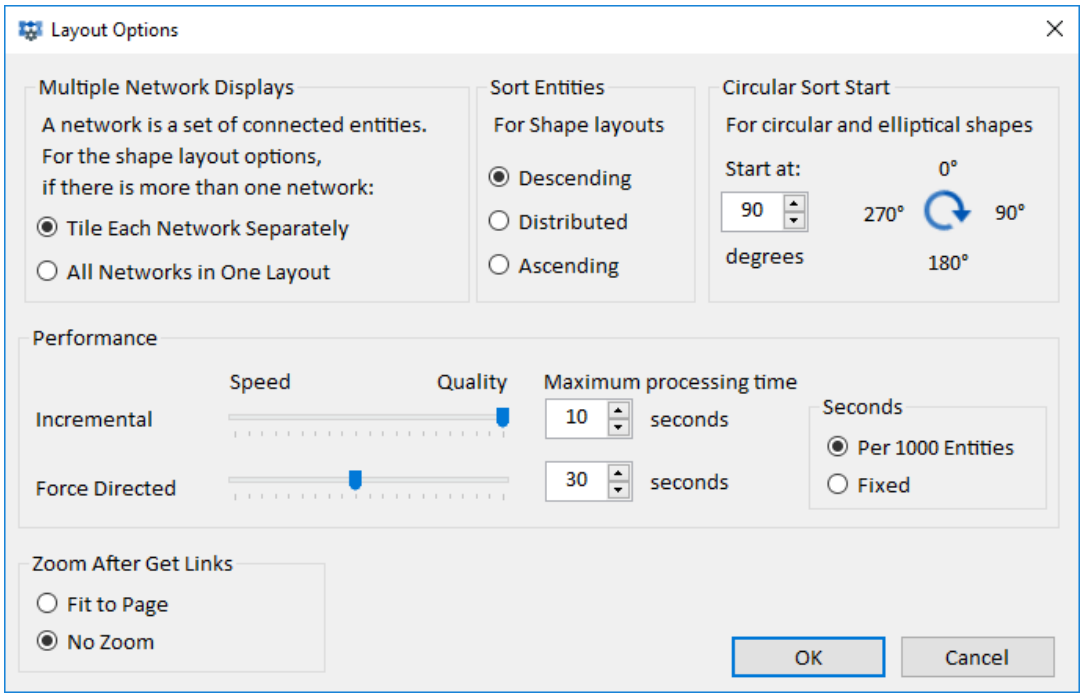
*Filled Triangle*

| ***Triangle with Center*** | ***One Triangle*** |
|---|---|
| All the entities are in one big triangle with the first one in the center: | All the entities in one triangle: |
|  |  |

## Layout Options

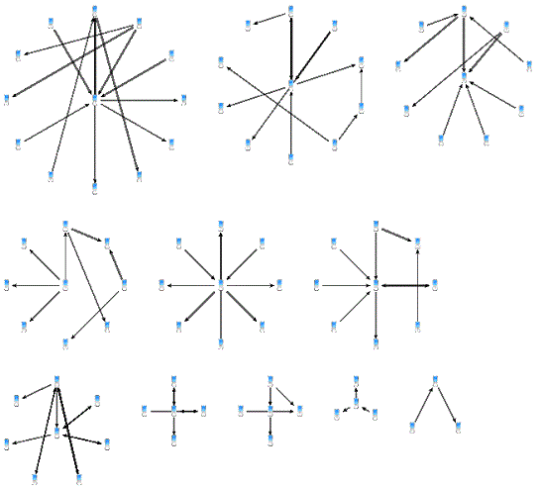
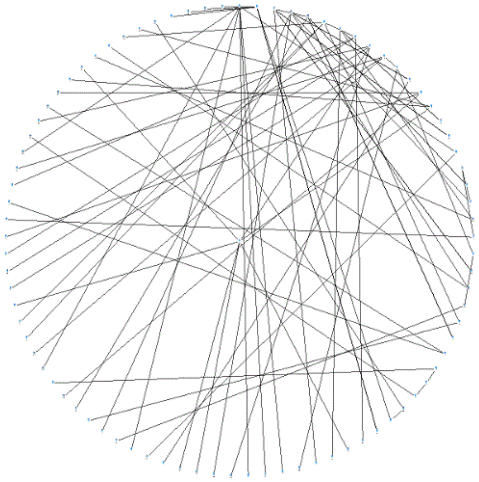
Layout options are reorganized so some of the options such as hierarchical direction and orthogonal size are removed and appear on the menu to make it easier to select.

New options let you customize the layouts, so all the entities are displayed in one shape, or each connected sets of entities (networks) displayed separately. You can also set the sort order and the angle to start circular layouts:




### *Multiple Network Displays*

If the entities on your Visualizer are all connected to each other, there is only one network. If they are disconnected, there are multiple networks. This option lets you tile them in separate shapes for each network or all in one large layout.

| *Each Network in Separate Circle with Center* | *All Networks in One Circle with Center Layout* |
|---|---|
| Each of the networks is displayed in its own Circle with Center | All the entities from all the networks are arranged in one Circle with Center |
|  |  |

### *Sort Entities*

Entities are sorted in the shape. This option lets you sort them in ascending, descending or distributed order based on the currently selected entity gradient or range filter. If none is selected, sorting is based on Line Count.

### *Circular Sort Start*

For the circular and elliptical shapes, you can specify where on the circle it starts.

### *Performance*

Use the slider controls to balance speed and quality. Faster speed yields quick results, but the resulting organizational layout may not be ideal. Conversely, moving the slider to the right for quality takes more processing time, but results in a better visual layout.

Limit the maximum time the Incremental layout algorithm uses. Note this is just the layout processing time and does not include the time to load the data.

The time can be adjusted based on the number of entities to allow more time for larger diagrams or set to the fixed time regardless of size.

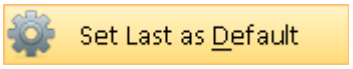
### *Zoom After Get Links*

After Get Links on an entity, you can automatically Fit to Page to see all the newly added entities. Choose No Zoom to remain with the same view where the new entities may be off screen.

### Set Last Layout as Default

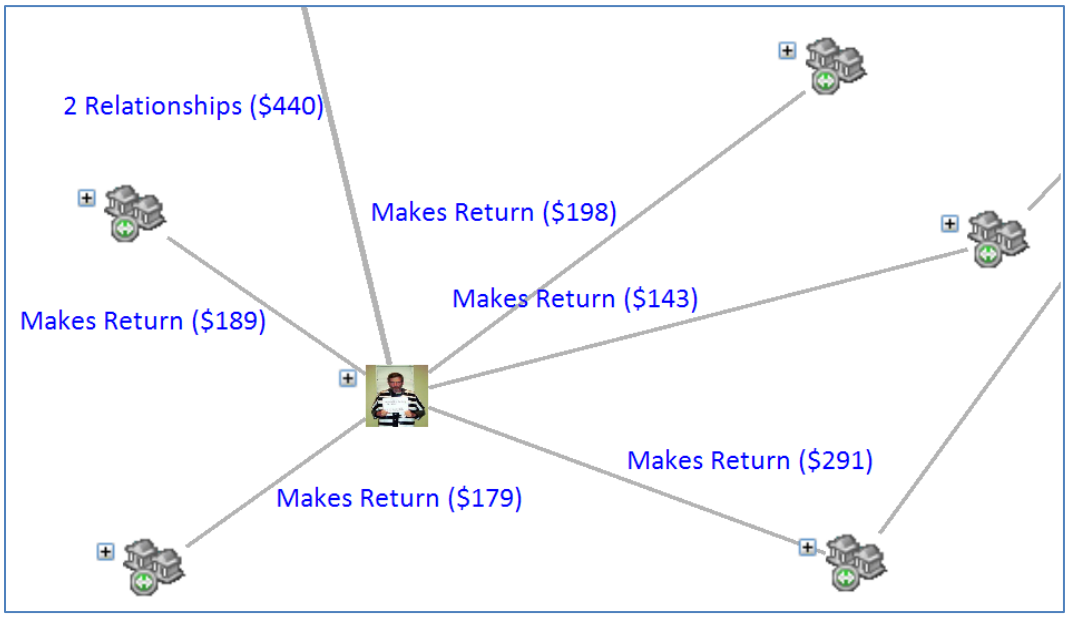
The last layout type you select is highlighted. By default, it is Incremental Layout, Tiled Networks. When you send entities to a new diagram, this is the layout that is applied.

You can change the default, by applying the layout you want, then clicking Set Last as Default.




## Relationship Lines with Sum

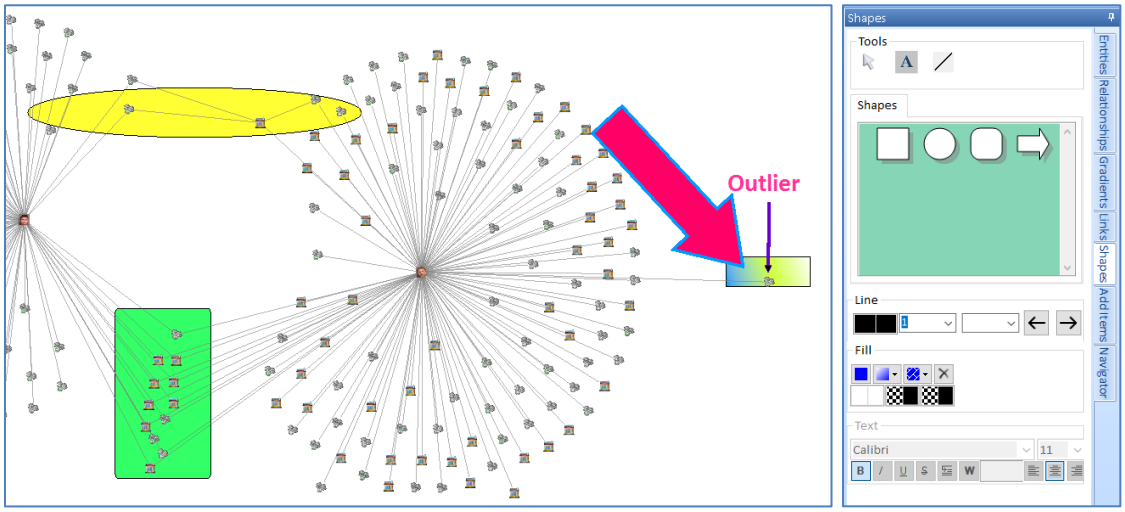
There is a new option to show the sum of values on the line for all the relationships between two entities with numeric formatting options:




*Lines Show the Sum of its Relationship Values with Numeric Formatting Options*

# Add Text, Lines, Boxes and Arrows to Visualizer Diagrams

You can now annotate your diagram with shapes: text, lines, rectangles, circles, arrows, etc. with a variety of color, size, and font options.




*Example of Shapes on the Diagram and the Shapes Panel*

Better explain your findings directly on the diagram.

# Undo and Redo Visualizer Changes

Multi-level Undo and Redo are now available to reset the last addition or removal of entities, relationships, shapes, layouts, transformations, and other significant changes to the diagram.

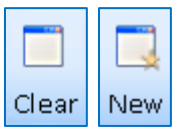
Make changes without worrying that you made a mistake.

# Visualizer Toolbar Enhancements

The Visualizer toolbar has updated icons and reorganized:

## Clear and New Buttons

The Clear button performs what the previous New button did which is clear the current window. The New button creates a new, empty Visualizer window.



## Open and Save Buttons

Open and Save buttons and related dialogs are improved and simplified. When selecting a saved diagram to open, the number of entities and relationships in each saved diagram is displayed in the open list.

Compared to version 8, more styles, zoom level, and other settings are saved for a more accurate retrieval.

## Diagram Merge

When a diagram is opened on an existing diagram, you have the option to merge it. This makes it easy to combine multiple diagrams into one.

## Entities are Added with Links to All Other Entities

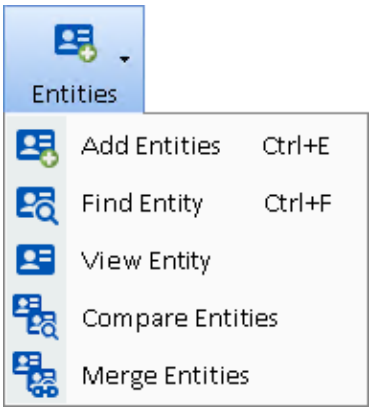
When Entities are added to the Visualizer from the Entity Search, Add Entities, or Get Links, their links to each other and all existing entities are automatically added. Previously, links were only drawn from the entity that added the links.

An option to add linked entities with only direct connections remains.

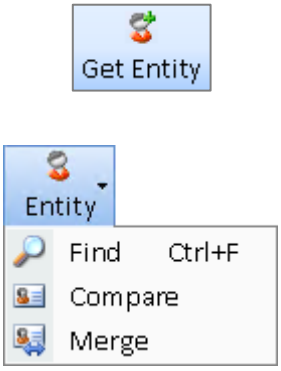
## Entities Button

Entities button combines the former Get Entity and Entity buttons. It includes Add and consolidates the other entity item such as Find, View, Compare and Merge:

***Version 9***




***Version 8***




- The Add Entities form is similar to the entity search and dataset builder forms, displays the recently selected entities and supports many more search options than before.
- Find Entity searches for entities and now remembers your last search term.
- View Entity opens the updated entity detail form for the selected entities.
- **Entity** Compare **Entities** and **Entity** Merge **Entities** forms are both enhanced.

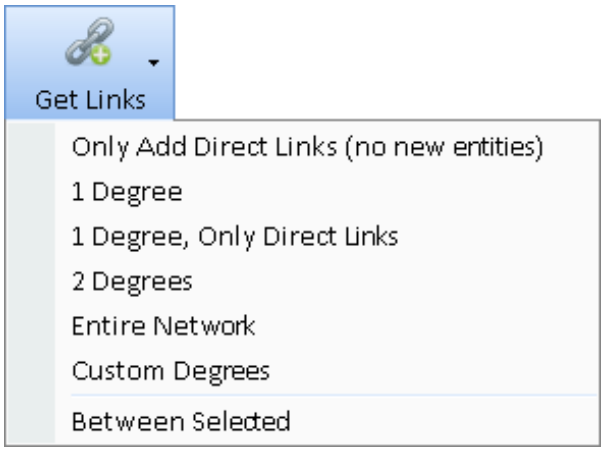
## Get Links Button

Get Links adds entities and relationships to the diagram for the selected entities.

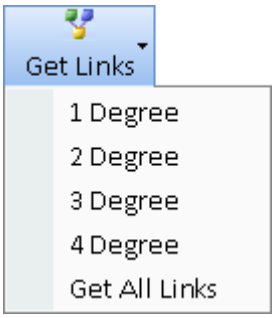
- Previously, you needed to select entities before adding their links. Now, if no entities are selected, all entities on the diagram are considered selected (similar to Ctrl A to Select All).
- When new entities are added to the diagram, they are added with links to all other entities on the diagram. Previously, Get Links would only add the lines linked to the selected entity.

The button is enhanced with more options:

***Version 9***




***Version 8***



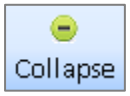

- **Only Add Direct Links** is a new feature that retrieves the relationships missing between entities already on the diagram. It does not add new entities. This feature ensures all the connections among the entities on the diagram are included.
    - The previous **Get All Links** added the links across the diagram but also added entities one degree.
- **1 Degree** adds entities linked to the selected entities. When the new entities are added, they can just have links to the selected entities (**Only Direct Links**) which was the previous behavior, or links to all the entities on the diagram including the other newly added entities.
- **2 Degrees** adds entities linked to the selected entities, plus the entities linked to them. They are always added with links to all the existing entities and each other.
- **Entire Network** is a new feature that retrieves the entire set of entities connected to the selected entities no matter how many degrees apart they are.
- **Custom Degrees** is a new feature to add entities up to 99 degrees from your selected entities. Previously, only entities up to 4 degrees could be added at one time.
- **Between Selected** replaces Link Traversal from the former Visualize panel and adds the fewest entities to connect all your selected entities. Previously, Link Traversal only analyzed one pair of entities.

## Collapse Button

Collapse removes entities linked to the selected entity if they are not linked to other entities. In version 9, linked entities that are only linked to other linked entities are also removed.

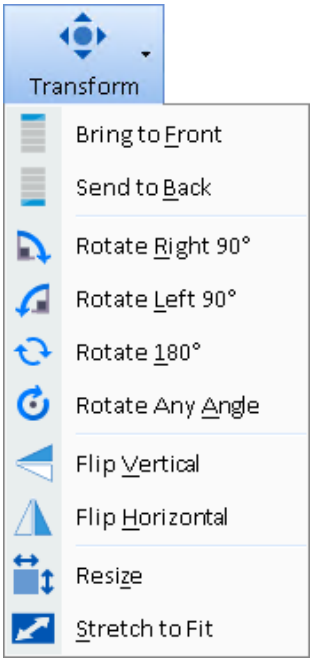
***Version 9***

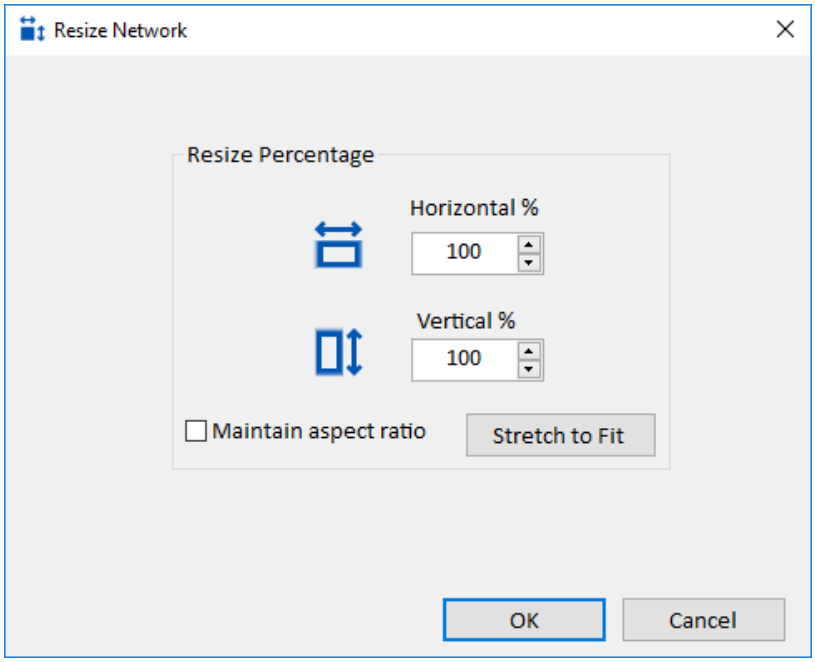
***Version 8***




## Transform Button

The new Transform feature lets you move objects forwards or backwards, rotate the entire diagram, flip it horizontally and vertically, and resize (stretch) it.

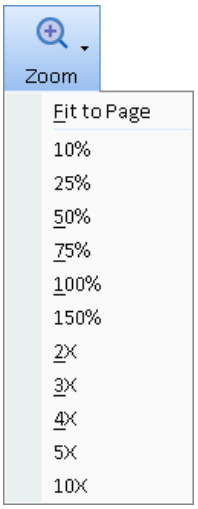


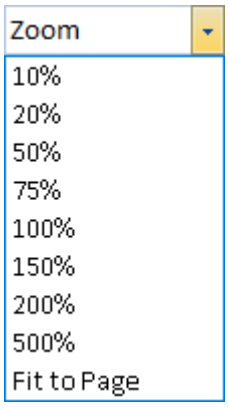

## Zoom Button

There are more Zoom % options, and Fit to Page is moved to the top:

***Version 9***




***Version 8***

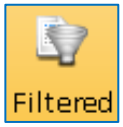



If an entity is selected, zoom centers on it. This lets you select an entity in a complex diagram and automatically zoom to or from it. If no entity is selected, zoom maintains the same center.

## Filtered Button

Filtered consolidates the previous Filtered and Unlinked items. When highlighted, it indicates that the current diagram is displaying a filtered subset of the data:

***Version 9***

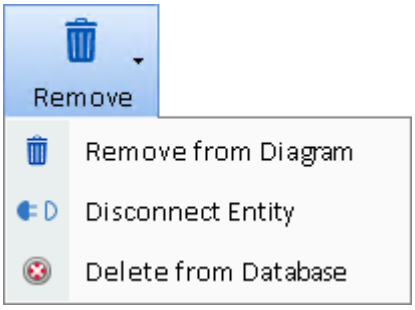



***Version 8***

## Remove Button

Remove replaces Delete with options to remove items from the diagram versus the database. You can also disconnect the selected entities from others by removing their relationship lines.

***Version 9***

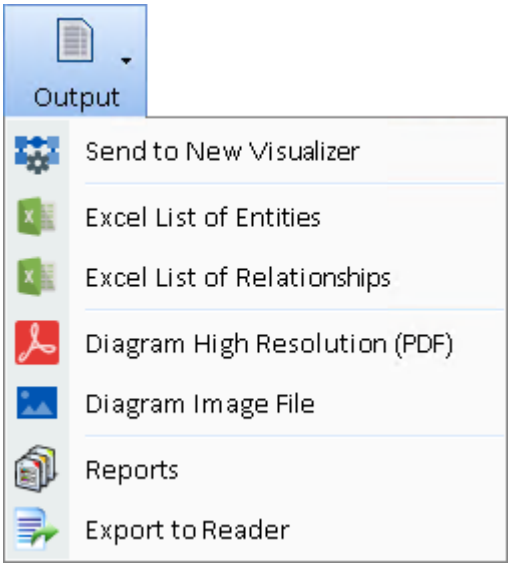



***Version 8***

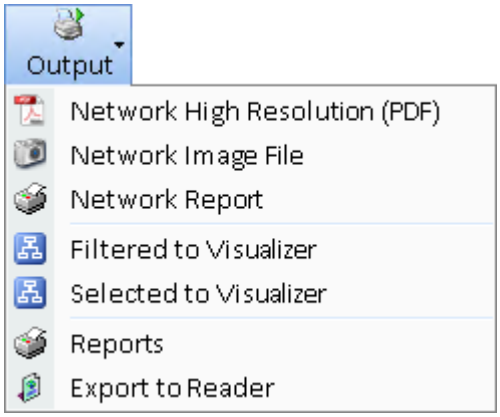
## Output Button

Output button offers many options including new items to export the list of entities and relationships on the diagram to Excel spreadsheets.

***Version 9***



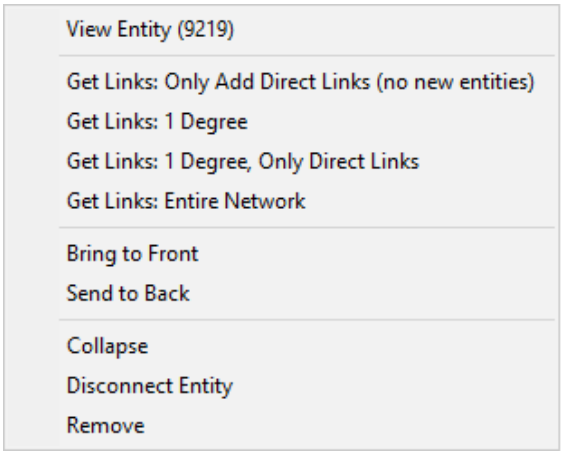

***Version 8***




The **Selected to Visualizer** item is removed and its functionality replaced on the Links panel which has options to filter to the selected entities or the Selected Entities and their connected entities. With that, you can use the **Send to New Visualizer** to send them to a new window.

### Context Right Click Menu

When using the diagram, you can right click to bring up a context sensitive menu. Version 9 offers a much richer context sensitive menu.



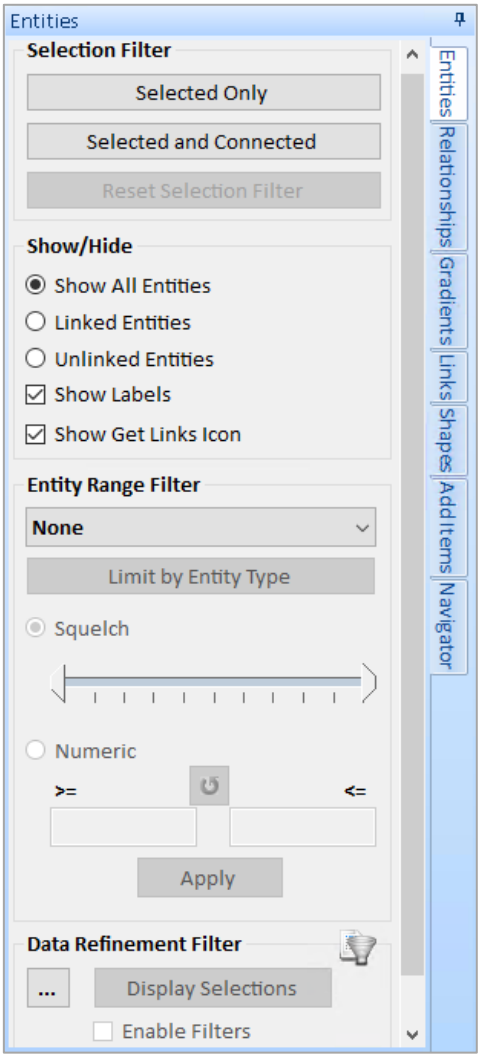

The appropriate menu appears to manage the entire diagram, or your selected entities and/or relationships. These simplify selecting similar options from the toolbar.

## Visualizer Entities Panel

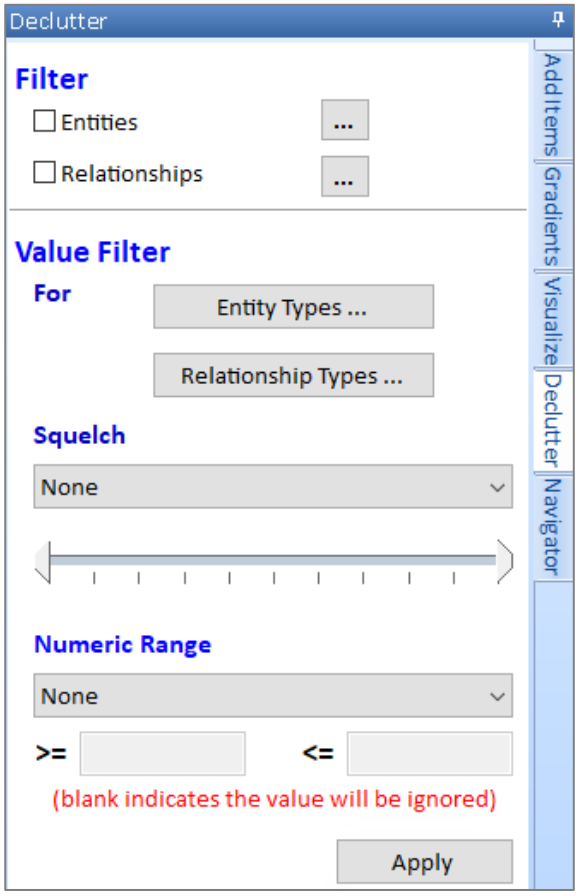
The former Declutter tab is split into the Entities and Relationships tabs. On the Entities tab, you can filter entities and their values:

- The new Show/Hide feature lets you quickly filter to just the linked and unlinked entities.
- The Show Labels check box moves this feature from the Visual Styles settings form to this tab to let you toggle this option and see it on the diagram. Note that the label is always hidden if the zoom level is less than 45%.
- The field with the value to filter is now the first choice and specified in one drop down list rather than separately for Squelch and Numeric.
- After the field is selected, the option to limit it to entity types is next rather than the first option before.
- The Squelch bar uses a log rather than linear scale to be more selective to smaller numbers.
- For Numeric, a button is available to fill the low and high values for the data in the diagram. This makes it easier to refine the actual values.
- Data Refinement is the former Filter feature and moved to the bottom. This is used to remove the entities on your diagram, so it is named distinctly from filtering. It uses the same entity selection options as the Advanced Dataset Builder.

*Version 9*



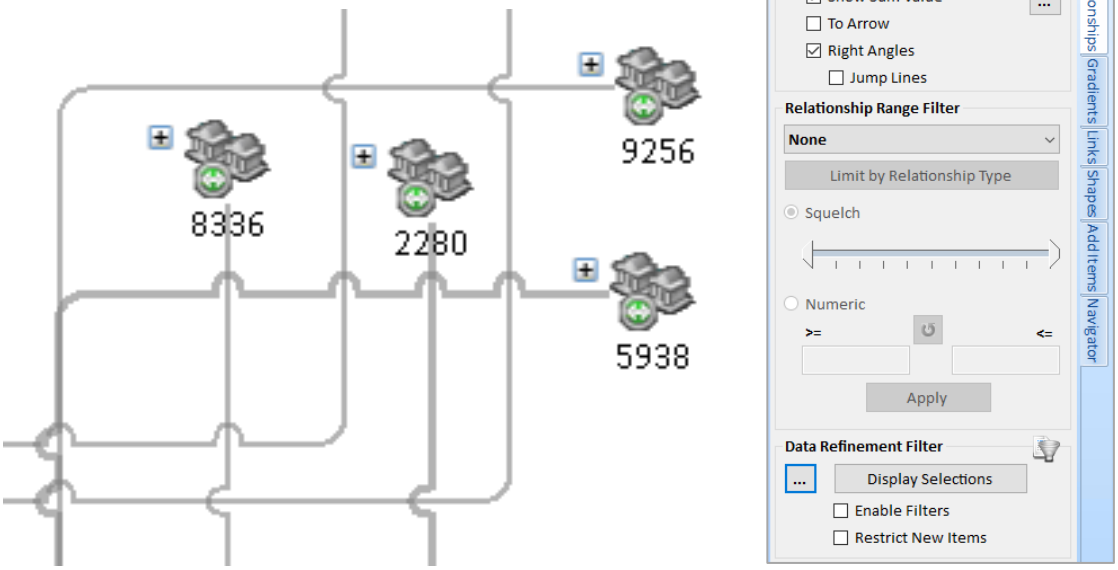

*Version 8*




## Visualizer Relationships Panel

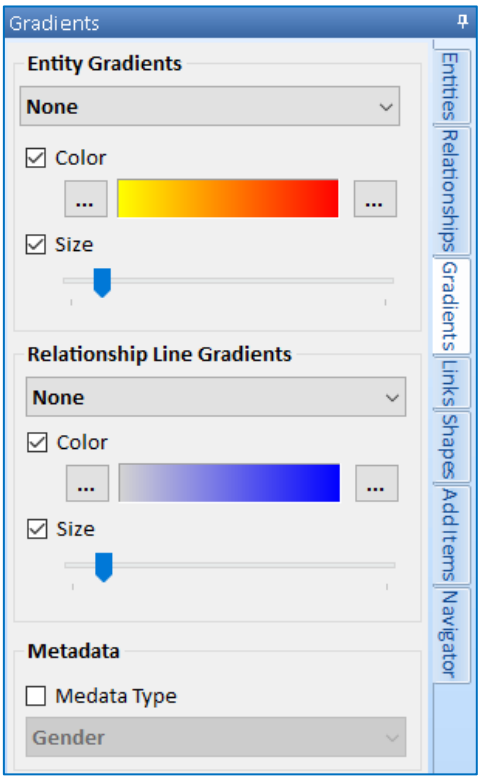
The Relationships tab includes the Relationship options that were on the previous Declutter tab and the Visual Styles settings form. It includes Relationship Line options to:

- Show lines. By turning this off, just the entities are displayed.
- Show labels on lines which shows the relationship type and if the line represents more than one relationship, the number of relationships.
- Show the sum of the value of all the relationships in a line with formatting options
- Display the lines with arrows is the relationship has a direction.
- Show lines with 90-degree right angles and if so a jump line option:

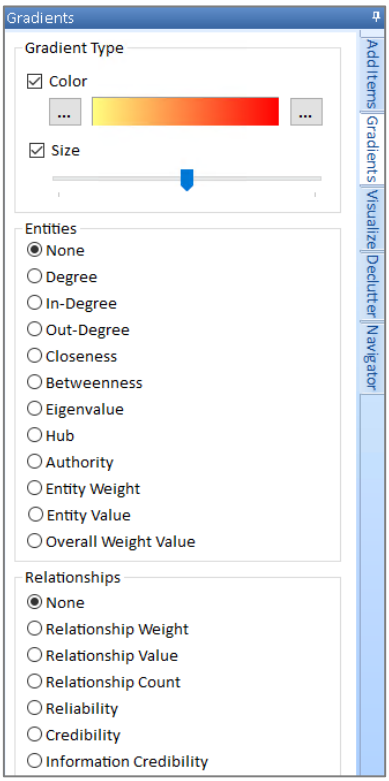



# Visualizer Gradients Panel

***Version 9***




***Version 8***




The Gradients panel is enhanced with:

- Separate sets of colors and size gradients for Entity and Relationship values.

- Field selections are in drop down lists rather than radio buttons.
- Metadata type moved here from the Visualize tab.

## Visualizer Links Panel

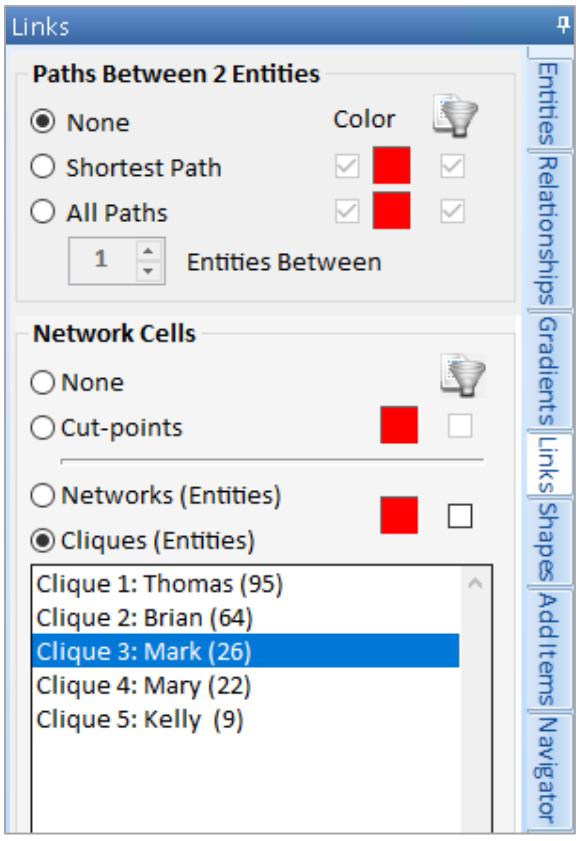
The new Links tab incorporates features from the former Visualize tab with new features:

- Selected Entities lets you select entities on the diagram and filter to just them or them and their connected entities. This lets you quickly focus on the items you want and use Output to a new Visualizer window to perform further analysis on them.
- After selecting two entities, display the shortest path between them and filter to them.
- Shortest path previously always displays a path if the two entities are connected. Previously it would not display entities that were far apart.
- The All Paths feature has an option to set the number of degrees between them so you can control how many jumps to include between the two entities.
- Cut points and Cliques can be filtered.
- Setting colors no longer uses the […] button. Just click on the color square.

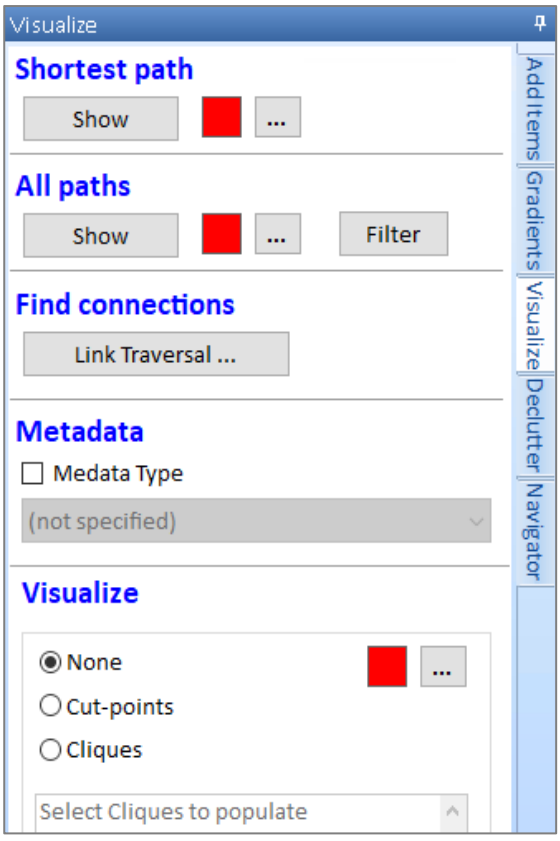
The Link Traversal feature is now under the Get Links button as Between Selected.

The Metadata option which colors entities based on its value is moved to the Gradients tab.

***Version 9***




***Version 8***

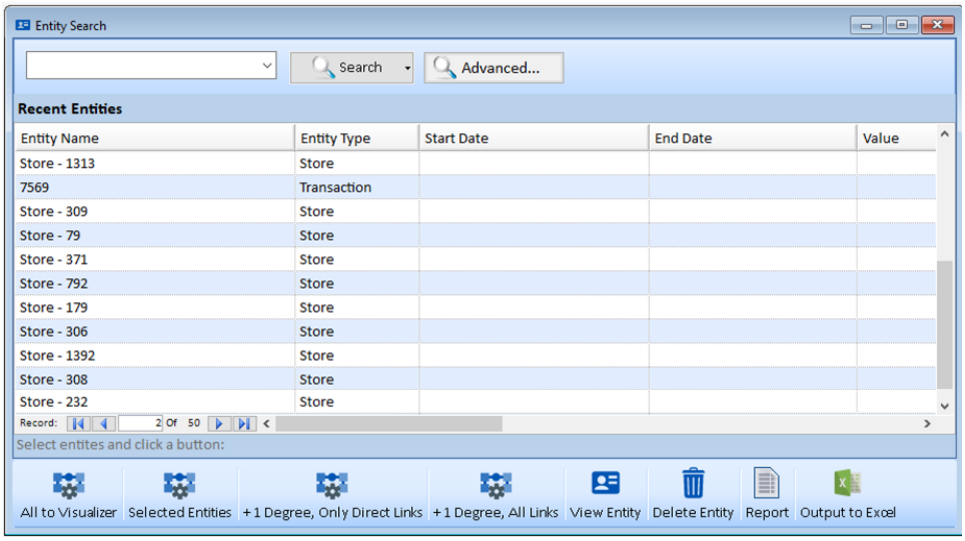



### Diagram Tab Panels Hidden for Timeline and Map

The panels that are specific for the Diagram tab are hidden on the Timeline and Map tabs.

# Entity Search Enhancements

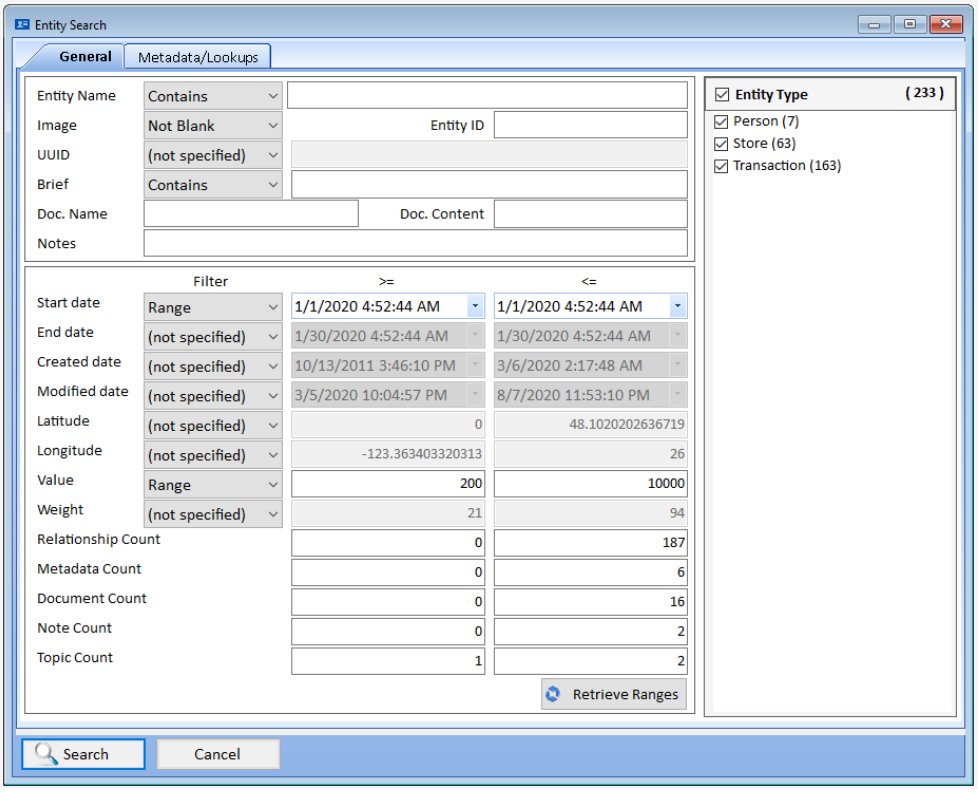
The entity search form is redesigned to be more powerful and easier to use. When the form appears, the list of last selected entities appears to eliminate the need to search. There are options to select and send it to Visualizer, view its details, or export it.




*Entity Search form with List of Recent Entities to Select and Toolbar with Actions*

## Advanced Entity Search

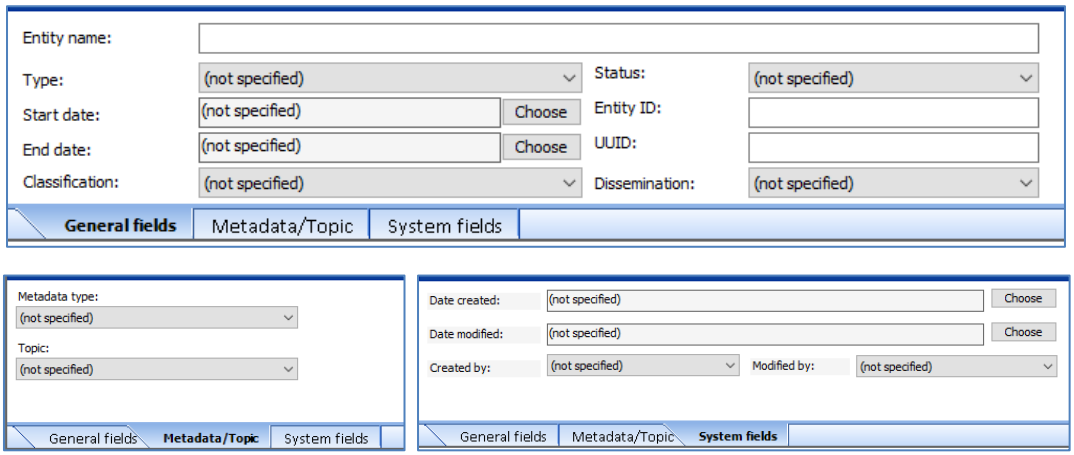
The advanced entity search provides the ability to search many more fields for specific values, numeric and date ranges, blank or not blank, and even document text contents.




*Entity Search, General Tab to Specify Values, Ranges, and Entity Types*

There is also a Metadata/Lookup tab to search for up to 3 metadata values and other entity lookup values. This entity search is also in the Advanced Dataset Builder and the Visualizer's entity refinement. For more information see **Advanced Entity Search** on page 59.

Version 8's search was much more basic with fewer options across three small tabs:




## New Version of Microsoft SQL Server Express

Version 9 ships with Microsoft SQL Express Advanced 2019 configured to support document content full text search. Databases for version 9 also adds referential integrity.

Version 8 shipped with SQL Express 2016.

## Document Content Search

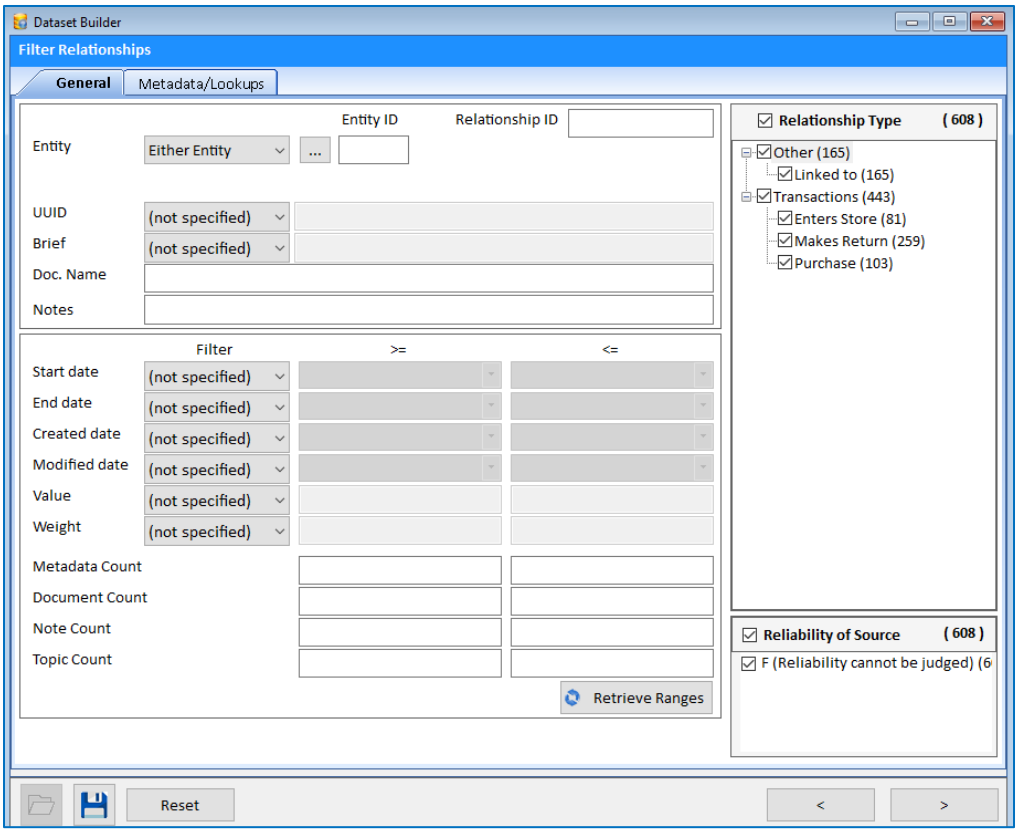
Entities and relationships can have an unlimited number of documents associated with them. If the documents are embedded (rather than linked), Sentinel Visualizer now supports searching the text contents of the documents. Your documents can be text files, Microsoft Excel and Word documents, PDF, etc.

Under Advanced on Entity Search and Relationship Search, or in the Advanced Dataset Builder, enter the text to search under Doc. Content:

This retrieves the list of entities or relationships with at least one document that contains your search text. In the Advanced Dataset Builder, the results also list the specific documents.

## Relationship Search Enhancements

The Relationship Search form it reorganized similar to Entity Search with search criteria on top, results below it, and options under that. Criteria are organized in tabs with localization and color support. The criteria section is expandable/collapsible to show more results.

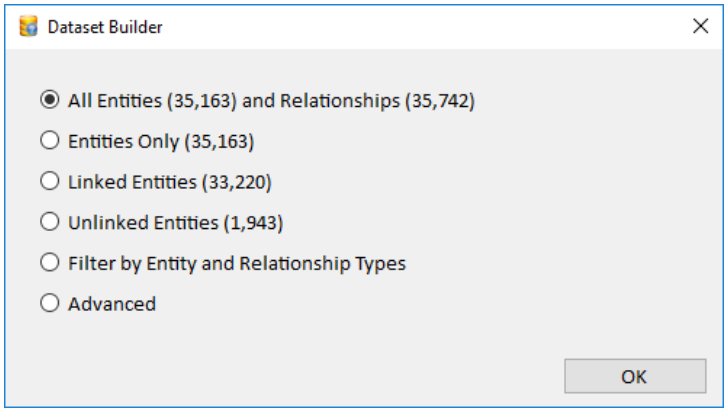



*Advanced Relationship Search, General Tab to Specify Values, Ranges, Relationship Types and Reliability*

The Metadata/Lookup tab is similar to the Entity Advanced Search.

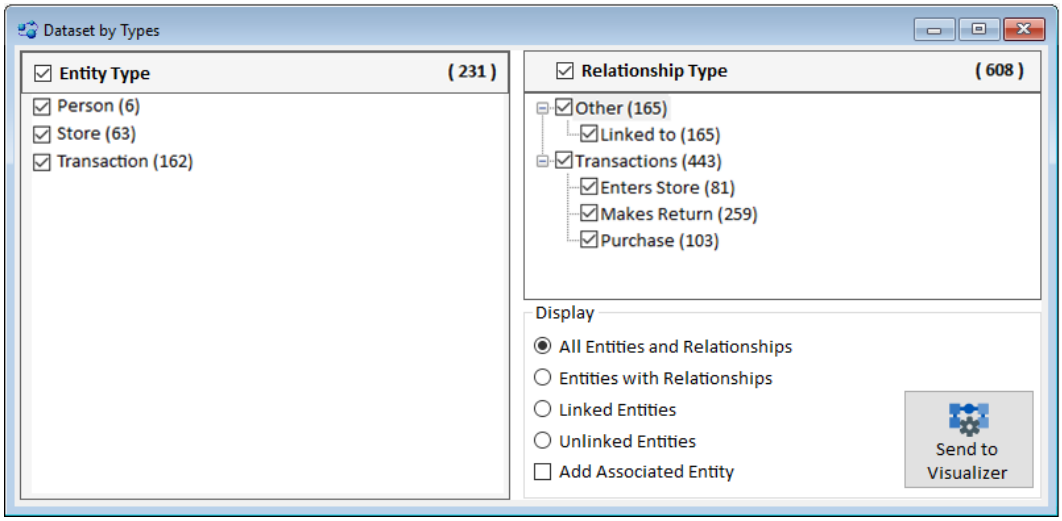
# New Dataset Builder

The Dataset Builder is redesigned to simplify the most common tasks of retrieving data from your database with one click. See the number of entities and relationships with each option, and easily send all data, only connected or disconnected entities to the Visualizer.




### *Filter by Entity and Relationship Types*

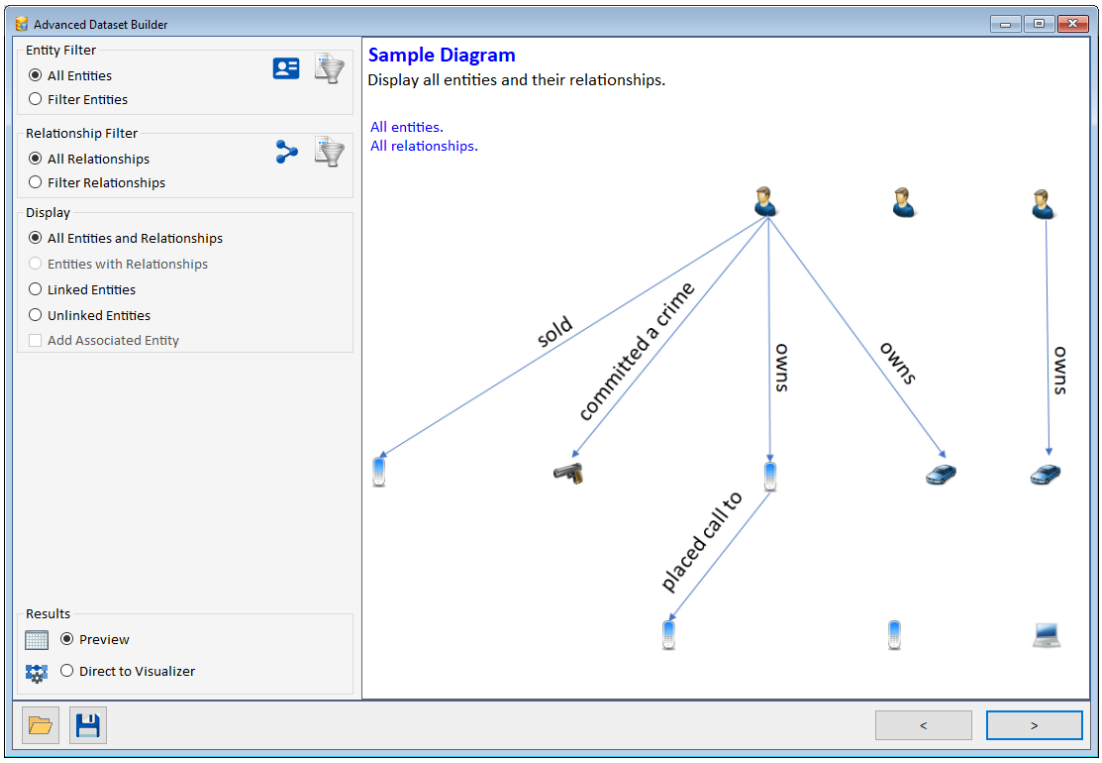
Easily select Entities and Relationships by their type with this new feature:




Notice each type displays the number of entities or relationships for it, and the total of selected items is displayed at the top of the list.

## Advanced Dataset Builder

The new Advanced Dataset Builder is a very powerful wizard to find the entities and relationships you want. It combines the advanced entity and relationship search features with additional options on which to include based on their links to each other.




*Advanced Dataset Builder with Entity and Relationship filters with Link Options*

There are separate pages for filtering entities and relationships, reviewing the results, and sending it to a new Visualizer window. The first page has descriptions and graphics illustrating the combination of your filter and display selections.

More information on all the powerful feature of the **Advanced Dataset Builder** on page 90.

## Import Wizard Enhancements

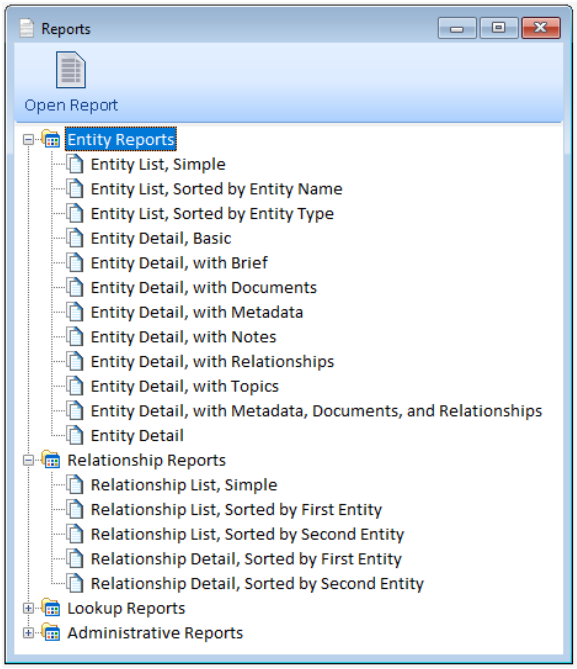
The import wizard is easier to use and catches common mistakes such as warning when the import entity and relationships do not exist in current database. It no longer defaults to the previous entity and relationship types, so you specifically select it.

The user interface is improved with the toolbar icons enlarged and more modern; New is renamed to Clear, and tabs in the bottom section are moved above it.

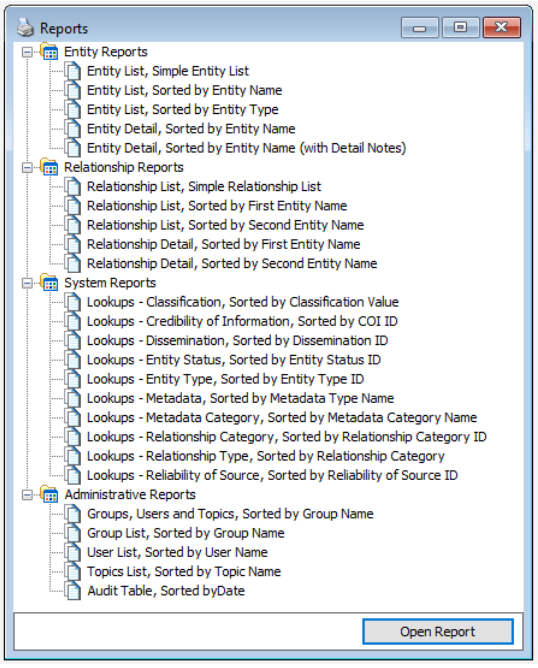
## Report Enhancements

Selecting reports from the home page or menu gets all the data without the need for selection. You can use the Advanced Dataset Builder to select your data and generate reports from that.

***Version 9***




***Version 8***

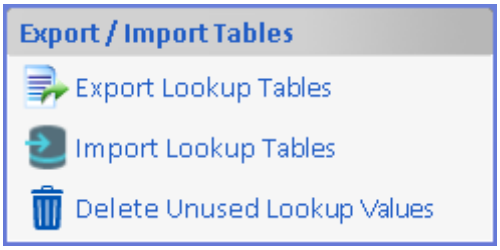



- A toolbar is added to the top with the Open Report button
- New entity reports were added to display entity details such as briefs, documents, metadata, notes, relationships, and topics.
- Reports can be exported to Excel XLSX format with improved layouts to save data in spreadsheet cells.
- Layouts and footers are consistent and standardized across reports.

# Entity and Relationship View/Edit Enhancements

- The Add Entity and Add Relationship forms now open as dialog and are easier to use.
- The user interface has more modern and consistent icons on the toolbar, tabs, and lookup forms. Fields are displayed similar to their layout in the Entity Search and Dataset Builder.
- The toolbar adds a Delete button to delete the current entity or relationship.
- For the Entity form, the Add Relationship item is moved to the Relationships tab.
- UUID field is editable
- The Relationship editor lets you flip the entities with one button or change them.

# Export and Import Lookup Tables, and Delete Unused Values




All the values in your lookup tables can be exported to a Sentinel Visualizer Lookup file (*.SVL) that can be imported by another database. This is a quick way to update the lookup values across databases or create new databases with a custom set of lookup values.

During import, there are options to update and delete lookups in your current database from the import file.

### *Delete Unused Lookup Values*

You can also delete all the lookup values in the current database that are not used.

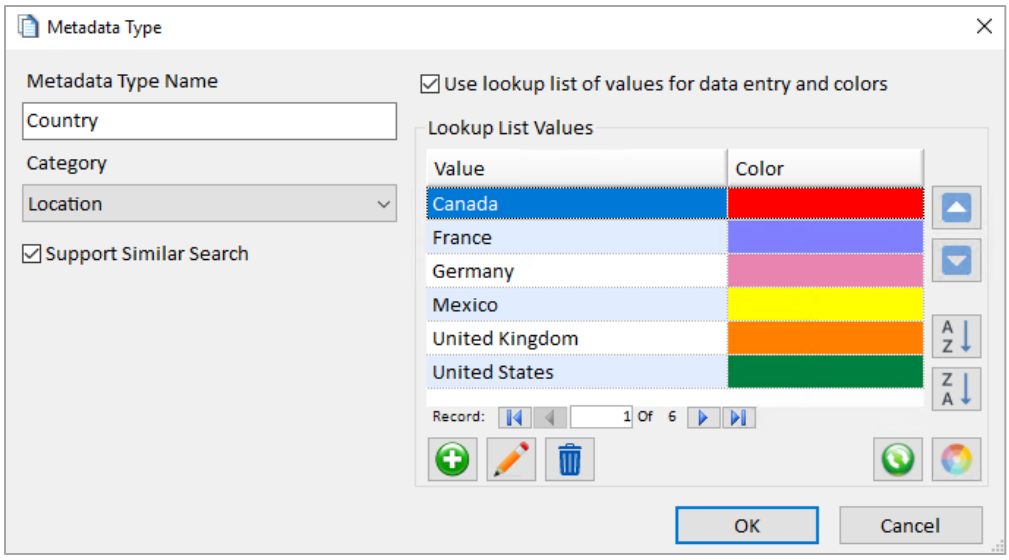
# Database Management Enhancements

## Maintaining Lookup Tables

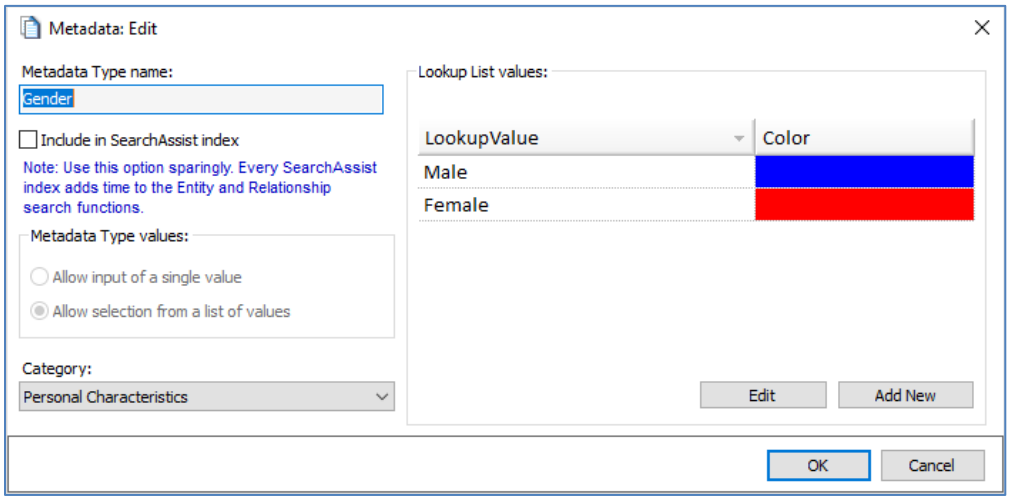
Managing lookup tables is significantly improved with a more consistent user interface to add, edit, and delete your lookup values.

### *Metadata Type Lookup Values*

For metadata types, one can define a lookup list of values to simplify adding them to entities and relationships. The metadata type form is redesigned:




*Version 9*



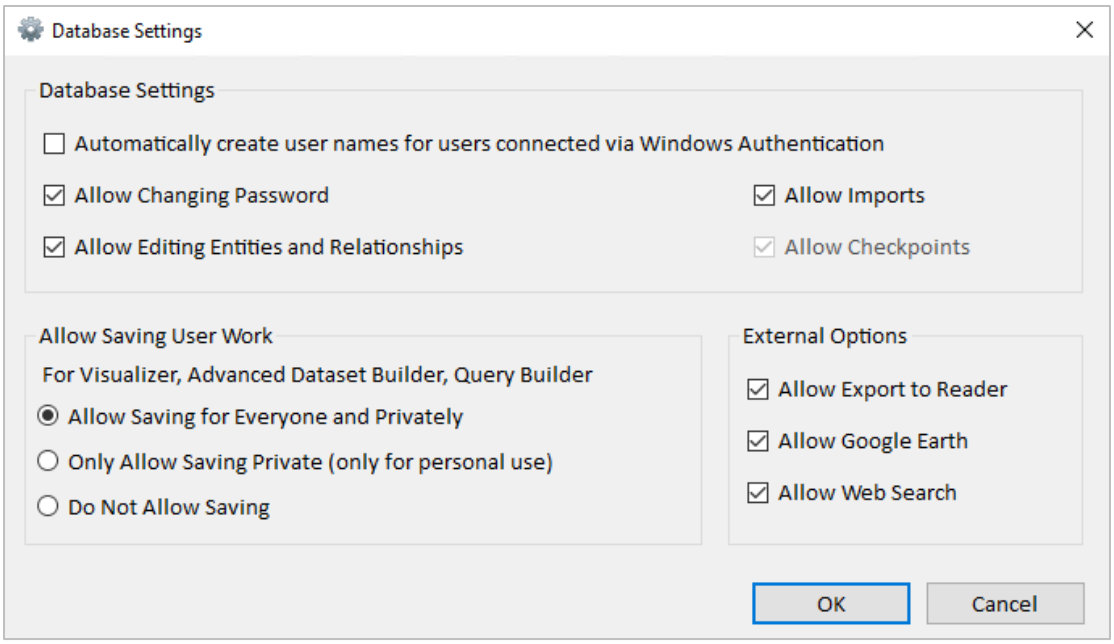

*Version 8*

Managing the Metadata Type lookup values is significantly improved to:

- Add lookup values to a new metadata type without saving the metadata type first
- Add multiple values at one time rather than individually
- Sort values alphabetically in ascending or descending order
- Apply a gradient range of colors to all the values
- Automatically add missing values in the lookup list from values in the database
- Update the values in the database when a lookup value is changed

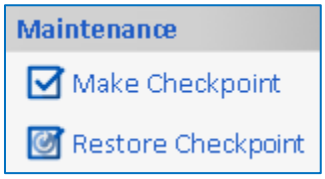
## Database Security Settings

Database Settings allow administrators to issue username and passwords to users who want to access databases in Sentinel Visualizer.




### Database Checkpoints

Database checkpoints can be created and restored at any time. During certain operations like imports, a checkpoint is automatically created before the action is performed.

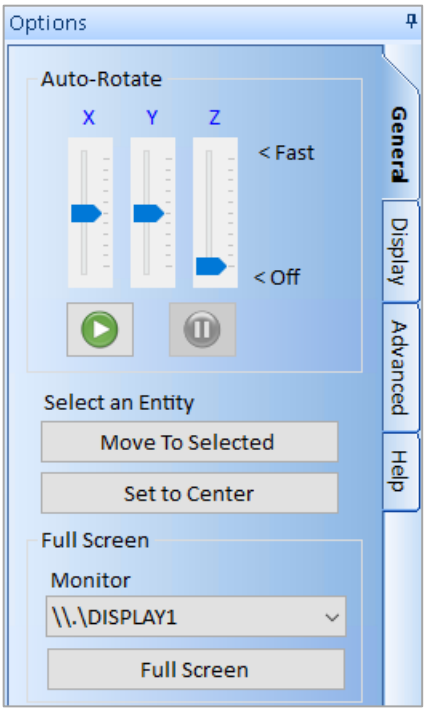



## Query Builder Enhancements

The Query Builder's toolbar uses the latest icons, the tabs on the results grid are moved to above it from below, output options are move from the toolbar to below the results grid, and related forms modernized.

## 3D Viewer Enhancements

The right-side panels are reorganized into tabs and rearranged for localization. The general tab has more common items on top with icons for play and pause, and improved adjustment of Anaglyph options. Less important items moved to the Other tab.




## Enhancements in Earlier Versions

For lists of enhancements in version 8 and earlier, please visit our web site:

### Version 8

http://SentinelVisualizer.com/go.aspx?id=8

### Version 7

http://SentinelVisualizer.com/go.aspx?id=7

### Version 6

http://SentinelVisualizer.com/go.aspx?id=6

### Version 5

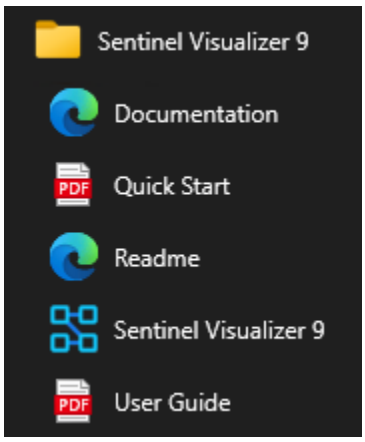
http://SentinelVisualizer.com/go.aspx?id=5

# Chapter 3: Getting Started

*Sentinel Visualizer is a Windows based program. Launch it, open a database, and analyze your data. The main form provides access to all the features of the application. The application uses the multiple document interface (MDI) model, which means you can have multiple windows open within the application at the same time. You can even support multiple monitors.*

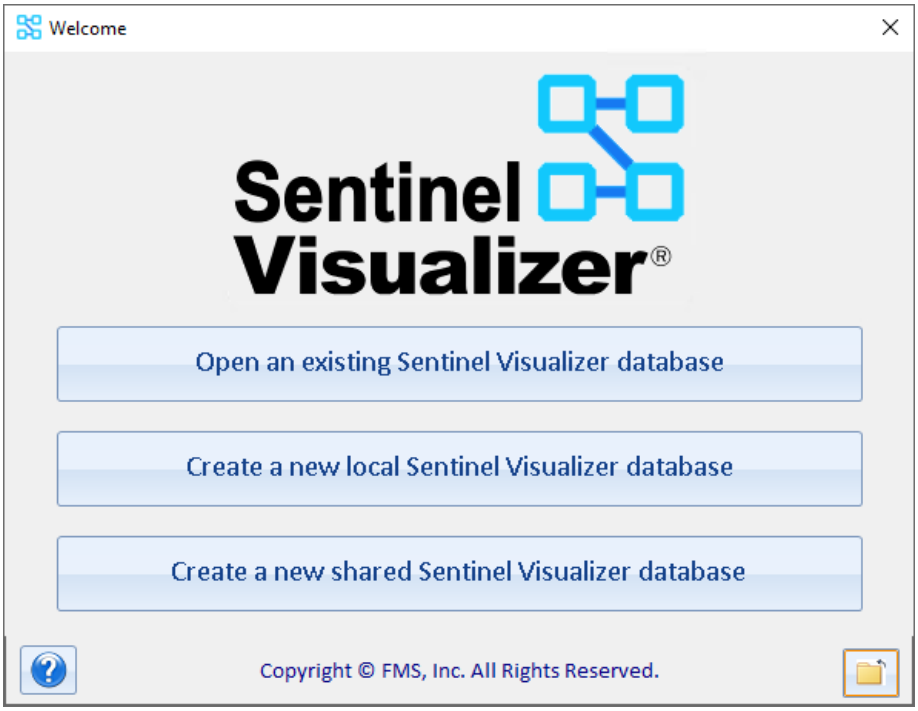
## Start the Program

Sentinel Visualizer provides all user functionality in one program. To launch the software, go to the Windows Start Menu and select it under Sentinel Visualizer 9:




### First Time Welcome Screen

The first time you run Sentinel Visualizer it displays the Welcome screen:




Use this form to open an existing database or to create a new database. Since this is the first time you are running the program, you can create a new database or open the sample database that is installed with Sentinel Visualizer.

## Open the Sample Database

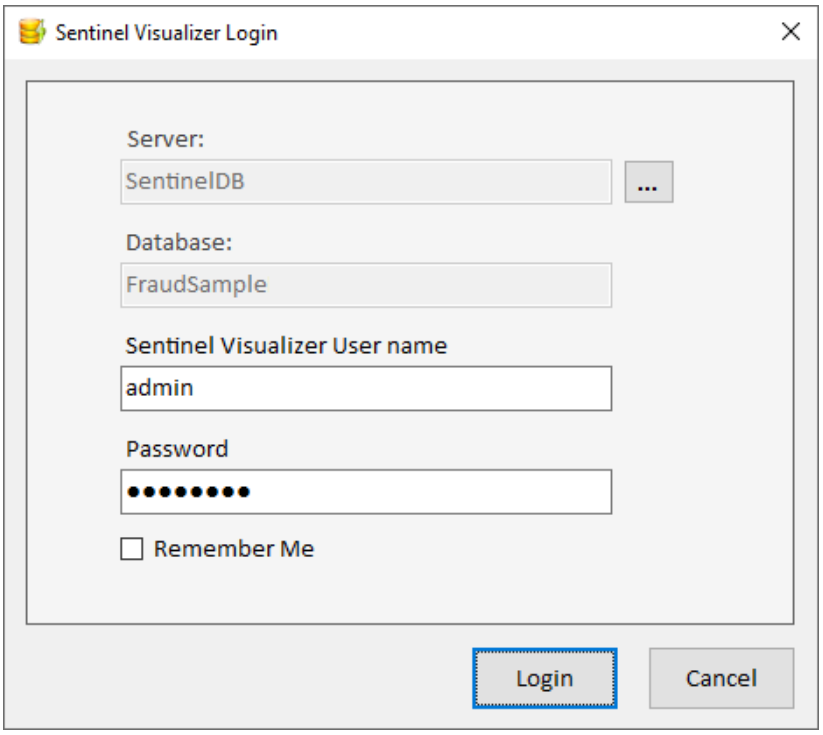
Sentinel Visualizer installs a sample database for you to become familiar with the program. Click on “Open an existing Sentinel Visualizer database” (or later from the Databases menu, Open Database), and select the **FraudSample** database.

The login credentials for the sample database:

- Username: **admin**
- Password: **password**

## What to Do Next

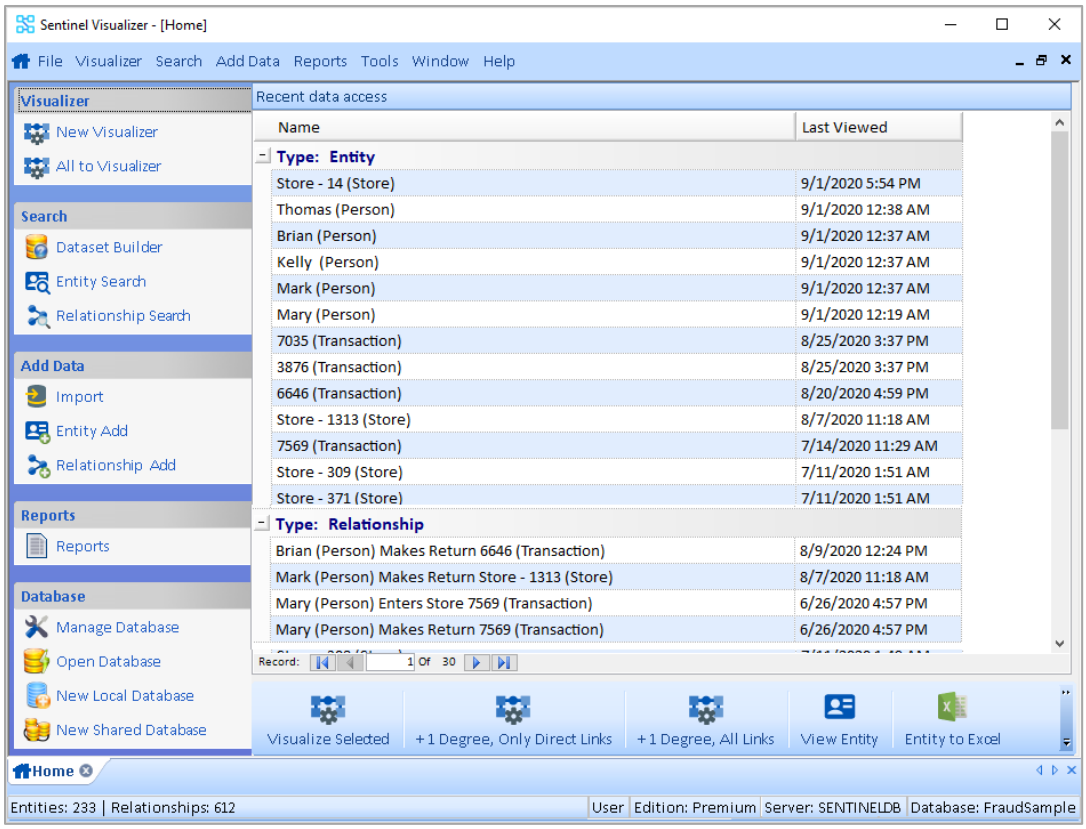
Use the Sentinel Visualizer menus to explore the sample database, look at the data, run the Visualizer, and see how the various features work.




When you are ready to create your own database, import data, customize the lookups and metadata, and run your own queries, read **Chapter 19: Importing Data** and **Chapter 20: Configuring and Managing Your Database**.

## Home Form

The Home page contains launch points for the program's most used functions, as well as lists of your recently accessed entities and relationships. The Home page always remains open, though you can open other windows in addition to it.



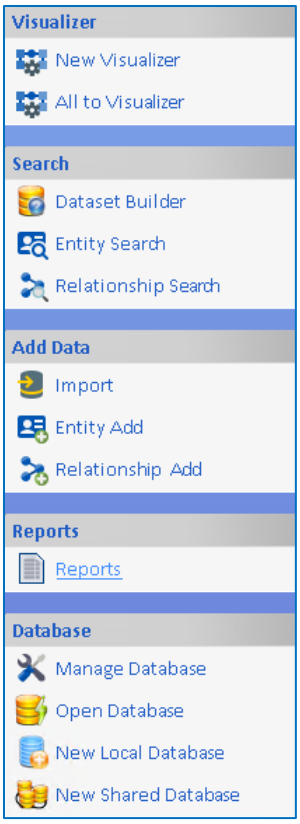

## Recent Entities and Relationships

A list of your most recently opened entities and relationships is listed. Double click on one to place it on a new Visualizer diagram.

The toolbar at the bottom has buttons to perform additional operations for the currently selected entities and/or relationships from the list.

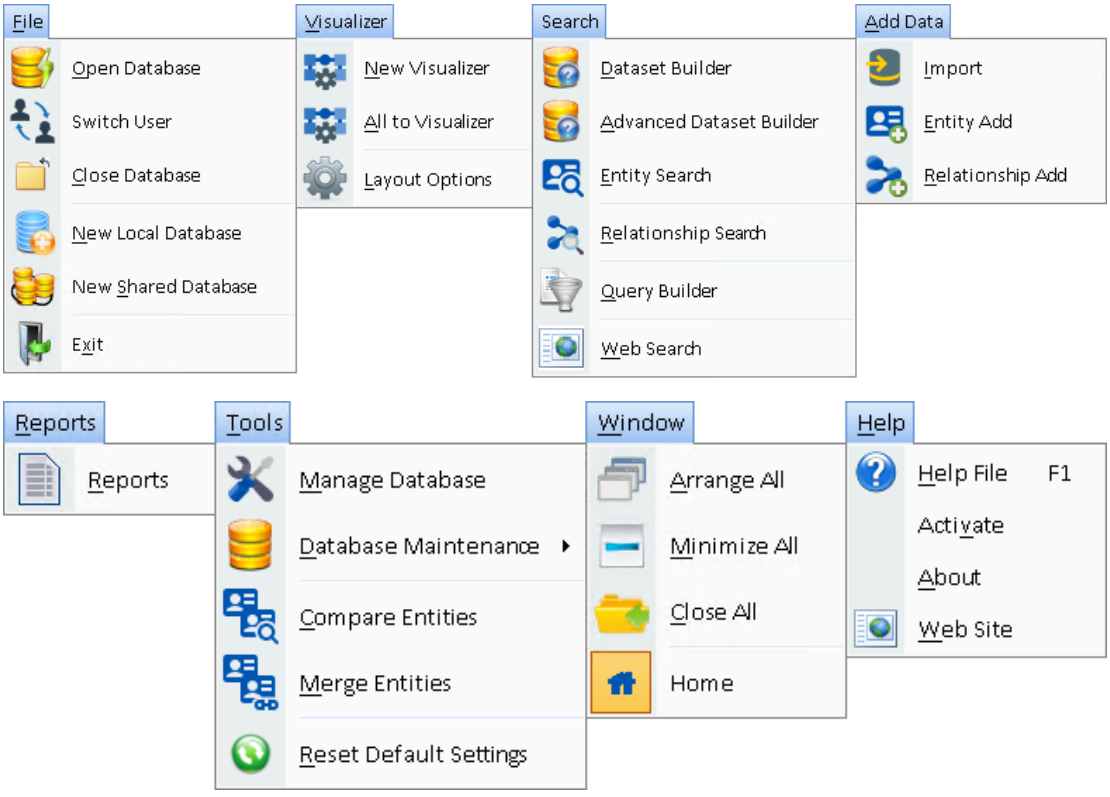
## Left Panel Options

On the left side, there are buttons for common operations in Sentinel Visualizer.




## Menu

The Menu has everything on the left panel, plus a few more items, and is available from any part of the program:



## Window Tabs

The tabs at the bottom display a tab for each open window.

Quickly see a list of all open windows and click on the one you want. You can also close a window from the tab.

## Status Bar

The Status Bar shows information about the number of entities and relationships in the currently opened database, and current user login and database information.

# Chapter 4: Entities

*The core of Sentinel Visualizer's knowledgebase is the entity. Entities are things: people, places, events, organizations, or anything else you want to represent within the diagram. Entities can also participate in relationships, and contain a wealth of information including characteristic data, linked documents, and aliases.*

## Introduction to Entities

Here are some important concepts about entities:

### Entity Types

Each entity has a type such as person, place, or organization. Sentinel Visualizer supports a rich array of entity types and can be configured to support user-defined types.

### Start and End Dates

Start and end dates are available for entities and relationships, allowing you to visualize and analyze the temporal nature of your data.

### Weights

Entities and relationships can be further defined with weight values from 1 to 100. This allows users or processes to rank entity and relationship strengths according to mission-specific criteria.

### Entity Field Values

Sentinel Visualizer supports a wide array of information fields at the entity level. These fields are shown in entity editor/viewer, entity level reports, and in the advanced entity search mode.

### Metadata

Entities support metadata, or fields that can be used to further define the entity. For example, a person entity might have metadata fields for first and last name, social security number, hair color, etc.

### Notes and Documents

You can add any number of text-based notes to an entity. Additionally, you can link or embed an unlimited number of documents to an entity. These documents can be text files, Word documents, web pages, videos, or any other file type recognized by the Windows operating system. This allows you to add rich documentation about each entity.

### Topics

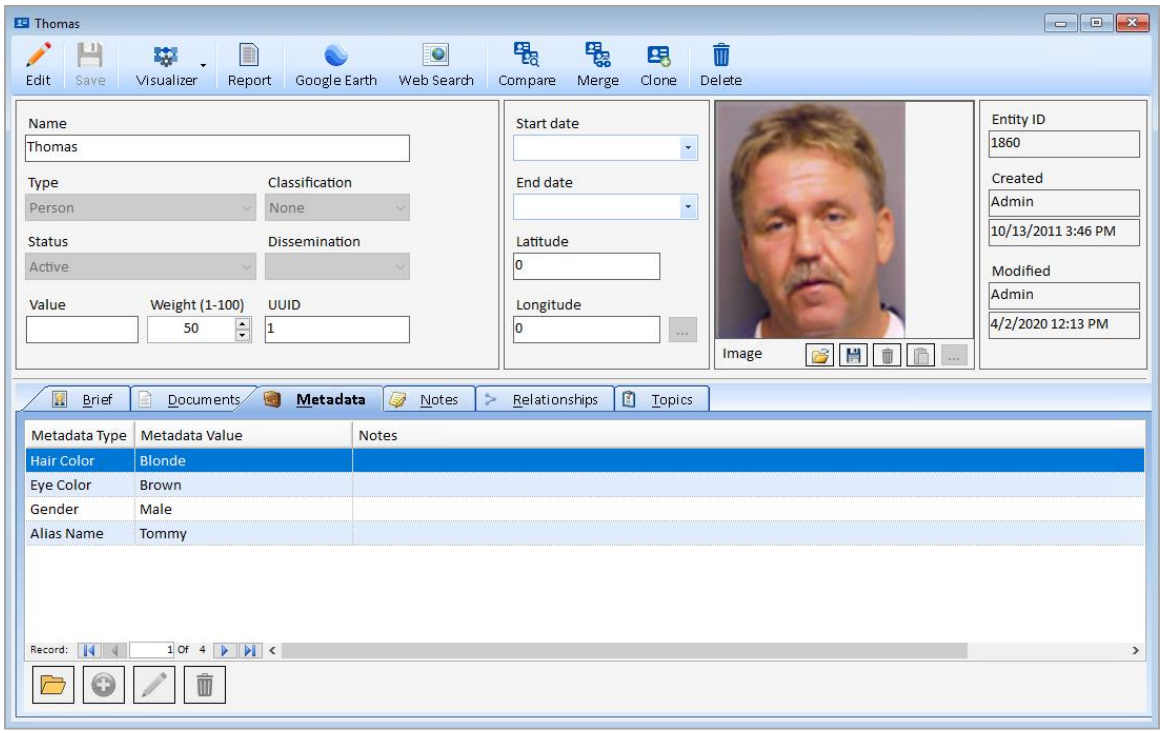
Topics allow you to categorize entities. You can create any number of topics and assign any number of topics to an entity or relationships.

## View Entity Information

The most common entity-related task is using the View Entity form to see a complete list of information available for the entity. You can get to the View Entity form several ways:

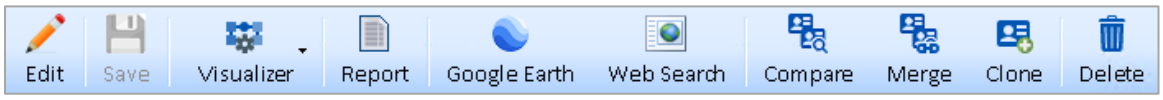
- From the Entity Search form, double-click on any entity in the Search Results.
- From the Visualizer, double-click on any entity in the display.
- On various other forms in the system, click the [View Entity] button.

When you open the View Entity form, you can see that it is organized into several key areas that help categorize the information.




### Entity Toolbar

The View Entity form's toolbar has the following buttons:




- **Edit** switches from view (read-only) mode to edit mode.
- **Save** your changes and returns to view mode.
- **Visualizer** opens a new Visualizer form with the current entity on the diagram. There are options to add it alone or with its connected entities.
- **Report** previews a report for the current entity's data.
- **Google Earth** launches Google Earth with the current entity's geospatial location.

- **Web Search** opens the Web Search form using the entity name as the search string to find it on multiple search engines.
- **Compare** opens the Entity Compare Tool to find similarities and differences between this entity and others you select.
- **Merge** opens the Entity Merge tool to merge this entity with other entities you select into one.
- **Clone** opens the Entity Clone tool to create a copy of this entity.
- **Delete** the entity. You are prompted to confirm. Deletions cannot be undone.

# General Entity Fields

Below the toolbar, is the basic entity information such as name, type, start and end dates, status, value, location, and image. Entity fields are the same regardless of entity type.

If you click the Edit button, the Entity fields with dropdowns contain the acceptable lookup values. For more information on adding new Entity Types, Statuses, etc., see **Manage Lookups** on page 229. Here are the fields:

**Name:** Enter the entity name. Since entities may represent many things such as people, places, organizations, etc., enter a name that most accurately and succinctly identifies the entity. For example, for people, use the person's full name. This field is required.

**Type:** Select the type of the entity from the drop-down list. The list of types has been preconfigured by your Sentinel Visualizer System Administrator. This field is required.

**Image:** The image is a picture to visually identify the entity such as a person's face. A thumbnail of this appears on the Visualizer diagram for this entity. This is optional.

Click the Choose […] button to open a dialog box to select the picture file. The image is imported into the database. The trash can button removes the image from the entity.

**Start date:** Enter the start date for the entity if it is known and applicable. Start date may mean different things based on the entity type. For example, a person's start date could be their birth date, whereas the start date for a telephone number could be its service start date.

**End date:** Enter the end date for the entity if it is known and applicable, using the same guidelines as for the Start Date field.

### *Lookup Values*

**Classification:** Classification level is useful to filter entities based on who can see this information. By default, the highest classification level is selected.

**Dissemination:** Dissemination type (e.g. public vs. internal) can be useful to filter the entities and limit the information that is distributed.

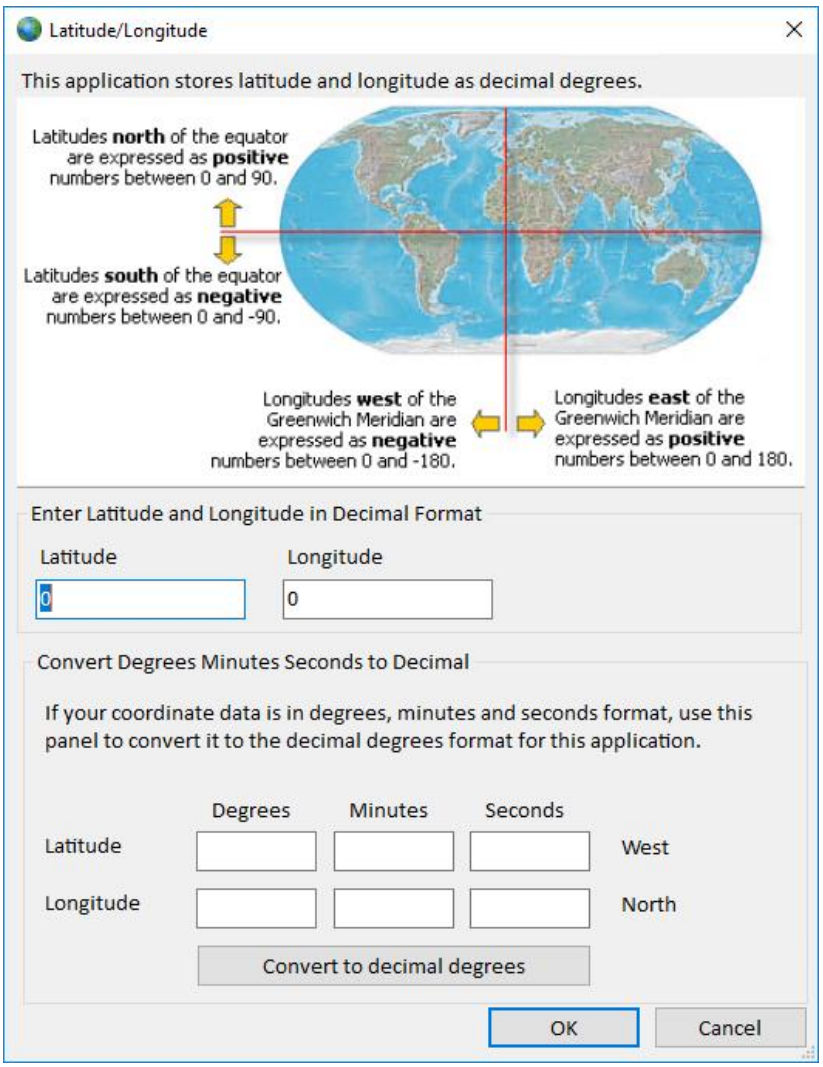
**Status:** Select the status for the entity from the drop-down list. If the status field list displays values applicable to specific entity types, choosing an appropriate value. This field is required.

**UUID:** The UUID is a unique identifier for the entity, typically used for entities imported from other systems.

**Value**: If the entity represents a numerical value, enter it in the Value field. For example, if an entity is a Bank Account, the Value could be the current balance.

**Weight:** The weight field allows you to assign a weighting factor between 1 and 100 to an entity. The default value for this field is 50. In general, weight is used by Sentinel Visualizer when it performs analysis using the Visualizer feature. Contact your Sentinel Visualizer System Administrator for information about how weight is handled for your installation of Sentinel Visualizer. This field is required.

**Latitude and Longitude:** If the entity has location data associated with it, you can enter that by pressing the […] button next to the fields. This displays the Latitude/Longitude form.




Use this form to enter the location information in decimal degrees. This form also has a DMS conversion utility if your location information is in degrees-minutes-seconds format. If you want to enter East/South numbers in the DMS conversion section, use negative numbers.

### *System Fields*

These fields are managed internally and are not modifiable by the user:

**ID:** The unique number that identifies the entity within the database.

**Created by:** The Sentinel Visualizer username who created the entity.

**Created date:** The date and time the entity was created.

**Modified by:** The Sentinel Visualizer username who last changed the entity's data.

**Modified date:** This date and time the entity was last modified.

# Entity Tabs

The tabs on the Entity form contains additional information about the entity.

- **Brief:** A text area where general textual information can be stored. Brief is generally used to incorporate text information that is "official" or "approved" for the entity.
- **Documents:** A list of documents that have been embedded or linked to the entity. From this tab, open the documents using the program associated with the document type.
- **Metadata:** A list of metadata items that further describe the entity. Metadata are fields that your System Administrator has created that allow you to view and store information about entities that is specific to your mission and to the entity type.
- **Notes:** A list of all text notes attached to the entity. This is different from the Brief area, because it allows any number of notes to be stored independently.
- **Relationships:** A list of relationships to other entities.
- **Topics:** A list of categories to which the entities belong. Topics make it easy to build structure around disparate entities. For example, you might have a Topic called "Financial Institutions" and another called "Terrorist Organizations." Entities can belong to multiple topics, but each entity must belong to at least one topic. Topics are used in the Enterprise version to restrict who has access to this information.

## Editing Data in Tabs

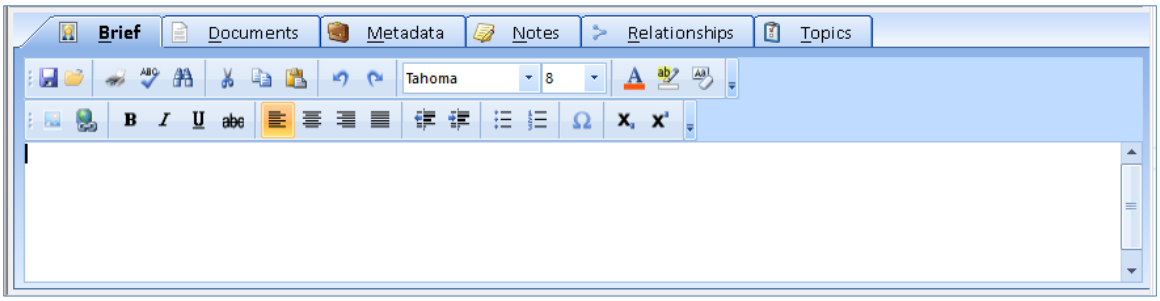
In Edit mode, with the exception of the Brief tab which you can just fill out directly, the other tabs may have multiple values and a set of buttons to manage them:

These let you:

- Add a new item
- Edit, Delete, Open and Export the current item

## Brief Tab

A rich text summary of your entity. It can be used to store "official" information about the entity separate from ad-hoc or non-official data that are stored in Notes.

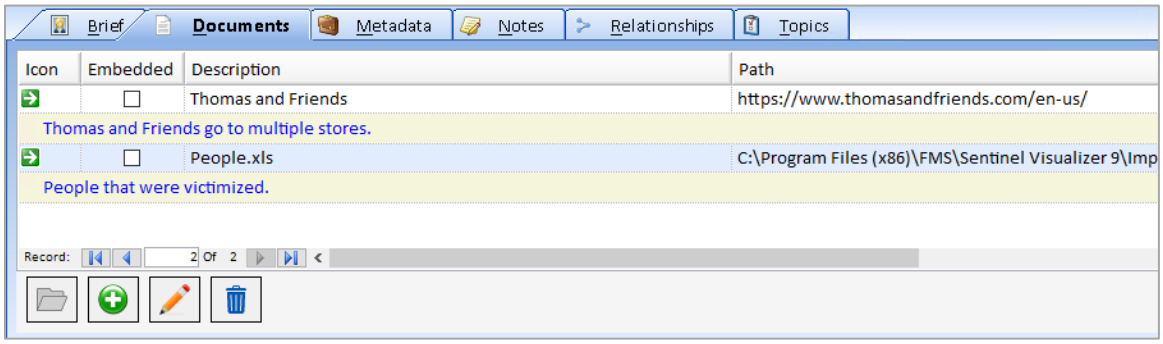


Enter your information and use the toolbar buttons to change fonts and other formatting options. Complete information about using the Text Editor is in **Working with the Text Editor** on page 79.

## Documents Tab

Sentinel Visualizer provides the ability to store documents with each entity record. Documents can be any type of file that your computer recognizes. For example, PDF files, Word documents, images, videos, etc. Documents may be stored in the database or reference to a file on your PC or network. If you choose the latter, make sure all your users can get to those files.

The Documents tab provides a list of documents for the entity in a grid. Use the scrollbars or the [Up] and [Down] keys to move through the list or click on a column header to sort.



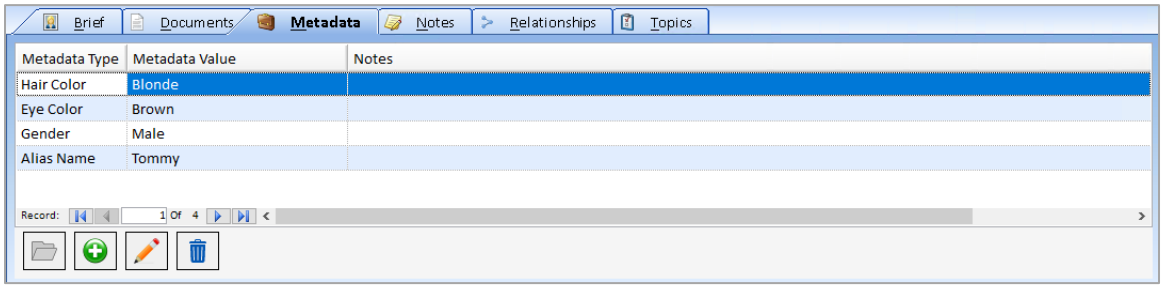

Select any document record and click the Open icon to open the document. Windows automatically launches the program associated with its file type. For example, an Excel spreadsheet opens in Microsoft Excel. If you do not have a program on your computer that is compatible with the document's file type, you cannot open the document.

You can also add, edit delete and export documents. More information about working with documents is included in **Working with Documents** on page 84.

## Metadata Tab

Metadata is typically used to add types of information that are specific to your data and analysis needs. Sentinel Visualizer is installed with a default set of Metadata types such as Address, City, State, Phone Number, etc. You can create additional metadata fields as needed.

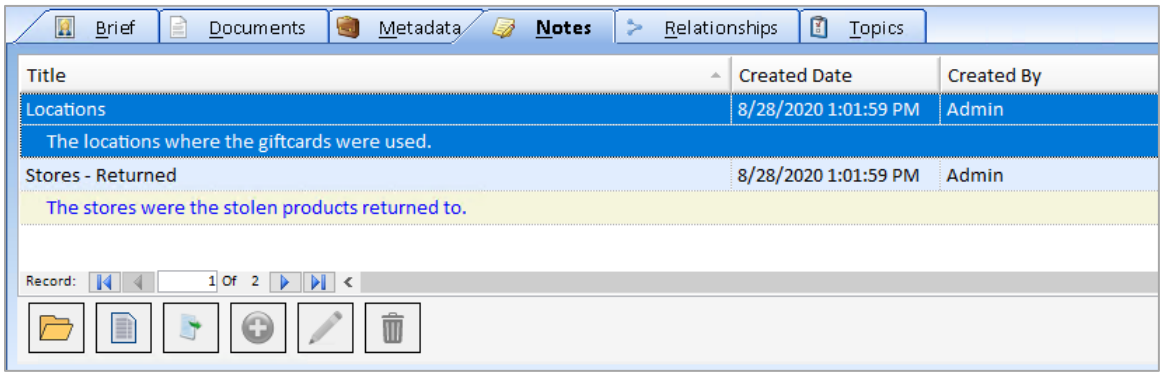
The Metadata grid is a scrollable list of all metadata records for the entity. Click on any column header to sort on it.



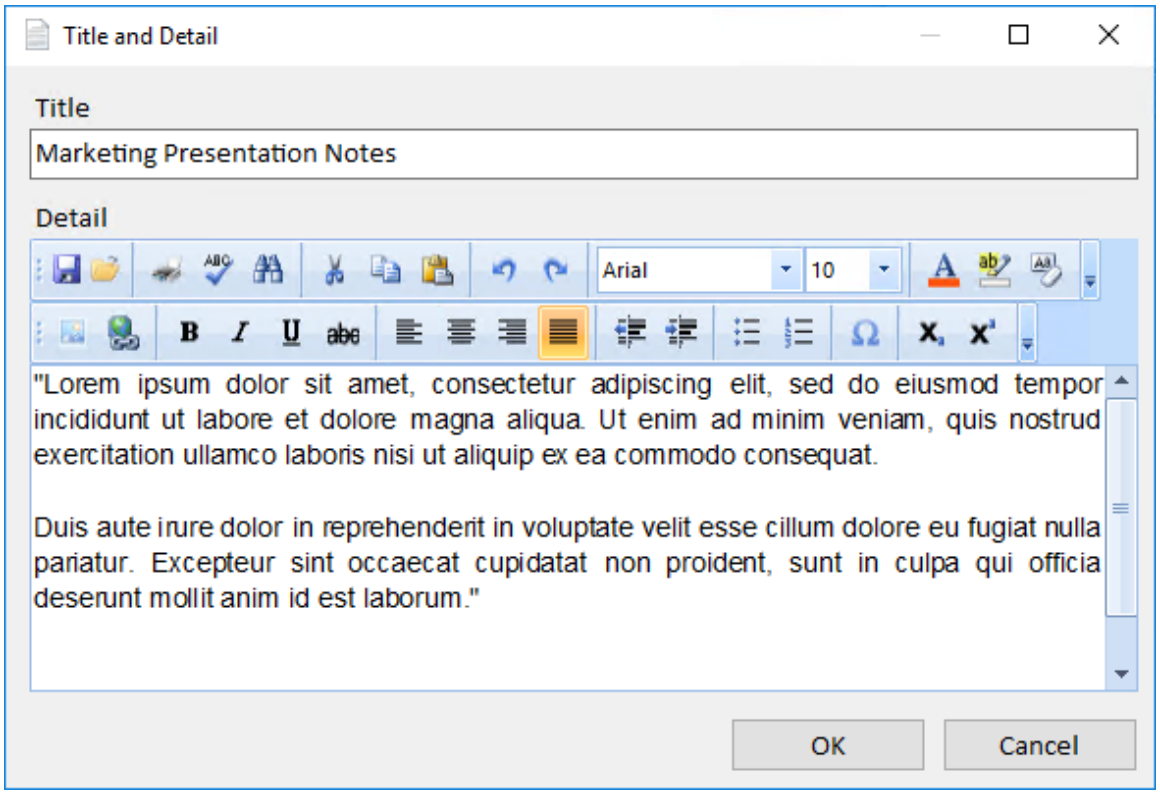

You can add, edit, and delete metadata records. Depending on how you have defined metadata types, some may only allow selecting values from a predefined list.

## Notes Tab

The Notes tab lets you store multiple rich text notes for the entity. Unlike the Brief, Notes allows you to keep multiple notes such as work-in-progress notes.



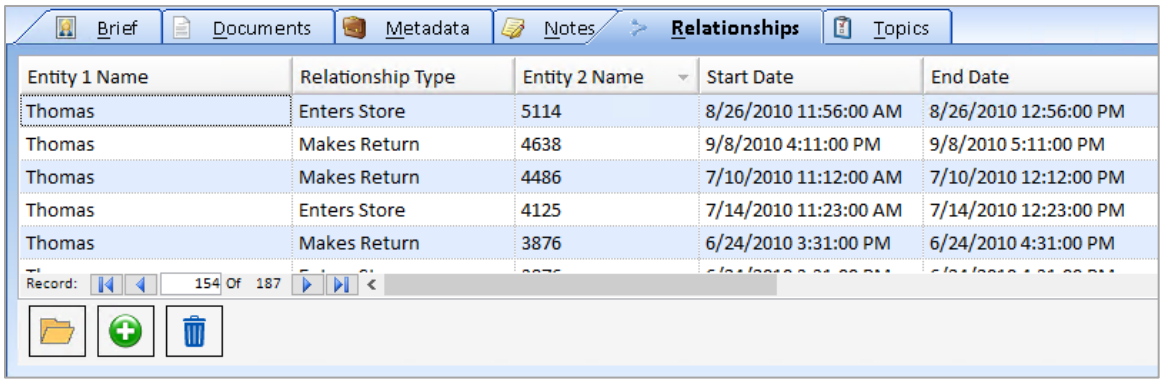

You can add, edit, delete, open, and export the notes. The Notes form displays full information:




Additional information about notes is in **Chapter 8: Selecting Dates and Rich Text Editing**.

## Relationships Tab

See all the relationships that the entity participates in.

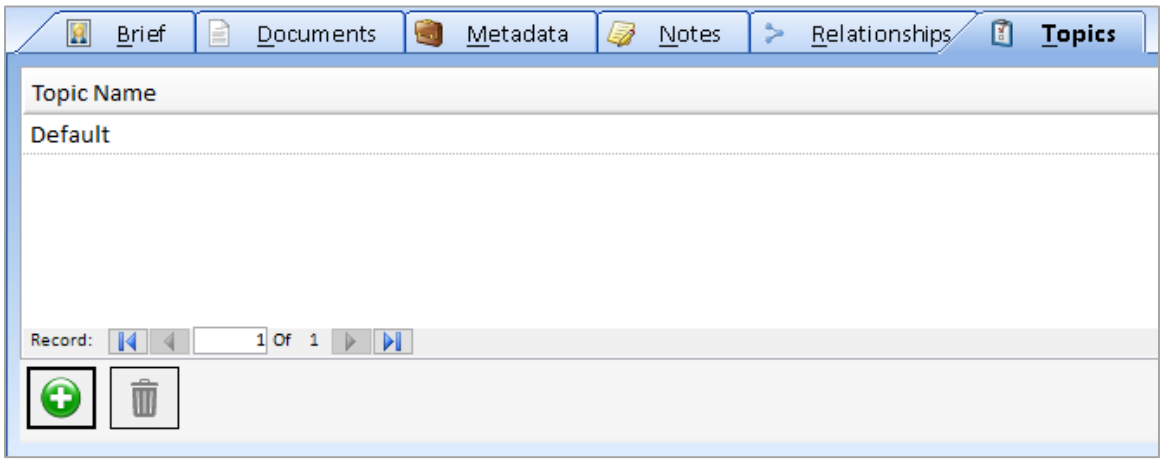



To view more detailed information about a relationship, double-click on the relationship record or select it and click the Open icon.

Complete information about Relationships is included in **Chapter 6: Relationships** on page 63.

### Topics Tab

The Topics area of the View Entity form contains a list of categories that the entity belongs to. Topics make it easy to organize information into areas that are specific to your data and analysis needs. Entities can belong to multiple topics, but each entity must belong to at least one topic.




You can add or delete topics for the entity.

## Save or Cancel Changes

After editing your entity information, there are two choices:

### Save

Click the [Save] button on the toolbar to save your changes to the database.

### Discard

Cancel all changes made since you opened the record by closing the Edit Entity form. Close the form by clicking the [x] on its tab or upper right corner. A prompt asks if you want to save your changes. Click [Yes] to save your changes, [No] to discard your changes. [Cancel] returns to editing with your changes intact without saving it to your database.

## Add New Entity

Sentinel Visualizer provides a powerful and flexible database to manage entity information. You can use the Import feature to import entities from an external source, or you can manually add an entity to the database.

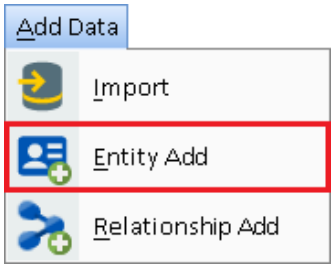
### Entity Add Wizard

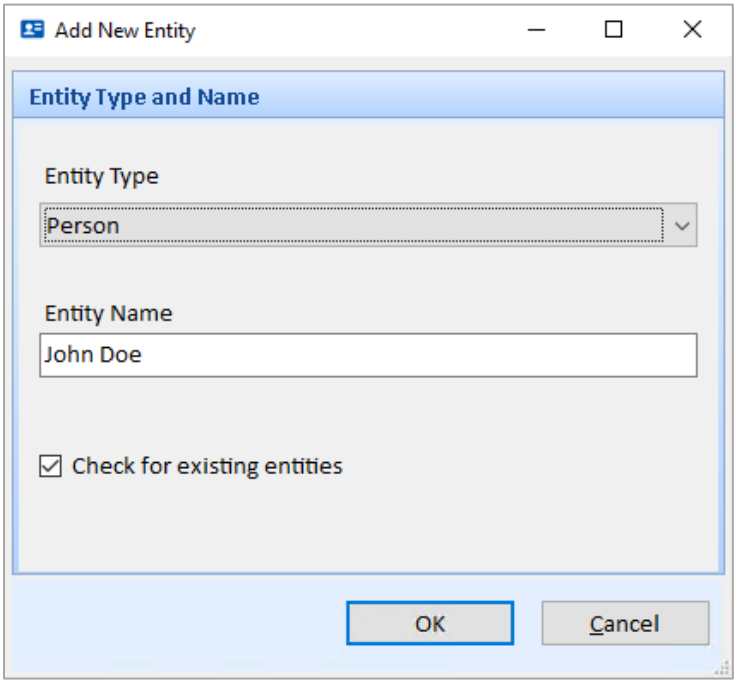
Since the Sentinel Visualizer database acts as your central repository of entity information, you want to be sure that the data it contains is accurate and does not contain duplicates. To help this process, Sentinel Visualizer provides a feature that makes it easy to check if an entity already exists before you add it.

Launch the New Entity wizard, select [Entity Add] from the Home page or Add Data menu:

***Home Page Left Panel***

***Menu Toolbar***



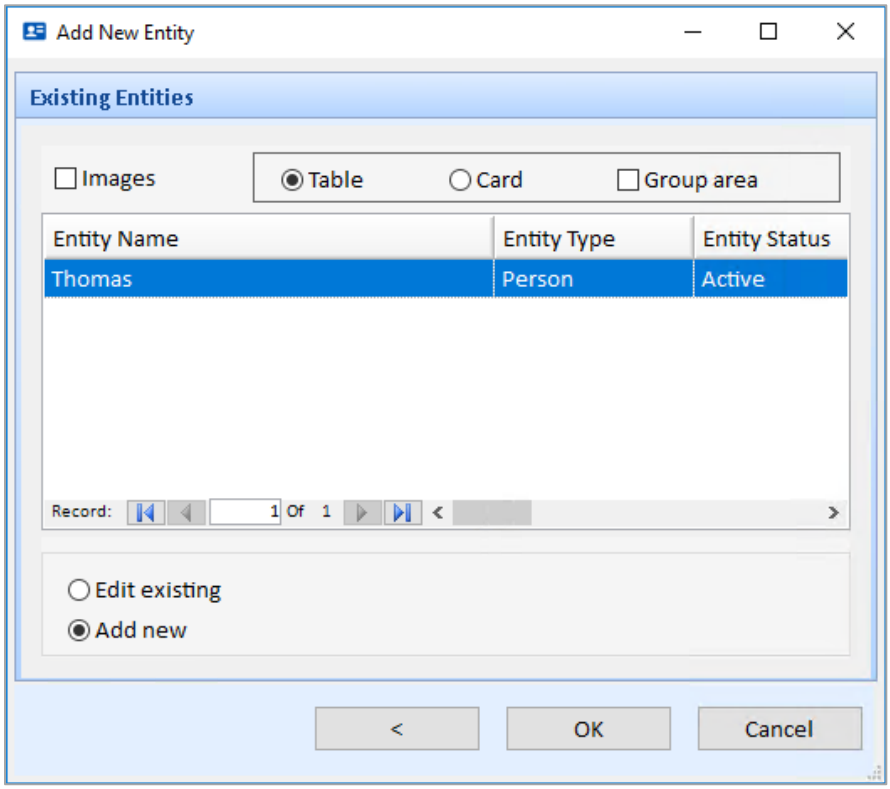



When the New Entity wizard appears, select an Entity Type, type the name of the entity. If the Entity Type does not exist, your administrator needs to update the list of Entity Types under Manage Database. For more information, go to **Manage Lookups** on page 229.

### *Check for Existing Entities Option*

By default, Sentinel Visualizer checks for existing entities with similar names. You can turn this option off if you know the entity you are adding is new or even if another entity has the same name, they are not the same entity.

Click the [OK] button to continue. If the check for existing entities option is selected and duplicate entities are found, a screen appears for you to review them. Decide whether you want to add the new entity or view/edit the existing one:




If the entity already exists, select the row, and choose the "Edit existing" option. If the entity is not in the list, select the "Add new" option. Click the [OK] button to open the Edit Entity form.

## Deleting Entity Records

Delete the current entity by clicking the Delete button on the Entity form's toolbar.

You can also use the Entity Search form to select multiple entities then click the [Delete] button on the toolbar below it. You are prompted to confirm the deletion.

## All Entity Data is Permanently Deleted

When you delete an entity, all data for that entity, including its notes and documents, is permanently removed from the database. There is no way to recover a deleted entity record, except to revert to a previous backup or checkpoint.

If the entity participates in one or more relationships, all those relationships are deleted but the corresponding entities related to it are not touched.

# Chapter 5: Entity Search

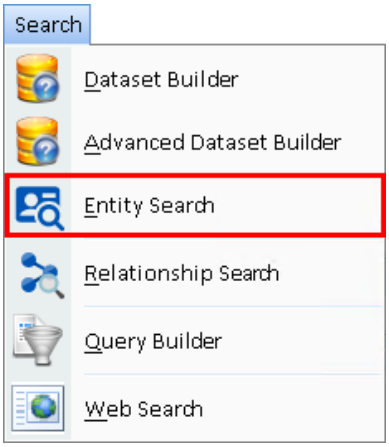
*Since your database contains a lot of entity data, being able to find entities quickly and accurately is important. Sentinel Visualizer includes powerful search tools that allow you to find entities.*

## Searching for Entities

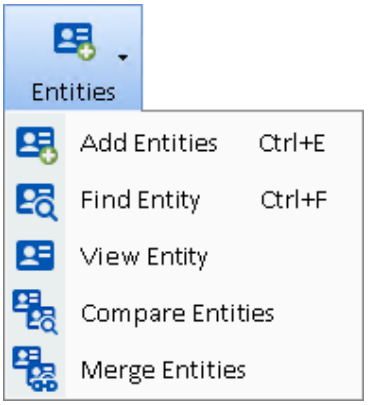
There are several places in Sentinel Visualizer to find entities. Entity Search and the Advanced Dataset Builder retrieve lists of entities. In the Visualizer, search to add and filter entities.

***Home Page Left Panel***

***Menu Toolbar***

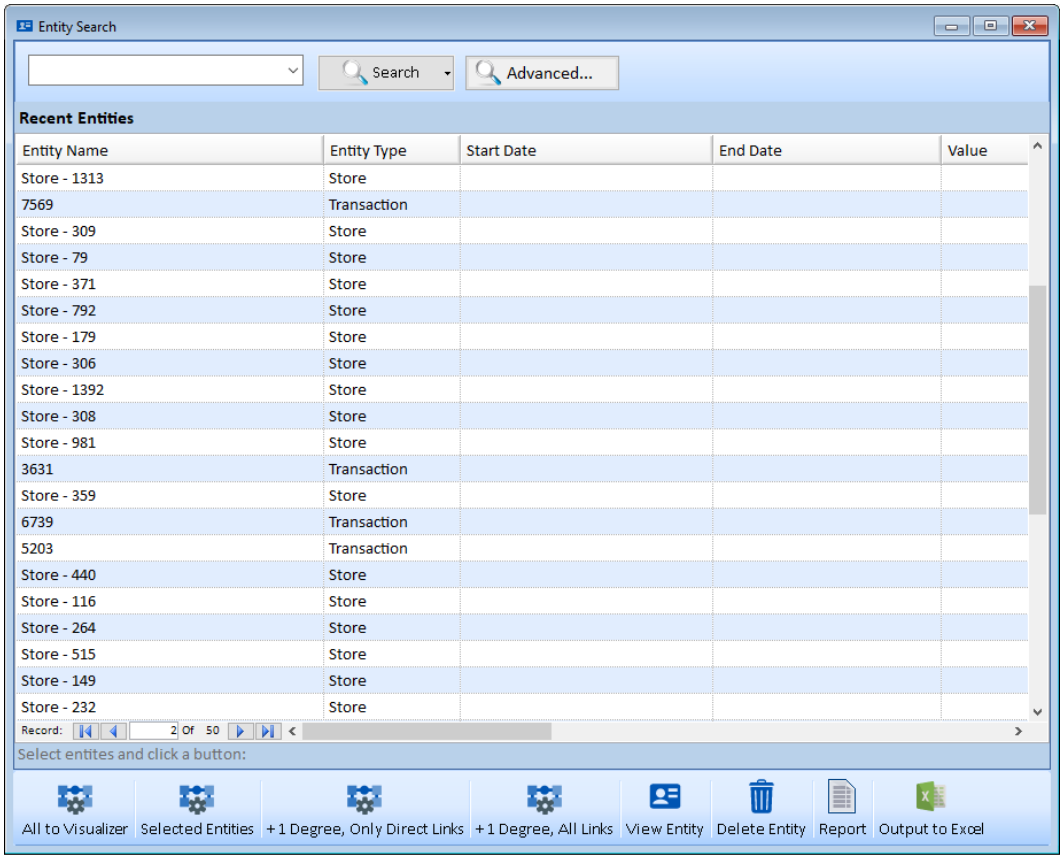



***Visualizer Toolbar***




## Entity Search Form

The Entity Search form displays the recently selected entities so you can easily pick them without any searching.




After performing a search, the list is updated with your results and the status bar below it displays the number of matches found.

### *Bottom Toolbar*

Select one or more entities by using Shift or Ctrl mouse click, then select an action to perform:

- **All to Visualizer**: A new Visualizer is created with all the entities in the list.
- **Selected Entities**: A new Visualizer is created with your selected entities.
- **+1 Degree, Only Direct Links:** A new Visualizer is created with your selected entities, plus their linked entities (1 degree) without adding links from those entities to each.
- **+1 Degree, All Links:** A new Visualizer is created with your selected entities, plus their linked entities with all their links to each other.
- **View Entity:** Open the Entity form for the selected entity or entities.
- **Delete Entity:** Delete the selected entity or entities.
- **Report:** Display a report for the list of entities.
- **Output to Excel:** Export a list of selected entities to an Excel file with details on each entity.

## Two Search Modes

Sentinel Visualizer has a variety of search features that allow both quick searching and in-depth searching. This is supported through two modes:

### *Basic Search*

Enter a word or phrase to find entities with that name, alias, and appearance in a brief, note, or metadata value.

### *Advanced Search*

Search for specific text, blank or not blank, and numeric ranges for many fields beyond name. You can even search for text in an embedded document associated with entities.

# Basic Entity Search

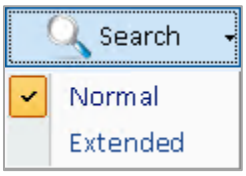
## Name Ambiguities and Aliases

One of the problems of uniquely identifying entities is name ambiguity. Names can be ambiguous when entities have alternate name spellings or aliases. This problem is exacerbated when two or more entities share the same name. When you add translating names from one language to another, entity name accuracy is problematic.

Sentinel Visualizer addresses this problem by supporting name disambiguation and alias matching through the Similar Search feature. Similar Search considers spelling and phonetic variations of names and aliases when finding entities. Type a value in the search field and click the [Search] button:

## Basic Search Modes

Fine-tune the accuracy of your search from the search button drop down:




### *Normal*

Normal mode considers phonetic variations and metadata fields. Normal mode:

- Entity Name field exactly matches your search criteria.
- Entity Name starts with your search criteria.
- All phonetic variations of the search phrase in the Entity Name field.
- All exact and partial matches of your search phrase in Metadata fields.
- All phonetic variations of your search phrase in Metadata Types configured for Similar Search such as Alias Name.

### *Extended*

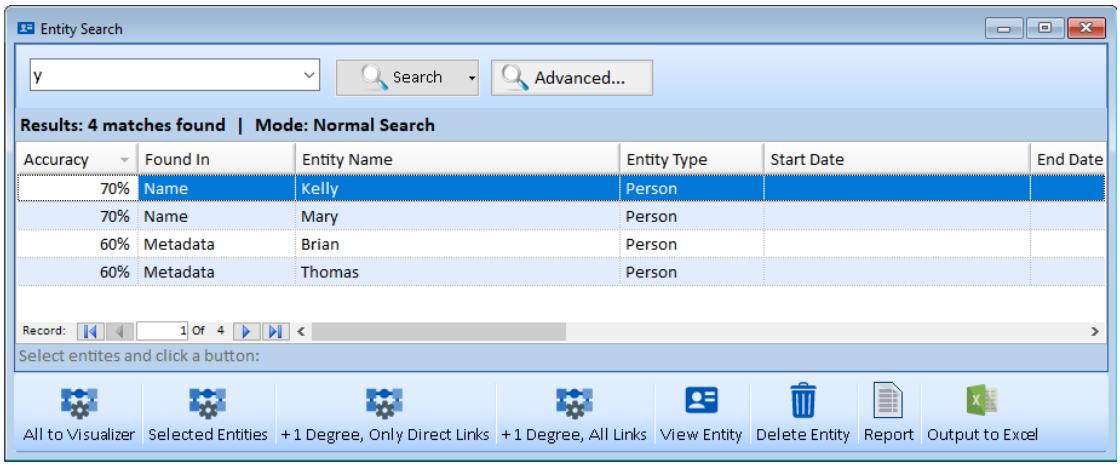
Extended mode is the most thorough, but may take more time, depending on the number of entities in your database and the number and length of Note records. Extended adds:

- Exact or partial matches in the Brief field.

- Exact or partial matches in Entity Note records.

# Search Results

After clicking the [Search] button, the system queries the database. The time it takes depends on the size of the entity data and the speed of the server. When the search results are returned, they appear in the Search Results area. Information in this area includes entity name, type, status, and other useful fields.




## Accuracy

The results grid has a field called Accuracy to help you find the results you are looking for. Accuracy is expressed as a percentage and indicates how close an entity matches. A higher Accuracy value indicates higher match accuracy:

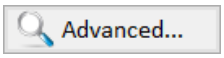
| Accuracy | Description |
|---|---|
| 100% | Exact match of search phrase in entity name field |
| 90% | Exact match of search phrase in one or more metadata fields |
| 70% | Partial match of search phrase in entity name field |
| 60% | Partial match of search phrase in one or more metadata fields |
| 50% | Phonetic match of search phrase in entity name field |
| 30% | Phonetic match found in Metadata fields that are indexed for Similar Search |
| 10% | Exact or partial match found in Entity Note records or the Entity Brief field |

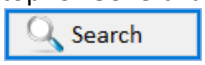
The Found In column shows where the match was found. For example, if the match was found in Entity Name, it may be more relevant than in Notes.

## Sorting

Sort the results by any field by clicking on the column's header area. The first click sorts the data in ascending order. Click the same column header again to sort the data in descending order.

# Advanced Entity Search

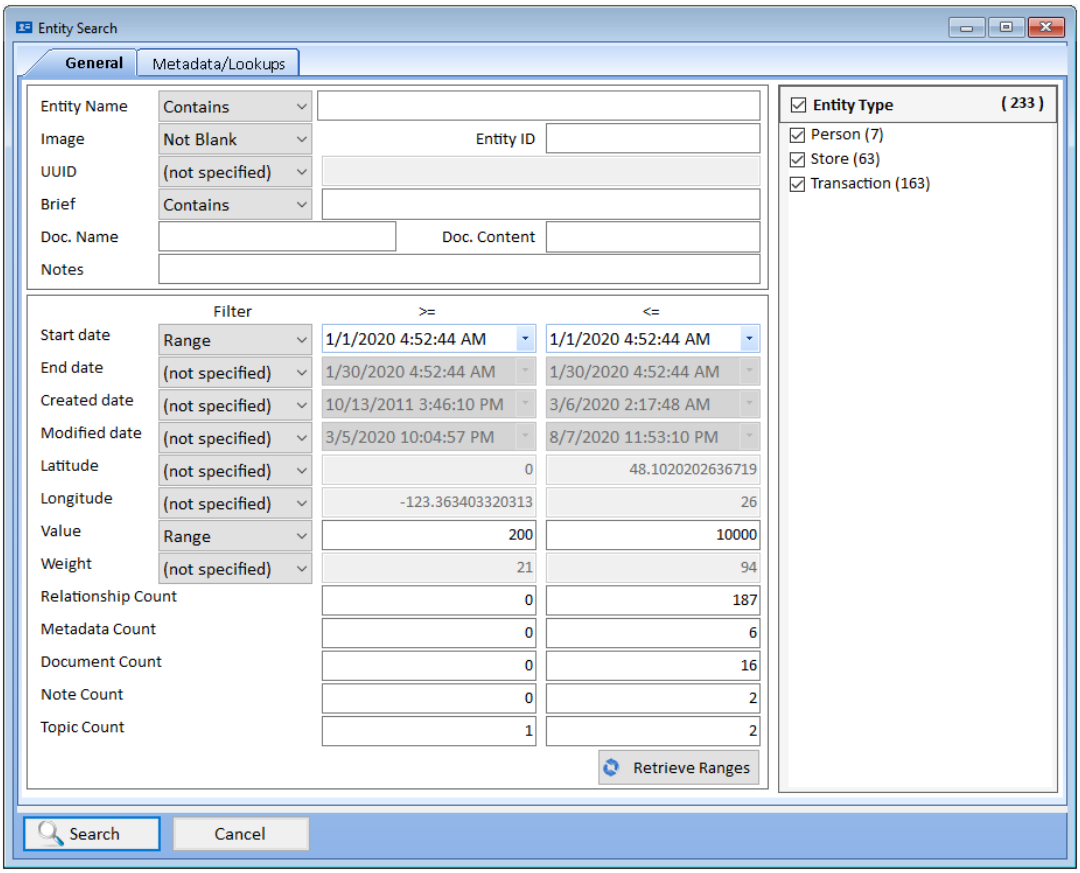
To search more fields, press the Advanced button 

to reveal many entity fields to search. There are two tabs at the top for General and Metadata/Lookups. Enter your search terms, then press the Search button 

at the bottom left to execute it.

This entity search is also in the Advanced Dataset Builder and the Visualizer's entity refinement.

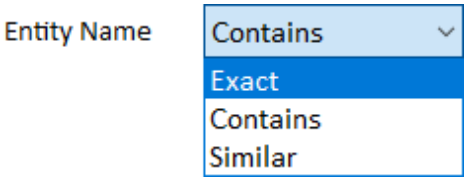
## General Tab




*Entity Search, General Tab to Specify Values, Ranges, and Entity Types*

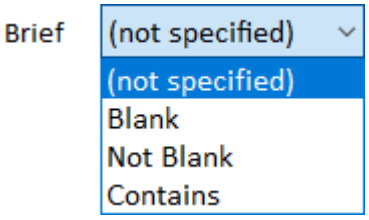
Enter your search criteria. There are dropdown options for many of the fields to select Blank or Not Blank, Contains or Exact, numeric or date ranges, etc.

### *Entity Name Search*




Entity names can be searched using an Exact match, Contains for a partial match, or Similar for phonic match.

### *Brief Search*




The entity brief field is a rich text field. Version 9 supports searching its text.

### *Document Name and Content Text Search*

An entity can have multiple documents associated with it. The documents can be linked or embedded in the database.

The Doc. Name filter is for the document's path, description, and notes fields when it was added or edited. The document is found if the search term exists in any of those fields.

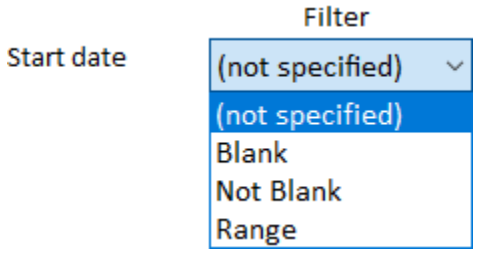
If the document is embedded (rather than linked), its text contents can be searched if the file format is supported. The Doc. Content value is searched in the embedded documents. Entities with one document that matches pass the filter (does not have to be all its documents). If you want to know which documents have the search text, run the entity search in the Advanced Dataset Builder where the preview lists the documents. For more information on installing and configuring Document Content Search, see **Chapter 20: Configuring and** Managing Your Database on page 227.

### *Notes Search*

A note has a title and detail. Entering a search term finds notes where it exists in either field.

### *Filter Date or Numeric Ranges*

Date and number fields can be searched for Blank or Not Blank, or Ranges.




If Range is selected, its two text boxes are enabled for you to enter its low and/or high values.

Entering the low value without a high value is a search for all values greater than or equal to the low value. Similarly, just entering the high value is a search for all values less than or equal to it. Entering both gets the entities with a value between the two.

- You can search the entity's Start Date, End Date, Created Date, last Modified Date, Latitude, Longitude, Value and Weight fields.

- The count fields are for the entities with that number of Relationships to other entities, Metadata values, Documents, Notes, and Topics.

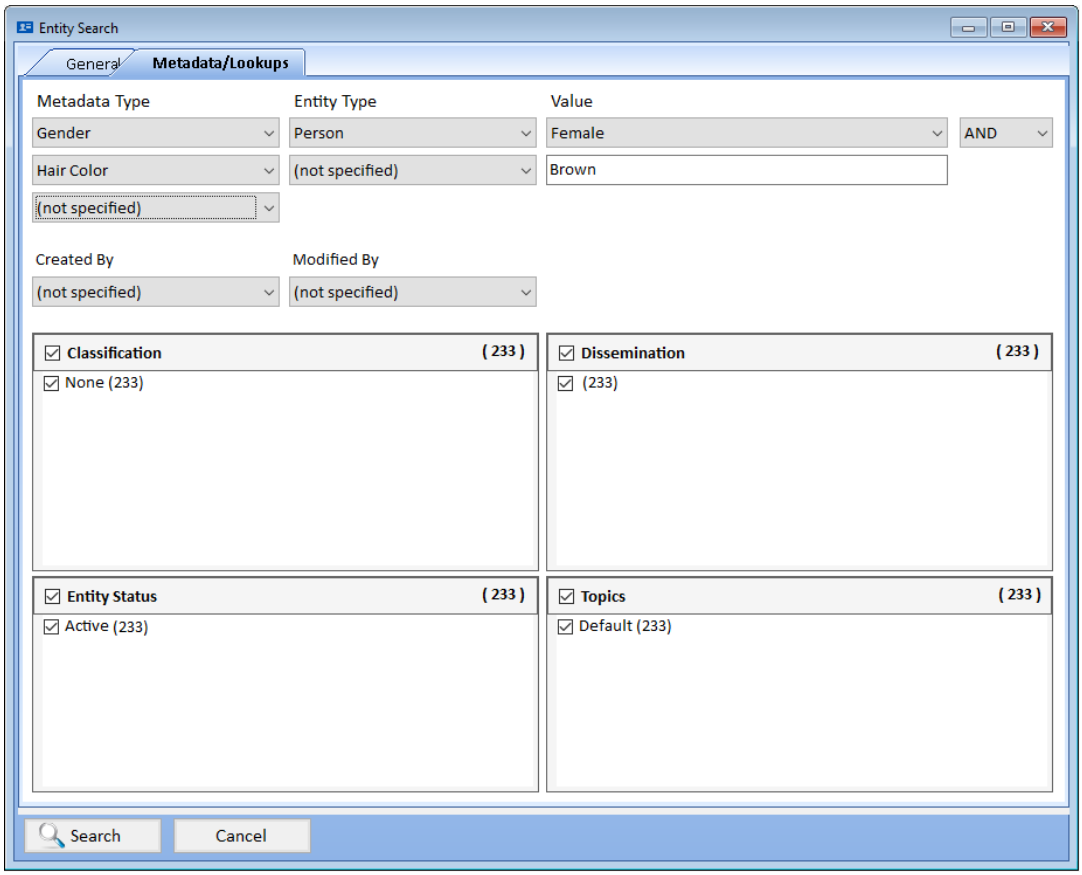
### *Retrieve Ranges*

Press the

Retrieve Ranges button to fill the criteria with the minimum and maximum values of your data. This can be very helpful to understanding your data even if you do not run the search.

## Metadata/Lookups Tab

You can also find entities with a specific Metadata type and other lookup values such as who created or last modified the entity, classification, dissemination, status, and topics.




### *Metadata Type Filters*

When you select a Metadata type, you can limit it to an Entity Type. Up to 3 metadata type values can be entered and combined using AND or OR.

For example, if your database has both mobile phones and land-line phones, then perhaps you might want to display only mobile phones. In other words, you want to filter out everything except mobile phones:

- in the Metadata Type field, choose Gender
- in the ENTITY TYPE field, choose Person
- in the VALUE field, enter: Female

If Gender is only used for entity type Person, there is no need to specify the entity type.

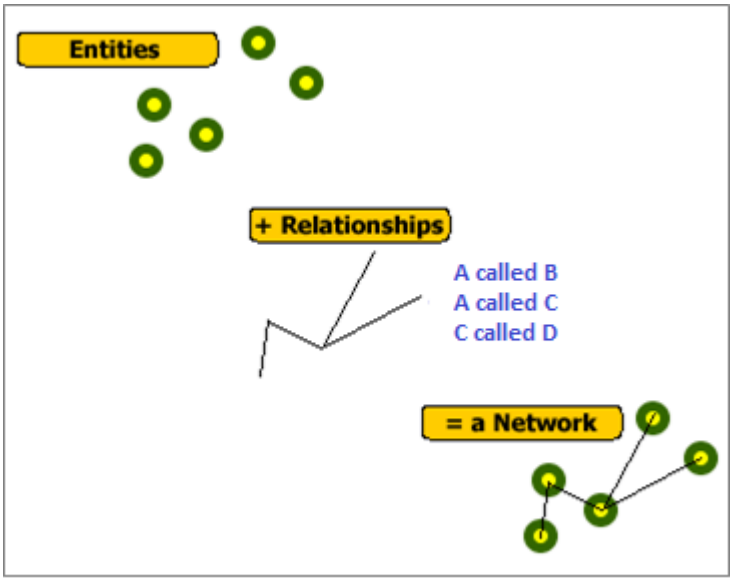
Add more metadata type filter with AND or OR. With AND, only entities with all the specified metadata values are included. With OR, any entity with one of the metadata values passes the filter.

# Chapter 6: Relationships

*While entities are the foundation of Sentinel Visualizer, they are not useful without relationships. Sentinel Visualizer supports a rich variety of relationship types that allow you to define how entities are connected to each other. Once you have entities and relationships, you have a network. And once you have a network, you can use Sentinel Visualizer to perform sophisticated analysis and tracking.*

## Relationship Concepts

If entities are the core of the Sentinel Visualizer, then relationships are the glue that binds them together. Relationships are links between entities: Bob placed a phone call to Ralph; Joe is a member of Organization X, etc.




Relationships can also contain a wealth of information, including information credibility and start and end dates. The following list shows some of the important characteristics of relationships:

- **Relationship Types:** Each relationship has a type that defines it. Sentinel Visualizer supports a rich array of relationship types and is configurable to add new types. Some of the built-in types are sibling of, senior member of, placed a phone call to, etc.
- **Start and End Date/Time:** A relationship can have start and end date/time. This allows both the user and the system to analyze the temporal (time-based) nature of a network.

- **Metadata:** Relationships support metadata, which further define the relationship. For example, you may have a metadata field for relationship information source.
- **Information Integrity:** The integrity of the information that establishes a relationship is important. Sentinel Visualizer supports two factors: credibility of information and reliability of source. When combined, they provide a sound basis on which to judge the integrity of the information.
- **Notes and Documents:** You can add any number of text-based notes to a relationship. Additionally, you can attach or embed an unlimited number of documents to a relationship. These documents can be word-processing files, web pages, videos, or any other file type recognized by the Windows operating system. This allows you to add rich documentation about each relationship.
- **Topics:** You can create a list of Topics for your database. Topics are general categories that allow you to organize information into areas that map to your data.

### Relationships and Directionality

It is important to note that all relationships in Sentinel Visualizer have a direction. In other words, one entity points to another entity. This is apparent when you look at the standard relationship types supplied with Sentinel Visualizer, such as:

- Father of
- Provided funds to
- Placed a call to

For Sentinel Visualizer to provide accurate analysis, the concept of directionality is important. When you enter relationships, be sure to identify the "to" and the "from" correctly.

### Relationship Inverse

It is also important to know that you do not need to enter the inverse of a relationship. If you add the relationship record “Fred is the father of Mary,” you do not need to enter the inverse of that relationship (Mary is the child of Fred).

### Relationship Field Values

Sentinel Visualizer supports a wide array of information fields at the relationship level. These fields are shown in the View/Edit Relationship form, on various relationship reports, and in the relationship search.

### Searching for Relationships

One of the most common relationship operations is searching. Since your database most likely contains a large amount of relationship data, being able to find relationships accurately and efficiently is important.

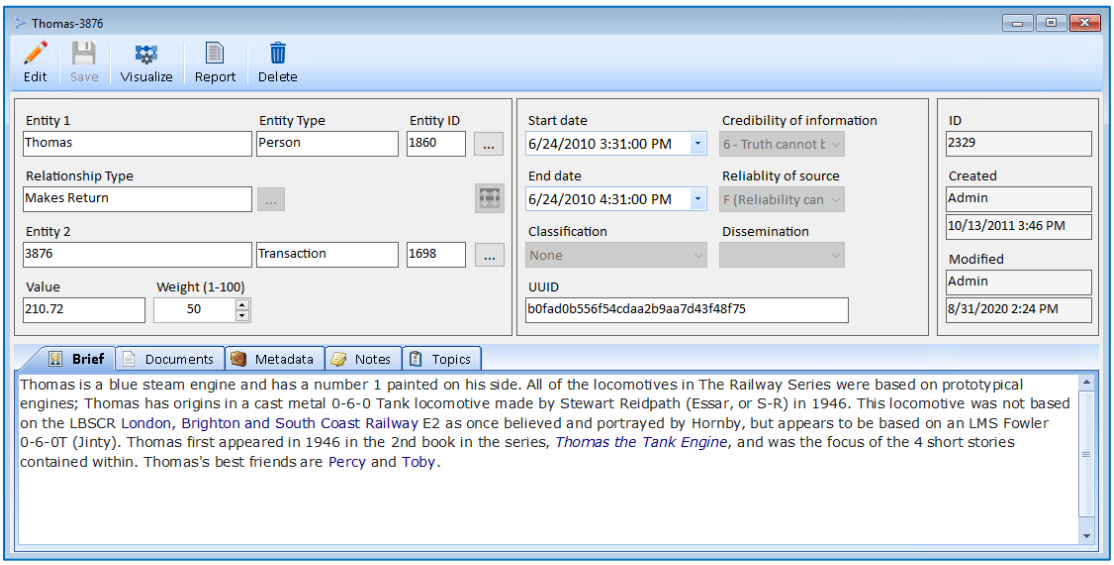
Relationship searching is not as complex as entity searching, since relationships are between entities that have already been identified in the system. As with entities, you can search for relationships by a variety of criteria.

## View Relationship Information

The View Relationship form shows a complete list of information available for the relationship. You can open the View Relationship form through a variety of program functions:

- From the Relationship Search form, double-click on a relationship in the Search Results.
- From the Visualizer, double-click on any relationship in the display.
- On various other forms in the system, click the [View Relationship] or [View] button.

When you open the View Relationship form, you can see that it is organized into several key areas that help categorize information about the relationship.




*The general information in the top section describes the relationship, including the two entities and their relationship type, start and end dates, value, etc.*

### Relationship Tabs

The tabs in the bottom section provide additional information and is similar to the tabs for entities.

- **Brief tab:** A text area where general textual information can be stored. Brief is generally used to incorporate text information that is "official" or "approved" for the relationship.
- **Documents tab:** A list of documents that are embedded in the database or linked on disk. You can open any of the documents using the program associated with that document type.
- **Metadata tab:** A list of metadata items that further describe the relationship. Metadata are fields extend information about the relationship.
- **Notes tab:** A list of all text notes attached to the relationship. This is different from the Brief area because it allows multiple notes.
- **Topics tab:** A list of categories that the relationship belongs. Topics provide structure around sets of relationships. For example, you might have a Topic called "Financial Institutions" and another called "Group A." A relationship can belong to multiple topics and each relationship must belong to at least one topic. Topics are used in the Enterprise version to restrict who has access to this information.

## Using the Toolbar

The View Relationship form toolbar has the following buttons:

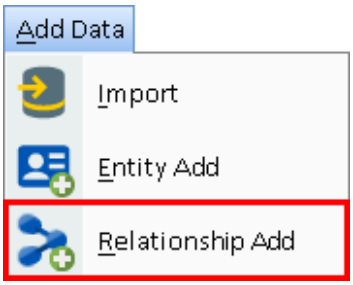
- **Edit:** Switch from view (read-only) mode to edit mode. You must have Edit permissions to edit the relationship. Contact your System Administrator for permissions.
- **Save:** In edit mode, save your changes to the data and return to the previous form.
- **Visualize:** Open Relationship in Visualizer.
- **Report:** Open Relationship in a Printable Report.
- **Delete:** Delete the Relationship.

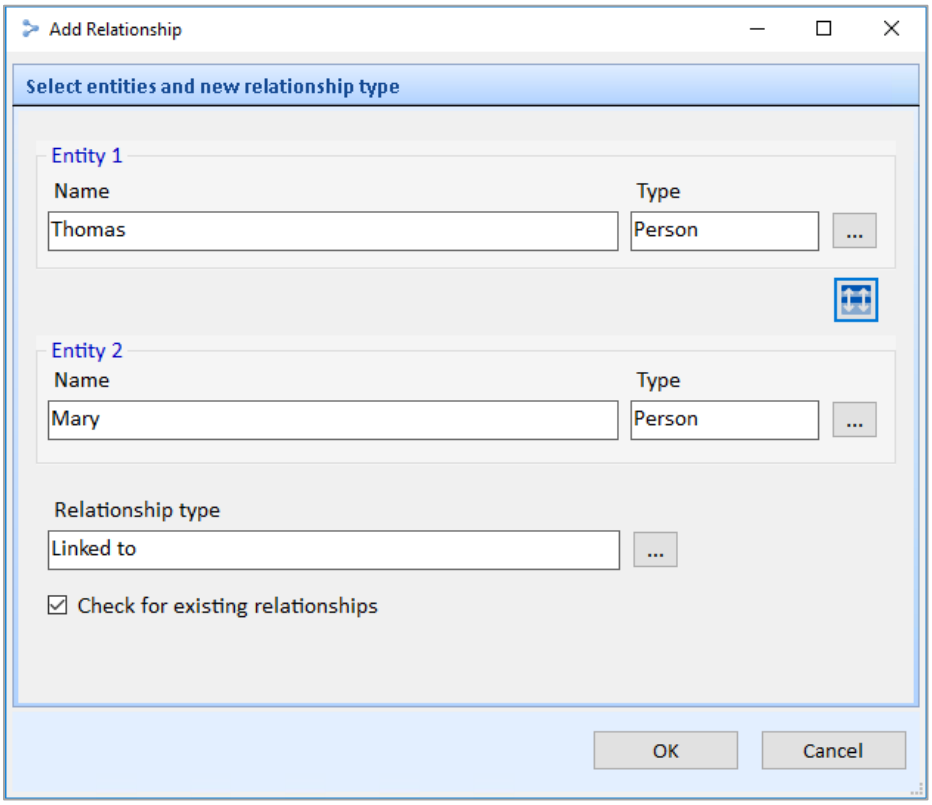
# Add a New Relationship

To add a new relationship, click [Relationship Add] from the Home page panel or menu.

***Home Page Left Panel***

***Menu Toolbar***




## Select the Entities for the Relationship

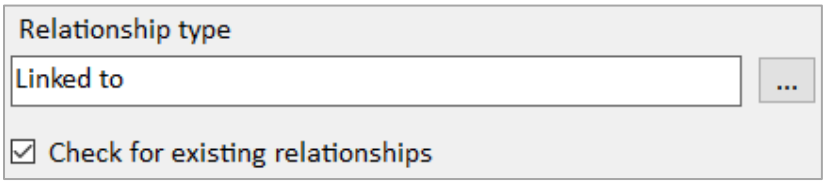
Select the two entities of the relationship. Use the [...] buttons to launch the Entity Picker:

This form is like the Entity Search form. Find the entity you are looking for. When the Search Results appear, either double-click on the desired entity, or select it and click [OK]. To cancel without selecting an entity, click the [Cancel] button.

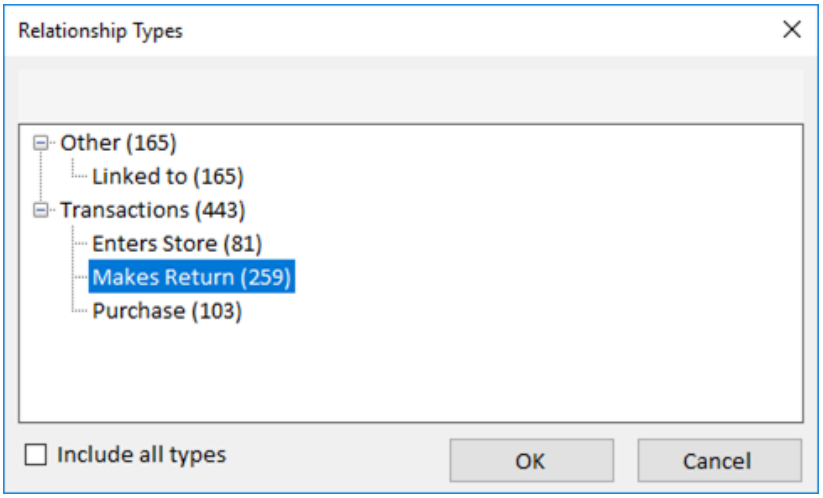
This button swaps the two entities.

## Select the Relationship Type

After selecting the two entities that form the relationship, use the [...] button next to the Relationship Type field to specify the type.




After making your choices, click the [OK] button to continue.



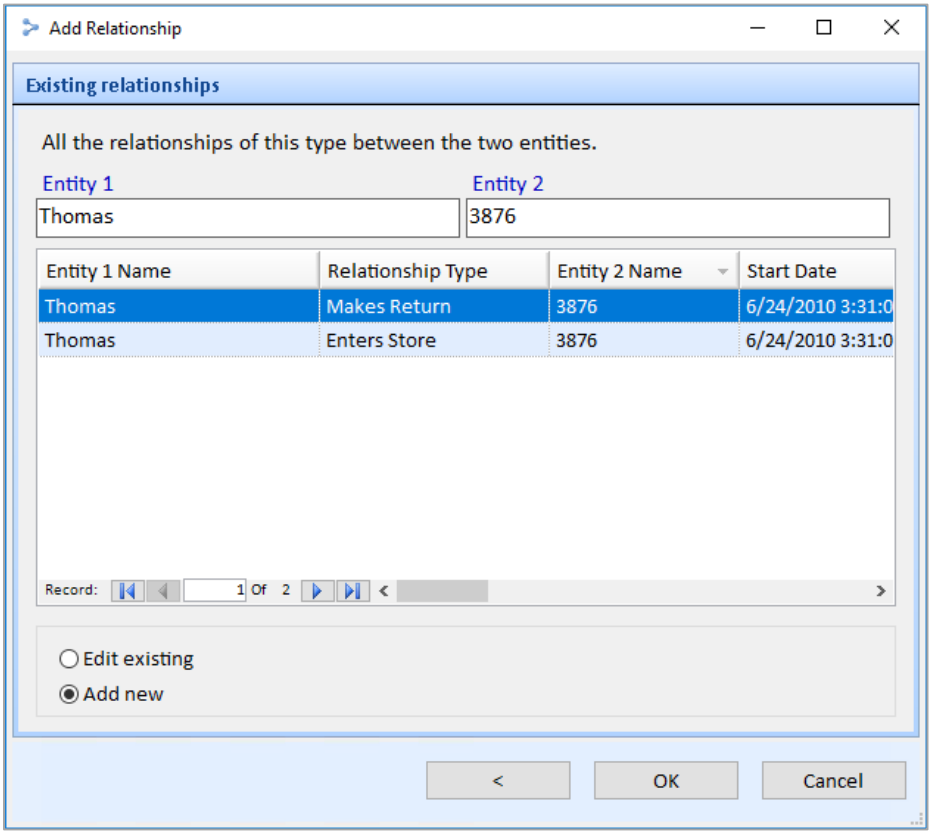

## Overriding the Check for Similar Relationships

There may be cases where you want to skip the step of having Sentinel Visualizer look for similar Relationships, for example:

- You are adding a relationship to a database that has thousands or millions of existing relationships which may yield an unmanageably high list of similar records.
- Your relationship database is very large, and you must manually enter many relationships. If this is the case, the search for existing similar relationships may be unnecessary and time consuming.

In cases like these, you can skip the search by un-checking the [Check for similar relationships] option. However, you should realize that skipping this step may result in duplicate relationship records, which may yield inaccurate results and analysis.

The next page displays any existing similar relationships and gives you the option to either edit one of the existing relationships or add a new one.




*Select the appropriate option and click [OK] to open the Relationship form*

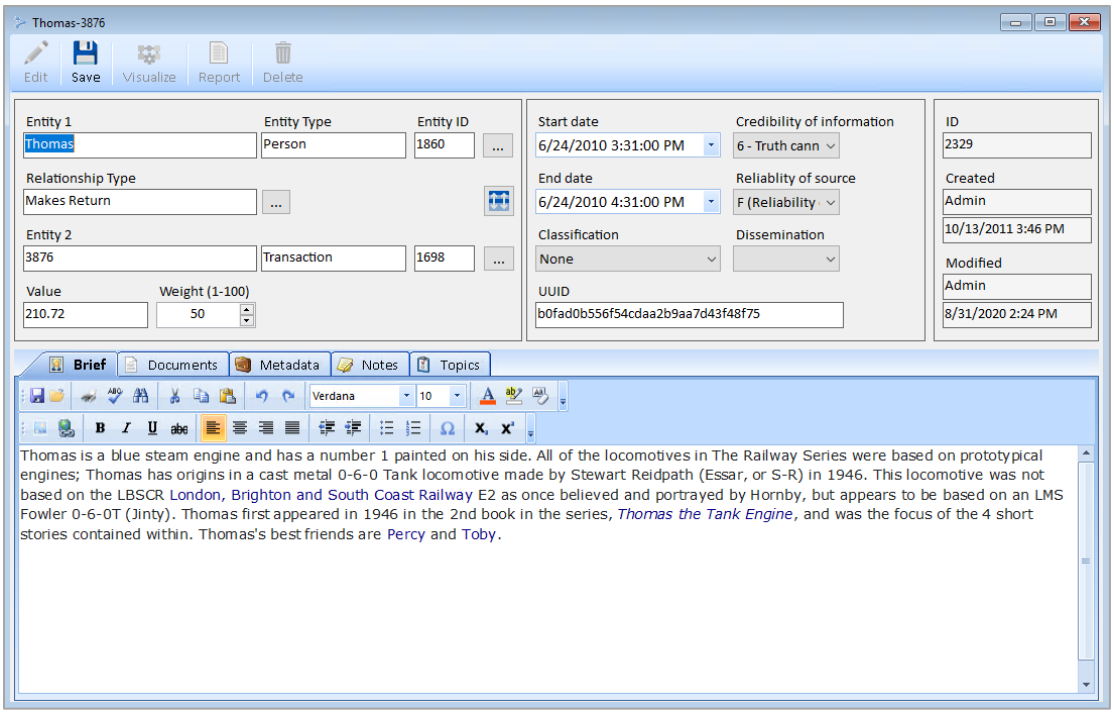
After the relationship is created, the relationship form is the same as editing it.

## Edit Relationship Form

The Edit Relationship form is similar to the View Relationship form, but it is used to enter information for new relationships or to change information for existing relationships.

The Edit Relationship form differs from the View Relationship form in the following ways:

- All buttons for editing and deleting information are enabled.
- You can select or type values in various fields.
- Several fields have additional features that allow you to select or change values.
- The [Save] button on the toolbar is enabled.



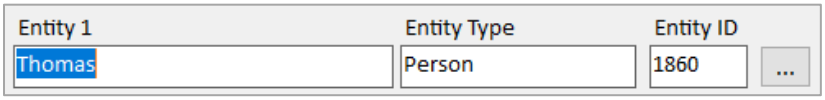

*Edit a Relationship*

## Editing General Relationship Fields

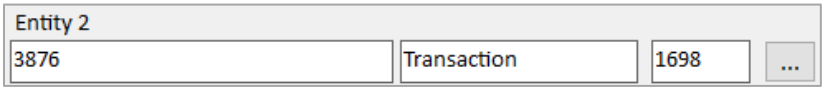
The upper portion of the Relationship form includes General Relationship fields.

### *Entity 1 and Entity 2*

This shows the entity name and unique ID for the first and second entity. You can use the […] button to open the View Entity form for that entity




*Entity 1*

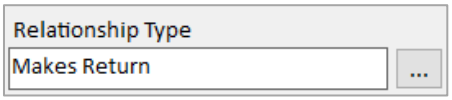



*Entity 2*

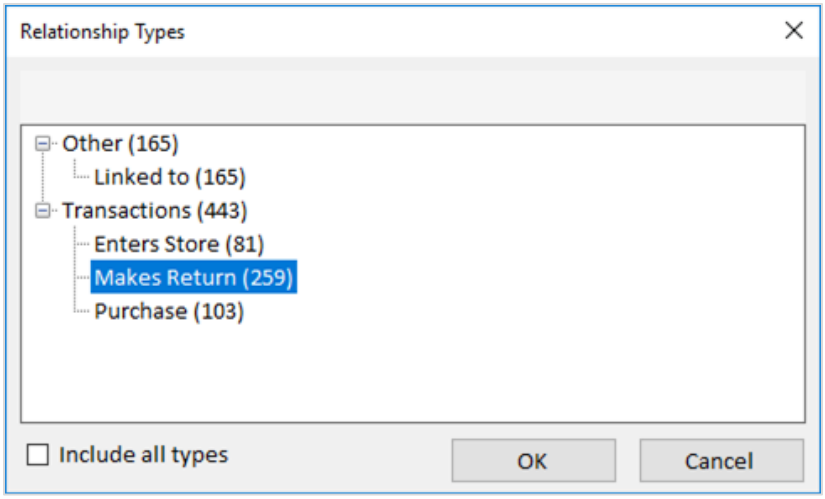
Use the swap button to switch Entity 1 to 2 and vice versa.

### *Relationship Type*

Select the type of the relationship by clicking the […] button.



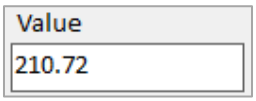

This opens the Select Relationship Type form which shows the list of relationship types and the number of relationships they are assigned. Check the [Include all types] box to show relationship types that are not currently used by a relationship.




Select the appropriate relationship type and click the [OK] button.

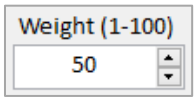
### *Value*

The value field is an optional number you can assign to the relationship. This value can be used to filter relationships. On the Visualizer diagram, relationships can be colored or sized based on value. It can also be summed and displayed on the relationship line between the two entities. It is also used in squelching and gradients multiplied by the relationship type weight and/or relationship weight.




### *Weight*

The weight field is a required value between 1 and 100 to add a custom weight factor to a relationship. The default value is 50. A Relationship Type also has a Weight. The Relationship's Weight can be used to emphasize or deemphasize a relationship relative to others of the same relationship type. It can be used for filtering relationships. On the Visualizer diagram, relationships can be colored or sized based on weight, and combined with value.

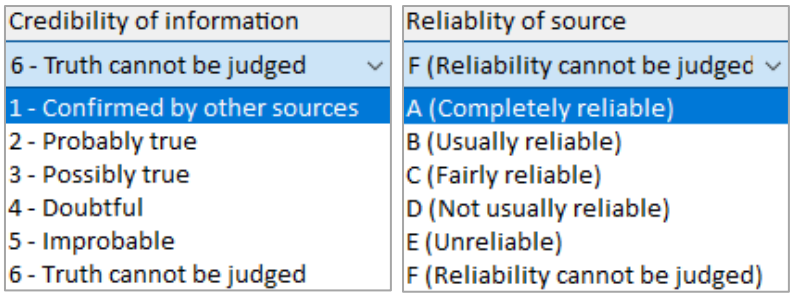



### *Start and End Dates*

Enter the start and end dates for the relationship if it is known and applicable. This can be used for filtering. On the Visualizer diagram, it is used by the Time Range filter and appears on the Timeline tab.

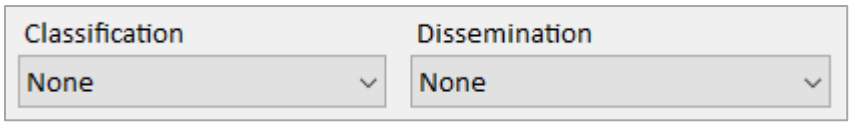
### *Credibility of Information and Reliability of Source*

Select the Credibility of Information and Reliability of Source from the list. These fields are required.



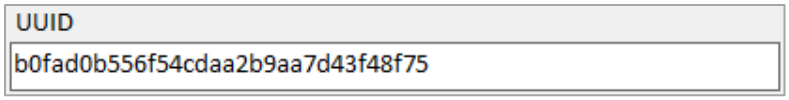

### *Classification and Dissemination*

Classification level tracks the sensitivity of the data to limit who can see it. Dissemination tracks who the data can be sent to. The values are defined in their lookup lists and are required.



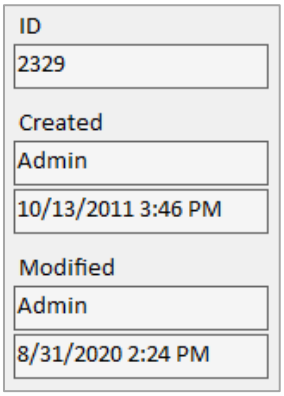

### *UUID*

The UUID is an optional unique identifier for the relationship, typically used when imported from other systems.




### *System Fields*

These fields are automatically generated by the system and cannot be modified:




- **ID:** This number uniquely identifies the relationship within the database.
- **Created by:** This field contains the name of the user who initially created the relationship.
- **Created date:** This field contains the date and time the relationship was initially created.
- **Modified by:** This field contains the name of the user who last changed the relationship.
- **Modified date:** This field contains the date and time the relationship was last modified.

## Relationship Tabs

The tabs are similar to the tabs for Entities and are viewed, edited, and deleted the same way. Refer to **Editing Data in Tabs** on page 47 for more information.

## Save or Cancel Changes

After changing your relationship information, there are two choices:

### Save

Click the [Save] button on the toolbar to save your changes to the database.

### Discard

Cancel all changes made since you opened the record by closing the Relationship form. Close the form by clicking the [x] on its tab or upper right corner.

## Delete Relationship Records

You can delete the current relationship by clicking the Delete item on the Relationship toolbar.

From the Relationship Search form, you can find and select multiple relationships to delete. You are prompted to confirm the deletion.

It is important to know that when you delete a relationship record, all data for that relationship, including its notes and documents, is permanently removed from the database. You cannot recover a deleted relationship except to revert to a previous checkpoint or backup.

# Chapter 7: Relationship Search

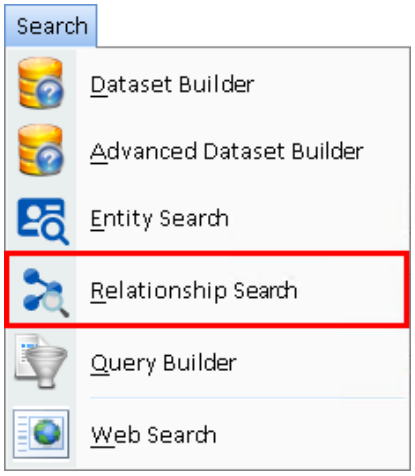
*Sentinel Visualizer includes powerful search tools that allow you to find relationships based on their entities, relationship type, metadata, documents, notes, and many other criteria.*

## Searching for Relationships

There are several places in Sentinel Visualizer to find relationships. Relationship Search and the Advanced Dataset Builder retrieve lists of relationships. You can also filter relationships in the Visualizer.

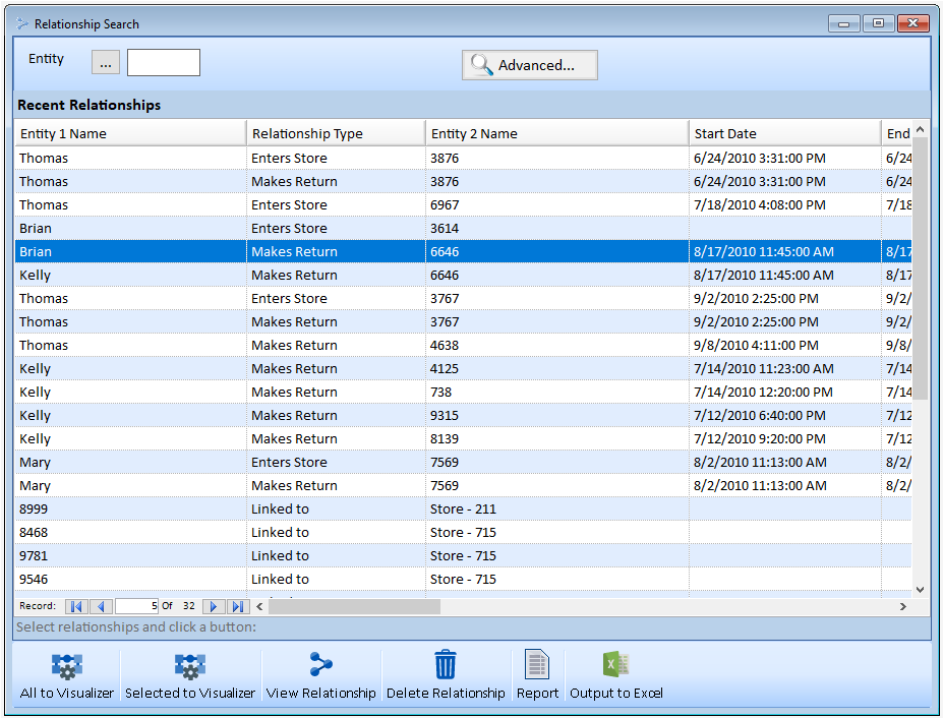
***Home Page Left Panel***

***Menu Toolbar***




## Relationship Search

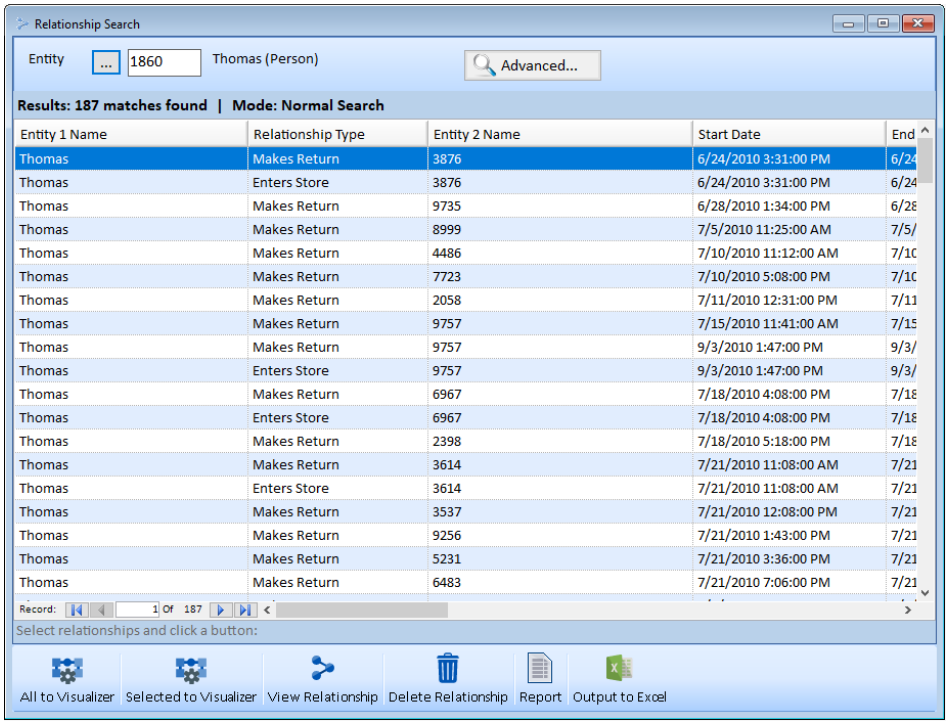
The Relationship Search form appears listing the recently opened relationships:




You can perform actions on relationships in the list, or search for all relationships associated with an entity. Click the […] button to select an entity. Any Relationships that has it as Entity 1 or 2 are listed in the results. For more search options, click the [Advanced] button.

## Search Results

Sentinel Visualizer queries the database and returns all the relationships matching your criteria. A variety of options are available for the search results grid.



### *Sorting*

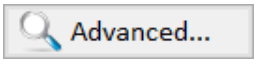
Sort on any field by clicking on the column's header. For example, to sort by the second entity, click on the Entity 2 Name header. The first click sorts in ascending order. Clicking again resorts in descending order.

### Toolbar

You can choose one or more relationships by clicking with the Shift or Ctrl key. Similar to Entity Search, you have these options below the search results.

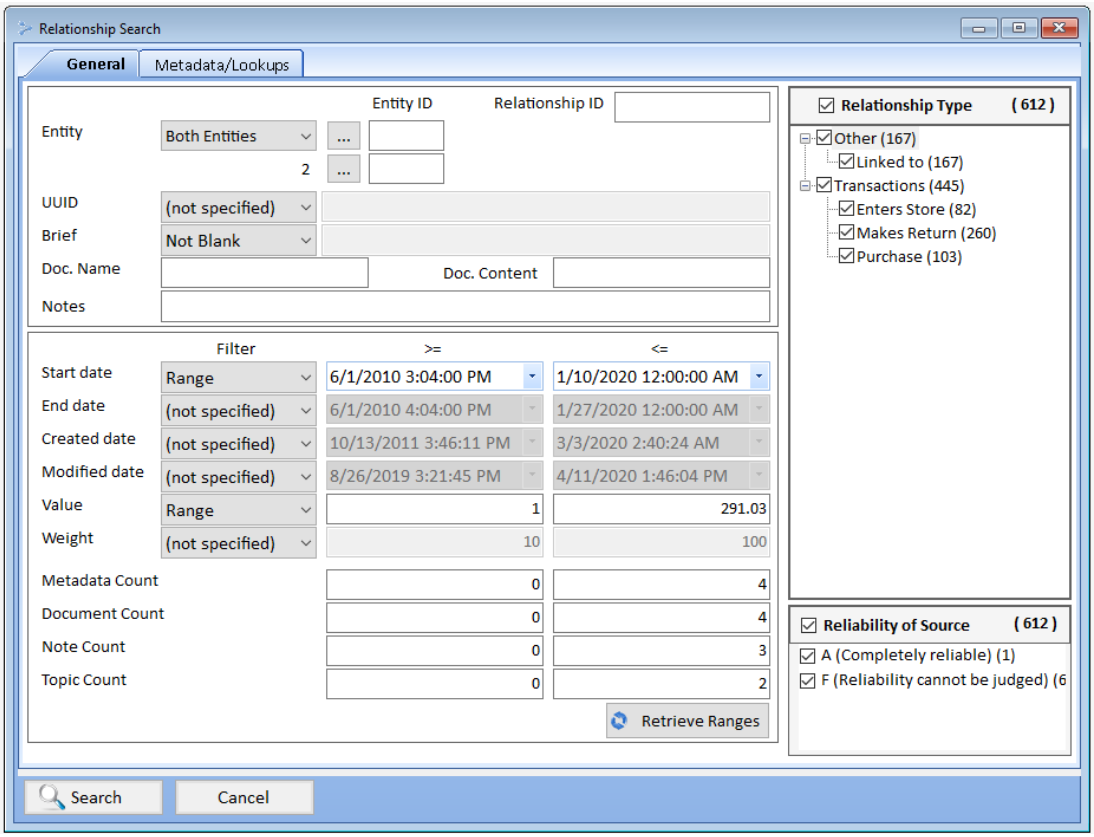
- **All to Visualizer:** All Relationships with their entities are displayed in a new Visualizer.
- **Selected to Visualizer:** Selected Relationships are sent to a new Visualizer. You can also double click on a relationship to do this.
- **View Relationship:** Open the View Relationship form for the selected relationship(s). From there, you can edit it.
- **Delete Relationship:** Delete the selected relationships. All data for the relationships, including their notes and documents, is permanently removed from the database. There is no way to recover deleted relationships except reverting to a previous database checkpoint or backup.
- **Report:** Print reports based on the relationships in the search results list.
- **Output to Excel:** Exports the list of selected relationships and its details to an Excel file.

## Advanced Relationship Search

To search for relationships beyond its entity, click the 

Advanced button. Similar to the Advanced Search for entities, the Advanced Relationship Search has two tabs for General and Metadata/Lookups criteria.

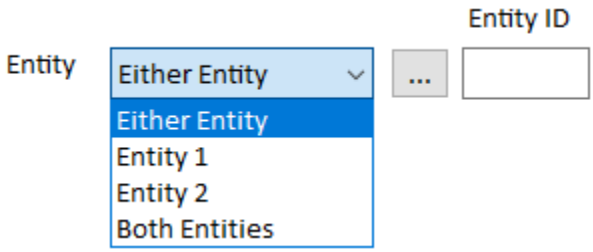
## General Tab




A wide range of criteria can be entered to select the specific relationships you want. Search for specific text values, Blank and Not Blank status, text in embedded documents, and ranges of numeric and date values.

### *Entity Search*

A drop down provides several search options. You can specify one entity for just entity 1, just entity 2, or either entity of a relationship. If you choose Both Entities, specify Entity 1 and 2.




### *Document Name and Content Text Search*

Similar to searching Entity Documents, the Doc. Name value searches the Path, Description, and Notes fields for Relationship Documents. Text in relationship documents can be searched by using Doc. Content if the server and database are configured for embedded document search. This retrieves relationships that have at least one document that contains the search phrase. To see the list of specific documents that contain the search phrase, use the Advanced Dataset Builder, Filter Relationships, and Preview the results. A Relationship Documents tab lists the documents.

### *Notes Search*

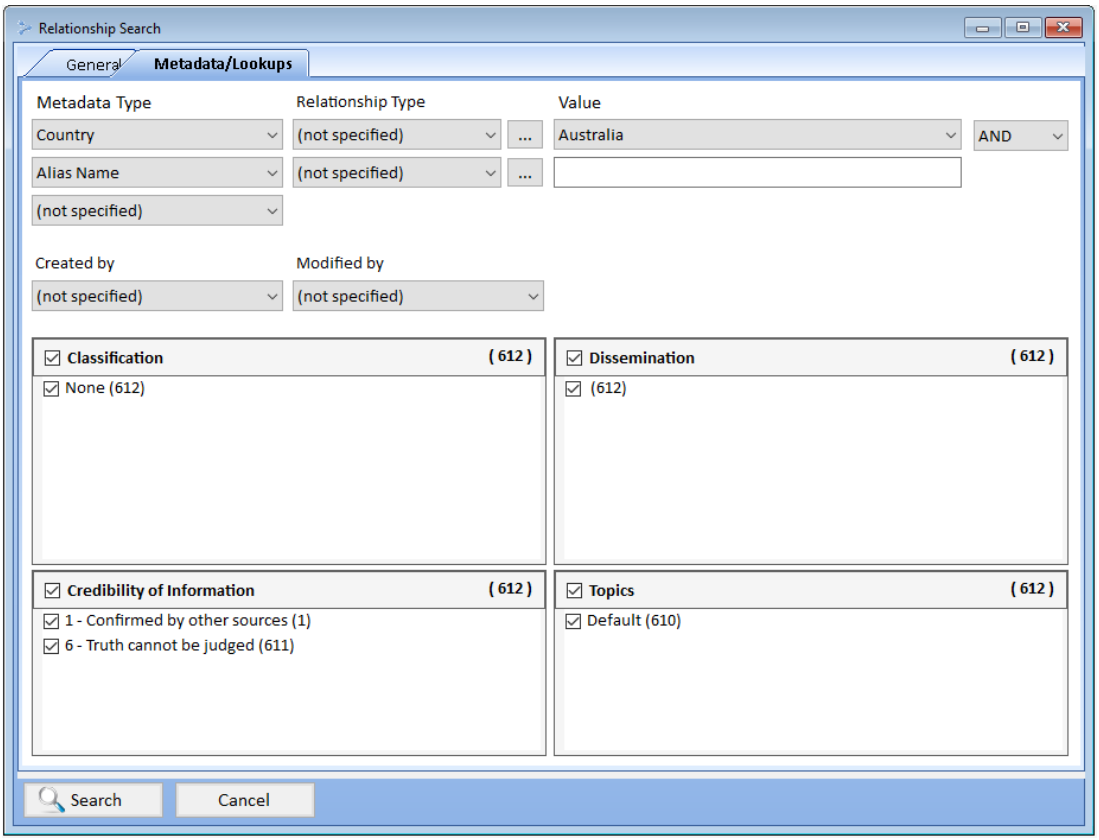
A note has a title and detail. Entering a search term finds notes where it exists in either field.

### *Retrieve Ranges*

Just like entity search, you can press the [Retrieve Ranges] button to fill the criteria with the minimum and maximum values of your data. You can use this feature to see what's in your database without even running the search.

## Metadata/Lookups Tab

On the Metadata/ Lookups tab, select values related to a relationship's metadata, created and modified person, classification, dissemination, credibility, and topic values.



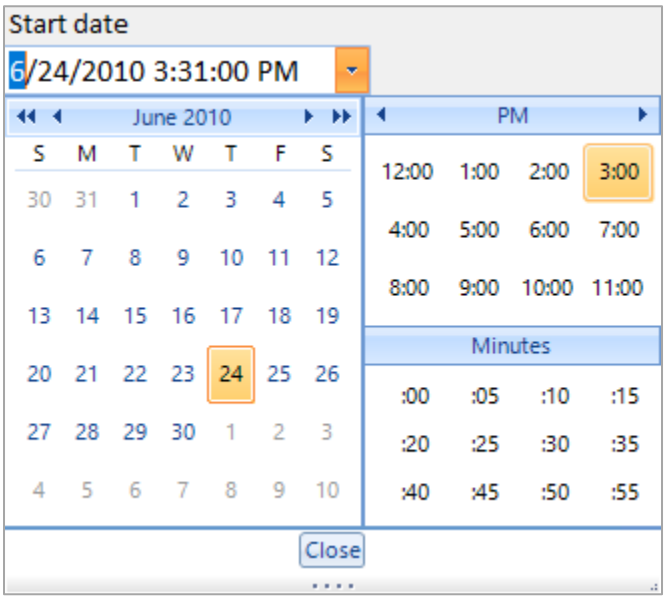

Searching metadata for relationships is identical to the corresponding feature for entity search. Specify the Metadata Type, an optional Relationship Type, and the value. You can have up to 3 metadata values combined with AND or OR to find the relationships.

# Chapter 8: Selecting Dates and Rich Text Editing

*Sentinel Visualizer provides the ability to store various types of data with both entity and relationship records. This includes dates in non-standard formats, and Briefs, Notes, and Documents. This chapter explains how you can use these features to enrich your knowledge of entities and the relationships that connect them.*

## Selecting Dates and Times

The Start date and End date fields do not accept direct text input. Instead, Sentinel Visualizer provides a specialized form that allows you to input accurate date and time information with resolution down to the millisecond level. To change a date/time value, click the drop-down button next to the appropriate field and the Choose Date and Time form appears.




## Working with the Text Editor

Several areas in Sentinel Visualizer support rich text. Rich text gives you the ability to format text right in the main program. Rich text is supported in entity and relationship records in:

- The Brief field
- Each Notes record

As an example, assume you are editing an entity record. Click on the Brief tab and the Brief field appears. This field includes the text data, along with toolbar buttons to control various options.

The following toolbar buttons are available:

- **Save:** To save your information.
- **Open:** Open the document using the application associated with the document type.
- **Print:** Allows you to print
- **Speller Check:** Checks for grammatical mistakes.
- **Find & Replace:** To find a word and replace with another.
- **Cut, Copy, and Paste:** Applies the standard Windows Clipboard commands to cut or copy the selected text or paste the text from the clipboard to the cursor location.
- **Undo:** Reverses previous result.
- **Redo:** Takes previous result that was altered and retables it.
- **Font Selector:** Lists fonts available on your system. Select a font to apply it to the selected text.
- **Character Size:** Lists all sizes available for the selected font. Select a character size to apply it to the selected text.
- **Font Color:** Shows the standard Windows Color Selection dialog. Select a color to apply it to the selected text.
- **Highlight Text:** Highlight specific text.
- **Photo button**: Upload photo
- **Insert Hyperlink**: Insert Hyperlink
- **Bold, Italic, Underline, Strikethrough:** Applies the chosen format to the selected text.
- **Align Left, Center, Right Justify:** Sets the justification mode for the selected paragraph(s).
- **Bullets, Numbering:** Adds bullet points to the selected paragraph(s).
- **Increase/Decrease Indent:** The distance is increased or decreased between the current paragraph.
- **Insert a symbol**: Insert a special character into your document
- **$X_2$ (Subscript):** Type very small letters just below the line of text.
- **$X^2$ (Superscript):** Type very small letters just above the line of text.

Enter text as you would in any word processing program. Use the toolbar buttons to select fonts, colors, attributes, alignment, and bullets.

# Working with Notes

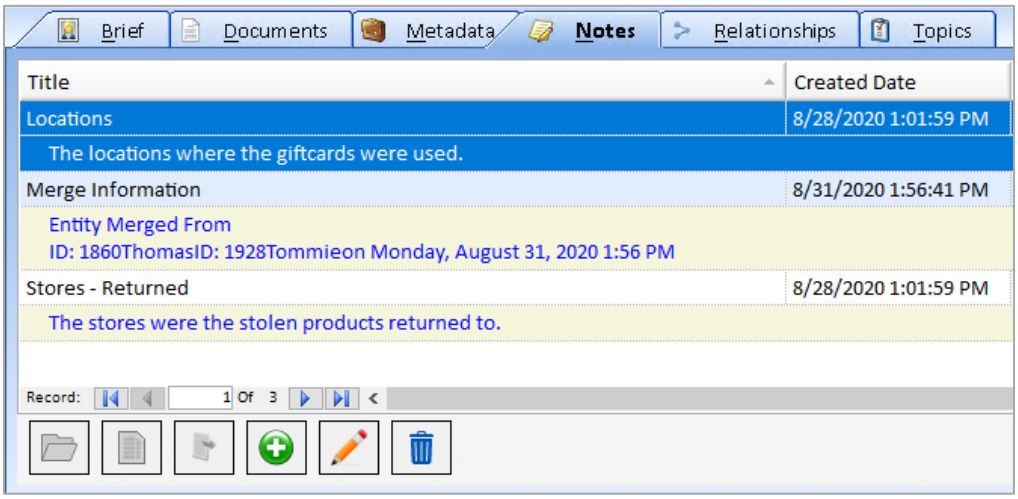
Notes are a useful way to attach textual information that you type directly into Sentinel Visualizer or copy and paste from other sources. You can use the Notes feature in various ways. For example, you could add a Note to keep your own list of information about an entity or relationship. Since Sentinel Visualizer tracks each user, you can easily find the notes that belong to you. This allows multiple members of a group to add to the general knowledge of the entity or post information that is theoretical or ad-hoc in nature.

Notes are available in the following areas of the Sentinel Visualizer program:

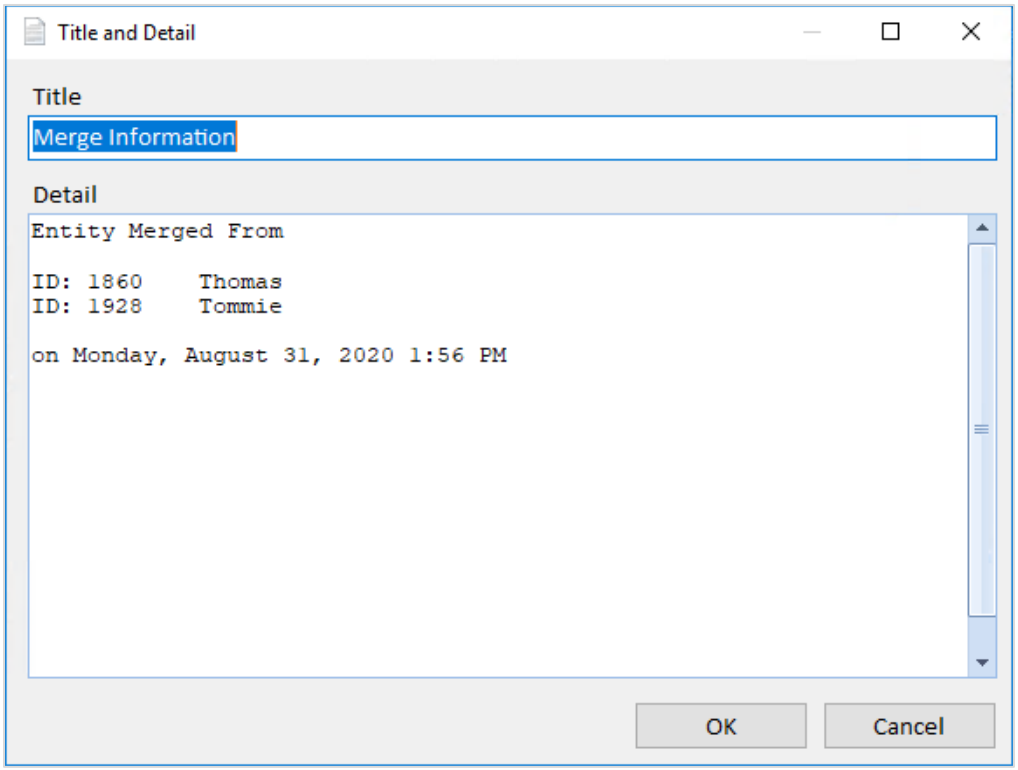
- View / Edit Entity form
- View / Edit Relationship form
- Various Entity and Relationship reports

## Viewing Notes

The Notes tab provides a list of all Notes available for an entity or relationship. The Notes grid area shows a scrollable list of all Notes for the record. Use the scrollbars or the [Up] and [Down] arrows to scroll through the list or click on any column header to sort by that field.



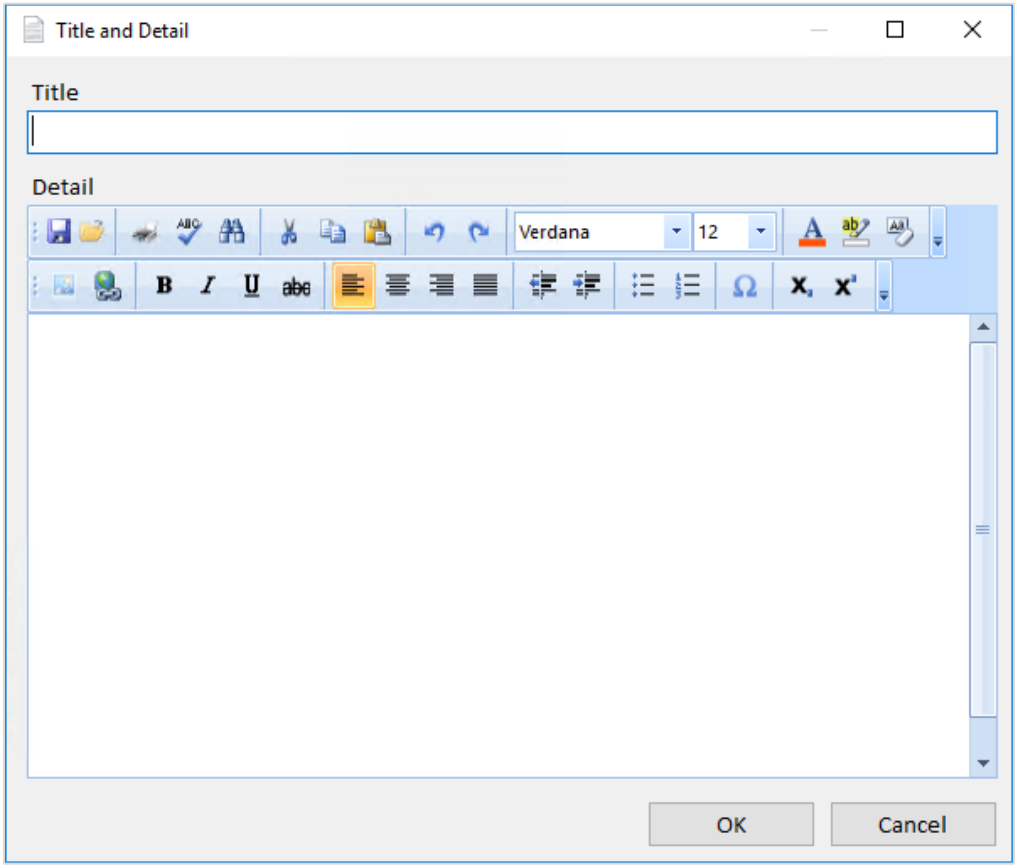

You can also select any Note and click the Open Folder button to see full information.




Note that the [Add], [Edit], and [Delete] buttons are disabled if you are in View Entity mode and enabled if you are in Edit Entity mode.

## Adding and Editing Notes

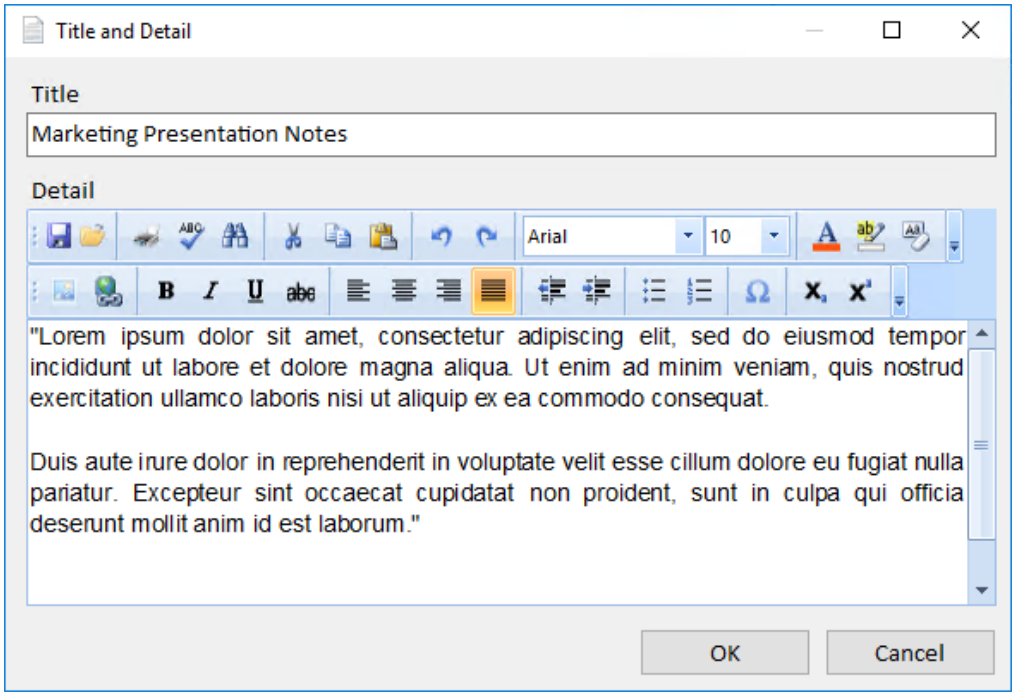
When you create or edit an entity or relationship, you can add new Notes and edit existing Notes. To add a new Note, click the green [+] button in the Notes grid. To edit an existing Note, select it in the Notes grid and click the [Edit] button. After a moment, the Note form appears.




Specify a title for the Note by typing it into the Title field. Choose a title that makes it easy to understand what the Note contains when it appears in a list of many notes.

In the Notes section, type in the actual text you want to store or use the Windows Paste feature to paste text from another source.

When you are finished, click the [Save] button to save the information. To discard your changes, click the [Close] button, and when prompted to save changes, select [No] to discard your changes.

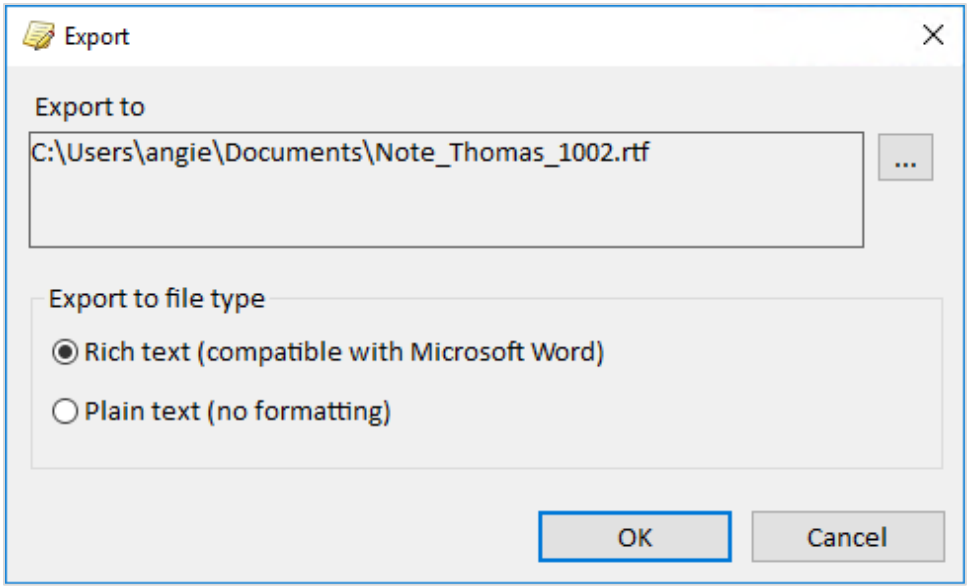



## Exporting Notes

Sentinel Visualizer provides the ability to export any Note record to a file you specify. This is useful when you want to take Note information that is embedded in the database and make it available to other users or applications.

To export a Note, select it in the list and click the [Export] button.

The Note Export dialog appears.




To specify the file, click the [...] button and use the dialog to locate the path and name for the file.

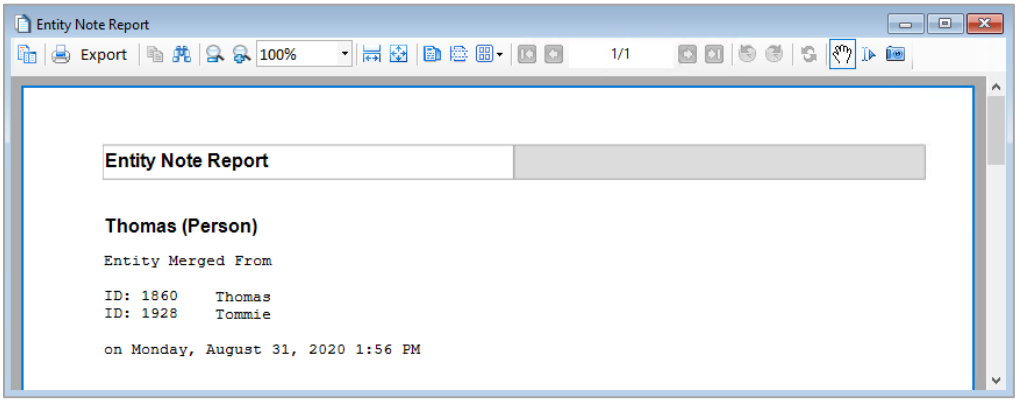
You can also choose the format for the exported file:

- **Rich Text (compatible with Microsoft Word):** Saves the note in Rich Text Format (RTF), which preserves note formatting, font selections, colors, etc. RTF documents can be opened with various Windows programs, such as Microsoft Write, WordPad, and Word. The RTF format is also recognized by a wide array of other word-processing programs, such as WordPerfect.
- **Plain Text (no formatting):** Saves the note in a text format (TXT). This option removes all formatting from the note, including font selections. Plain text documents can be opened with text editors such as Microsoft Notepad.

### Printing Note Records

To print a Note, select the Note in the list and click the [Report] button.

The system displays the Report Viewer with a report for the Note:




For more information about using the Report Viewer to print and export reports, see **Report Viewer** on page 98.

### Notes and Searching

When you search for Entities using the Entity Search form, you can choose the Extended Search mode. In this mode, Sentinel Visualizer considers the text in the Notes, making it easy to find matches in all Notes attached to all entities. For more information, see **Chapter 4: Entities**.

## Working with Documents

Documents are similar to Notes in that they allow you to enrich entity and relationship information. However, unlike Notes, Documents are actual files created by other programs that are embedded in or linked to an entity or relationship record. For example, you can collect word processing documents, audio files, images, videos, etc. that relate to an entity or relationship and store them as Documents.

Documents are available in the following parts of the Sentinel Visualizer program:

- View / Edit Entity form
- View / Edit Relationship form

- View Various Entity and Relationship reports

## Linked vs. Embedded Documents

Sentinel Visualizer supports two ways of handling documents to provide flexibility to both permanently store copies of files and link to files to avoid duplication of data.

### *Linked*

A link or path to the original document is stored in the Sentinel Visualizer database. The contents of the document are not imported. If the original document is moved, deleted, or renamed, Sentinel Visualizer can no longer view the information. However, if the document is updated, it is always pointing to the latest version.

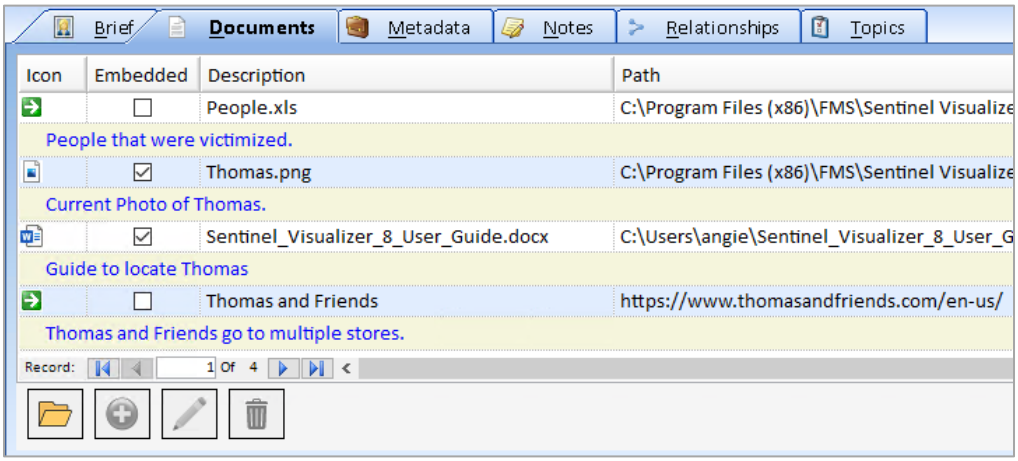
### *Embedded*

The file is copied into the Sentinel Visualizer database. This is a permanent addition to your database. Even if the original document is modified, deleted, or renamed, your copy remains in the database.

Sentinel Visualizer can search the text contents of documents stored in the database.

## Viewing Documents

The Documents tab provides a list of all Documents available for an entity or relationship. The Documents grid area shows a scrollable list of all Documents. Use the scrollbars or the [Up] and [Down] arrows to scroll through the list or click on any column header to sort by that field.




The following fields help you identify important information about Documents:

- **Icon:** The Windows icon for the application associated with the file type.
- **Embedded:** If the field has a checkmark, the Document contents are stored in the Sentinel Visualizer database. If the field does not have a checkmark, it is only a link (path) to the document.
- **Description:** A user-supplied short description of the file.
- **Path:** The original path of the document. If the Document is embedded, this value represents the original path of the source document or where it existed when it was originally added to the database. Note that this path may no longer be valid if the file has been renamed, moved, or deleted from its original location. If the item is a Linked Document, this path represents the location that Sentinel Visualizer points to when you view the file.

- **Size:** If the document is embedded, this field shows the size of the document in bytes. Size is not applicable for Linked documents, so Linked documents always show a blank size value.

## Opening Documents

To open a document, select it in the list and click the [Open] button.

Sentinel Visualizer opens the Document using the application associated with its file extension.

File type associations are handled by Windows and are based on the extension of the document's original file. For example, if you import a Microsoft Word document named **biography.doc**, Sentinel Visualizer looks at the file extension (.doc) and asks Windows for information about the application that is associated with this file type.

In most cases, Windows associates .doc files with Microsoft Word. As such, the Microsoft Word icon shows in the Icon column and Sentinel Visualizer launches the document in Microsoft Word when you open it.

## Strategies for Working with Document Types

If your computer does not have an application associated with a Document's file extension, Sentinel Visualizer cannot display it. For example, assume that Mary adds a Document named **info.bin**. She has a program called SuperWidget, which has been identified as the application to use for **.bin** files. So, when Mary opens the document in Sentinel Visualizer, the system launches the SuperWidget program to view it.

Now, assume you do not have SuperWidget installed on your computer. When you try to open the **info.bin** document that Mary stored in the database, Sentinel Visualizer displays a message telling you that the associated application was not found.

For this reason, you may want to consider storing documents in two ways:

- Store the original document in its original format. This maintains all the information in the document.
- Store another copy of the document in a more universally available format.

For example, Mary could have stored her original **info.bin** file and then used the SuperWidget application to make a copy of the data in a format such as Microsoft Word or as a PDF file. This would ensure that the original document could be accessed by users with or without the SuperWidget application.

## Document Actions

The following buttons are available on the Documents tab:

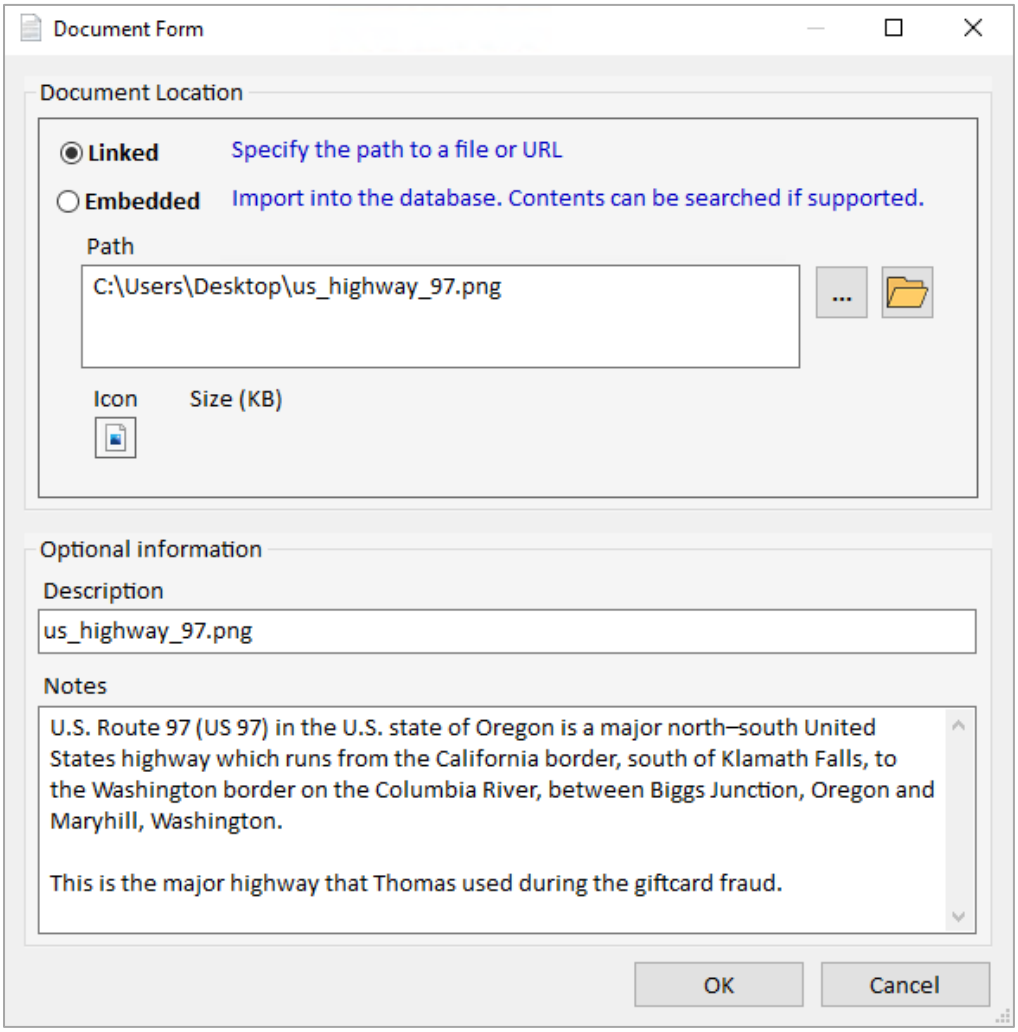
- **Open:** Opens the document using its associated program.
- **Add:** Opens the Document form, which lets you add a new document record to the entity or relationship.

- **Edit:** Opens the Document Edit form, which lets you make changes to an existing document.
- **Delete:** Deletes the selected document record.

Note that the [Add], [Edit], and [Delete] buttons are disabled if you are not in Edit Mode. If the buttons are disabled, and you want to make changes, click the [Edit Mode] button on the Entity or Relationship Editor's toolbar.

## Adding and Editing Documents

To add or edit a Document, click the [Add] or [Edit] button. Then use the Document form to make changes:




There are two options for storing documents:

- **Linked:** The path to the original document is stored in the database. The contents of the document are not copied. If the original document is moved, deleted, or renamed, Sentinel Visualizer can no longer open it.
- **Embedded:** The file is copied into the database. This makes it a permanent addition—even if the original document is deleted or renamed, your copy remains in the database. This also allows searching the text contents of the document if it is a supported format.

Use the […] button to locate the file. The path box is filled with the selected path and file. You can also use the open button to open the file with the application associated with it.

You can optionally enter a Description and Notes for the document, regardless of its type. This information is helpful when you are viewing a list of documents for an entity or relationship—if you have a description; it is easier to determine the applicability of the file without having to open it.

## Saving Changes

When you finish adding or editing a document, click the [OK] button to save the information back to the entity or relationship. To discard your changes, click the [Cancel] button.

# Chapter 9: Dataset Builder

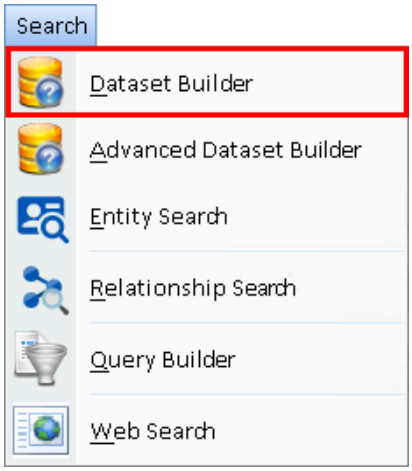
*The Dataset Builder is a wizard that steps you through the process of selecting entities and relationships with a variety of criteria and exporting the resulting data to files or processes.*

## Launch the Dataset Builder

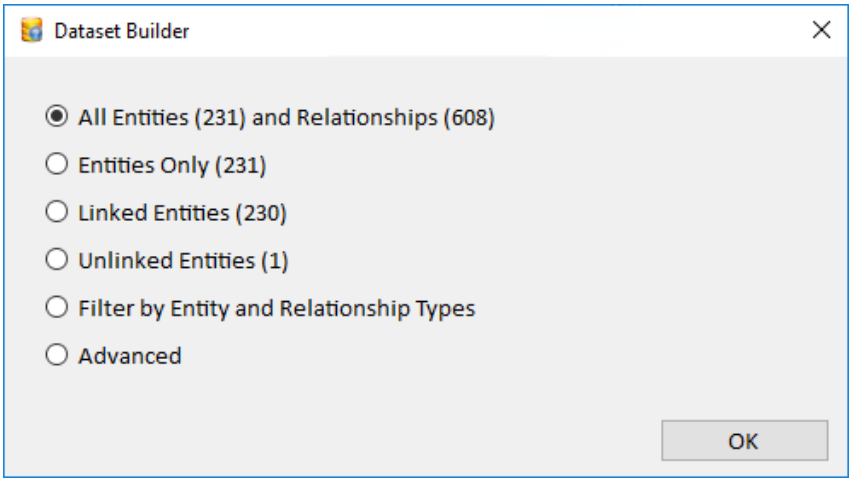
The Dataset Builder makes it easy to send your data to the Visualizer. Launch the Dataset Builder from the home page left panel or menu under Search.

***Home Page Left Panel***

***Menu Toolbar***

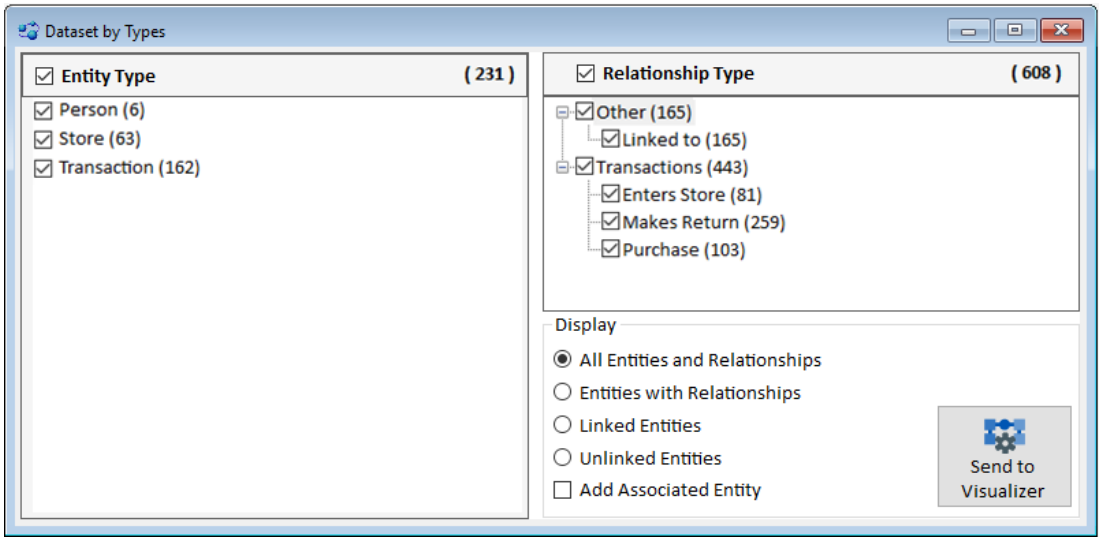



Easily send All Entities and Relationships, Entities Only, Linked Entities, and Unlinked Entities to the Visualizer with a single click. Additional options let you select more specific data.



### Filter by Entity and Relationship Types

Select Filter by Entity and Relationship Types and select the different result and filter options.




Click [Send to Visualizer] to visually see the Entities and Relationships.

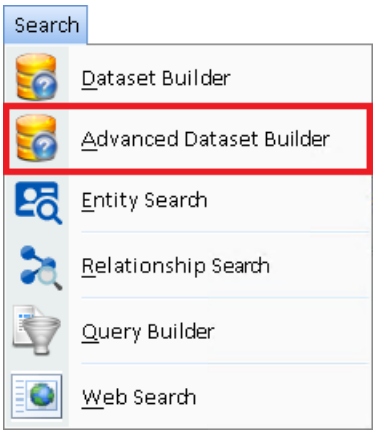
### Filter Related Entities

If you specified an option other than "Don't include any relationship data" on the filter Relationship page, the Filter Relationship Entities page allows you to specify how related entities are retrieved. The options are:

- **Only get entities that participate in relationship criteria:** Use this option to include only entities that participate on at least one side of the selected relationship criteria.
- **Get all entities that match entity criteria and include additional entities that participate in relationships:** Use this option to include all entities that match the entity criteria regardless of relationship participation, and all entities that participate in the relationship criteria.
- **Get entities for relationships and limit to match the entity search criteria:** Use this option to retrieve all entities that respect the initial entity search criteria.

## Advanced Dataset Builder

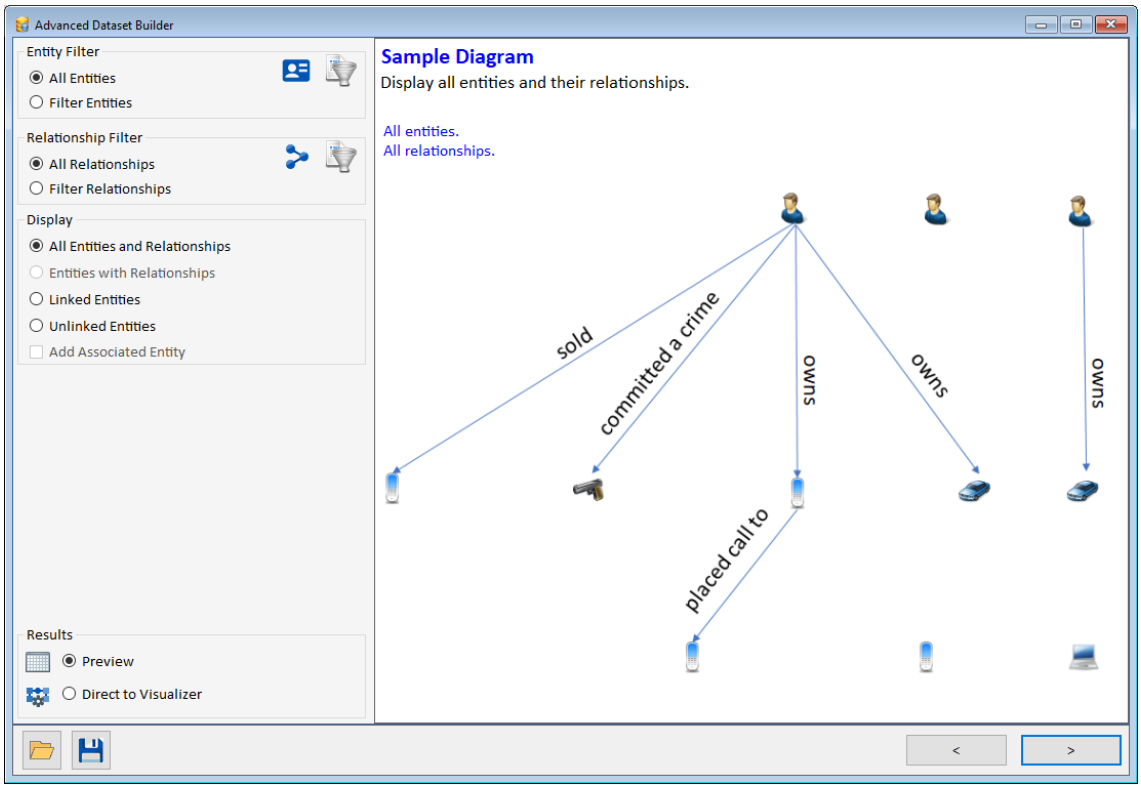
From the Search menu, choose Advanced Dataset Builder:



The Advanced Dataset Builder is a wizard with separate pages for

- Filtering Entities
- Filtering Relationships
- Selecting how they are related
- Reviewing the results
- Sending selections to a new Visualizer window

The first page of the Advanced Dataset Builder offers options to determine how to select the entities and relationships you want. As you change the options on the left, the Sample Diagram on the right shows how it impacts the selected entities and relationships.



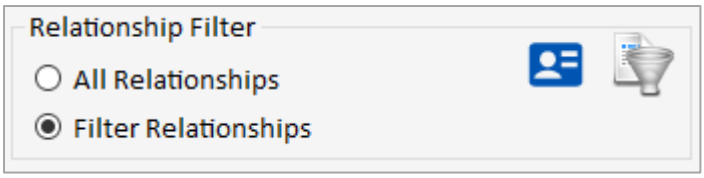

*Advanced Dataset Builder with Filter with Display Options*

## Filter Entities

If Filter Entities is selected, the next page of the wizard displays the entity search identical to **Advanced Entity Search** in Entity Search. See page 59 for details.

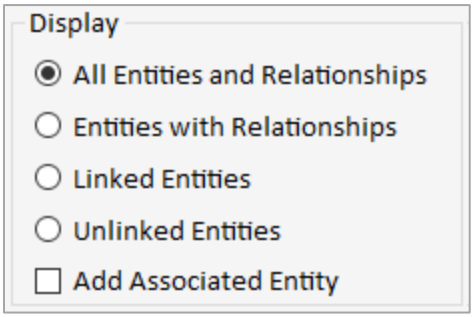
## Filter Relationships

If Filter Relationships is selected, the wizard displays the relationship search identical to the **Advanced Relationship Search** in Relationship Search. See page 75 for details.

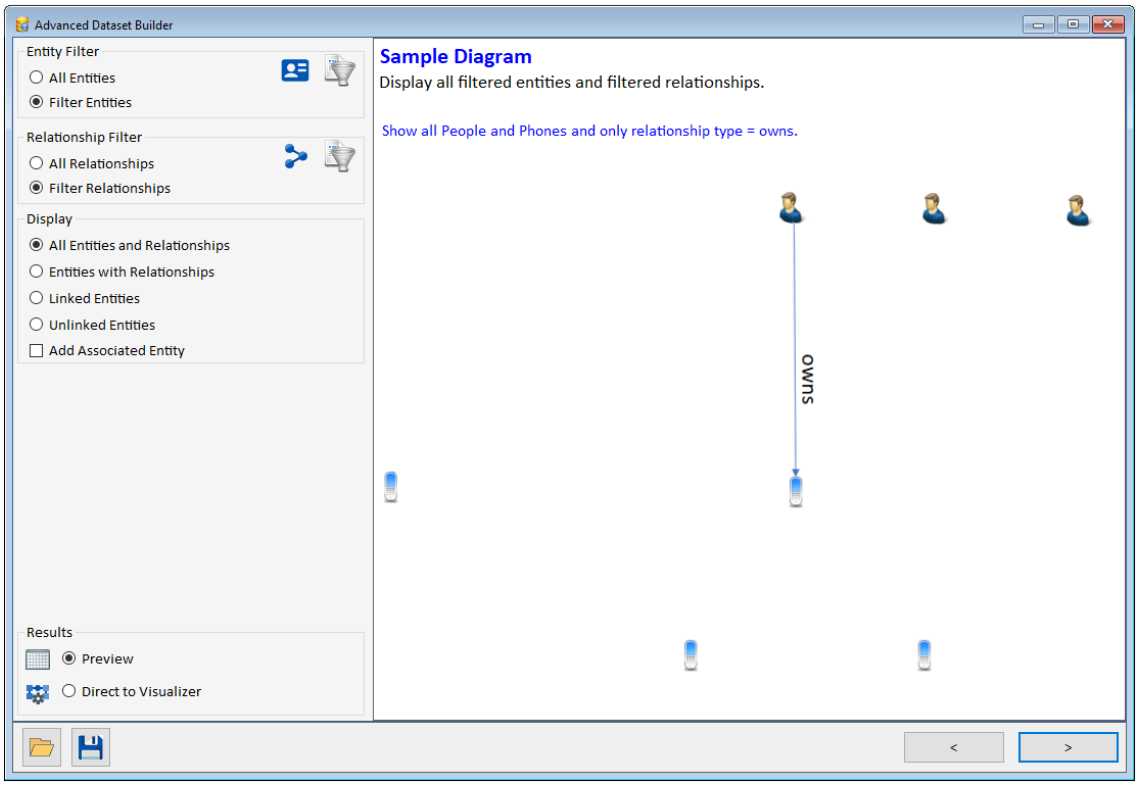



## Display Options

The Display options determine what is included or excluded in your results. It starts with the entities passing the entity filter and the relationships passing the relationship filter, then how they should be related.




To understand the options on the results, the Sample Diagram illustrates and explains the selection. Keep in mind that a relationship requires its two entities which impacts whether a relationship is included or not. There are 30 different types of results, for example:




*Advanced Dataset Builder with Filtered Entities and Relationships*

### *All Entities and Relationships*

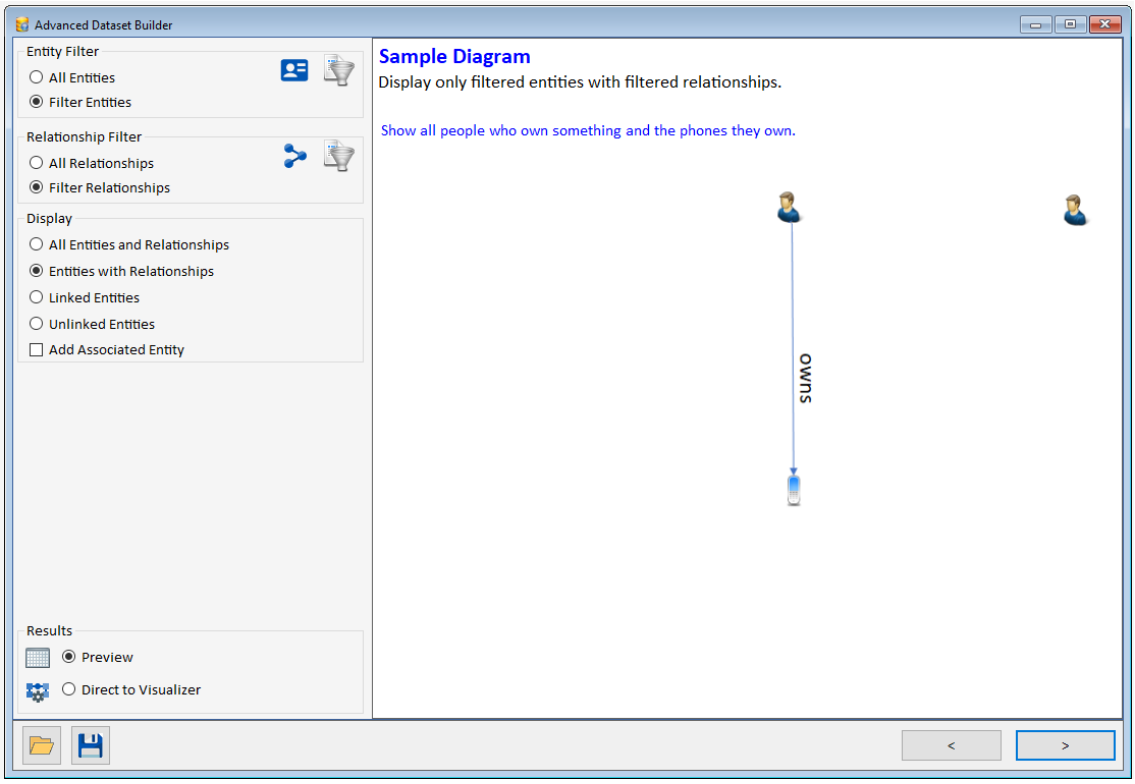
This option retrieves “All Entities” that pass the filter and generates these results:

- If there are no filters, all the entities and relationships are retrieved.
- If there is only an entity filter, the filtered entities and only relationships among them are included.
- If there is just a relationship filter, all the entities and just the filtered relationships pass.
- If there is both entity and relationship filters, all the filtered entities are included with only filtered relationships among those entities.

### *Entities with Relationships*

This option constrains entities with their relationships. It is only available if both entity AND relationship filters are used and is rather complex to understand.

Only entities that pass the entity filter which ALSO have relationships that pass the relationships filter are included. Note that this includes entities passing the entity filter with those relationships to entities that did not pass the entity filter.




*Filtered Entities and Relationships for Entities with Relationships*

In our example, we show an entity filter on Persons and Phone, and Relationship filter on owns.

- Only Persons and Phones that have an Owns relationship type are included.
- This excludes Persons and Phones that do not have an Owns relationship.
- It includes Persons that own entities that are not Phones.

So once those entities are in the results, only relationships where both of its entities are in the results are included.

### *Linked Entities*

This option retrieves entities with relationship links to other entities. Entities without relationship links are excluded.

- If there are no filters, only entities with relationships are retrieved.
- If there is only an entity filter, the filtered entities with relationships among them are included with their relationships. Entities that passed the filter with relationships to just entities that did not pass the filter are excluded.
- If there is just a relationship filter, all the entities with the filtered relationships are included with those relationships.
- If there is both entity and relationship filters, only the filtered entities with filtered relationships among them are included. This is the tightest filter.

### *Unlinked Entities*

This option is opposite of the Linked Entities option.

- If there are no filters, only entities without relationships are retrieved.
- If there is only an entity filter, the filtered entities without relationships among them are included. This includes filtered entities with relationships just to entities that did not pass the entity filter.
- If there is just a relationship filter, all the entities without the filtered relationships are included.
- If there is both entity and relationship filters, only the filtered entities without filtered relationships among them are included.

### *Add Associated Entity*

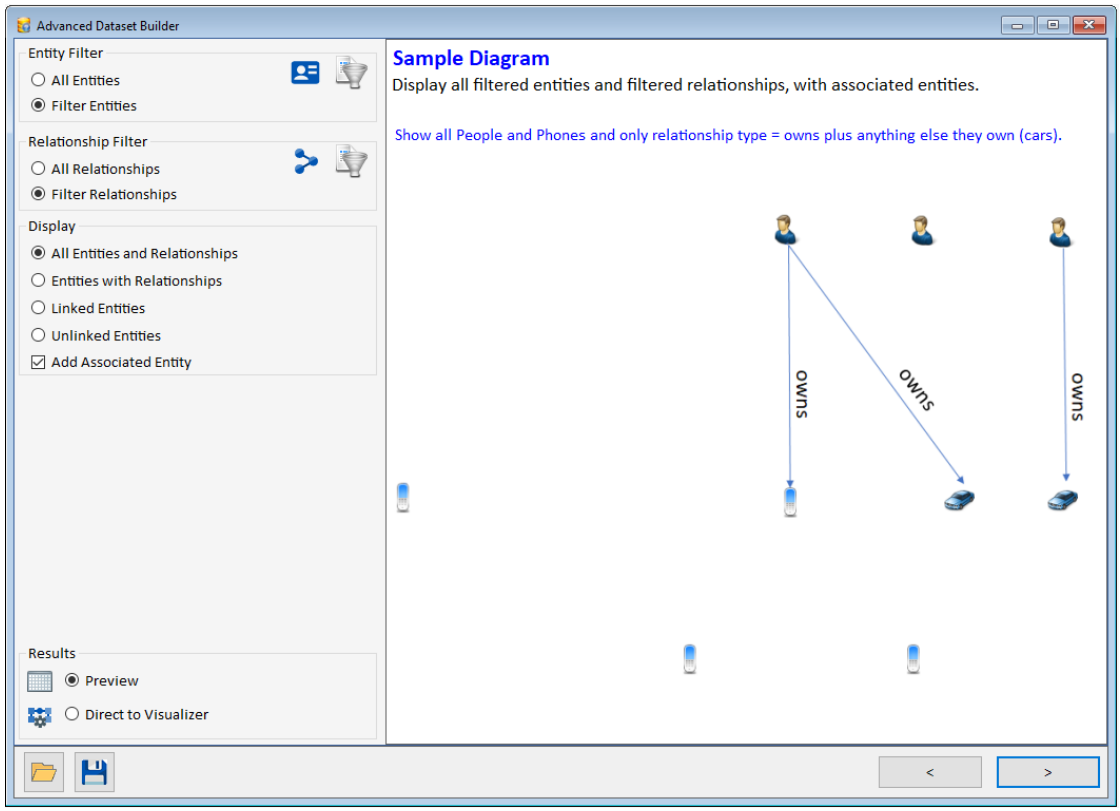
If entities and relationships are filtered, and you have one of the first two display options selected (All or Entities with Relationships), the checkbox for Add Associated Entity is available.

For relationships that passed its filter and only one of its entities passed the entity filter, this option lets you add the associated entity, so all the filtered relationships are included.

For instance, in our example, the entities are filtered to Persons and Phones, and Relationships for Owns. For All Entities and Relationships, without this option, all the Persons and Phones are included with just the Owns relationships among them.

With Add Associated Entity checked, the same entities and relationships are included, plus all Owns relationships for those entities by adding entities that did not pass the entity filter.

The example shows car ownership since the cars are the associated entity to the people's Own relationship, but cars were not included in the entity filter:




*Advanced Dataset Builder with Entity and Relationships filtered plus Associated Entities*

### Results Options

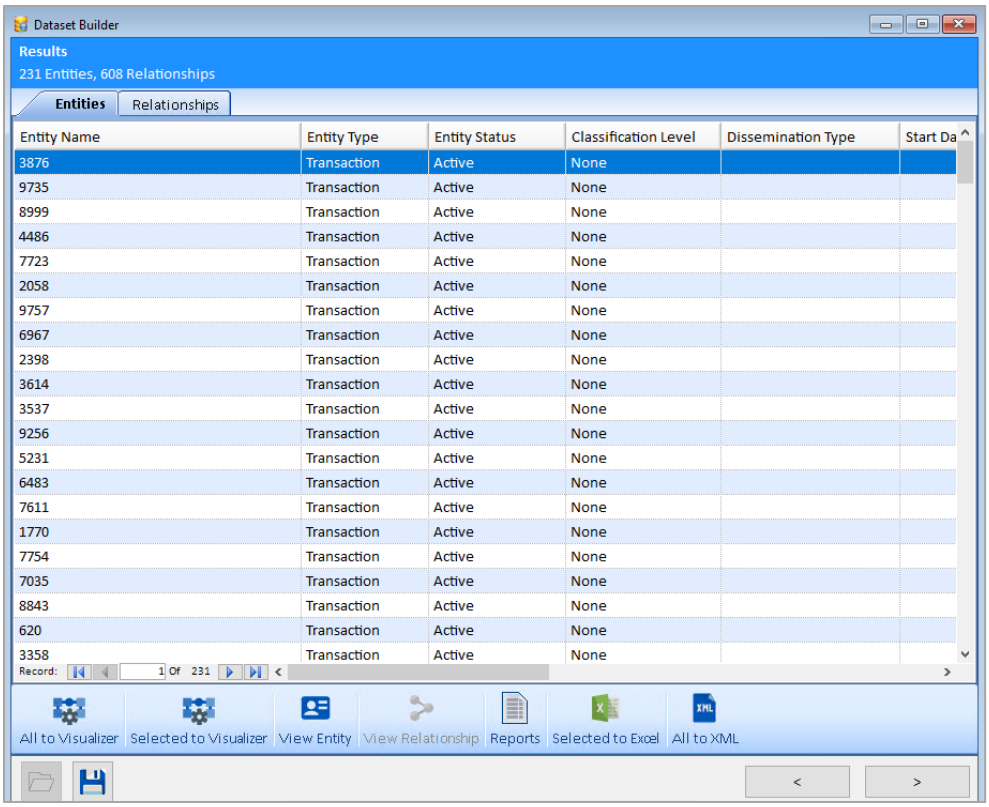
The search results can be previewed in a screen with multiple options to select, view, and export to Excel, plus being sent to a new Visualizer window. Or all the results can be sent directly to a Visualizer window without review.

## Previewing Results

After entering the entity and relationship criteria, if you selected to preview the results, the list of entities and relationships that passed the filter are displayed.

If the data preview is not what you expected, click the [<] button to change the search criteria.

Move to a row or use Shift or Ctrl with mouse click to select multiple rows. You can send all or a subset of results to a new Visualizer window, view individual details, open reports, and export the data to Excel or XML.




If document contents were searched, the documents with the search terms are listed in an Entity Documents or Relationship Documents tab.

A variety of output options are available:

### *All to Visualizer*

Sends all the data to the Visualizer diagram. Pressing the [>] also does the same.

### *Selected to Visualizer*

Sends all the selected rows to the Visualizer diagram.

### *View Entity or View Relationship*

Open the entity or relationship details form for the selected row.

### *Reports*

Entity and Relationship reports are available for the data that passed your filter. For more information about reports, see **Report Selection** on page 97.

### *Selected to Excel*

Sends information on the selected records to an Excel spreadsheet.

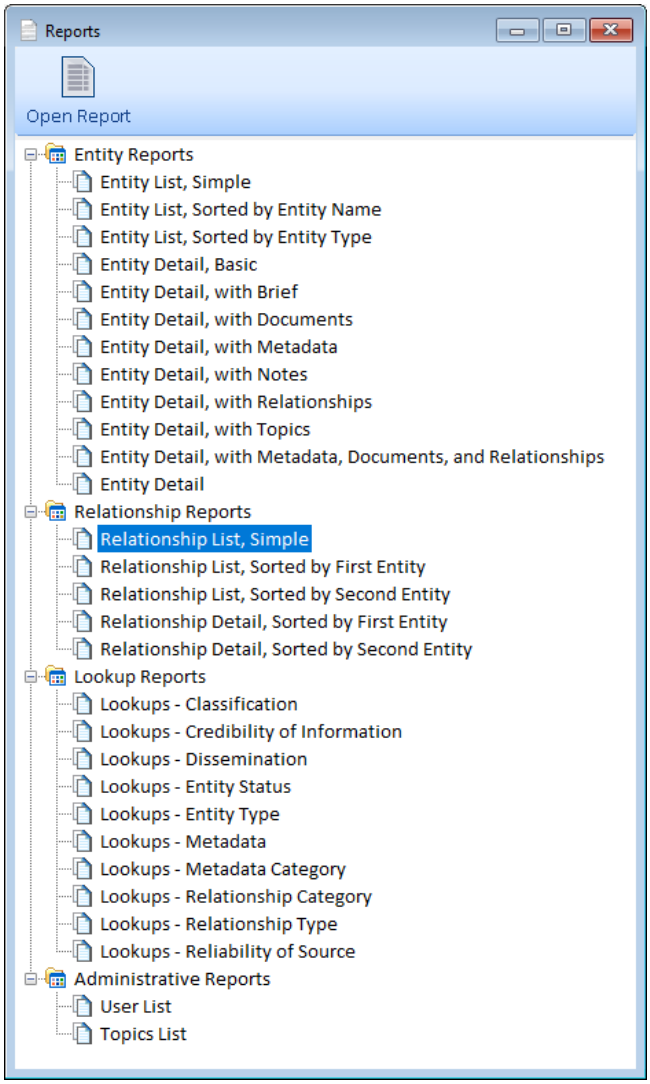
### *All to XML*

Saves data for all results to a standard XML file.

# Chapter 10: Reports

*Sentinel Visualizer provides a variety of reports that aid in the management, analysis, and sharing of entity and relationship information. Reports can be previewed and printed or exported to a variety of formats.*

## Report Selection




### Reports For All Data

Reports are available on the Home page and top menu under Reports for all the data in the currently open database.

### Filtered Data

Most of the reports are also available in other places for a subset of data.

For instance, on the Visualizer, and results of a search or Advanced Dataset Builder the Entity and Relationships reports are for those lists.

The Lookup reports are always for all the data in the lookup tables.

### Launching a Report

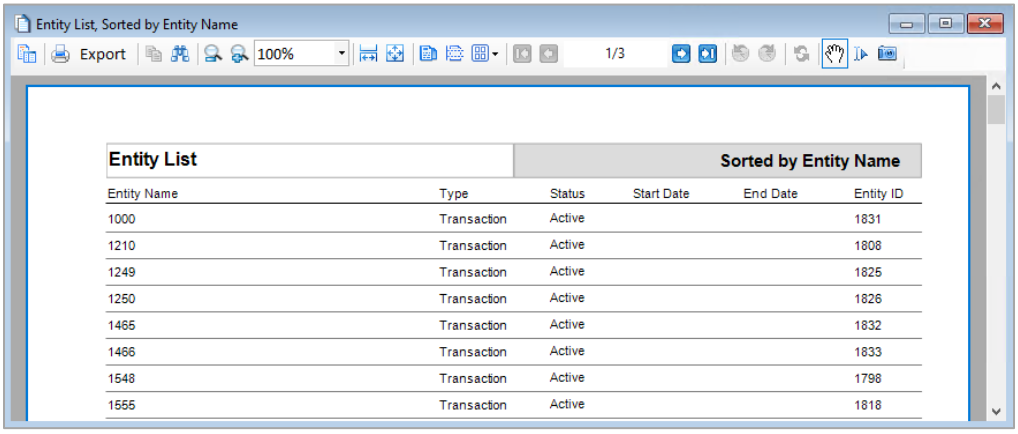
To preview a report, double-click on it, or select it and click the Open Report icon at the top.

The list of reports is organized into four categories:

- **Entity Reports**: Reports with data from entity records.
- **Relationship Reports:** Reports with data from relationship records.
- **System Reports:** Lists of lookup values.
- **Administrative Reports:** Reports of Users and Topic data for use by System Administrators. Note that this report category does not appear for users who are Administrators.

# Report Viewer

The Report Viewer allows you to preview, print, and export the report.




Entity List — Sorted by Entity Name

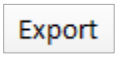
| Entity Name | Type | Status | Start Date | End Date | Entity ID |
|---|---|---|---|---|---|
| 1000 | Transaction | Active | | | 1831 |
| 1210 | Transaction | Active | | | 1808 |
| 1249 | Transaction | Active | | | 1825 |
| 1250 | Transaction | Active | | | 1826 |
| 1465 | Transaction | Active | | | 1832 |
| 1466 | Transaction | Active | | | 1833 |
| 1548 | Transaction | Active | | | 1798 |
| 1555 | Transaction | Active | | | 1818 |

## Using the Report Viewer Toolbar

A variety of buttons along the top of the Report Viewer comprise the toolbar:

View the page thumbnails.

Open the Print Options dialog to print the report.



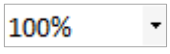
Open the Export Options dialog to export the report to an external format.

Copy button

Open the Find dialog to search for specific text within the report.

Zoom out.

Zoom in.



Set the Zoom level.

Contents are scaled to fit within width of the page.

Fit content to one page.

Show a single page view.

| | |
|---|---|
| | Continuous Scroll. |
| | Show a multi-page view. |
| | Move to the first page. |
| | Move to the previous page. |
| | Move to the next page. |
| | Move to the last page. |
| | Select a specific page. |
| | Move backward in the navigation history. |
| | Move forward in the navigation history. |
| | Pan mode. |
| | Selection Mode. |
| | Take a snapshot of specific content. |

# Export Options

If you choose to export a report, there are a variety of options you can set depending on the type of export format you choose. This section describes each of the options.

## HTML Options

- **BookmarkStyle:** Indicates whether a page of bookmarks is created if the report contains bookmarks.
- **CharacterSet:** Sets the character set encoding that is used in the output HTML pages. The default character set is UTF8. Changing this property changes the meta tag in the header of the resulting HTML pages to the appropriate IANA character set value, for example: <META content="text/html;charset=ISO-8859-1" http-equiv=Content-Type>. Additionally, the inner text portion of the pages is encoded according to the specific character set's encoding rules, as well as font names.
- **CreateFramesetPage:** Sets a value indicating that the HTML pages appear in a frame set. Any bookmark entries appear on the left, and the report document contents appear on the right. The resulting file uses the specified filename, with the extension ".frame.html".
- **IncludeHtmlHeader:** Determines whether the resulting HTML files include normal HTML page headers, such as the HTML, HEAD, and BODY elements.
- **IncludePageMargins:** Determines whether the page's margins are included in the output.
- **MultiPage:** Determines whether multiple HTML pages are generated for the document.
- **OutputType:** Sets the type of HTML output that is used to export reports.
- **RemoveVerticalSpace:** Indicates whether completely empty vertical spacing is removed.
- **Title:** Sets the title used in header of HTML pages.

### PDF Options

- **ExportBookmarks:** Indicates whether bookmarks are exported and shown.
- **ImageQuality:** Determines the quality of images.
- **ImageResolution:** Sets the image resolution for the PDF export if a metafile is used as an image for the picture control.
- **NeverEmbedFonts:** Sets a semicolon-delimited string of values indicating fonts that should not be embedded in a PDF document.
- **Options:** Specifies viewer preferences and document options.
- **Security:** Defines document encryption and security.
- **Version:** Sets the version of the PDF format that the exported document is saved in.

### TIFF Options

- **Dither:** Specifies whether the image is dithered when saving to a black and white output format such as CCITT3. If CompressionScheme is RLE or None (indicating color output), this property has no effect.
- **CompressionScheme:** Specifies the compression scheme used when exporting a TIFF file.

### Text Options

- **PageDelimiter:** Sets the text inserted between pages.
- **SuppressEmptyLines:** Determines whether empty lines are inserted for layout purposes.
- **TextDelimiter:** Sets or returns the text inserted between text fields.

### Excel Options

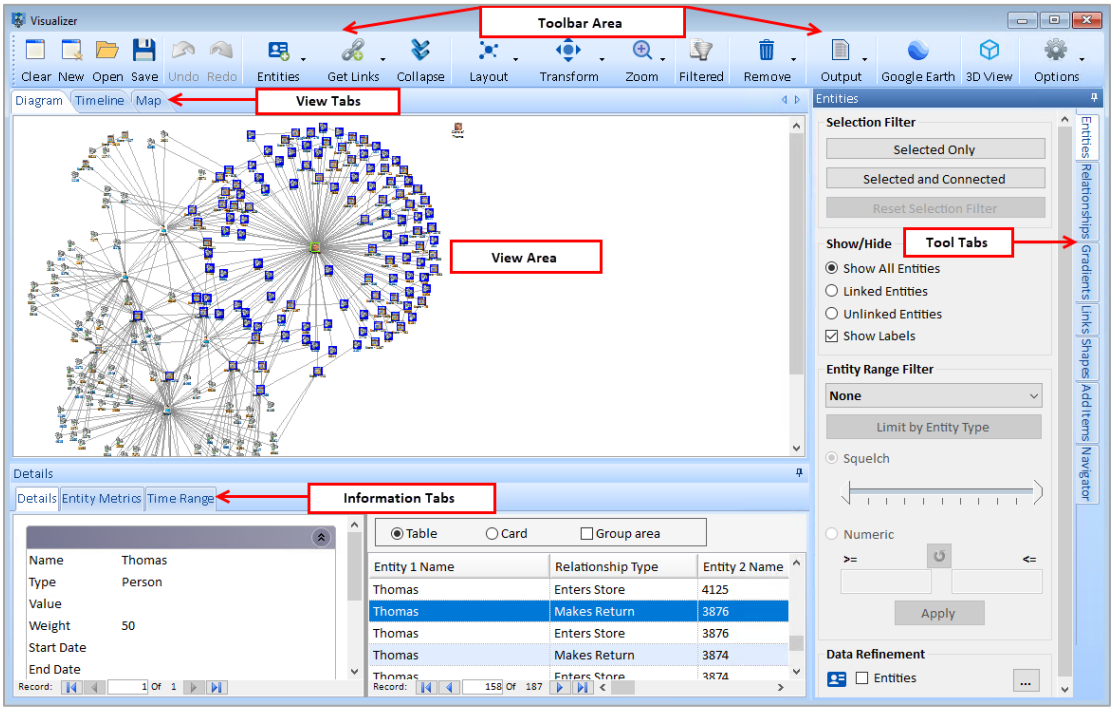
- **AutoRowHeight:** Sets the height of the row based on the contents of that row.
- **DisplayGridLines:** Indicates whether grid lines in a workbook are displayed.
- **FileFormat:** Sets the file format version that the output file supports.
- **MinColumnWidth:** Sets the minimum width (in inches) of an empty column.
- **MinRowHeight:** Sets the minimum height (in inches) of an empty row.
- **MultiSheet:** Indicates whether each page is exported to a separate sheet.
- **RemoveVerticalSpace:** Removes completely empty vertical spacing from the output.
- **UseCellMerging:** Indicates whether cells are merged together where applicable.

# Chapter 11: Visualizer

*Sentinel Visualizer provides powerful capabilities beyond the entity and relationship database. Through the Visualizer, you can create link charts with a variety of layouts, perform ad-hoc filtering and advanced analysis, add color gradients, and automatically calculate Entity Metrics. Additionally, work you do in the Visualizer can be saved and shared with other users.*

## Visualizer Interface

The Visualizer interface consists of a main window that is divided into several areas.



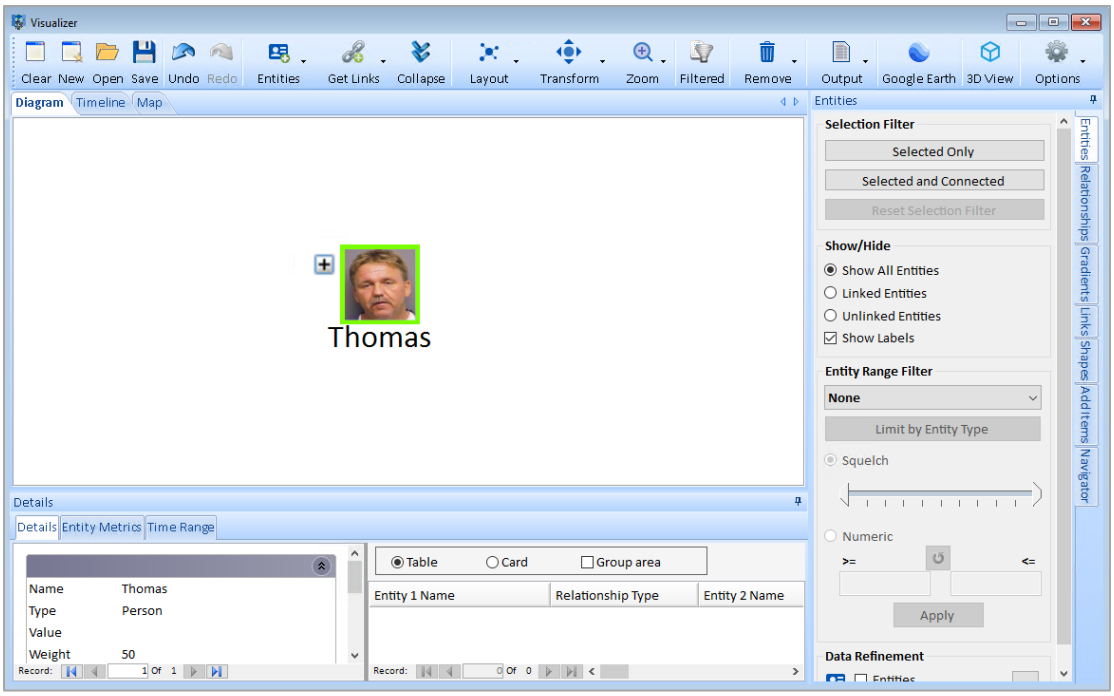

- **The Toolbar:** Provides command buttons and other controls for commonly used tasks.
- **View Tabs:** Show your data in various formats including Diagram, Timeline, and Map.
- **View Area:** Provides a visual representation of entities and relationships according to the View Tab that is currently selected.
- **Tool Tabs:** Provide access to various visualization and analysis panels.
- **Information Tabs:** Provide current entity or relationship details, entity metrics, and time range filtering tools.

# Quick Tour

To give you a feel for what the Visualizer offers, this section provides a quick introduction to its features. To open the Visualizer, click [Visualizer] on the Home page.

## Picking an Entity

The first step is to select an entity from your database as the starting point. Click the [Entities] button on the toolbar and select [Add Entities]. A form similar to the Entity Search form appears to let you find and select the entities to add to the diagram.

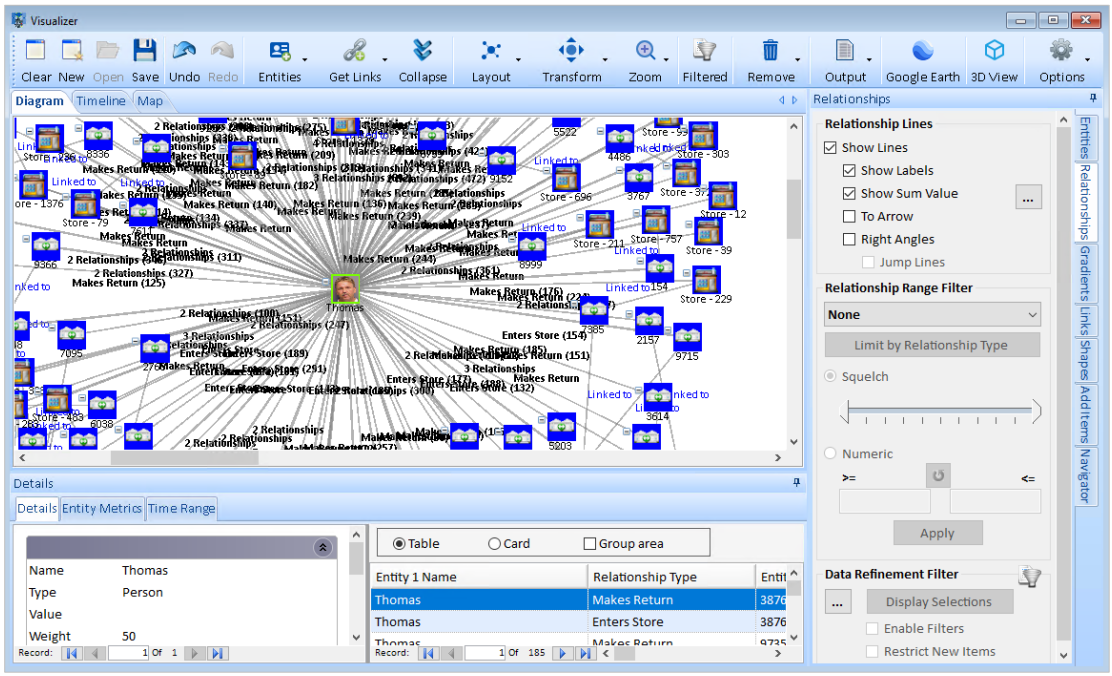



## Getting Links

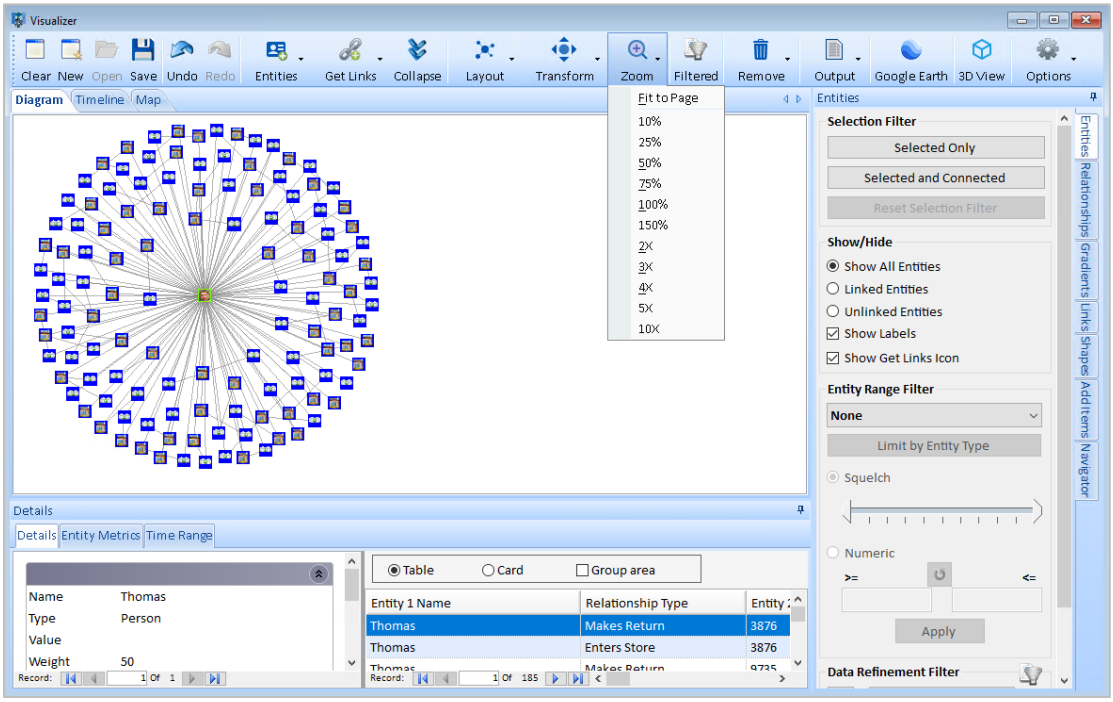
To see the relationships for the entity that you added to the View Area, click on the entity to select it, and a green box appears around it to indicate it is selected. Click the [Get Links] button on the toolbar to choose an option.

Another way to add related entities is to click on the [+] button that appears next to the entity. If the entity has any relationship links, the [+] appears; otherwise, it does not.

Visualizer displays all entities that are directly connected to the selected entity and draws lines to represent the relationships.



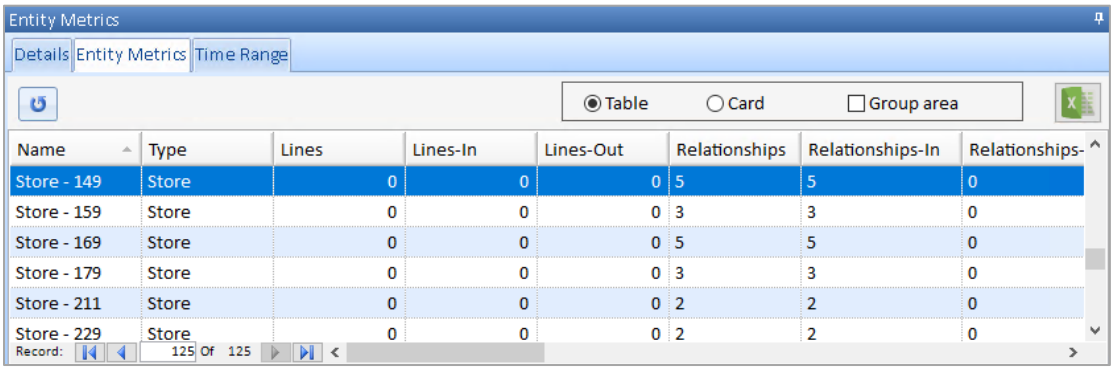

You can click on any entity in the diagram and get its links. This allows you to explore the diagram and expand your view. You may find it useful to set the Zoom level to “Fit to Page” by using the Zoom button on the toolbar. You can also recalculate the Layout.



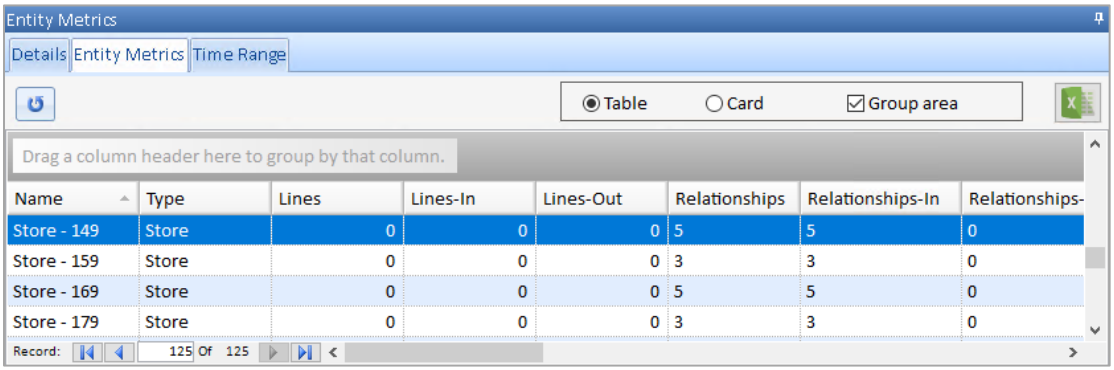

## Using Entity Metrics

As your diagram gets more complex, you may want to use Entity Metrics to apply automated analysis to the data. This makes it easier to rank entities by a variety of criteria. Select the Entity

Metrics tab at the bottom of the screen and click the [Calculate] button. Visualizer calculates all values for the entities in the diagram.



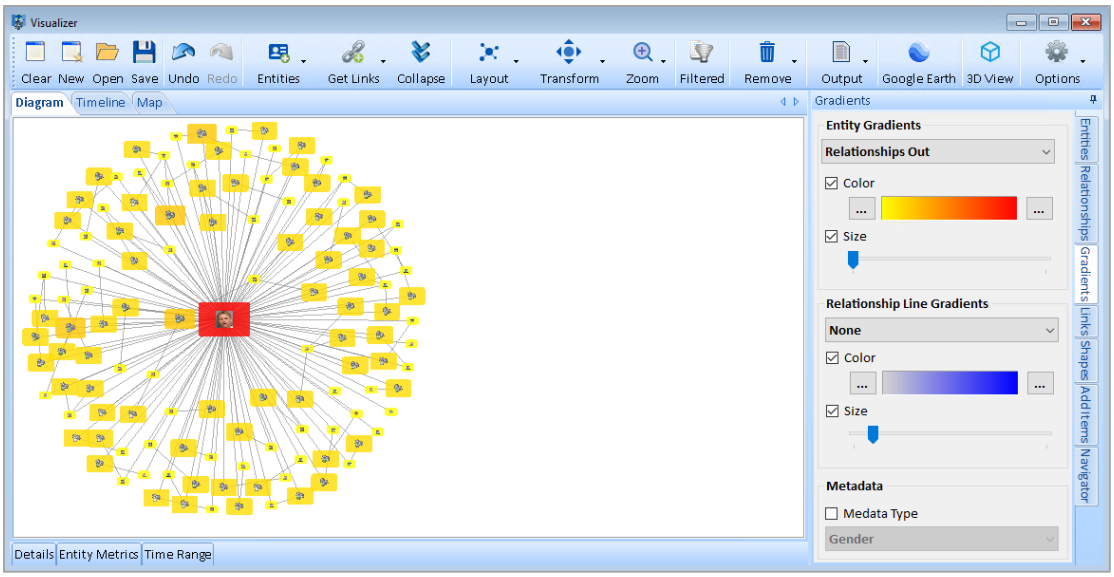

You can click on any entity in the list to locate it on the diagram or click any entity in the diagram to highlight it in the list. Additionally, you can use the [Group area] check box to group the grid by any column or click on any of the column headers to sort by that column.




## Using Gradient Metrics

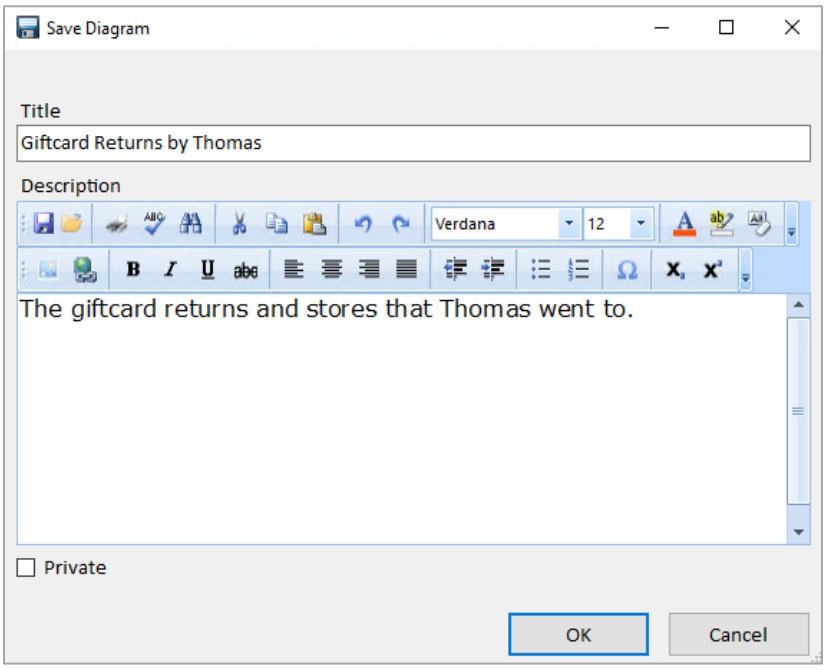
Now that you have your diagram visually displayed, and Visualizer has calculated a variety of useful metrics, you can use the Gradient Metrics feature to visualize Entity Metrics on your diagram. Select the Gradient tab to the right of the Visualizer window to color your entities and relationships based on the metric you select. See **Gradient Metrics** on page 158 for more information.

If a Metadata Type has lookup values, you can assign a color to each, and select it for display here.




## Saving Your Work

At any time while using Visualizer, you can save the current state of your work. Click the [Save] button on the toolbar to show the Save Diagram form.




Type a title that describes your diagram, and optionally use the Description to add more details. Diagrams can be marked as private to the current user. Click the [OK] button to save it to the Sentinel Visualizer database. This can be opened by you or (if not private) any Sentinel Visualizer user who connects to the database to easily share information and analysis.

# How Visualizer Interacts with the Database

The Visualizer's central purpose is to allow you to select entity and relationship information from your database to visualize and analyze. In the Quick Tour above, you learned how to use the standard Entity Search form to query the database for items to show on the diagram.

The remainder of this chapter explains how to add entities and relationships to the diagram to support hypothetical scenarios.

Since you can save any number of Visualizer diagrams to the Sentinel Visualizer database, it is easy to manage multiple scenarios and analysis. While working with these options, it is important to understand the distinction between entity and relationship records in the database and how Visualizer Diagrams are saved.

## Formal Database Items

The entities and relationships that you view, edit, and add to the database are considered "formal" items. They have been added to the database according to your organization's information policy, and even though some items may be based on less credible or reliable information, they are nonetheless considered to be part of your body of knowledge.

Since you interact with formal items through the entity and relationship search, view, and edit features, you can provide rich information, including metadata, notes, documents, and topics.

With Visualizer, entities and relationships are not saved back to the entity and relationship tables in the database. Rather, they are saved as a Visualizer diagram, which contains pointers to entities and relationships in your database.

## Informal Database Items

When you use the adding entity and relationship features in the Visualizer, the resulting items are considered "informal" database items. Informal items do not have the same support for metadata, notes, documents, and topics—they simply have a name and a type.

This means that they are not saved as entities and relationships in the database. Instead, they are stored as items in the saved Visualizer diagram. This allows you to add any number of informal items to your knowledgebase and save them in a way that prevents informal items from being intermingled with formal data.

## Promoting Informal Items to Formal Items

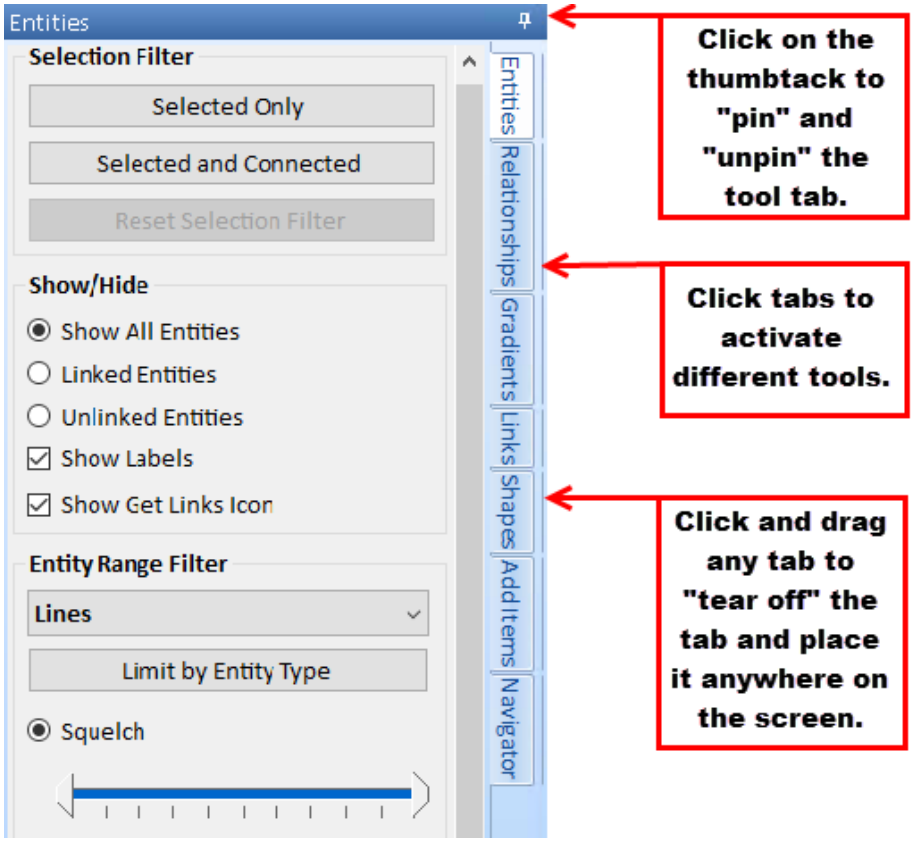
As you work through your analysis process, you may find that some informal items turn out to be real data—that is one of the central values of Sentinel Visualizer. For example, an entity that you added to your Visualizer diagram last week turns out, through new intelligence, to be an actual person with a known name and location.

In this case, you should "promote" the informal item to a formal item. The typical process for promoting items is:

1. Ensure that you adhere to your organization's information policy concerning data.
2. Add a new entity or relationship to the database using the Add Entity or Add Relationship wizards described earlier in this manual.
3. Update your Visualizer diagrams to replace any added entities or relationships with the Formal items from the database.

## Tool Areas

To maximize the amount of space within the Visualizer interface, the tab areas are designed to be sized, moved, or hidden. This applies to both the tool tabs on the right, and the information tabs on the bottom.




- To move the entire tool area, click on the blue area at the top of the tool area, hold the left mouse button down, and drag the window to its new position.
- To automatically hide unused tool areas, click the pin icon in the upper right corner of the tool area. The tool area automatically shrinks to provide more screen space for the diagram. To reactivate the tool area, simply move the mouse cursor over the desired tab.
- To “tear off” a specific tab, click on the tab, hold the left mouse button down, and drag it to its new position.
- To resize a tool area, move the mouse cursor over the border until the cursor changes to a resize picture, then click and drag the area to the desired size.

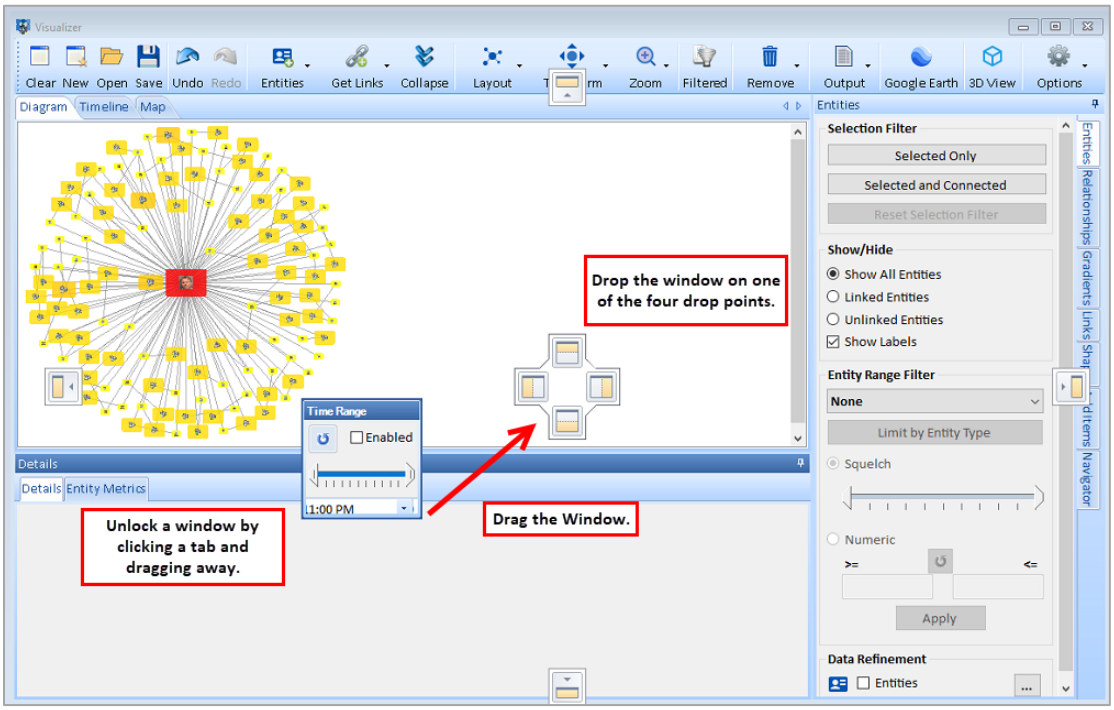
As a convenience, Sentinel Visualizer remembers your last tool area positions and settings when you close the Visualizer. The next time you open the Visualizer, your tool areas are restored to the saved positions and settings.

## Dockable Windows

The window areas in the Visualizer form are designed to be dockable at multiple locations. This allows you to interactively “design” a workspace that is most conducive to the way you want to see data.

## How to Dock an Entire Window

To move an entire window (i.e. either the Information Tabs window or the Tool Tabs Window), click on the blue title bar of the window and start dragging it. The window shrinks, and a series of drop points appear. Drop the window on the desired drop point.




## How to Dock a Tab

You can also “tear off” a tab using the same technique. Click on any of the tabs and start dragging. That tab shrinks and moves. Drag the tab to the desired drop point and release the mouse button.

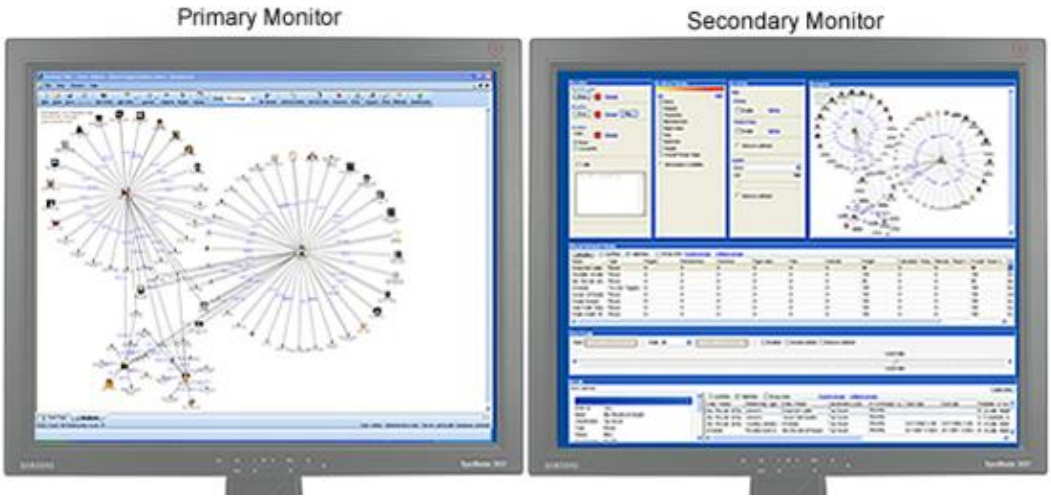
## Multi-Monitor Support

The Visualizer supports multiple monitors. If your computer has more than one monitor, and your display adaptor and driver software support multiple monitors, you can configure Visualizer to provide a larger working area.

There are two ways to leverage multi-monitor support when using Sentinel Visualizer.

### *Tool Areas on a Second Monitor*

Using the techniques described above in “Working with Tool Areas,” you can drag tool panels onto another monitor. This frees more screen area on the primary monitor for the diagram.




### *Stretching*

Un-maximize Sentinel Visualizer by clicking on the "Restore Down" button in the top right corner of the main Sentinel Visualizer window. You can then drag the overall Sentinel Visualizer window to extend to both monitors.

# Toolbar Overview

The Visualizer toolbar offers commonly used tasks. Each item is summarized here with more details later.

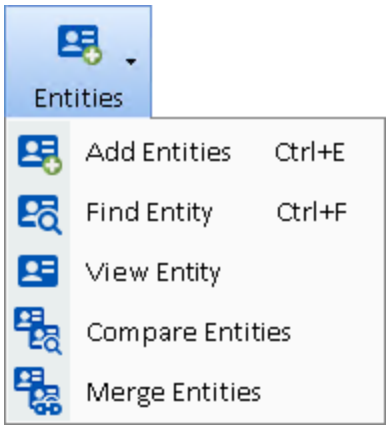
For buttons with dropdowns of additional options, clicking the button selects the first item.

## Basic Options

- **Clear:** clears all entities and relationships from the screen. If you made changes to the current Visualizer diagram, you are prompted to save changes.
- **New**: creates a new Visualizer form without modifying the current one.
- **Open:** opens a previously saved diagram. You are prompted to save changes.
- **Save:** saves your current diagram. A drop down for Save As is available if you previously opened or saved this diagram.
- **Undo/Redo:** Reset the last addition or removal of entities, relationships, shapes, layouts, and other significant changes.

## Entities

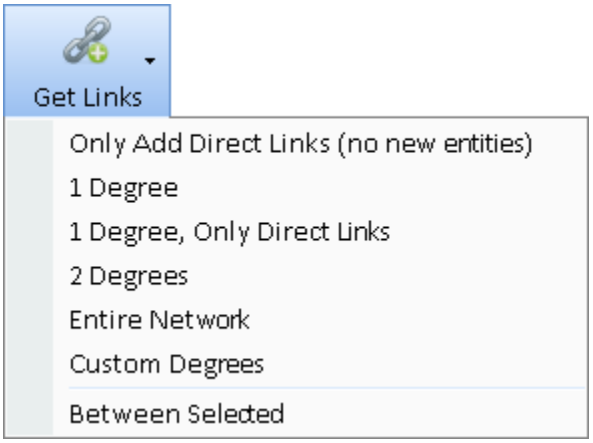
Entities includes the entity related tasks on the Visualizer.




- Add entities to the diagram through a search form to find and select one or more entities with options to add them with or without their connections.
- Find an entity on the diagram by its name.
- View Entity details for the selected entity.
- Compare selected entities for data differences.
- Merge selected entities into one entity.

## Get Links

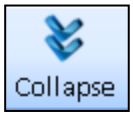
One of the most powerful tools, Get Links, offers a wide range of options to add entities and relationships based on your selected items.




Options include:

- Add all the missing relationships among the entities on your diagram.
- Add entities up to 99 degrees from your selected entities
- Add all the entities for the entire network linked to your selected entities
- Add entities and links between your selected entities

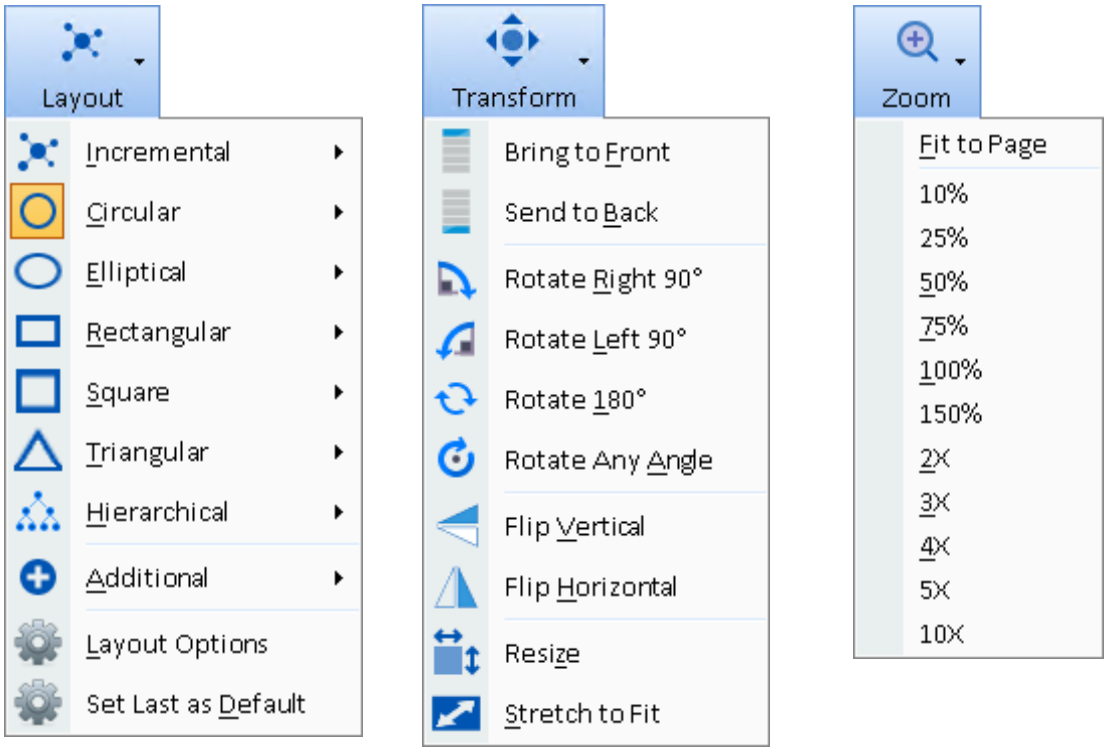
## Collapse




Related to Get Links is Collapse which removes all entities that are only connected to the selected entity. For more information, see **Getting Links** on page 102.

## Layout, Transform, and Zoom

Rearrange the entities on the diagram with the layout type you select. Several layout types are available. The last selection is highlighted. Layout options are also available here.

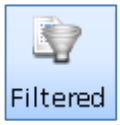



The Transform button lets you modify your objects and diagram, the zoom to move in and out. For more information, see **Chapter 12: Visualizer Layouts,** Transform and Zoom on page 131.

## Filtered and Connected Entities

The diagram can be filtered with the entities, relationships, and links panels, and time range. The Filtered button indicates whether the data is filtered and lets you easily turn it off.

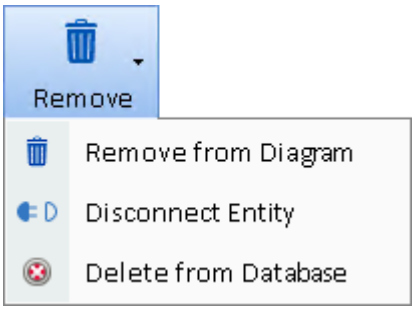
***Filtered Off***




***Filtered On***

## Remove

Select objects on your diagram and click the remove button for options to remove entities and relationships.




### *Remove from Diagram*

Removes items from the diagram but not the database.

### *Disconnect Entity*

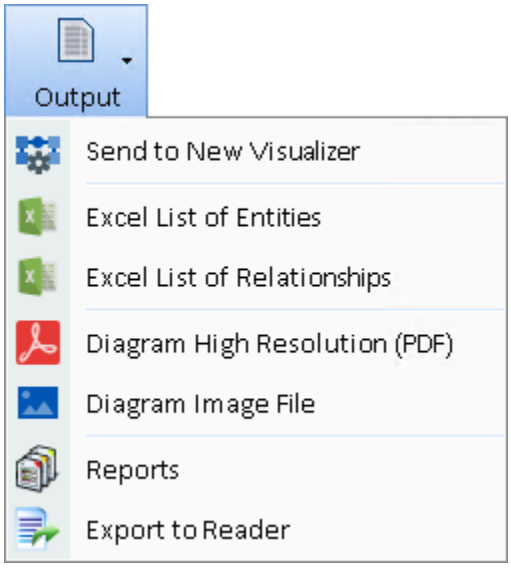
Removes all the lines from the selected entity.

### *Delete from Database*

Deletes the items from the diagram and database.

### Output

You can take your Visualizer data and output it. You can create a new copy of your diagram, export it to Excel, create a PDF, create an image file, print reports, and export the data to the free Reader version to share your findings with other users.



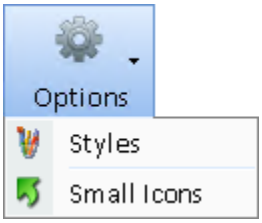

### Additional Display Options

You can export your data for two additional views:

- If your entities have geospatial coordinates, it can be exported to Google Earth. See **Google Earth Integration** on page 195 for more information.
- The 3D View lets you explore and animate your diagram in three dimensions. See **Chapter 17: Three-Dimensional Viewer** for more information.

### Options

Set style options and reduce the toolbar to just icons without text:




## Basic Diagram Operations

The Diagram area provides an interactive surface to view and manipulate entities and relationships. Typically, you use the Entities, Add Entity feature to select entities from the database, then use Get Links to find all relationships to and from that entity. You can also add new entities and relationships to see their effect on the overall diagram.

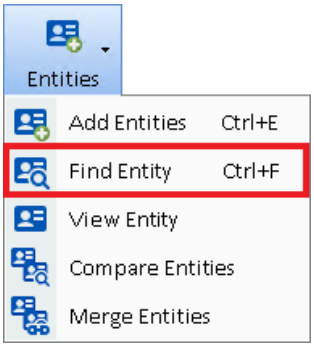
## Selecting and Moving Objects

Once entities and relationships are displayed on the diagram, there are a variety of ways to interact with them:

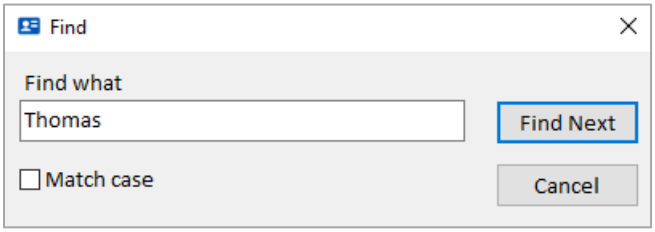
- **Selecting a Single Object:** Select an entity or relationship by clicking on it. This sets focus to the object and provides the context for other operations such as Get Links and Remove.
- **Selecting Multiple Objects:** Select multiple objects by dragging a bounding rectangle around the objects. To do this, click the mouse within an empty area of the diagram, and drag the bounding rectangle to encompass the objects you want to select. You can also select multiple objects by holding down the [Ctrl] key and clicking on each object.
- **Selecting All Entities:** Click the Windows Select All key sequence (Ctrl-A) to select all entities. Note that if you have a diagram with thousands of entities, the Select All operation may take time to complete.
- **Moving Entities:** To move an entity, click on it, hold down the left mouse button, drag it to a new location, and release the mouse button to finalize the operation.
- **Moving Multiple Entities:** First, select the objects using one of the methods described in "Selecting Multiple Objects" above. Then drag the selected items using the mouse.
- **Multiple Relationships:** Some entities may have multiple relationships between them. If this is the case, they are shown as "x relationships" (where x is the number of relationships). To see the individual relationships, click on the relationship text, and the Details tab updates with information about each of the relationships.
- **Launching the Entity or Relationship Viewer:** Double-click on an entity or relationship to open the entity or relationship viewer. Note that this function is disabled for the informal added entities and relationships, since there is no database entry for the added items.

## Using the Find Function

As you add entities and relationships to your diagram, it becomes more difficult to locate specific entities. The Find feature is under [Entities] or Ctrl F.




The Find dialog appears:

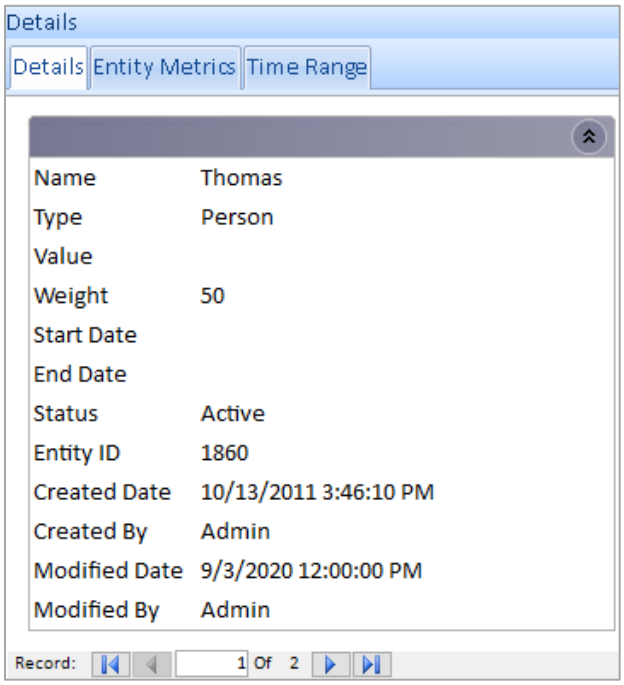


Type the name (or any portion of the name) of the entity to search for and click the [Find Next] button. This finds every occurrence of your search phrase in the entity names of the entities currently on the diagram. Click [Find Next] to cycle through all matches. Check the [Match case] checkbox if you want the search to be case-sensitive.

### Getting Detailed Entity and Relationship Information

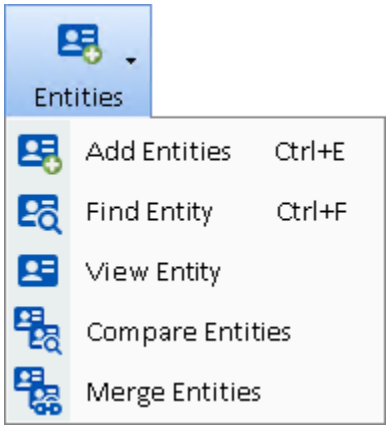
Double-click on any entity or relationship to open the item in the View Entity or View Relationship form. This gives you access to the complete information for the item.

Also, as you click on entities and relationships, the Details Tab in the Information Tabs area updates to show information about the item.




## Adding Entities and Relationships

To add an entity, click the [Entities] button on the toolbar and select [Add Entities].




The Entity Picker form is essentially the same form as the Entity Search form explained in **Chapter 5:** Entity Search on page 55.

Pick one or more entities from the search results using the [Shift] or [Ctrl] keys with mouse click, then choose one of the following options.

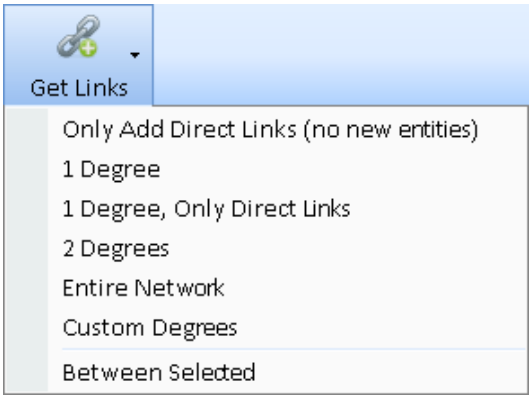
In all cases, the selected entities are added to the diagram. You can specify what else is added:

- **Entity with Links:** If the entities have relationships with other entities on the diagram or each other, those lines are added.
- **Entity Only:** No connections to other entities are added.
- **+1 Degree, Only Direct Links:** The entities with their 1-degree connections are added, but connections among those 1-degree entities and existing entities are not added.
- **+1 Degree, All Links:** The entities are added along with their connected (1 degree) entities with their links to everything else on the diagram.

# Get Links

Get Links adds entities and relationships related to your selected entity or entities. If no entities are selected, Get Links is applied to all the entities.

A relationship from one entity to the next is one degree. You can add multiple degrees at once.



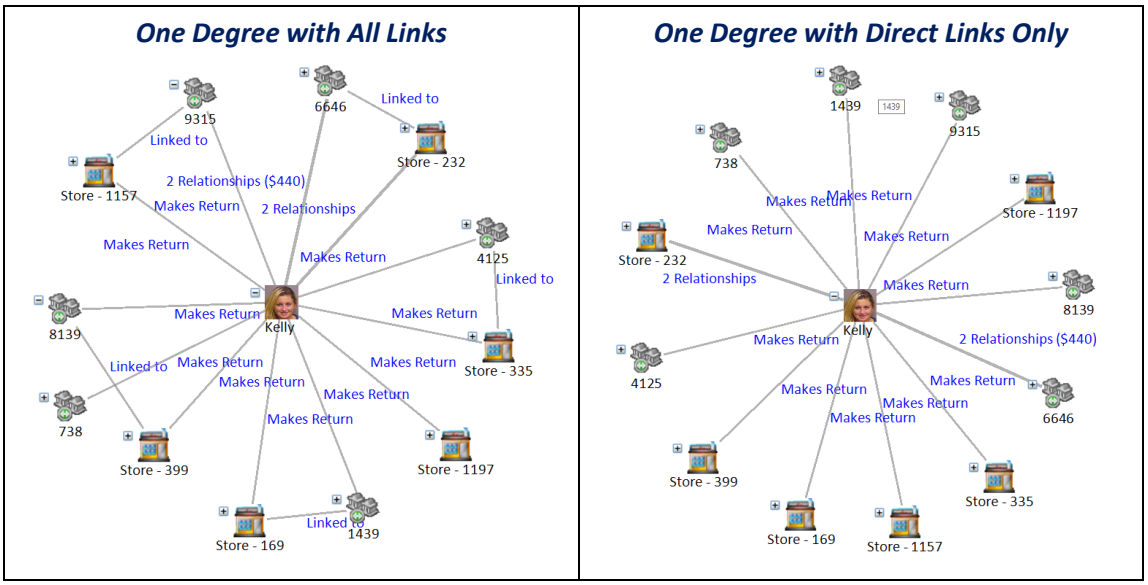

## Only Add Direct Links (no new entities)

The first menu item can be considered zero degrees. It adds any missing relationships among the entities. It is a way to make sure all the relationships among the entities are included.

## 1 Degree

If an entity on the diagram has links available, a [+] button appears next to it. One degree can be added by clicking on the [+] button or 1 Degree from the menu.

1 Degree has two options: default or Only Direct Links. All relationships and their entities that are directly connected to the selected entity are added. This is called “one degree” because it gets all entities that are within one degree of connection to the entity.




If you choose the Direct Links Only option, you can add the missing relationships later by using the Only Add Direct Links menu item.

## 2+ Degrees

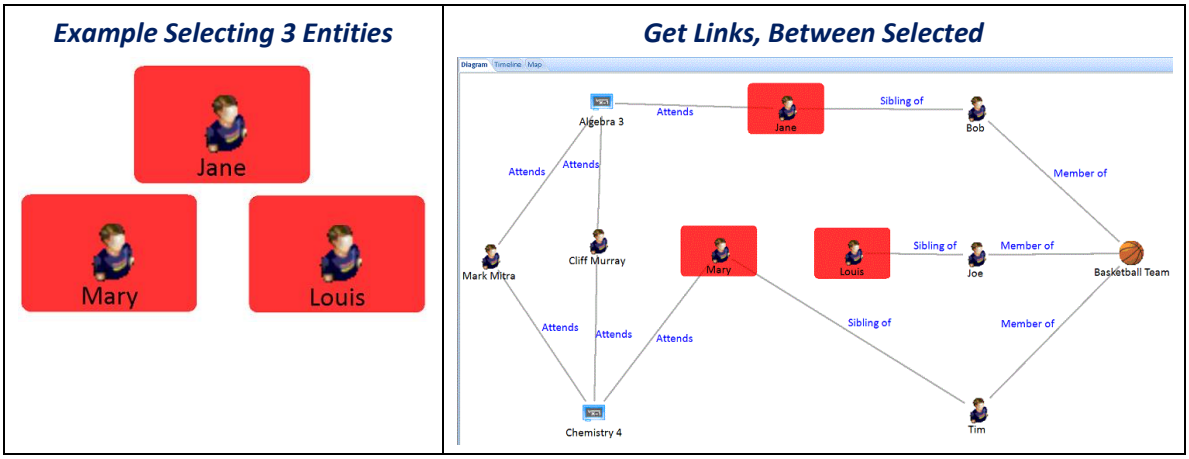
You can also use [Get Links] for 2 or more degrees (up to 99 under Custom Degrees). Higher degrees may bring back so many entities that your diagram becomes too cluttered to use.

## Entire Network

The option [Entire Network] gets all the entities linked to your selected entity or entities. This adds all the entities in the network without guessing how many degrees it has.

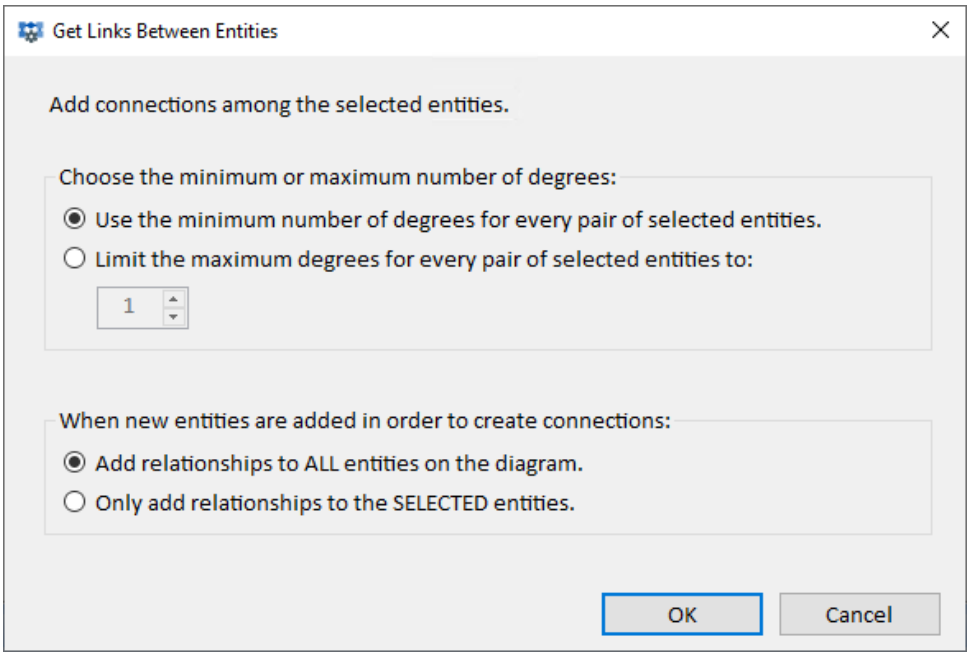
## Between Selected

This is an extremely powerful feature that allows you to select multiple entities to add the fewest entities and relationships connecting them, creating the smallest, tightest network among them.




For every pair among the selected entities, the fewest entities are added to connect them. They are added without moving your selected entities. You may want to use the Layouts options to redraw the network such as Incremental or Circular, Multiple Circles.

### *Get Links Between Entities Options*




#### *Choose the minimum or maximum number of degrees between your entities*

Select the first option to add the fewest entity degrees between each pair of selected entities. Note that a pair may have multiple sets of entities with the minimum degrees.

The second option lets you limit the number of degrees. For instance, if you specify 3 degrees, it means up to 2 entities can be added between every pair, so they are no more than 3 degrees apart. If any pair is more than 3 degrees apart, those entities are not added.

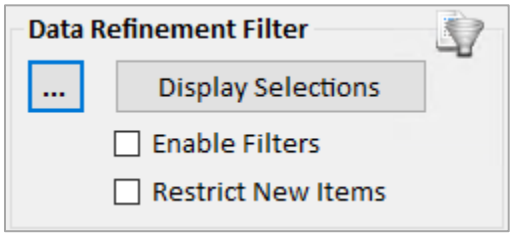
#### *When new entities are added*

When the new entities are discovered and added to your network, its relationships to the selected entities and other added entities are also added.

You can optionally add the relationships to the selected entities on your network.

### *Get Links and Data Refinement*

Get Links respects filters that have been specified with the Data Refinement Filter.




#### *Display Selections*

Displays the items that pass the Data Refinement Filters.

#### *Enable Filters*

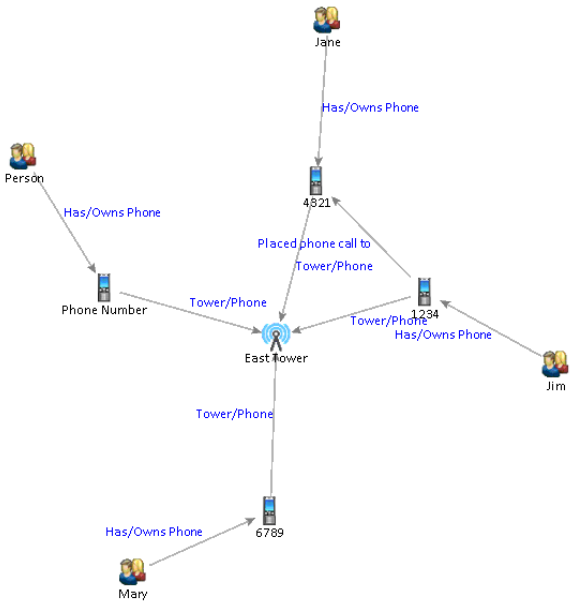
Hide items that do not pass the Data Refinement Filter.

#### *Restrict New Items*

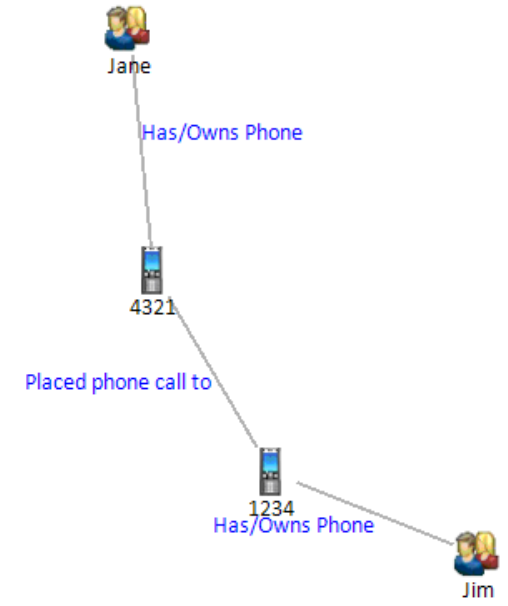
When performing Add Entities or Get Links, add new items only if they pass the Data Refinement Filter.

Consider the two diagrams below. The left diagram shows a get links with no data refinement applied. The right diagram shows the results of a get links when Data Refinement excludes cell tower entity types.

***Get Links, Entire Network***

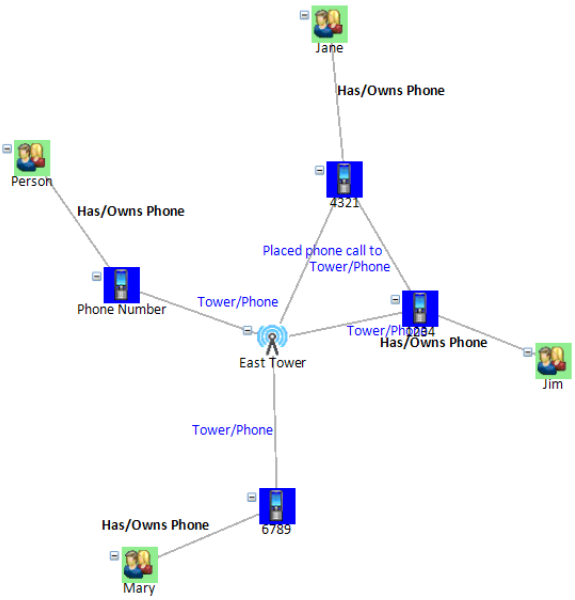



***Get Links, Entire Network, with Data Refinement***

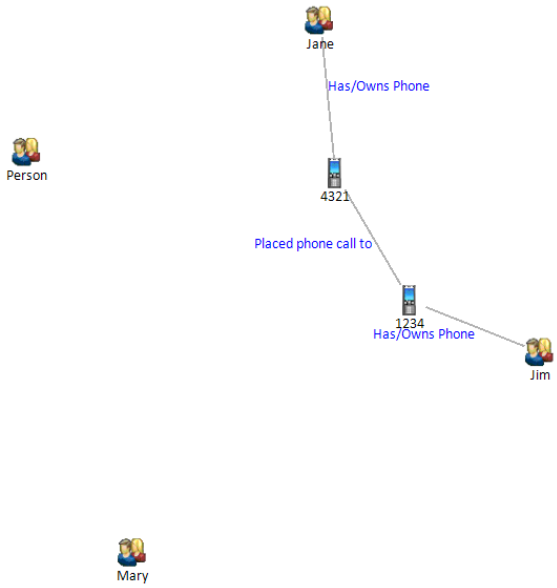



Below is an example an example of performing a Get Links, Between all people. The left diagram shows the results of get links, between, with no data refinement applied. The right diagram shows the results of a get links, between, when Data Refinement excludes cell tower entity types.

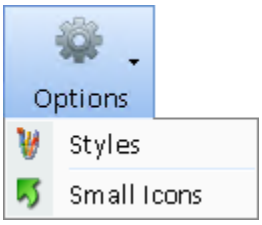
***Get Links, Between, All People***




***Get Links, Between, All People, with Data Refinement***

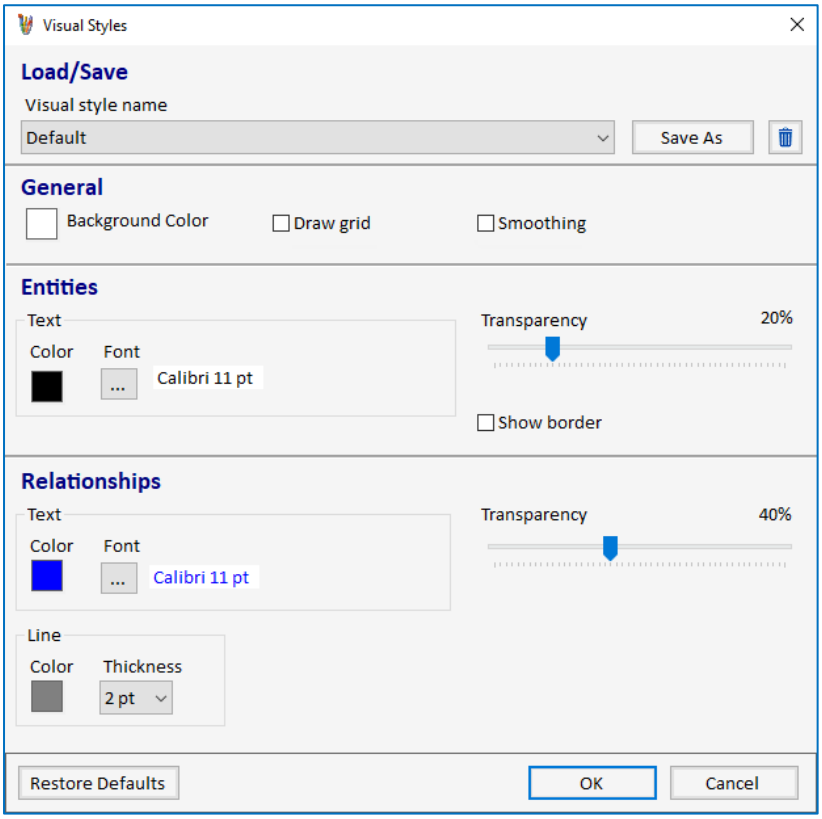


# Visual Styles



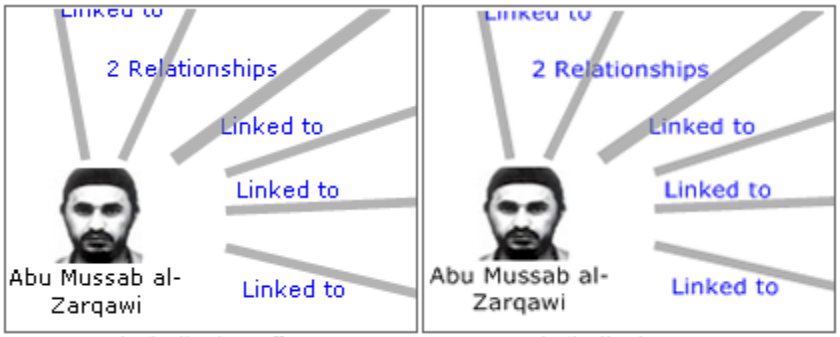

The [Small Icons] options toggles the toolbar buttons between standard graphics and text or just a small icon without text labels.

Click the [Styles] button on the toolbar to launch the Visual Styles form.



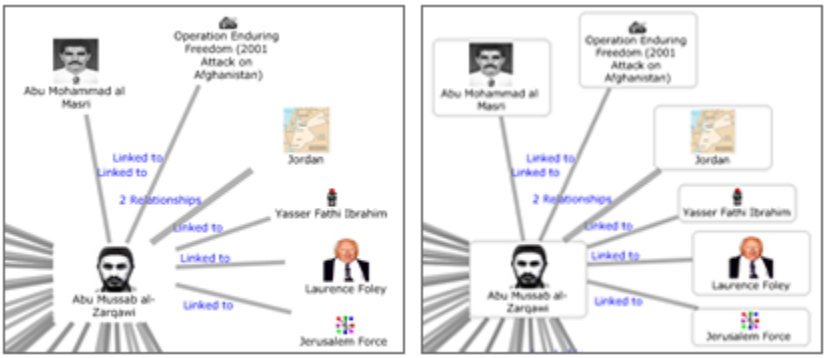

## General Settings

- **Background Color**: Sets the background color of the diagram.
- **Draw Grid**: Turns the grid background on or off.
- **Smoothing**: Turns smoothing on or off. Anti-aliasing smoothens the edges of text objects for a higher-quality display, as shown below:




Anti-aliasing off Anti-aliasing on

## Entities




Borders off Borders on

- **Text Color:** Sets the color for entity text. Click the [Change] hyperlink to specify a new color.
- **Font:** Sets the font for the entity text. Click the [Change] hyperlink to display the standard Windows Font dialog to change the font.
- **Show Border:** Toggles whether an entity icon should have a border
- **Transparency:** Sets the transparency of the icons. A higher value is more transparent.

## Relationships

- **Text Color:** Specifies the color for relationship text. Click the [Change] hyperlink to specify a new color.
- **Font:** Specifies the font for the relationship text. Click on the [Change] hyperlink to display the standard Windows Font dialog to change the font.
- **Line Color:** Specifies the color for relationship lines.
- **Line Thickness:** Sets the thickness for relationship lines, from 1 to 6 points.
- **Transparency:** Sets the transparency for relationship lines. A higher value is more transparent.

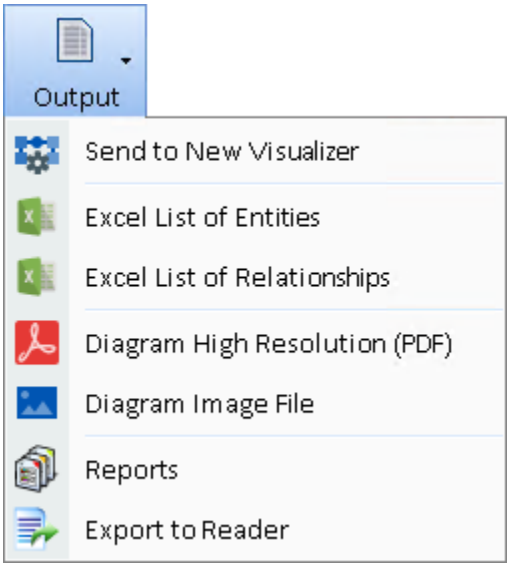
## Saving and Loading Visual Styles

When you click the [OK] button on the Visual Styles dialog, your settings are automatically saved. The next time you start Visualizer, those settings are in effect.

You can save any number of Visual Style settings by clicking the [Save As] button and entering a name for the new style. To return to the default Sentinel Visualizer settings, click the [Restore Defaults] button, and all settings in the current visual style are reset to their default values.

# Output

Visualizer supports various methods of sending the current diagram to a new Visualizer window, Excel spreadsheet, PDF, image file, reports, or a sharable file for the Reader.




## Filtered to Visualizer

The Filtered to Visualizer options makes it easy to create a new Visualizer window that contains only the elements in the current view that are not filtered out. This opens a new Visualizer window containing the filtered entities and relationships, while leaving your current Visualizer state unchanged.

## Excel List of Entities

Create an Excel file with the list of entities in the diagram. The list includes the entity name, type, and a variety of other details for each entity.

## Excel List of Relationships

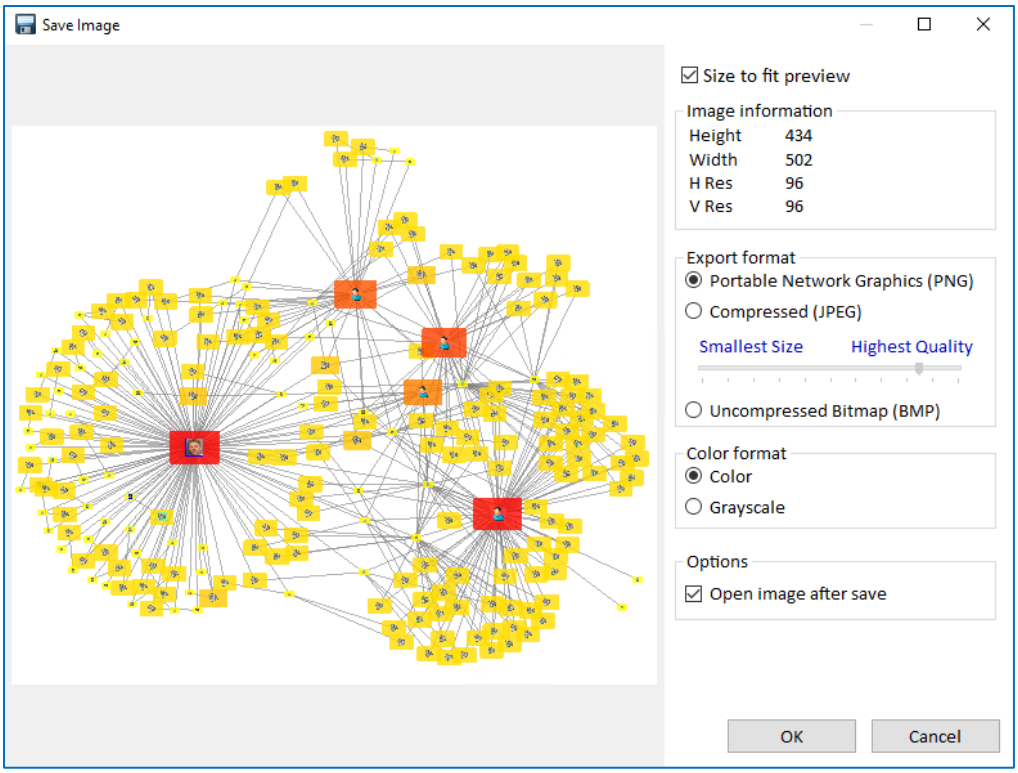
Create an Excel file with the list of relationships in the diagram. The list includes the pair of entities, the relationship type, and many other details of each relationship.

## Diagram High Resolution PDF

Create an Adobe Portable Document Format (PDF) file for the diagram. The PDF limit is 200 by 200 inches, roughly 20 pages. This is an Adobe limitation. PDF output uses a high-resolution vector representation, not just an image.

## Diagram Image File

Export a picture of the current diagram. The Save Image form appears:




The Preview area shows a thumbnail view of the picture to be exported. Uncheck the [Size to fit preview] checkbox to see the full view.

### *Specifying Options*

Use the Export format controls to specify formatting options for the picture. The JPEG format uses compression to result in a smaller file size but may lose some information fidelity. You can control the amount of compression for JPEG files using the Size/Quality slider.

The Windows Bitmap format is uncompressed and provides the highest picture quality but results in larger file sizes. You may want to experiment with the file formats and compression ratios to arrive at the best option for your needs.

You can also convert the default color image to grayscale by selecting the grayscale option.

### *Saving the Picture*

After setting the options, click the [Export] button and specify a location and file name for the exported picture. If you checked the [Open picture after export] checkbox, Sentinel Visualizer launches the picture using the program associated with the file type in Windows.

## Reports

Sends to current Visualizer Dataset to the Reports. For more information, see **Chapter 10: Reports** on page 97.

## Export to Reader

Saves the diagram to an external SVX file, allowing you to share link analysis charts with non-licensed users with the free Sentinel Visualizer Reader. Users with a Sentinel Visualizer license can also view the Reader diagrams. For more information, see **Export to Reader** on page 127.

# Saving and Loading Visualizer Diagrams

As you work with the Visualizer, you are likely to create many diagrams to handle multiple analysis projects. You can save your diagrams, and optionally share them with other users.

When saving a diagram, it is important to understand that there are three types of data active in the Visualizer tool:

- **Diagram** is the pictorial link chart of entities and relationships. Diagram data consists of pointers to entities and relationships, and their position on the diagram.
- **Database Items** are entities and relationships that are retrieved from the database via the Get Entity operation and the Get Links operation. Database entities and relationships are stored in the database and therefore are available through standard database functions like Search, Add New, Reports, Export, etc.
- **Added Items** are entities and relationships that you create "on-the-fly" using the Add Items panel. Added items are not saved to the database. As such, they exist only in a saved Visualizer diagram and cannot be accessed by the Sentinel Visualizer functions such as Search, Reports, Export, etc.

When you save your diagram, the layout is saved. The database items are not saved since they use their current information when the diagram is retrieved. The added items can be saved to the database, or merely kept as part of the saved diagram data.

## Saving Your Diagram

To save a diagram, click the [Save] button on the toolbar. One of two forms appear:

### *Saving "Database-Only" Diagrams*

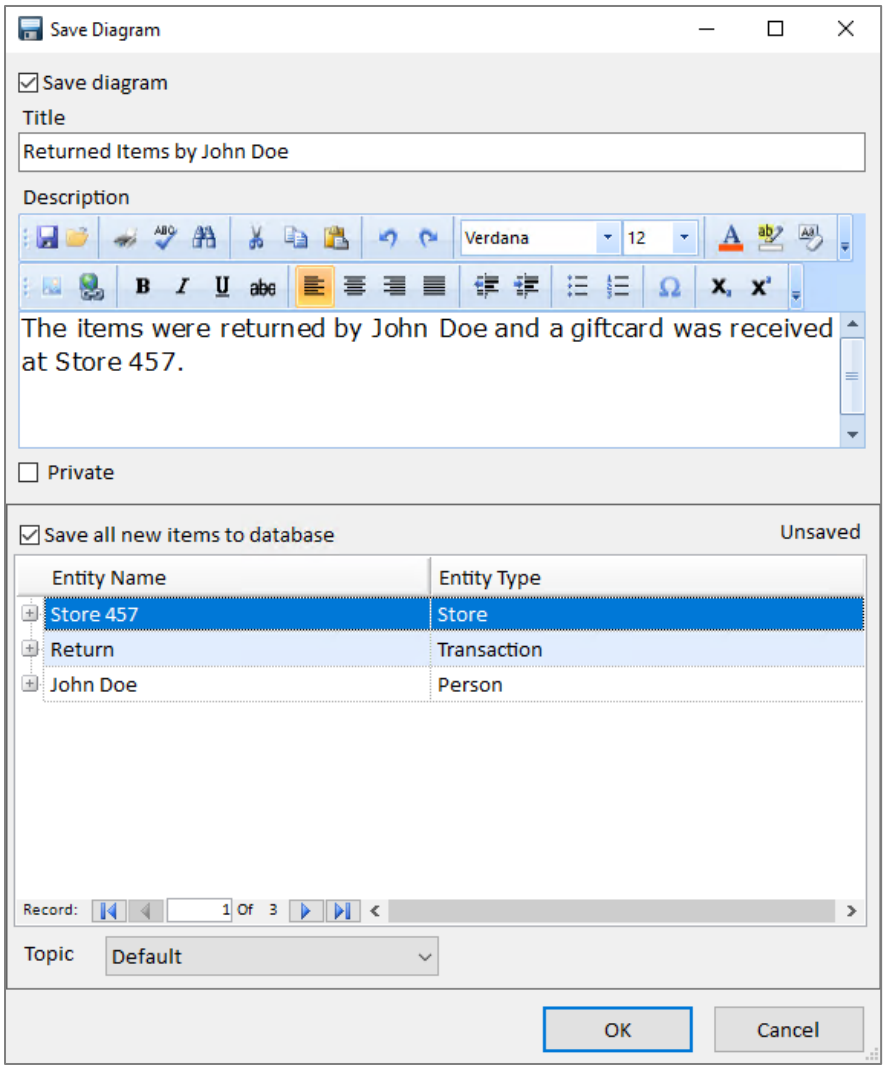
If your diagram has no added entities or relationships, the standard Save form appears to type a title and comments. When you save using this screen, the system saves the layout of entities and relationships on the diagram, and points back to the entities and relationships in the database. It does not save anything on the entity and relationship records in the database.

Type a title that describes your diagram, and optionally type notes in the Description field using the same techniques you learned in Working with Notes. Notice that the system automatically stores your username and the create date/time in the "Created by" and "Created on" fields. When you or another user changes this, the "Modified by" and "Modified on" fields are updated. This makes it easy to keep track of saved diagram by username and date.

Click the [OK] button save or click [Cancel] to return to Visualizer without saving.

### *Saving a Diagram with Added Items*

If your diagram contains one or more added entities or items, the Save button opens a different version of the Save form.



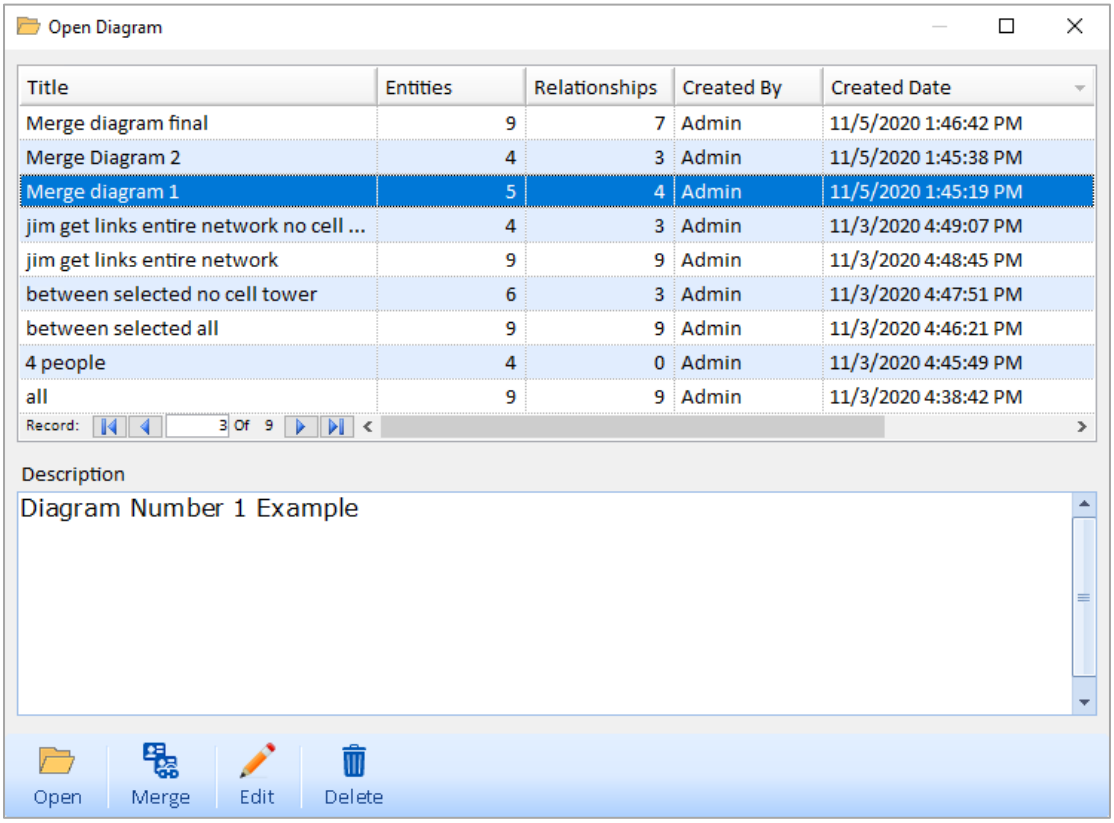

This form allows you to save your data just as the standard form does; however, it also adds the ability to save your added entities and relationships to the database as formal entity and relationship records. The following options are available:

- **Save Diagram:** Check this option if you want to save the diagram data, which is the collection of entity and relationship pointers and their locations and styles.
- **Save All New Items to Database:** Check this option to save all your added entity and relationship items, as shown in the Unsaved area, to the database. Once added items are added to the database, they are no longer unsaved items. They are now "Formal" database items, and available to standard database features like Search, Add New, Reports, Export, etc.

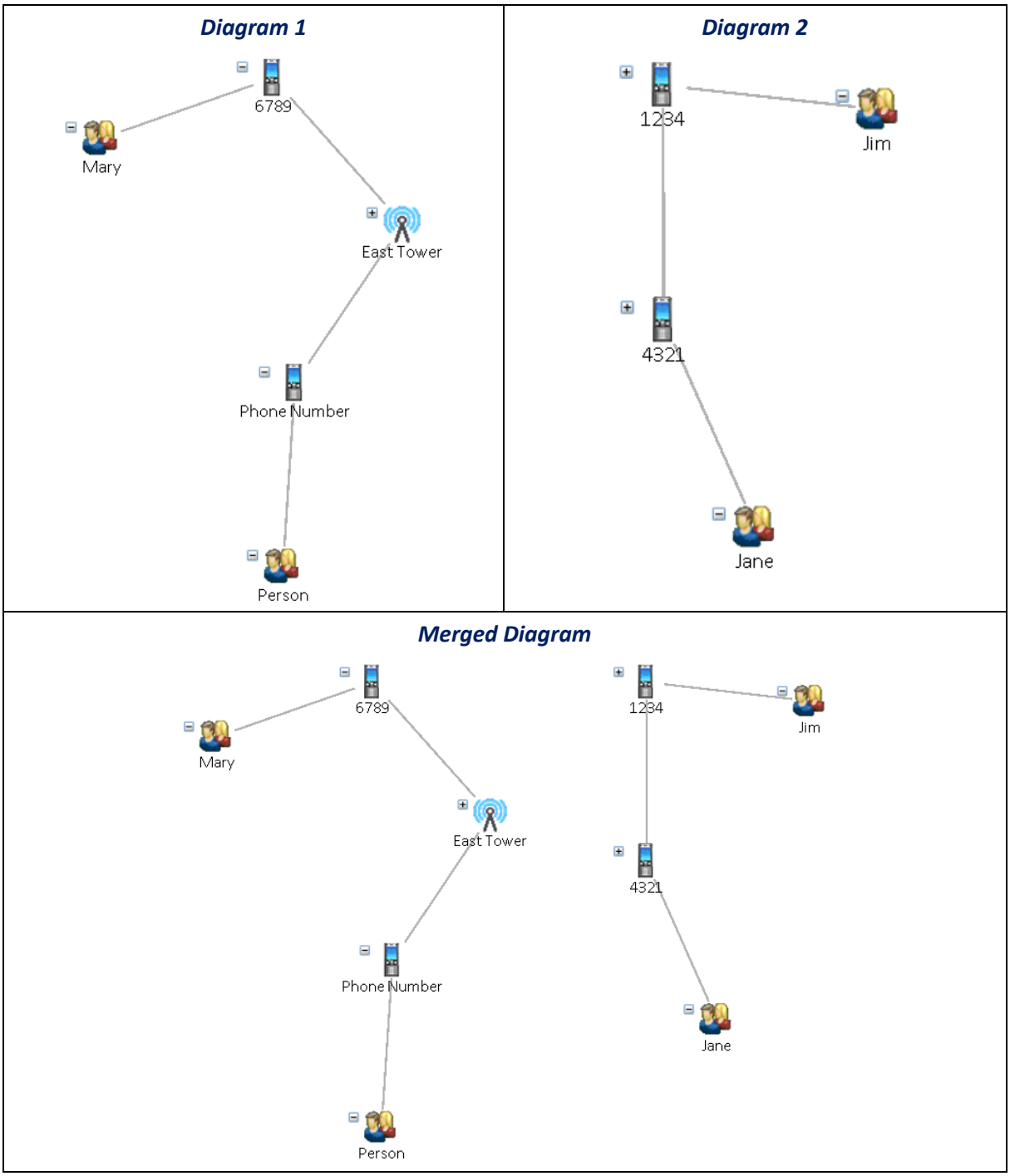
## Loading a Diagram

You can load a previously saved diagram by clicking the [Open] button on the toolbar.

**Note:** If you have unsaved work in the Visualizer, you are prompted to save your current work first. After a moment, the Open Visualizer Diagram form appears.




- **Open:** To replace current diagram, select an item in the list and click the [Open] button on the toolbar.
- **Merge:** You can also merge a previously saved diagram with your current diagram. Merging a saved diagram adds entities and relationships from the saved diagram that do not exist within your current diagram. Note that shapes from the saved diagram are not merged with the current diagram.




- **Edit:** Edit the title and notes of the selected diagram.
- **Delete:** Delete the selected diagram.

To close this form, click the [X] button.

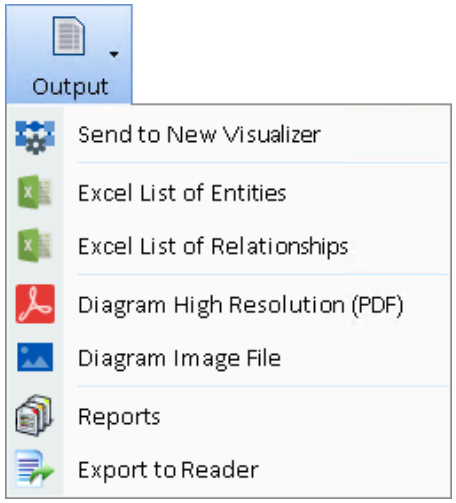
**Note:** You can only delete your own items—only Administrative users can delete items that do not belong to them. For more information, contact your Sentinel Visualizer System Administrator.

## Export to Reader

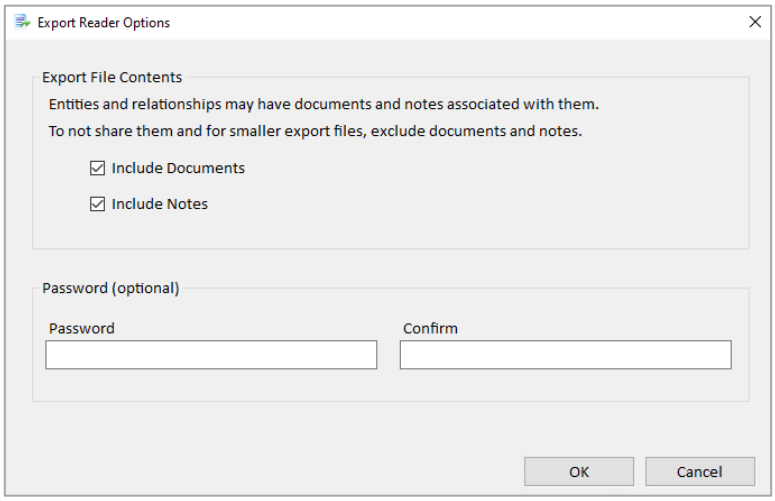
Sentinel Visualizer licensed users have the option to save their diagram to an external SVX file and share link analysis charts with non-licensed users with the free Sentinel Visualizer Reader.

From the toolbar of the Visualizer pane in the licensed version, click **[Output]** and select **[Export to Reader]** and the Export Reader Options will open.

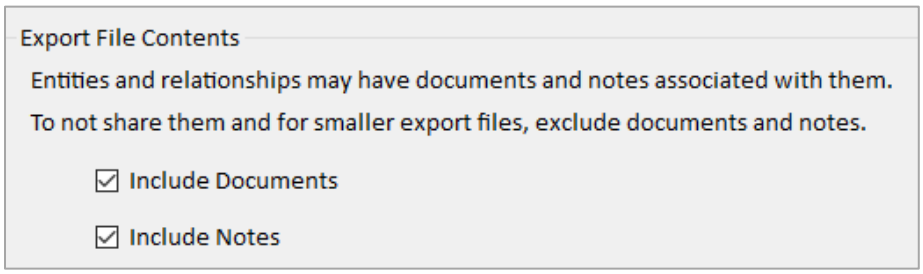
***Export to Reader***




***Export Reader Options.***

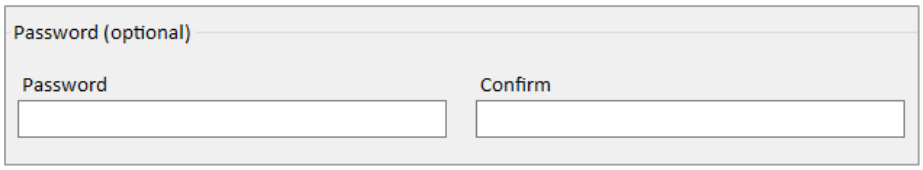



The Export Reader Options allows the Sentinel Visualizer licensed user to choose what content the SVX file should or should not contain.




- **Include Documents:** Text files, Word documents, web pages, videos, or any other file type recognized by the Windows operating system.
- **Include Notes:** Textual information that a licensed Sentinel Visualizer user typed directly into Sentinel Visualizer or copy and paste from other sources.

A password can be added to the SVX file for added security.



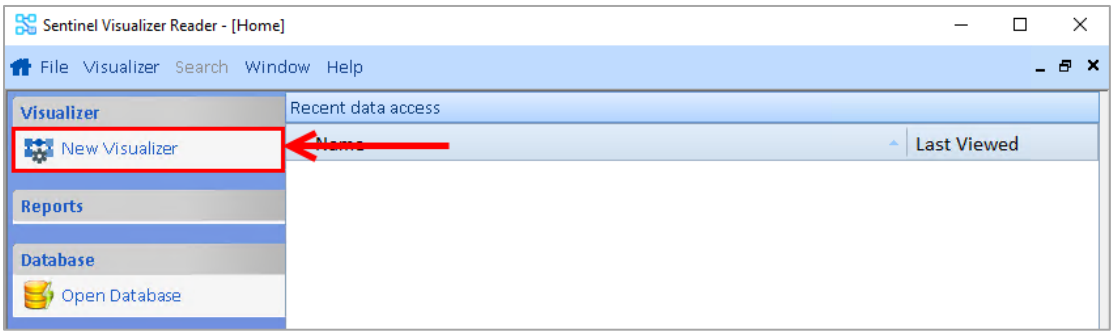

Click **[OK]** and name the SVX file (make note of the path/folder). Once the file is created, the SVX file can be shared.

## Opening a Reader Diagram

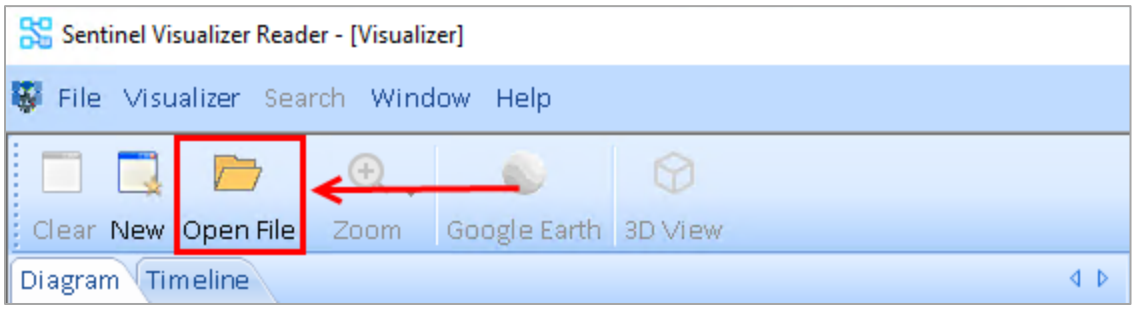
Download and install the Free Sentinel Visualizer Reader to view the diagram and the data behind the diagram including metadata, notes, topics, documents, and information on the Brief tab, but they cannot modify the data.

Simply have your colleagues download and install the FREE Sentinel Visualizer Reader from visit https://sentinelvisualizer.com/LinkAnalysis/reader/.

Once Sentinel Visualizer Reader is installed the user can open an SVX file. Launch Sentinel Visualizer Reader and click [New Visualizer].




Click [Open File] and select the SVX file that was sent by a licensed Sentinel Visualizer user.




The Visualizer window will open, showing the network diagram as the author saved it and allowing the Reader user to move objects and navigate.

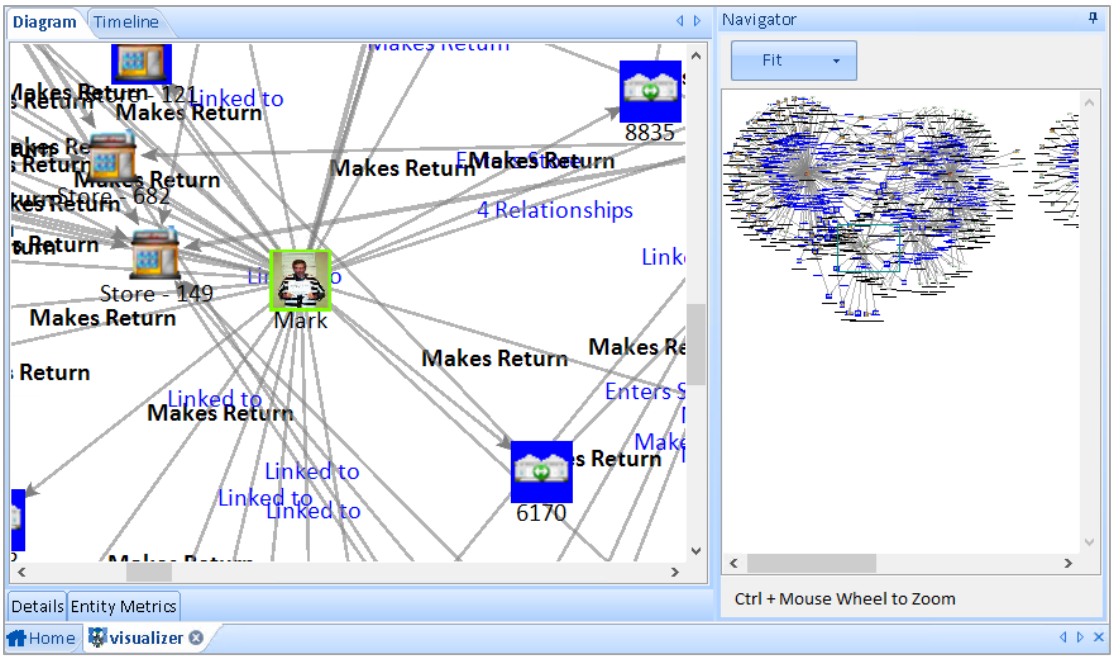


Diagram
Timeline
Navigator
Fit
Store - 121
Linked to
Makes Return
8835
Store - 682
Makes Return
4 Relationships
Store - 149
Mark
Makes Return
Linked to
6170
Ctrl + Mouse Wheel to Zoom
Details
Entity Metrics
Home
visualizer

# Chapter 12: Visualizer Layouts, Transform and Zoom

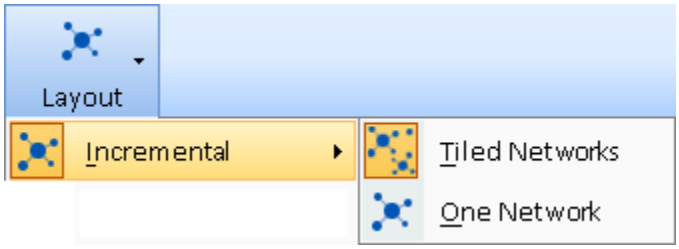
*Sentinel Visualizer's Visualizer Diagram provides a variety of automatic layout routines that can organize the entities and relationships in your diagram in more understandable and manageable patterns. Transformation options let you rotate, resize, and skew the layout, and the Zoom feature lets you magnify and decrease the diagram.*

## Layout Toolbar Button

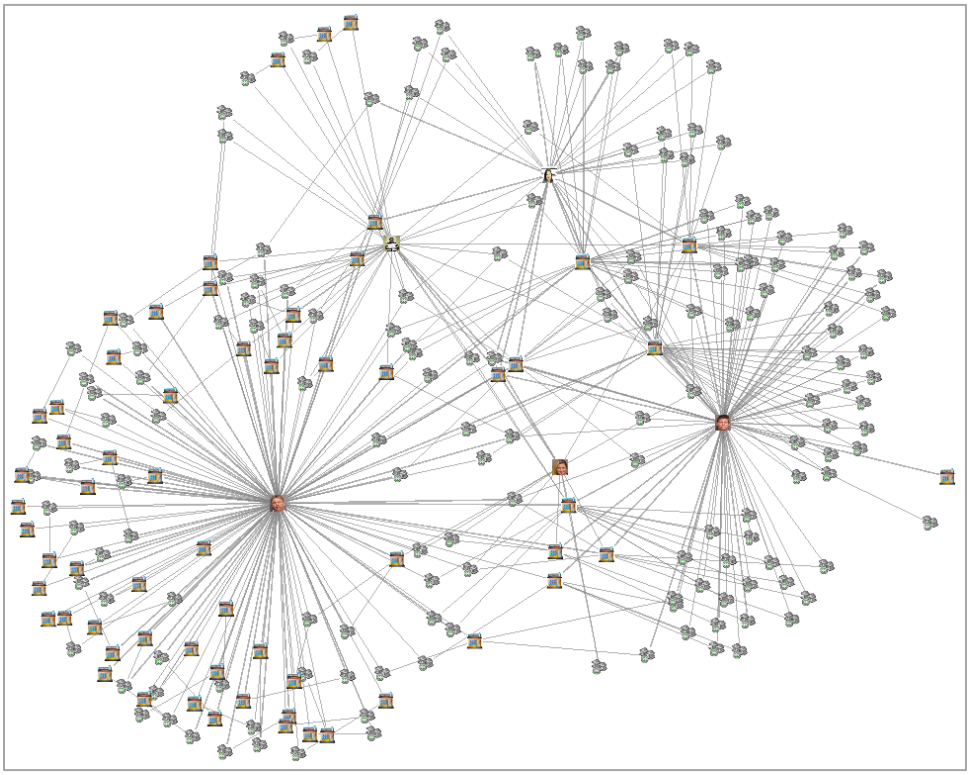
Use the Layout toolbar button to select and initiate automatic layouts, set options, and set the default layout for All to Visualizer.

# Incremental Layout

Incremental layout uses an algorithm from the “Spring Embedder” family of graph layouts. Spring Embedder layout algorithms provide a layout that highlights clusters and groupings while minimizing edge crossings.




The result is a layout that can highlight clusters and groupings.



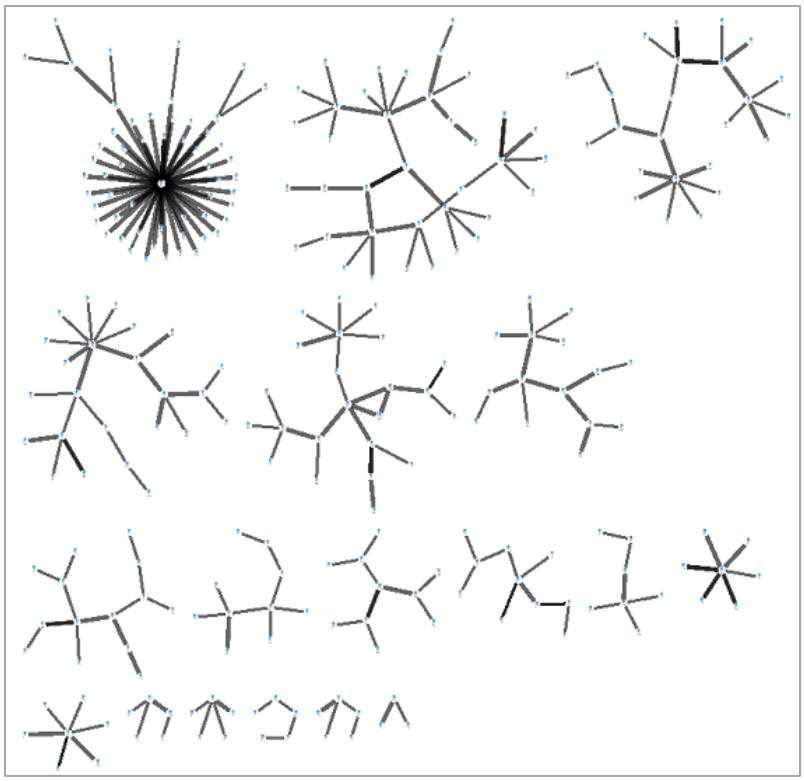
The Incremental layout uses a random initialization, so the results vary each time. Run it multiple times and use Undo/Redo to switch between them. If you like the results, but not the rotation, use the Transform feature to adjust it.

A special feature of the Incremental layout is that it does not modify positions of existing entities as you use the Get Links function. This is useful as you manually arrange entities and repeatedly use the Get Links function.

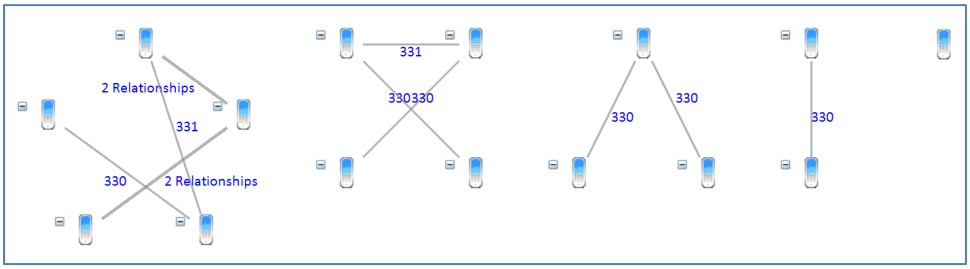
Incremental layouts can tile each network separately or put them all in one block.

## Tiled Networks

If the data on the Visualizer includes multiple, disconnected sets of entities (networks), the layout now tiles each network more efficiently. They are sorted by tallest to shortest heights, and “word-wrap” around the largest (first) network.

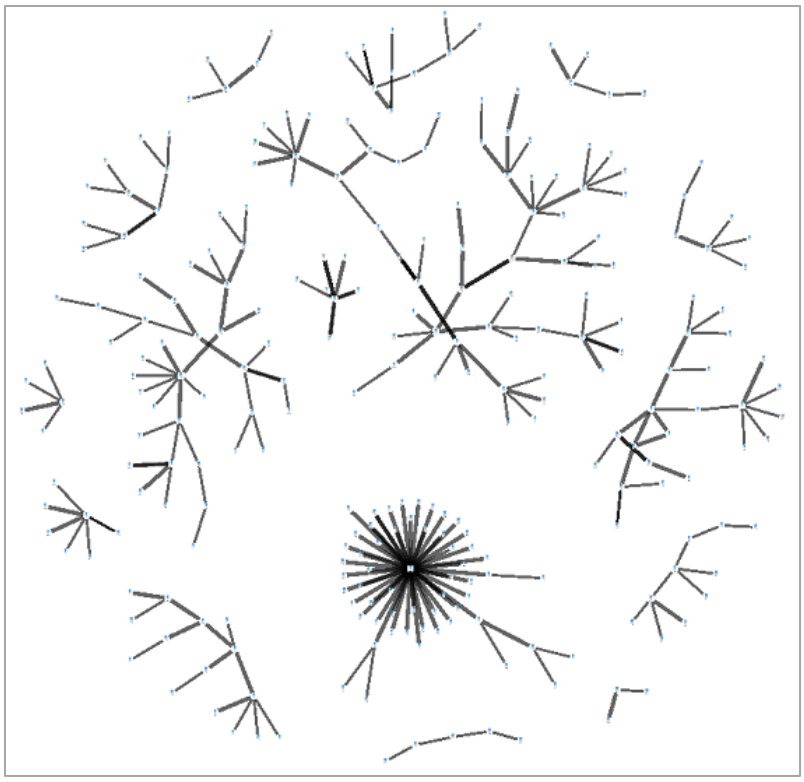


For small networks of 5 or fewer entities, standard layouts are used for consistency:



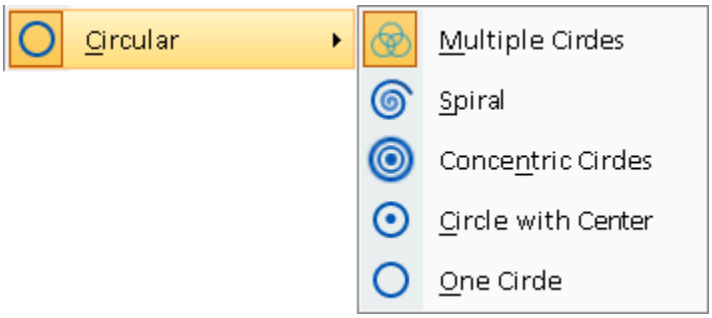

### *One Network*

One network arranges each of the networks around a central point:



## Circular Layout

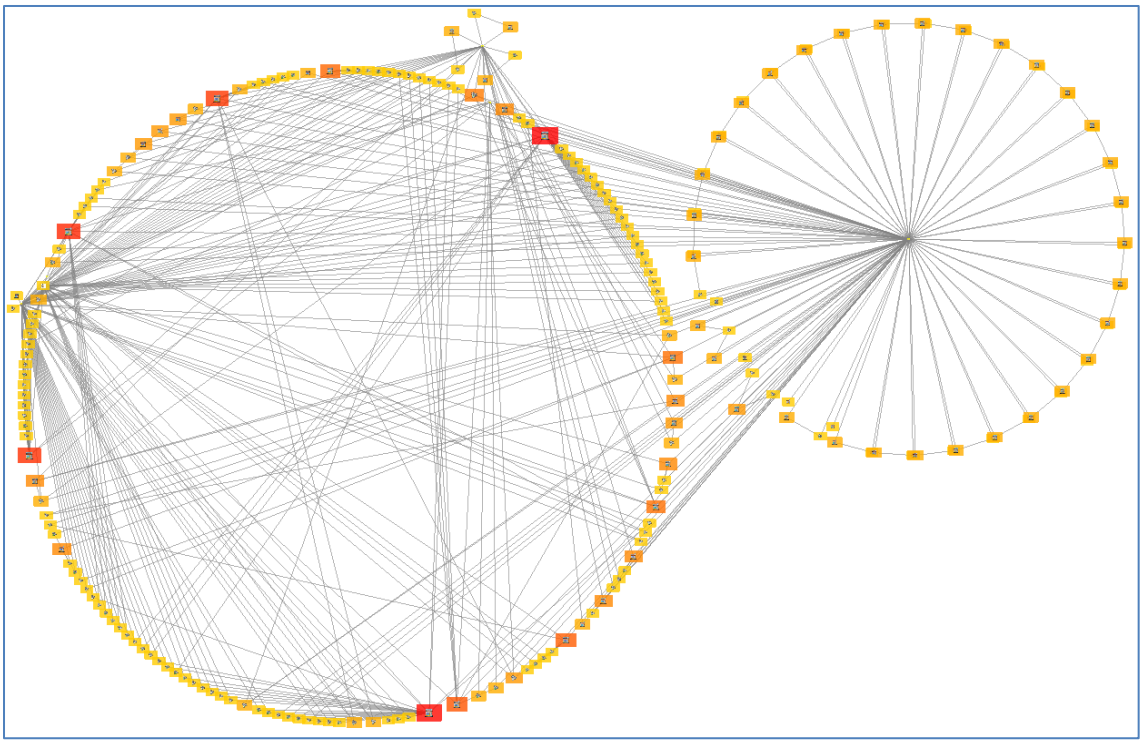
The circular layout option organizes entities and relationships in a circular pattern.




These examples are for entities sorted by Lines Out with gradient coloring. For the single circles, the entities are filtered to 2 or more lines to include fewer entities to illustrate the differences.

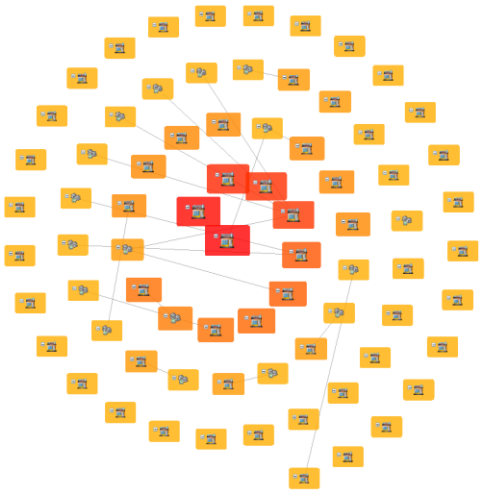
### *Multiple Circles*

Multiple Circles displays entities with their own set of linked entities as a separate circle:



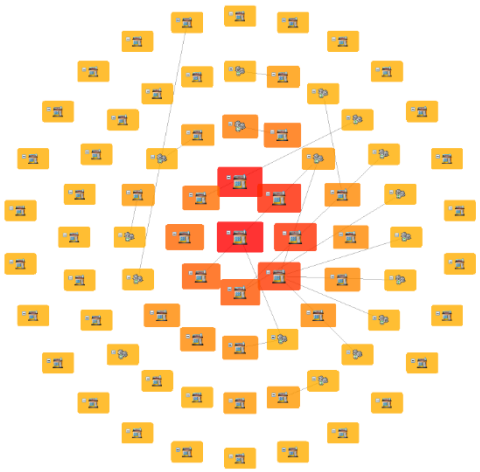
### *Circular Spiral*

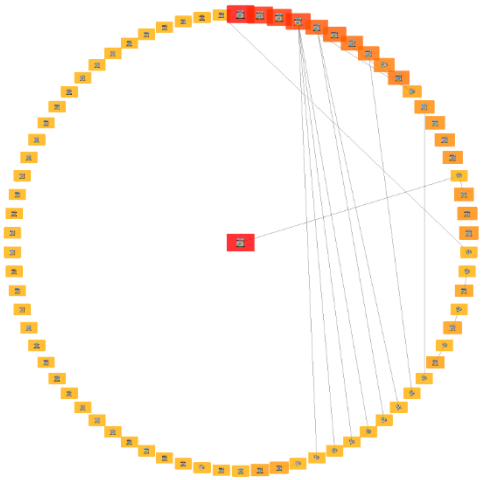
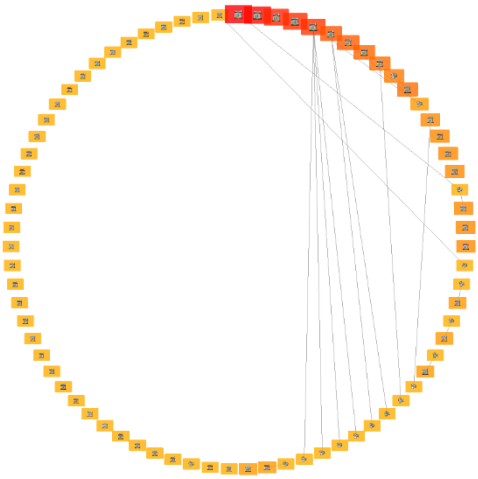
Entities are sorted from the center and grow out in a spiral (with gradient on Lines Out):



### *Circular Concentric*

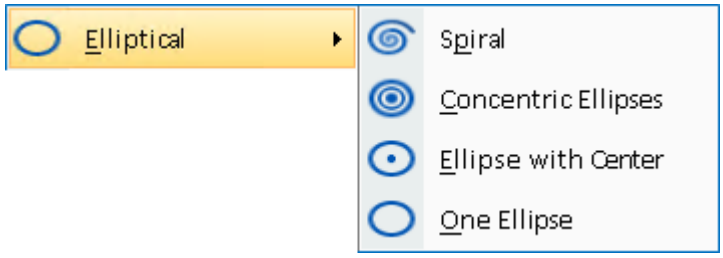
Entities are placed in larger circles from the center out:



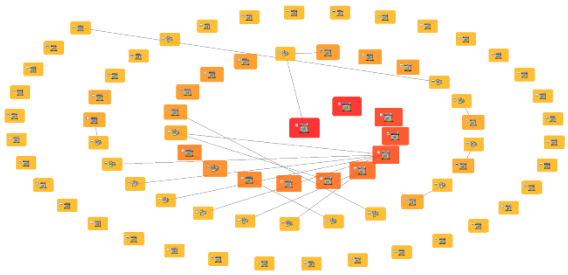
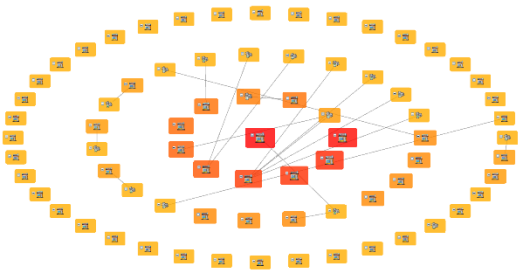
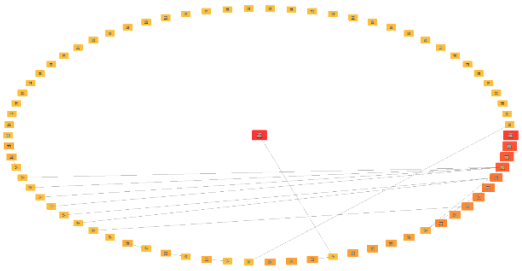
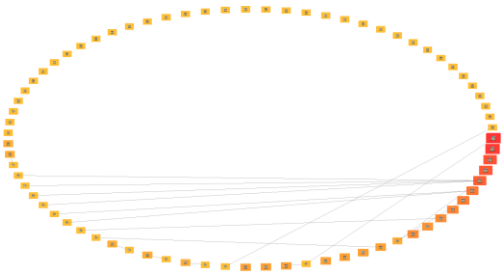
| *Circle with Center* | *One Circle* |
| --- | --- |
| All the entities are in one big circle with the first one in the center: | All the entities in one circle: |
|  |  |

# Elliptical Layout

The Elliptical layout option arranges the entities in an ellipse that fills the entire Visualizer window starting from the center out. This is similar to the circular layout but users more space, so it has more entities in one orbit than a circular layout.

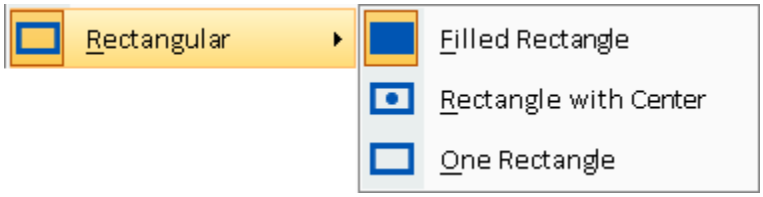



Shown with angle starting at 90 degrees (far right) as defined under Layout Options.

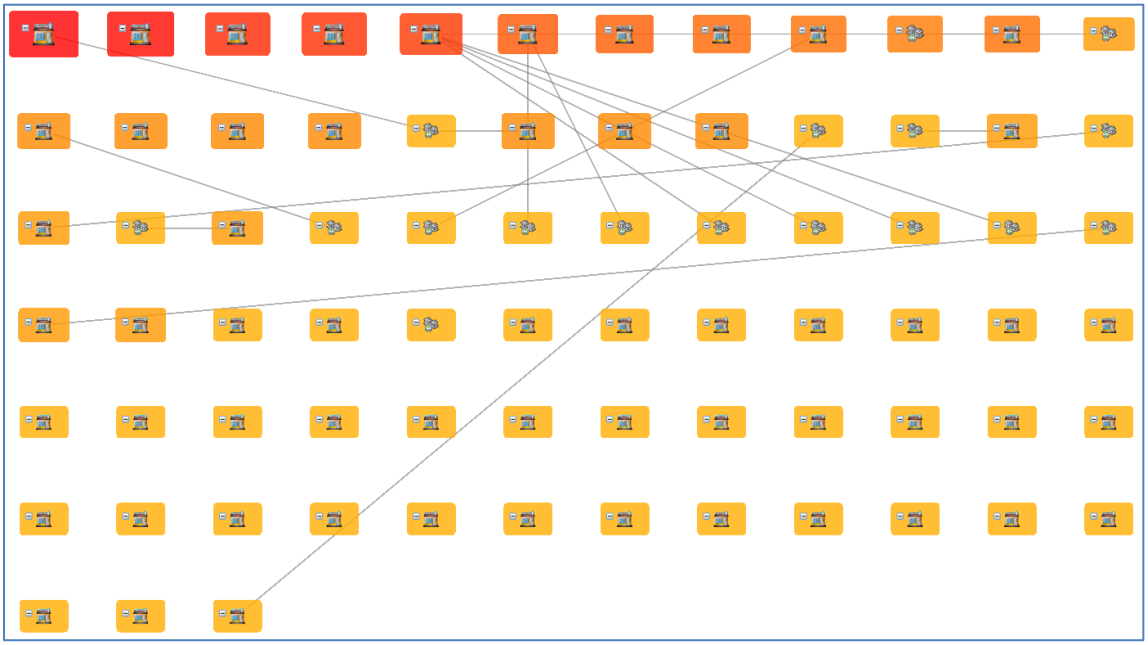
| | |
|---|---|
| ***Elliptical Spiral***<br>Entities are sorted from the center and grow out in a spiral:<br>  | ***Elliptical Concentric***<br>Entities are placed in larger ellipses from the center out:<br>  |
| ***Ellipse with Center***<br>All the entities are in one big ellipse with the first one in the center:<br>  | ***One Ellipse***<br>All the entities in one ellipse:<br>  |

# Rectangular Layout

The Rectangular layout option arranges entities in a rectangle that fills your Visualizer window starting from the top left corner.

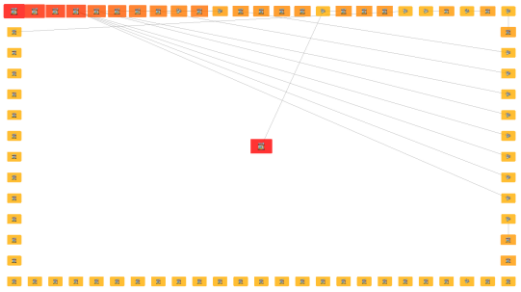



***Filled Rectangle***



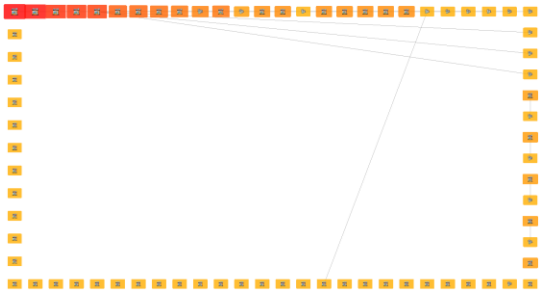
***Rectangle with Center***

All the entities are in one big rectangle with the first one in the center:



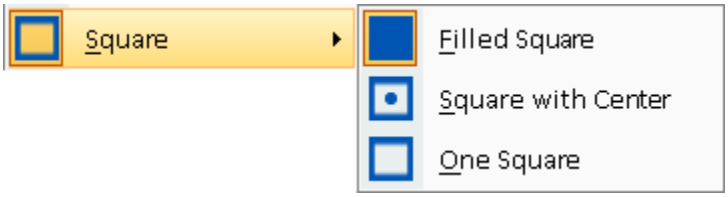
***One Rectangle***

All the entities in one ellipse:



# Square Layout

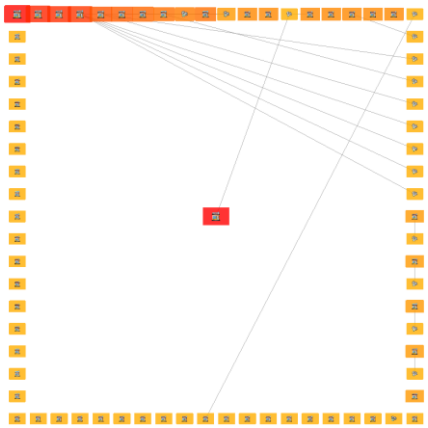
The Square layout option is similar to Rectangular except the entities are in a square which does not fill up the window if it's not square.




### *Filled Square*

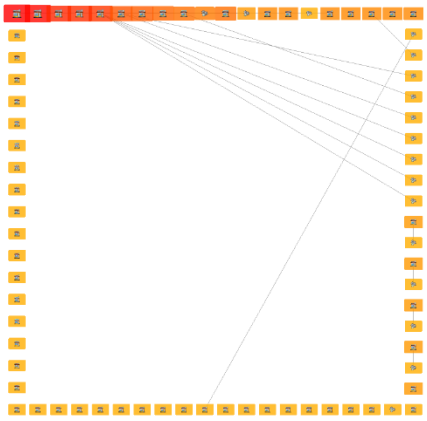
### *Square with Center*

All the entities are in one big square with the first one in the center:



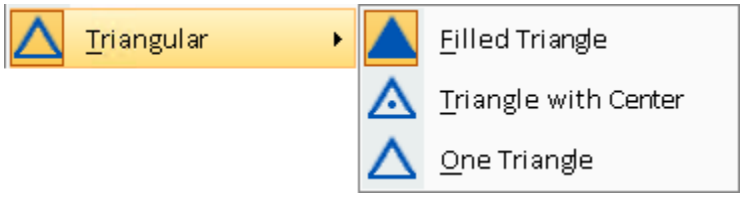
### *One Square*

All the entities in one square:



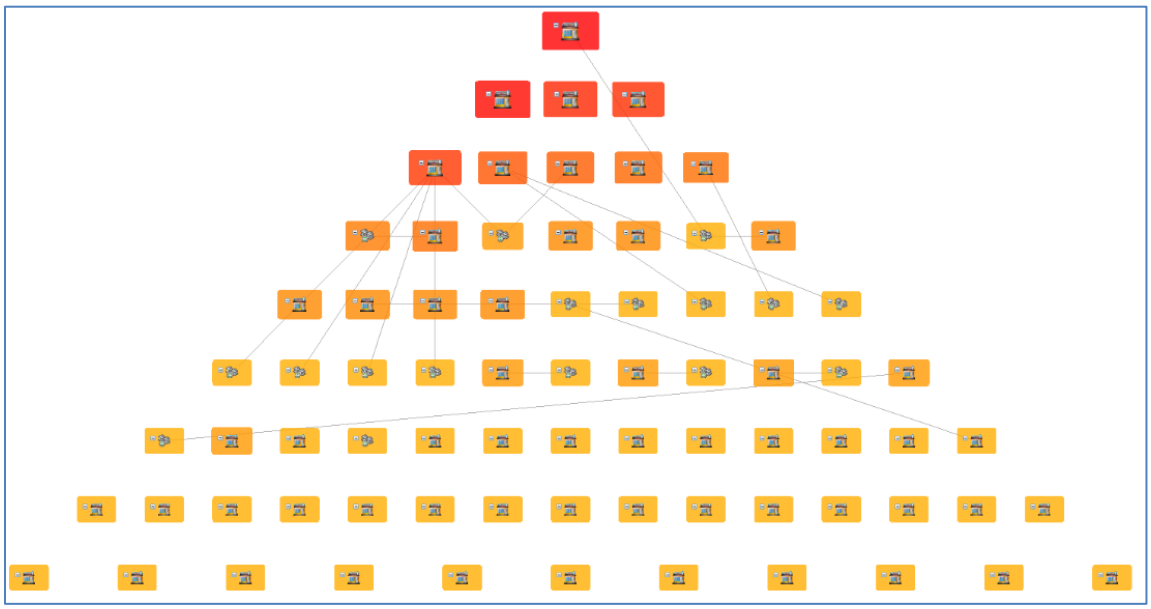
# Triangular Layout

The Triangular layout organizes the entities in a triangle that fills the Visualizer window.



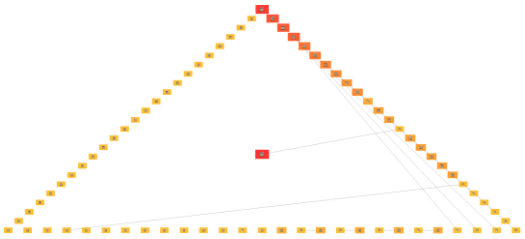

### *Filled Triangle*

Each row has more entities. The bottom row distributes the remaining entities evenly:



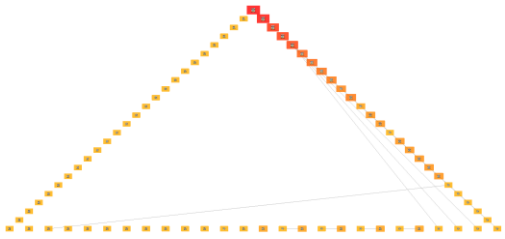
### *Triangle with Center*

All the entities are in one big triangle with the first one in the center:



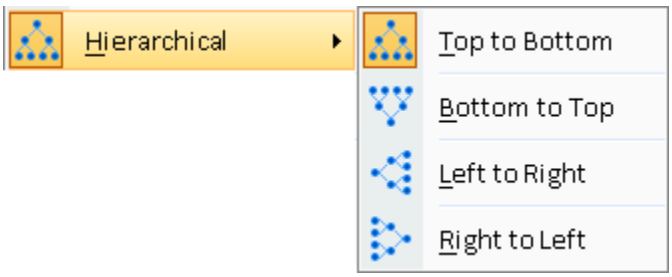
### *One Triangle*

All the entities in one triangle:

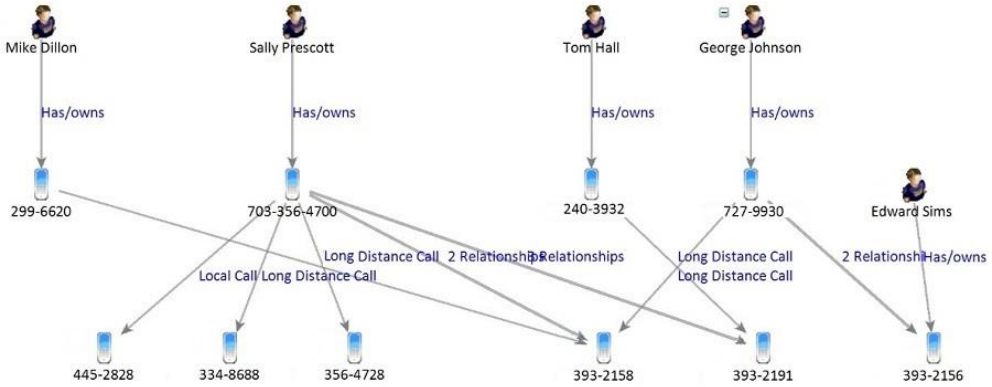


# Hierarchical Layout

The Hierarchical layout option arranges entities in a hierarchy. As explained in **Chapter 6: Relationships**, all Sentinel Visualizer relationships are directional—they point from one entity to another in a specific direction. For example, Mary is the boss of Fred; Fred is the supervisor of Joe, and so on. The Hierarchical layout option takes advantage of this design to show the hierarchy of a network. You can select which direction the layout appears.



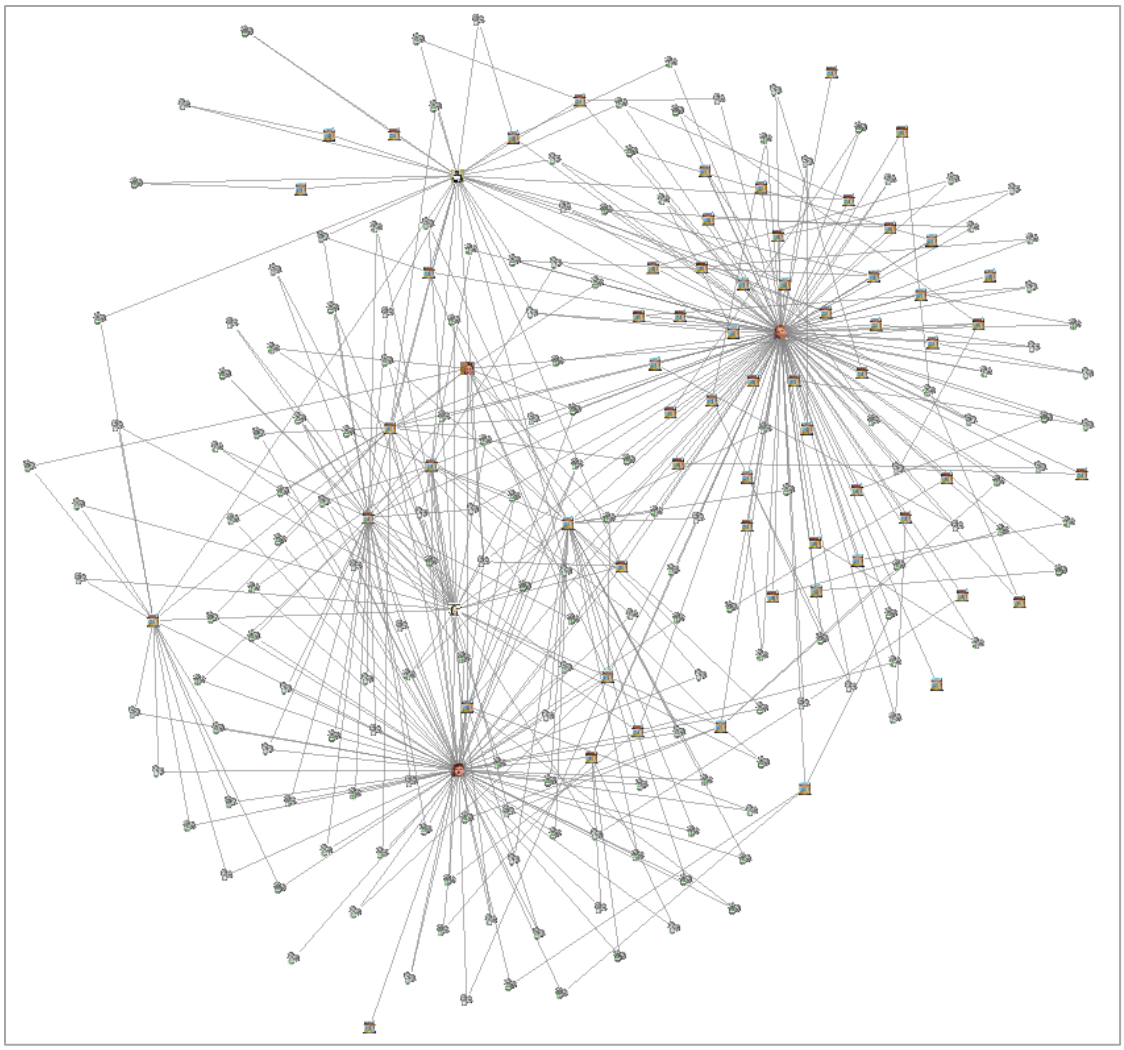

For example, if you select only organizational type relationships, you can see the hierarchy layout of the entities.




# Additional Layouts

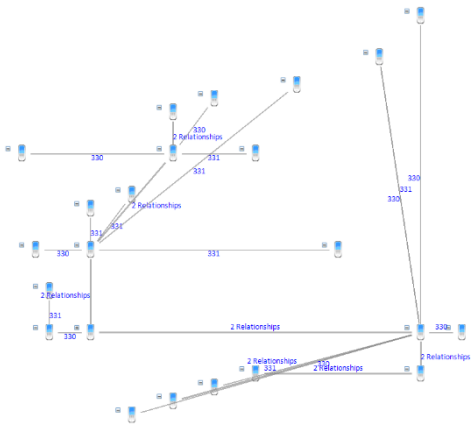
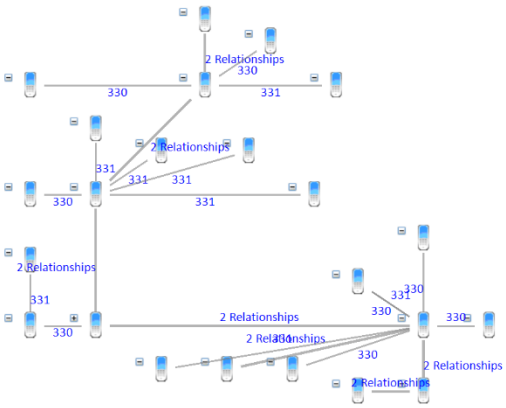
## Force Directed

Force Directed is another layout algorithm from the “Spring Embedder” family of graph layouts. The difference from Incremental layout is only one of aesthetics



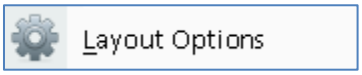
## Orthogonal Layout

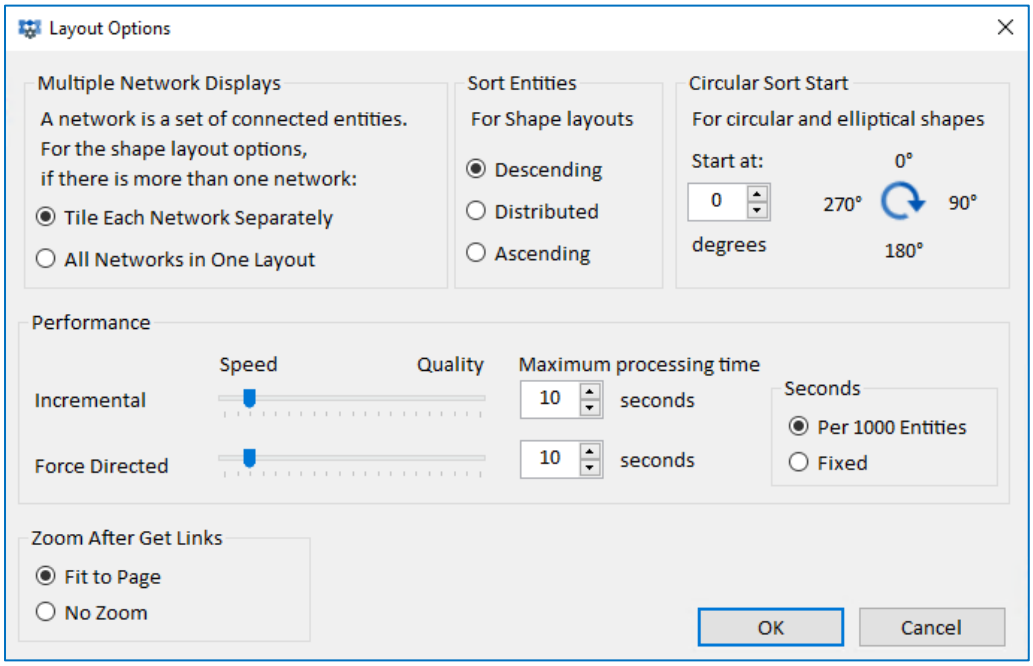
The Orthogonal layout creates schematic representations using only horizontal and vertical orientations. The entities are placed on a grid of rows and columns with relationships parallel to the x and y axes.

| *Orthogonal Large* | *Orthogonal Small* |
| --- | --- |
|  |  |

# Layout Options

Select Layouts Options to customize default behavior for displays, sorting, angles, time limits, and zoom behavior.



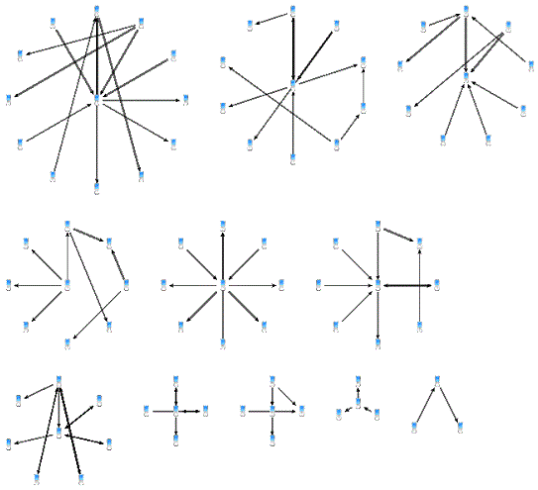
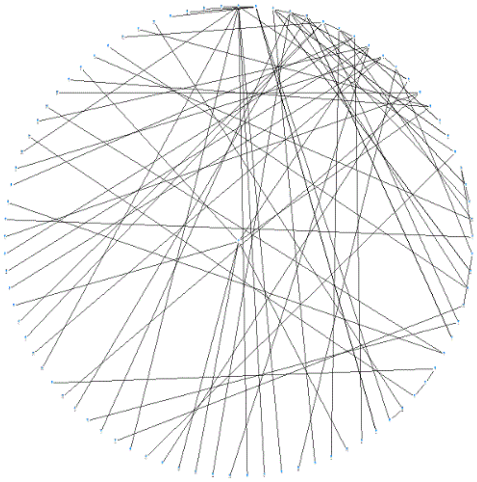




## Geometric Shape Options

The Geometric shapes include Circular, Elliptical, Rectangular, Square, and Triangular layouts.

### *Multiple Network Displays*

If the entities on your Visualizer are all connected to each other, it is one network. If they are in multiple disconnected networks, this option lets you tile them in separate shapes for each network or all in one large layout.

| *Each Network in Separate Circle with Center* | *All Networks in One Circle with Center Layout* |
| --- | --- |
| Each of the networks is displayed in its own Circle with Center | All the entities from all the networks are arranged in one Circle with Center |
|  |  |

### *Sort Entities*

Entities are sorted in the shape. This option lets you sort them in ascending, descending or distributed order based on the currently selected entity gradient or range filter. If none is selected, sorting is based on Line Count.

### *Circular Sort Start*

For the circular and elliptical shapes, you can specify where on the circle it starts.

### Performance Options

Use the slider controls to balance speed and quality. Faster speed yields quick results, but the resulting organizational layout may not be ideal. Conversely, moving the slider to the right for quality takes more processing time, but results in a better visual layout.

### Maximum Processing Time

Limit the maximum time the Incremental layout algorithm uses. Note this is just the layout processing time and does not include the time to load the data.

The time can be adjusted based on the number of entities to allow more time for larger diagrams or set to the fixed time regardless of size.

### Zoom after Get Links

After Get Links on an entity you can automatically Fit to Page to see all the newly added entities. Choose No Zoom to remain with the same view where the new entities may be off screen.

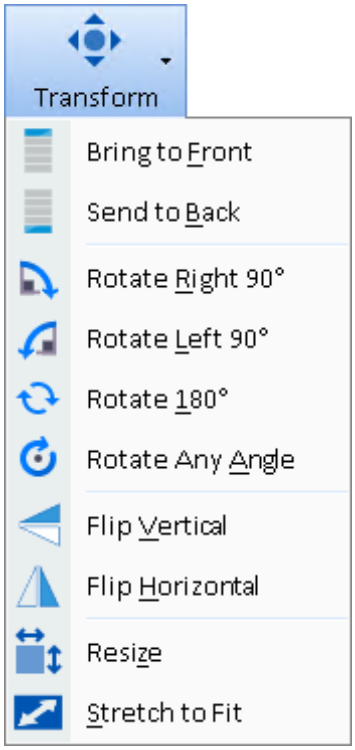
## Set Last Layout as Default

By default, when you launch All to Visualizer from the menu, it displays the entities with the Incremental, Tiled Networks layout. You can change this by selecting the layout you prefer and selecting Set Last as Default.

# Transform

Transform lets you modify the location of your diagram objects:

- Move the selected items forwards or backwards
- Rotate the diagram in 90-degree increments or a specified angle
- Flip the diagram vertically or horizontally
- Resize (stretch) the diagram horizontally and/or vertically



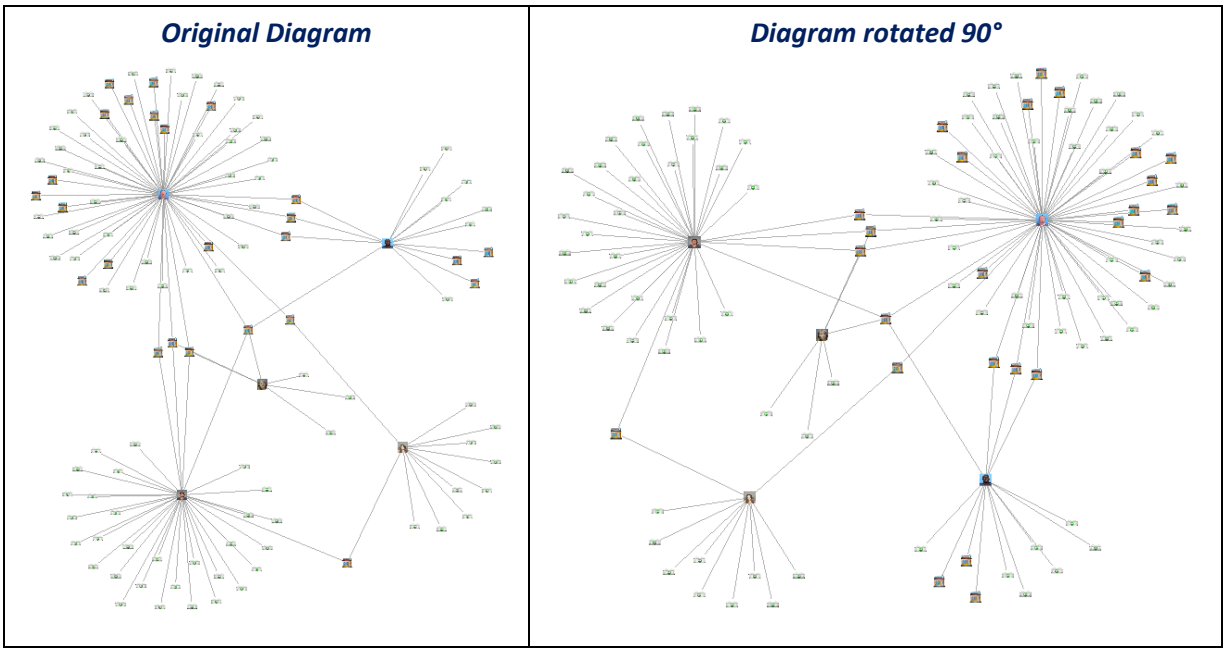

## Z-Order

Move the selected items forwards or backwards in the diagram.

## Rotations

Rotate moves all the objects in your diagram by the specified angle. By default, it rotates around the center of the diagram. If an entity is selected, rotation is around that entity.

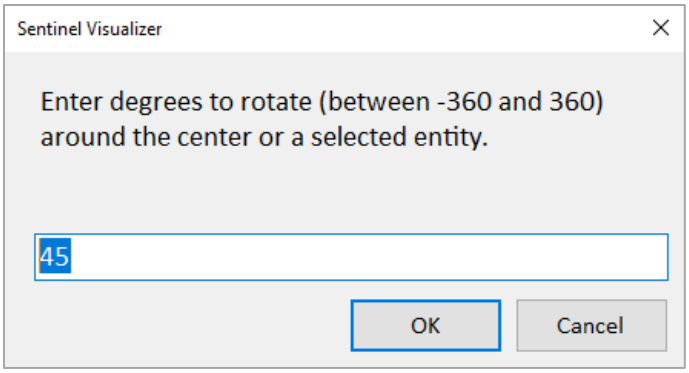
When entities are moved, their image and labels remain horizontal in the new location. Similarly, if a text shape is rotated, the center is relocated, and the text remains horizontal.




Other shapes, like lines, arrows, rectangles, and circles, are rotated and adjusted to their new locations.

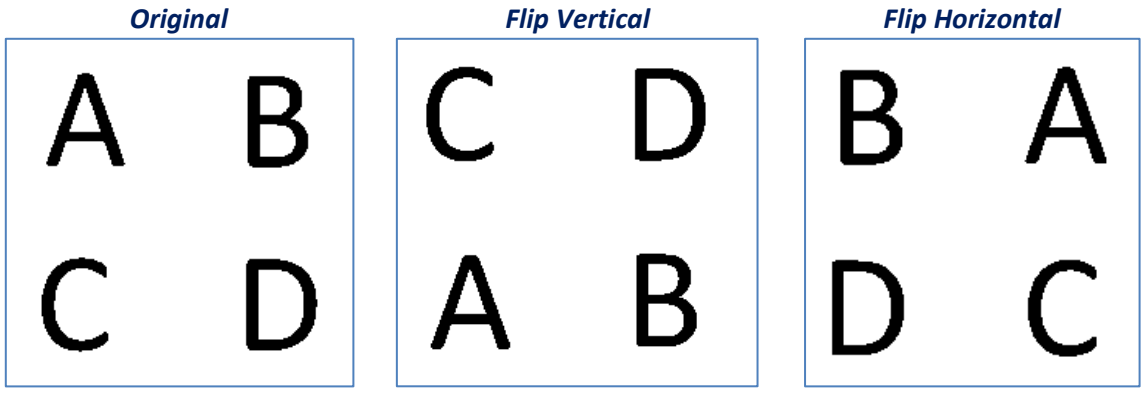
## Rotate Any Angle

For more refined rotations, you can specify the exact angel to rotate. A value greater than zero rotates clockwise. A negative number is counterclockwise up to 360 degrees in a circle.




## Flip Vertical and Horizontal

You can also flip the diagram vertically and horizontally.



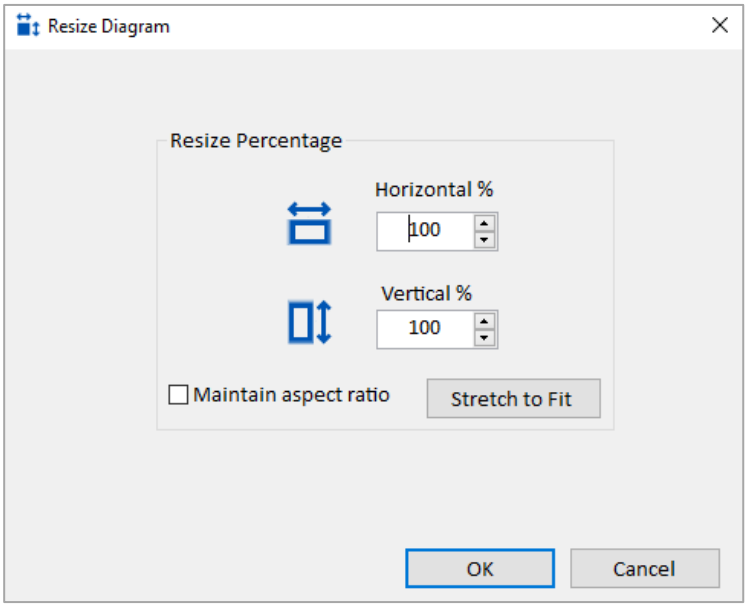

Flip Vertical swaps the top and bottom. Flip Horizontal swaps left and right.

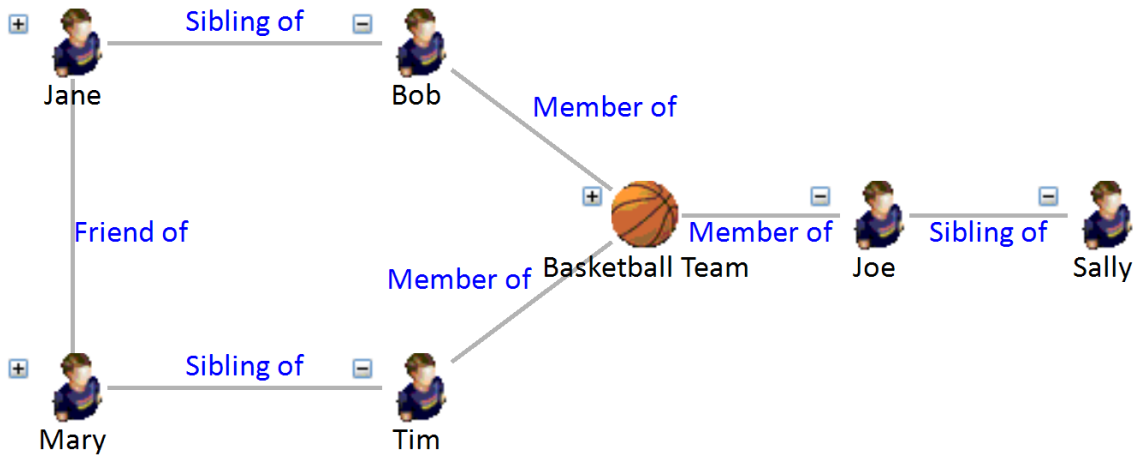
## Resize

For Resize, set the % to increase the horizontal and vertical dimensions of your diagram. A value more than 100 stretches the dimension while a value before 100 shrinks it.

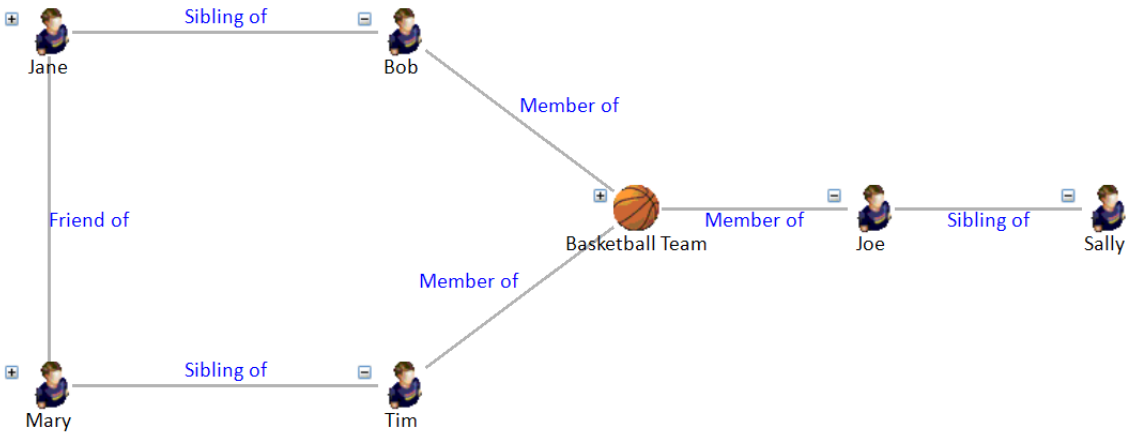
Click the "Maintain aspect ratio" checkbox to keep horizontal and vertical the same.

The [Stretch to Fit] button fills in the horizontal or vertical resize, so your diagram fills the dimensions of the display size. You can also select this directly from the menu.



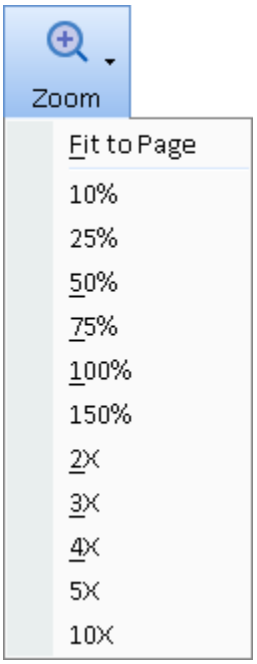

*The Relationship and Entities Text are overlapping in this diagram.*




*The resized diagram gives a better layout.*

## Zoom

Set the magnification level for your diagram. Combine this with the Navigator panel to see the details and overview of your diagram.




You can also set the zoom level by clicking anywhere on the Visualizer diagram, holding down the [Control] key, and using the mouse wheel to zoom in and out.

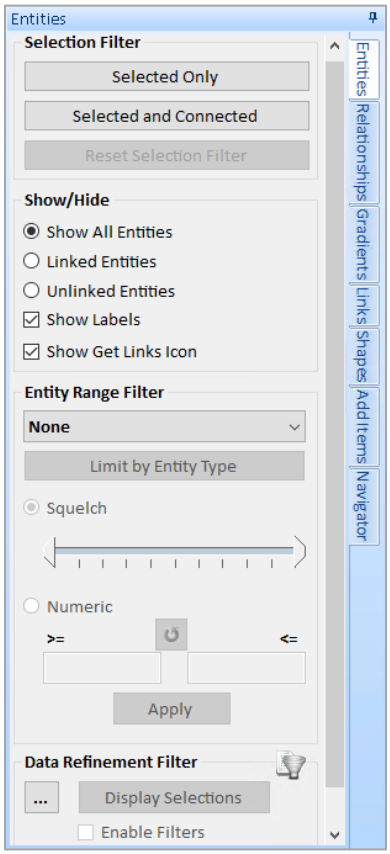
# Chapter 13: Visualizer Tool Panels

*The panels on the right side of the Visualizer let you customize your diagram. Filter entities, relationships, color and resize them, show paths, select individual networks and cliques, add new items, add shapes, and navigate your diagram mover efficiently.*

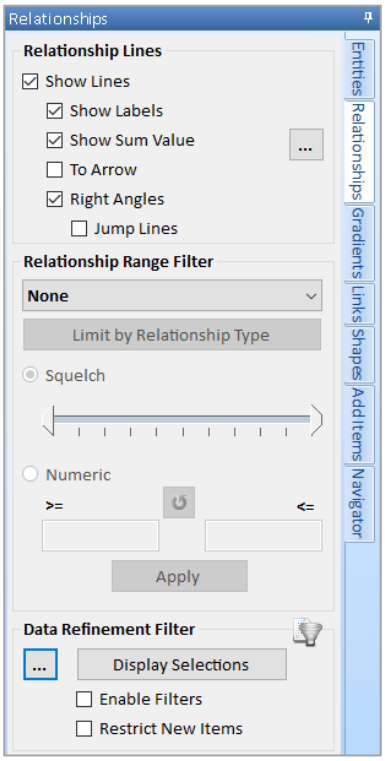
## Tool Panels

There are seven panels on the right side of the Visualizer. The whole section can be minimized to provide more room for the Diagram. They can also be dragged to another monitor.

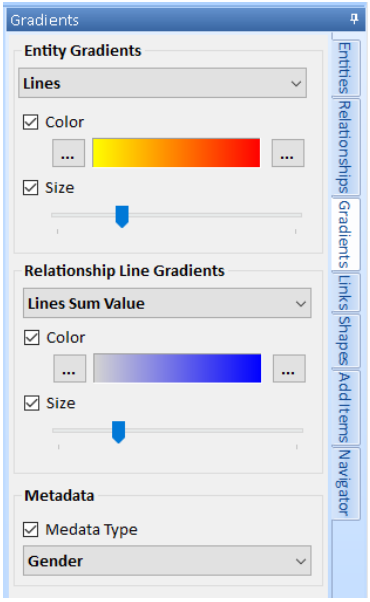
***Entities Panel***



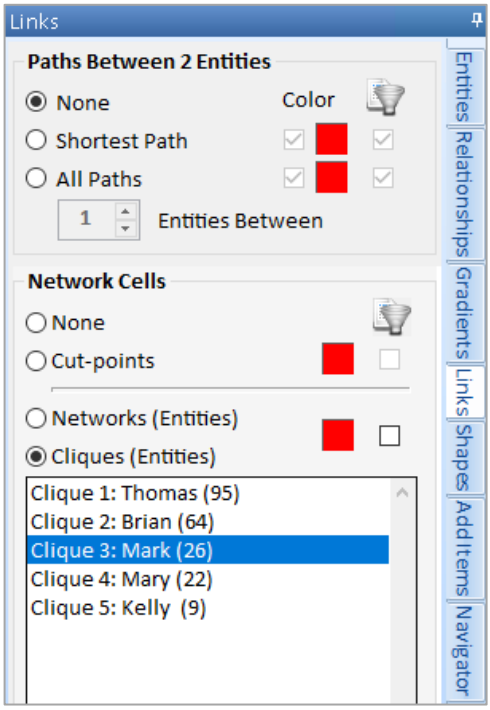

***Relationships Panel***



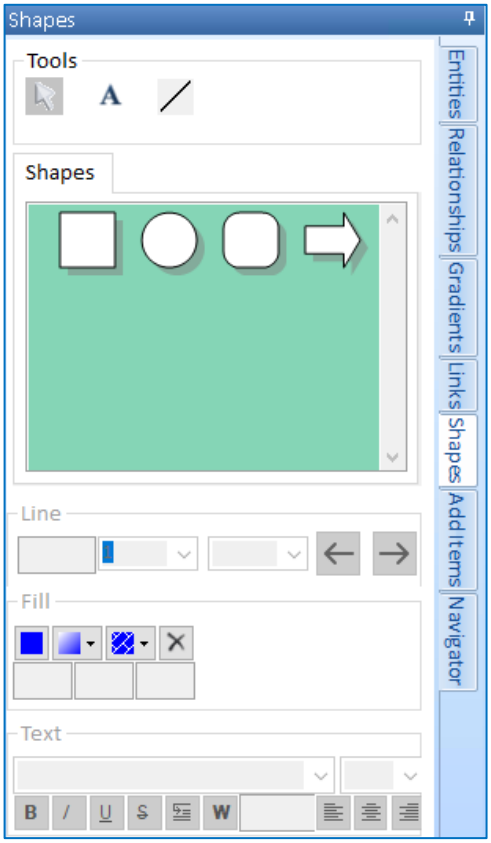

***Gradients Panel***



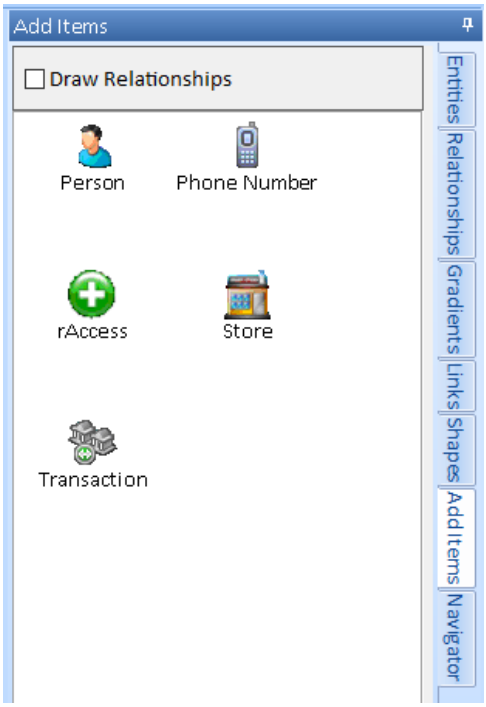
### *Links Panel*



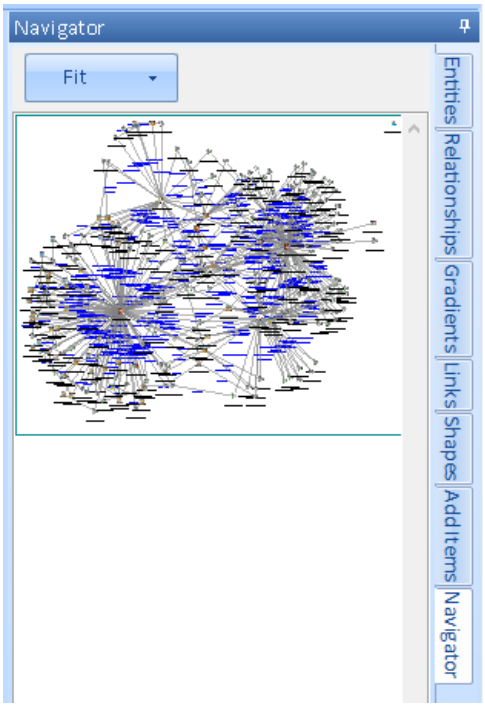

### *Shapes Panel*




### *Add Items Panel*

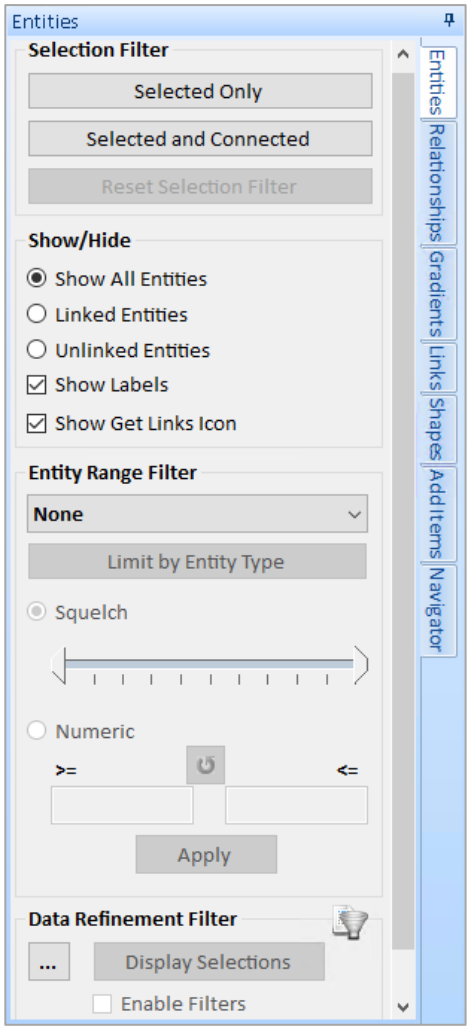



### *Navigator Panel*



# Entities Panel

As you add more entities and relationships to your diagram, you may find that the visual clutter makes it difficult to see various patterns or important items and clusters. Visualizer offers declutter features to solve this problem. Select the Entities tab to see the available options.




## Selection Filter

You can select entities and relationships on the diagram by clicking on them individually, Ctrl Click for multi-select, or clicking and dragging a box around them. The selected entities are highlighted in green. The entities linked to them (that are not selected) are highlighted in blue.

From the Selection Filter, click [Selected Only] to reduce your diagram to just the selected items. Click [Selected and Connected] to filter the diagram to the selected and their connected entities.

Note that if only relationships are selected, the two entities in the relationship are considered selected.

## Show/Hide

You can quickly see and switch between all entities, linked entities, and unlinked entities that have no relationship lines to other entities.

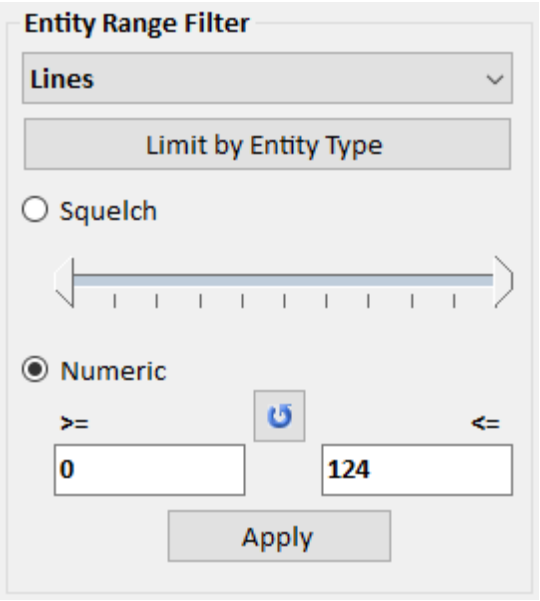
You can also toggle the entity labels and get links icon. These options are useful when you are ready to save or share a diagram.

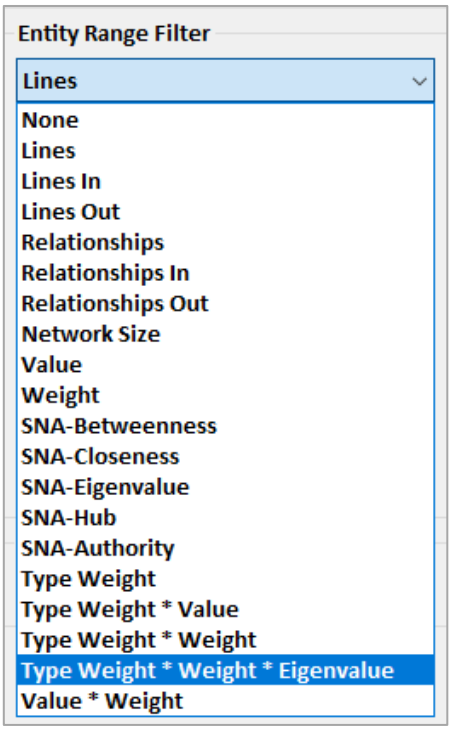
Note that if the diagram is large with lots of entities, the labels and get links icon are automatically hidden at smaller zoom levels.

## Entity Range Filter

You can filter entities based on their values. Filtering just hides, but does not remove the items from view, so you can switch and adjust your criteria without losing data.

Select the data type, then specify the numeric range either with the squelch range or specific numbers. You can limit the criteria to specific entity types, so they do not apply to other entity types under [Limit by Entity Type].




The dropdown list is identical on the Gradients panel for setting entity colors and size. For more information on the Entity Range Filters, see **Chapter 14: Entity Metrics** on page 171.

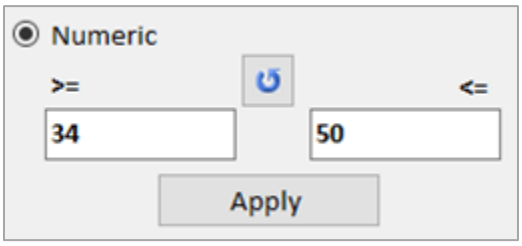
### *Squelch*

Click and drag the low and hide arrows to adjust the filter:

For most data, there are many more entities that have a small value compared to the largest value. The scale in Version 9 is logarithmic rather than linear so that small adjustments on the low end affect fewer entities.

### *Numeric Range*

The Numeric Range feature lets you specify the actual low, high or both values to filter.

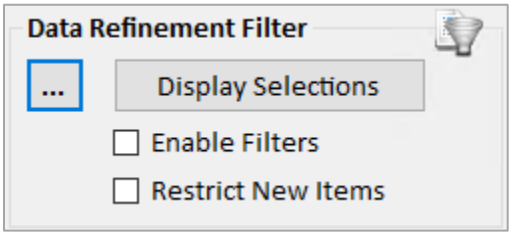



If you do not know the values, press the refresh button to fill the boxes with your current entities' lowest and highest values.

TIP: If you need to apply multiple sets of filters, from the toolbar, use Output, Filtered to Visualizer to export your data to a new Visualizer window and apply your next filter.

## Entity Data Refinement

Data Refinement lets you perform more advanced entity filtering.




Press the […] button to open a dialog similar to the entity filtering.

### *Display Selections*

Displays the items that pass the Data Refinement Filters.

### *Enable Filters*

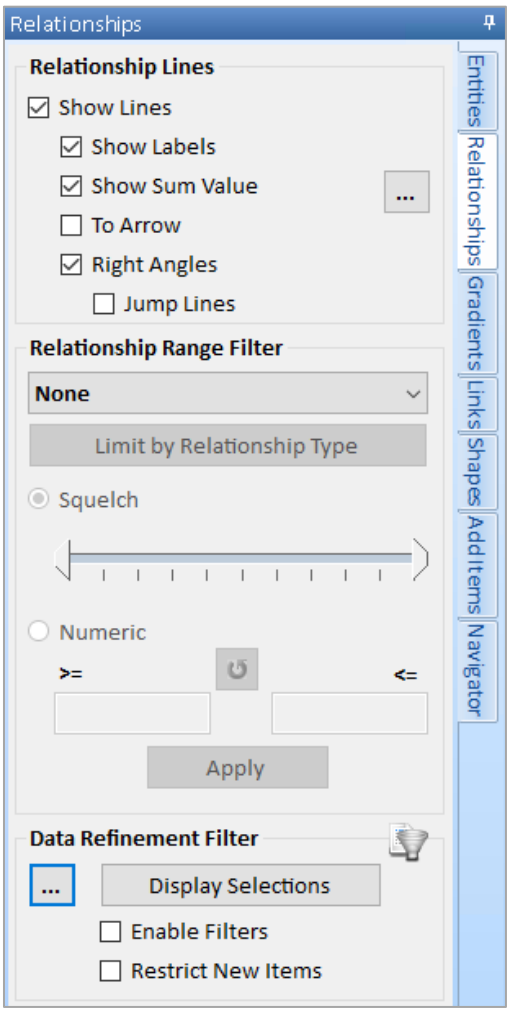
Hide items that do not pass the Data Refinement Filter.

The filter merely shows and hides entities—it does not delete them from the diagram, nor does it have any impact on the entities saved in the database.

### *Restrict New Items*

When performing Add Entities or Get Links, add new items only if they pass the Data Refinement Filter.

# Relationships Panel

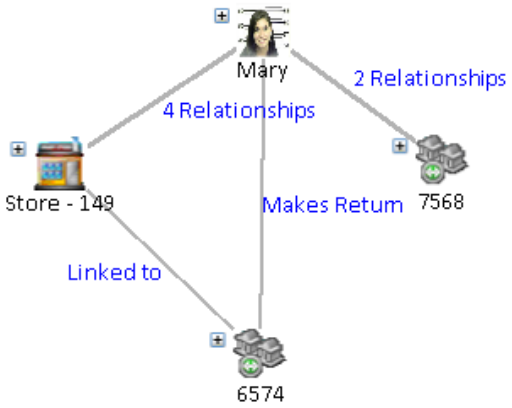



## Relationship Lines

Customize the relationship lines. The Show Lines checkbox controls whether relationship lines are visible. If it is checked, you can customize the lines further.

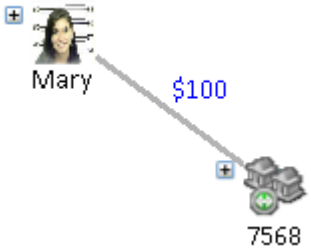
### *Show Labels*

Control whether line labels are visible. The label shows the number of relationships the line represents, or if there is just one, its relationship type.




### *Show Sum Value*

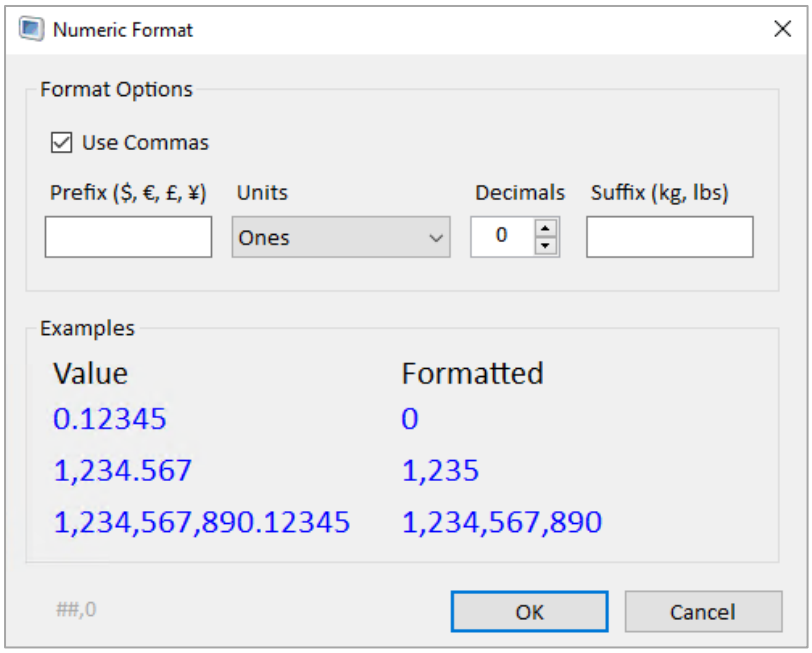
For all the relationships in a line, sum their values and display it. Blank values in the value field are ignored.

| *Show Labels and Sum Value* | *Shoe Sum Value without Label* |
|---|---|
| |  |





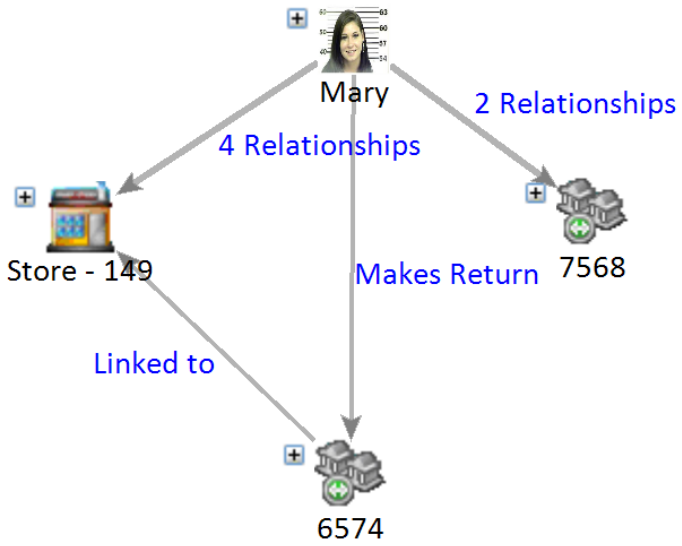
Use the […] to customize the numeric format of the sum.




You can use commas, add a prefix like a $ sign, specify the units in ones, thousands, millions, and billions, and set the number of decimals. You can also specify a suffix. Examples of the selected format are shown in the bottom section as you change the options.

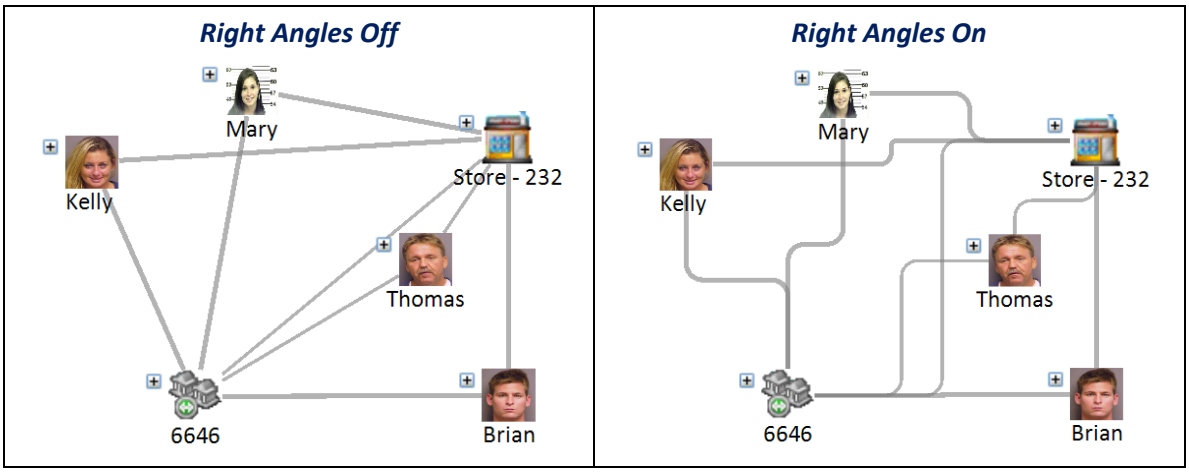
### *To Arrow*

Specifies whether or not to draw an arrowhead at the terminus of the relationship line.

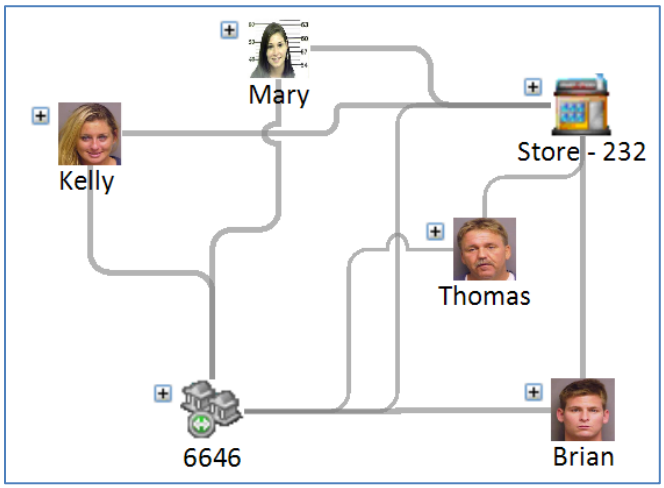



### *Right Angles and Jump Lines*

By default, the lines are straight. Check Right Angles to display them with a corner.




If Right Angles is selected, there is an additional option to show intersecting lines as jumps, so they don't look connected.

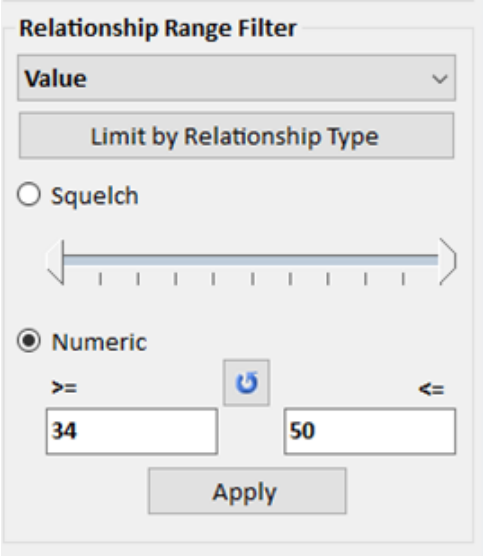


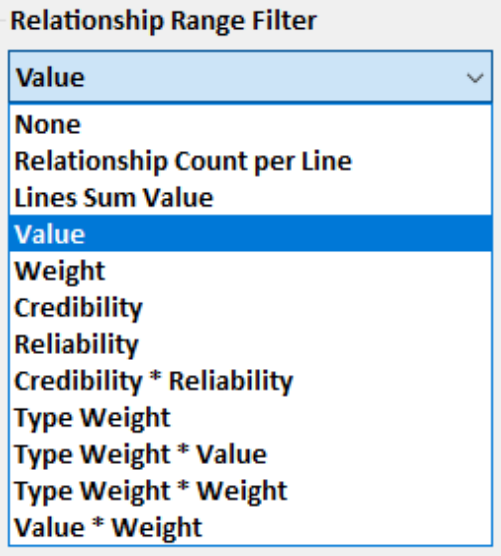

*Jump Lines On*

## Relationship Range Filter

Similar to entities, relationships can be filtered on their values. Filtering just hides, but does not remove the items from view, so you can switch and adjust your criteria without losing data.

Select the data type, then specify the numeric range either with the squelch range or specific numbers. You can limit the criteria to specific relationships types, so they do not apply to other entity types under [Limit by Relationship Type]. For instance, you only want to apply the filter on Values for money transfers.




There are a wide range of values you can filter. Note that a line may include multiple relationships and remains visible until all its relationships are filtered.

- Relationship Count per Line is the number of relationships on a line.
- Lines Sum Value is the sum of values on the relationship line.
- Value is the value field for the relationship. If a relationship does not have a value, it is not included and becomes invisible if it is the only relationship.
- Weight is the weight field for the relationship.
- Credibility is the credibility field for the relationship.
- Reliability is the reliability field for the relationship.
- Credibility * Reliability is product of the relationship's credibility and reliability fields.
- Type Weight is the weight value defined for each relationship type. For instance, a brother relationship should have a higher type weight than a phone call.
- Type Weight * Value is the product of a relationship's type weight and its value field. If a relationship does not have a value, it is not included.
- Type Weight * Weight is the product of a relationship's type weight and its weight field.
- Value * Weight is the product of the relationship's value and weight fields. If a relationship does not have a value, it is not included.

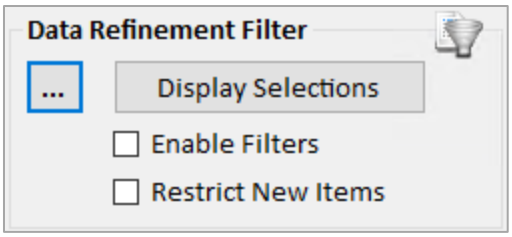
The dropdown list is identical on the Gradients panel for setting relationship colors and size.

The Squelch and Numeric features are identical to the Entities panel. See page 152 for details.

TIP: If you need to apply multiple sets of filters, from the toolbar, use Output, Filtered to Visualizer to export your data to a new Visualizer window and apply your next filter.

## Relationship Data Refinement

You can filter relationships in the 'Data Refinement' section. Click the […] button and to open the Relationship Filter form. This is identical to the **Advanced Relationship Search** on page 75.




### *Display Selections*

Displays the items that pass the Data Refinement Filters.

### *Enable Filters*

Hide items that do not pass the Data Refinement Filter.

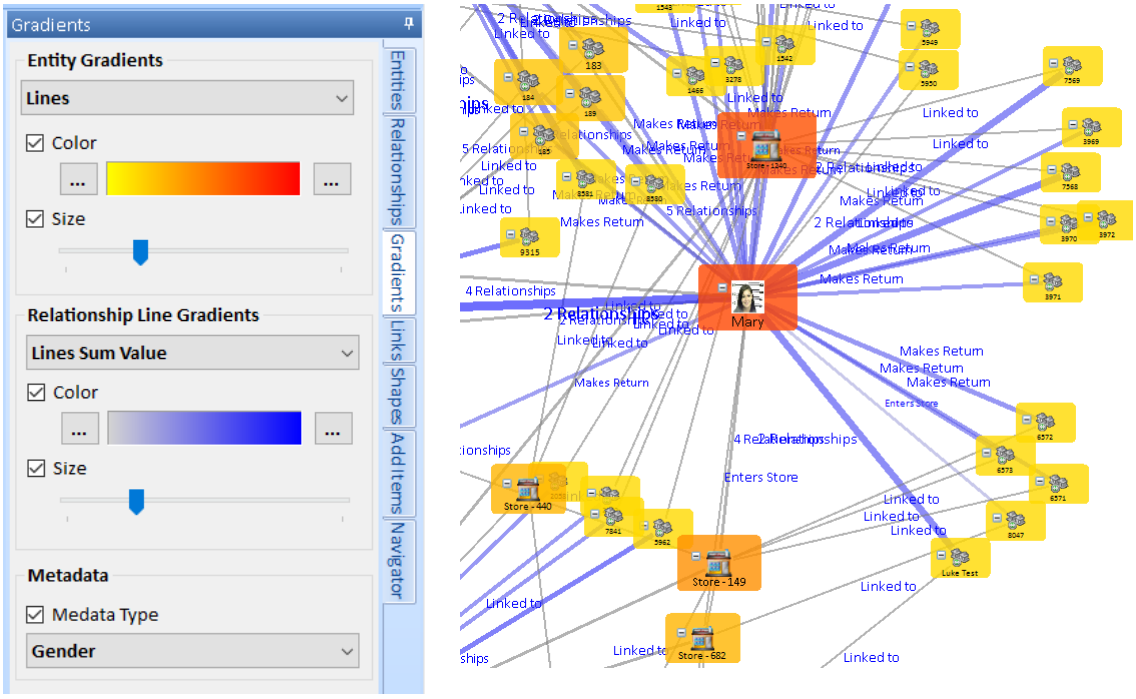
The filter merely shows and hides entities—it does not delete them from the diagram, nor does it have any impact on the entities saved in the database.

### *Restrict New Items*

When performing Add Entities or Get Links, add new items only if they pass the Data Refinement Filter.

## Gradient Metrics

You can color and size your entities and relationships based on a variety of metrics. This lets you see the relative value between your entities. For relationships, the thickness of the line represents the value.




Version 9 lets you set the Entity and Relationship colors and size separately.

Select the data type to perform the gradient. The options are identical to the types for numeric filter on the Entities and Relationships panels.

Check the Color and Size to show them on the diagram. Pick the low and high color values, and the relative size by moving the slider bar by clicking and dragging its arrow.

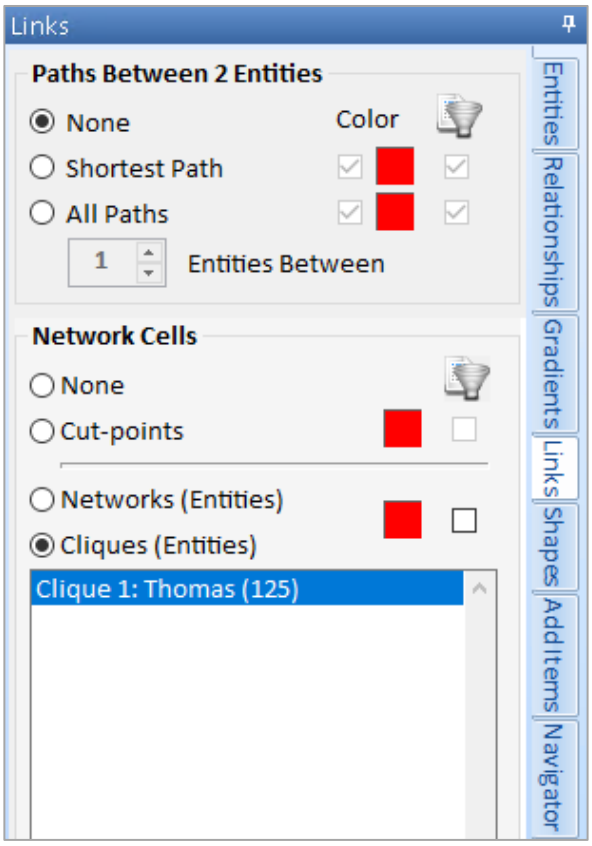
### Metadata Type Coloring

Metadata Type allows you to color Entities based on a metadata value. The metadata must be defined as a lookup type, such as Gender.

The colors are specified for metadata type lookups in Manage Database, Metadata Types. See **Managing Lookup List Values** on page 242 for more details.

## Links Panel

The Links Panel provides tools that aid in the visual analysis and understanding of a diagram.




## Paths Between 2 Entities

**None** – Does not show any paths.

**Shortest Path** – The shortest path between two entities.

**All Paths** – All connecting paths between two entities, up to the specified number of entities between them.

## Network Cells

**None** – Does not show any network cells.

**Cut-points** – Entities whose removal would cause a network to become disconnected.

**Networks** – Groups of connected entities. Click on a network to highlight its entities with the option to filter to just the network.

**Cliques** – Groups of 5 or more entities, all within 2 degrees of each other. Click on one clique to highlight it with the option to filter to the selected clique.

## Shortest Path

To show the shortest path between entities, select any two entities by clicking on the first entity, and then holding down the [Ctrl] key while clicking on another entity. Then click the Shortest Path option. Sentinel Visualizer optionally highlights and filters the shortest path between the two entities.

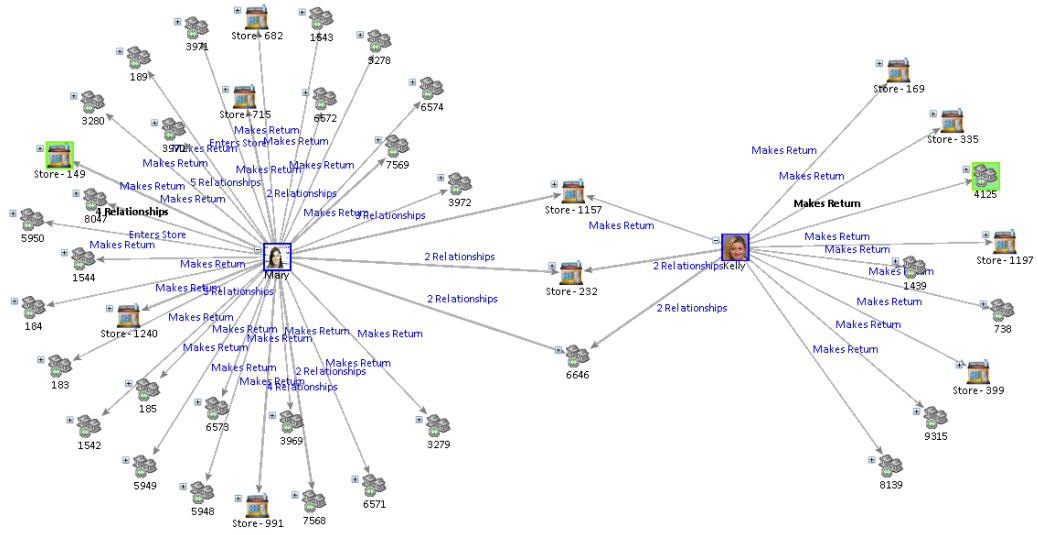



*Diagram of all Entities and Relationships*

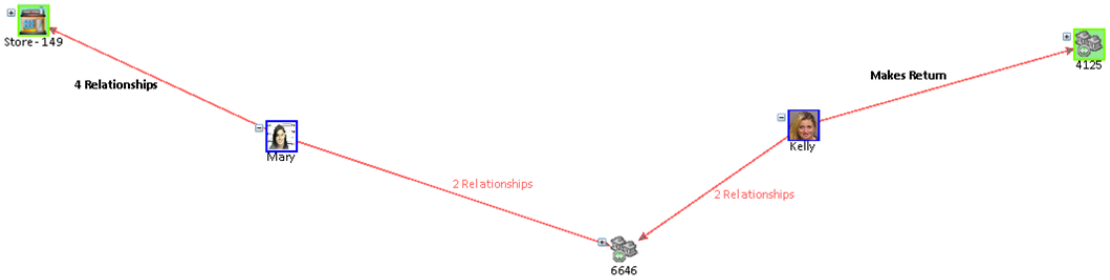



*Diagram of Shortest Path between two Entities*

## All Paths

To show all paths between entities, select any two entities by clicking on the first entity, and then holding down the [Ctrl] key while clicking on another entity. Then click the All Paths option. Sentinel Visualizer optionally highlights and filters all possible paths between the two entities.

The number of degrees to highlight can also be specified by changing the Entities Between value. By default, this is the minimum number of degrees required to connect the two entities.

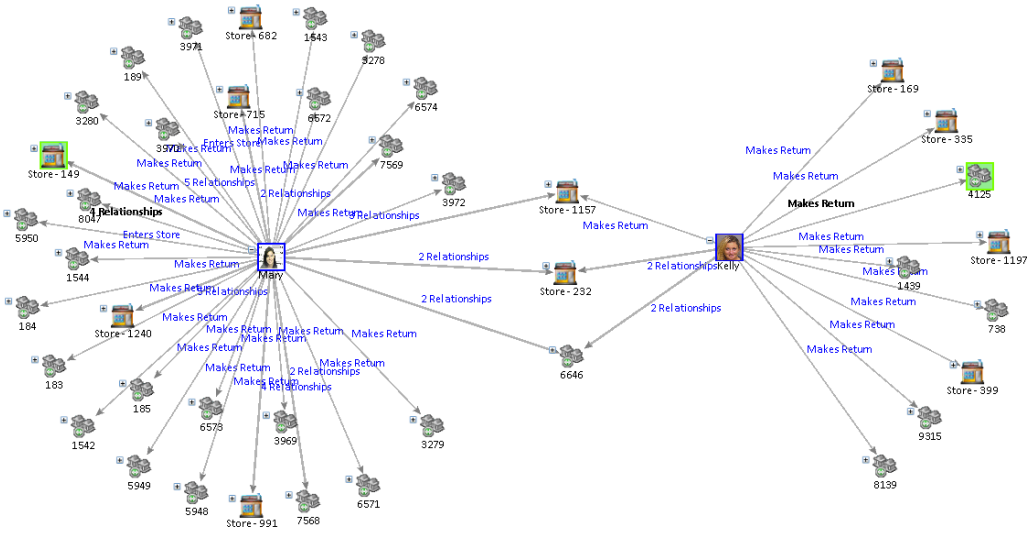



*Diagram of all Entities and Relationships*

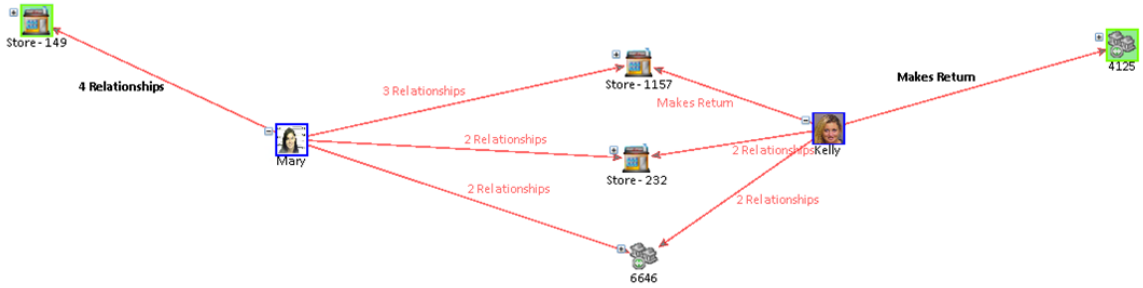
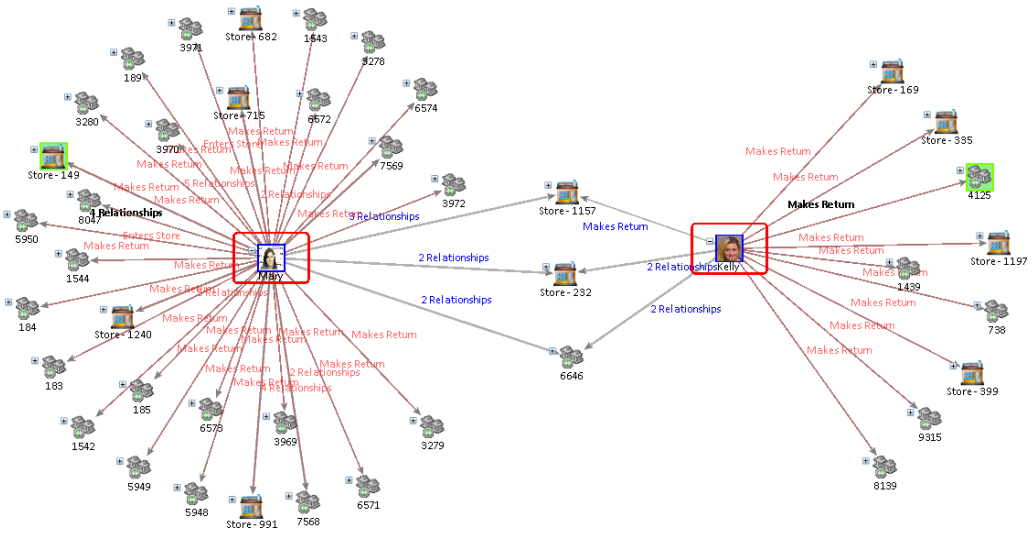



*Diagram of All Paths to the two Entities*

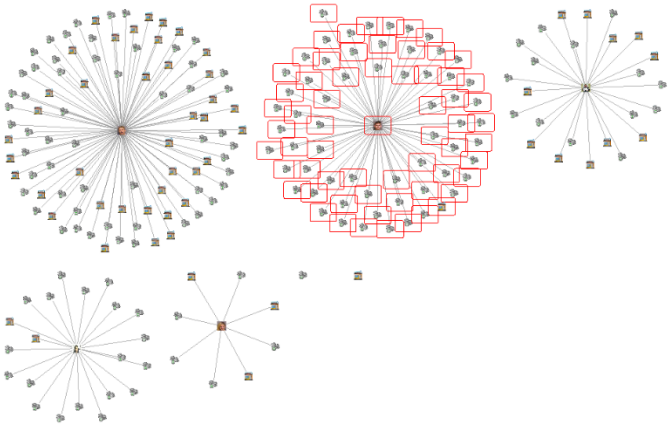
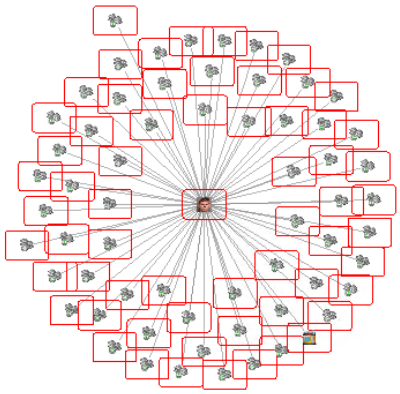
## Cut Points

Sentinel Visualizer uses Social Network Analysis to identify cut-points in a network. A cut-point is an entity whose removal would cause a network to become disconnected. Select the Cut-Points option to optionally highlight and filter by cut-points.



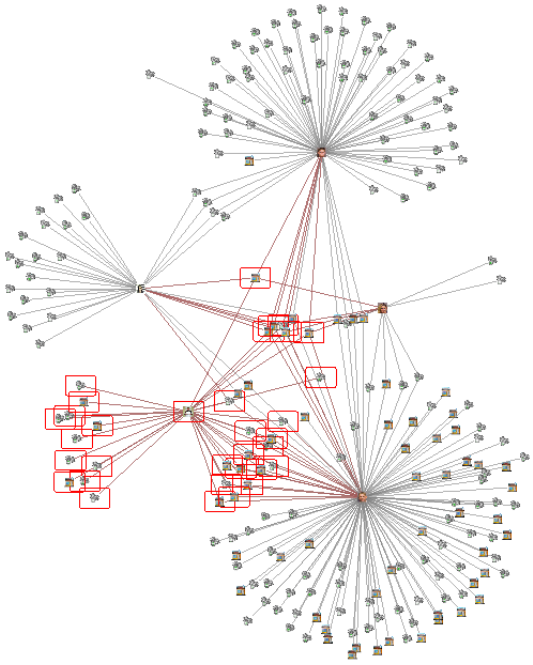
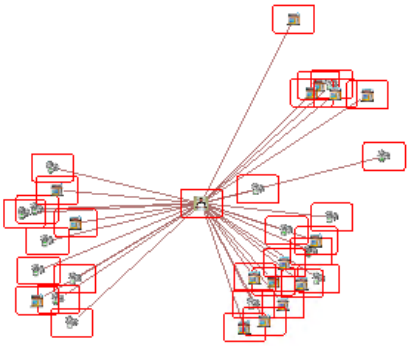
## Networks

Select the Networks option to generate a list of networks. As you click on each network in the list, the diagram highlights the members of the network with the specified color. Check the filter button to only show the selected networks entities.

| *Networks* | *Networks with Filter* |
| --- | --- |
|  |  |

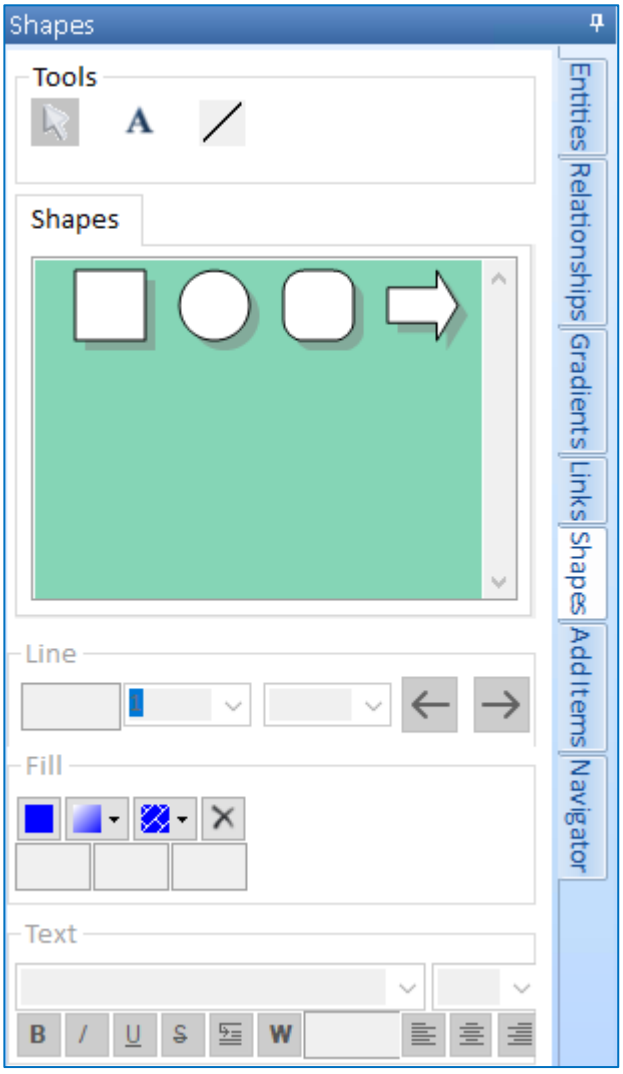
## Cliques

Select the Cliques option to generate a list of cliques. As you click on each clique in the list, the diagram highlights the members of the clique with the specified color. Check the filter button to only show the selected clique's entities.

| *Networks* | *Networks with Filter* |
| --- | --- |
|  |  |

# Add Shapes

The Shapes panel lets you add text, lines, arrows, circles, and rectangles to your diagram. There are options to change the font, colors, and dimensions.




### Tools

**Cursor** – An indicator to select items in the diagram.

**Text** – Create a text box to input text information.

**Draw Lines** – Draw a straight line.

### Shapes

Variety of shapes to use in the diagram.

### Line Control Tools

Change the thickness of line and shape outline.

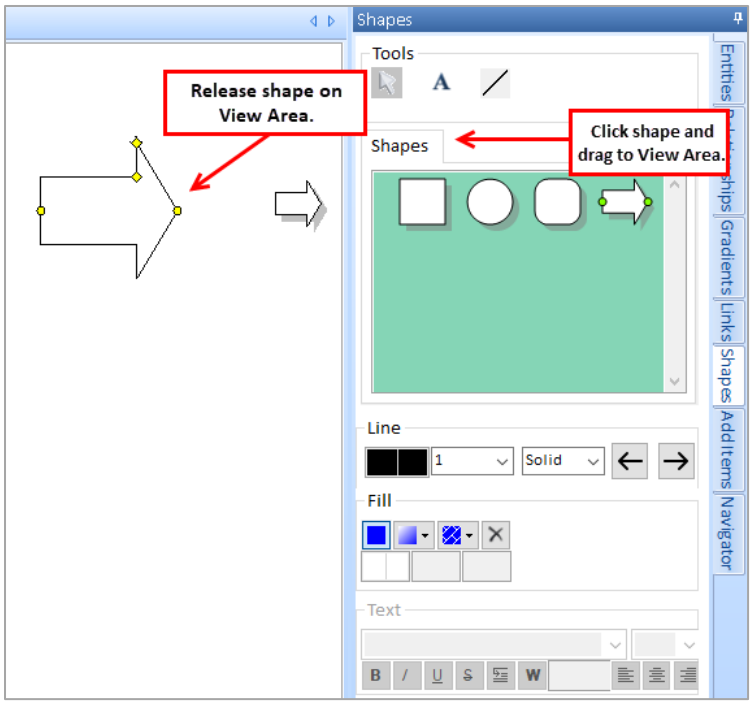
### Fill Control Tools

Change the color, pattern, texture to the interior of a shape.

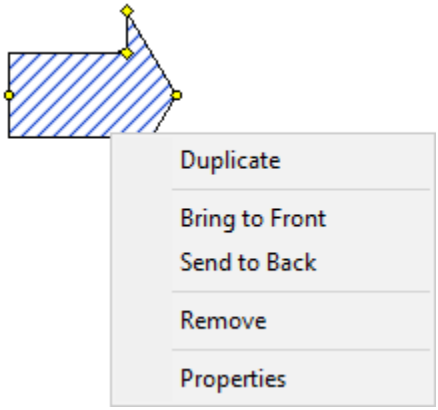
### Text Control Tools

Change the font, the size of font, formatting, and justification.

Select the object, drag it to your diagram, then set its properties from the panel.




If you want to make a copy of an existing on your Diagram, you can right-click and select Duplicate. Additionally, you can show the Shape Panel by selecting a shape in the Diagram, right-click, and select Properties.

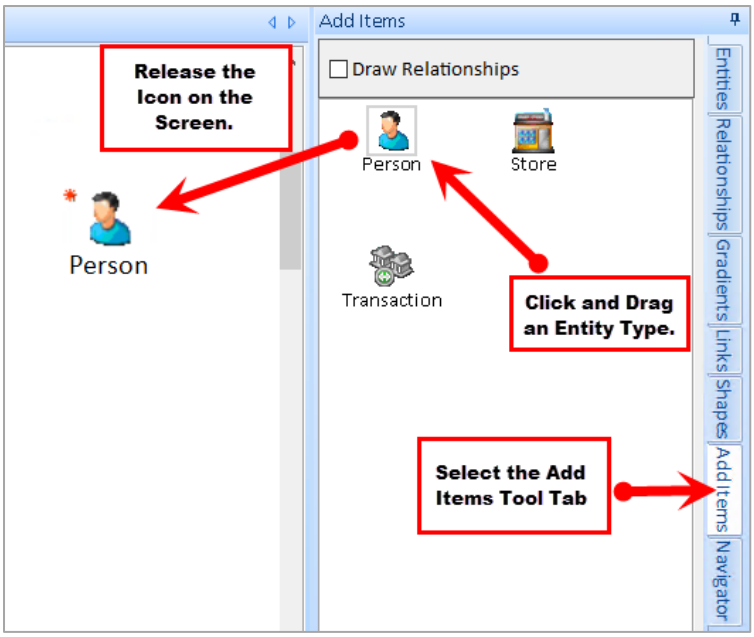



# Adding Items

In addition to adding entities and relationships to the diagram by querying the database, you can add your own items. Adding entities and relationships provides a way to visualize hypothetical or otherwise informal items to further your analysis process.

## Adding Entities

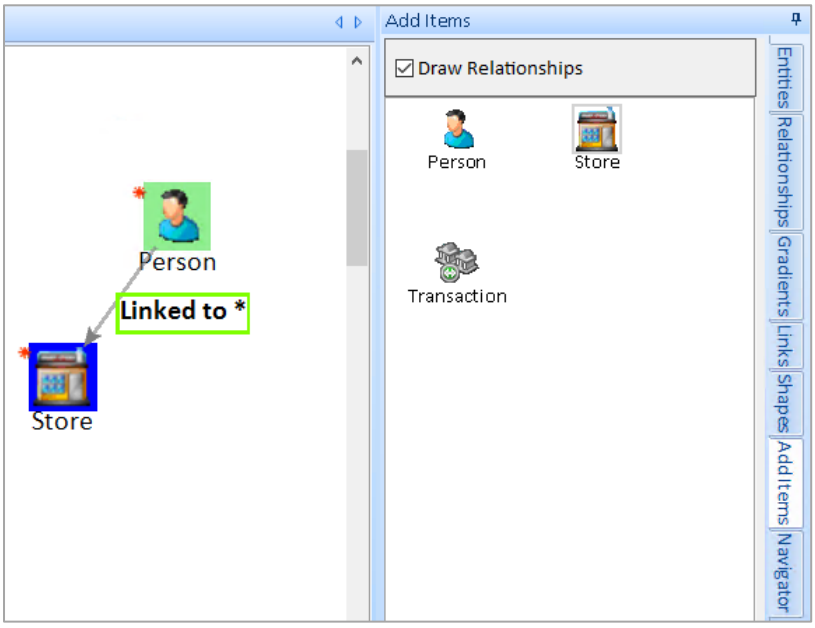
To add an entity, click the [Add Items] tab in the Visualizer. A list of entity types appears. Click on the appropriate entity icon and drag it to the Diagram.




It is important to remember that adding items are not automatically saved to the database as formal entities and relationships. Instead, they are stored with your Visualizer diagram when you save it. You can specify that the added items are to be saved to the database. For more information, see **Saving and Loading Visualizer Diagrams** on page 123.

## Adding Relationships

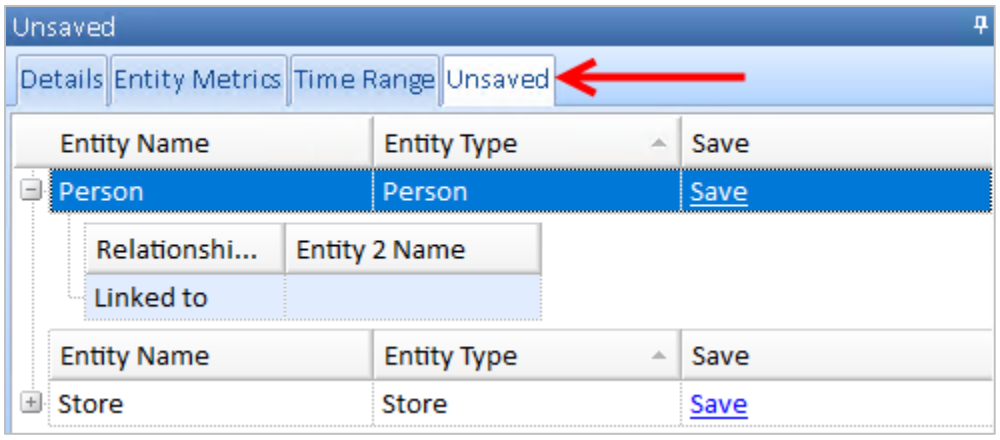
To add a relationship, check the [Draw Relationships] checkbox to switch to Add Relationship mode. This mode allows you to manually “draw” relationships. Click on an entity and drag the mouse cursor to another entity for the Visualizer to draw a relationship.



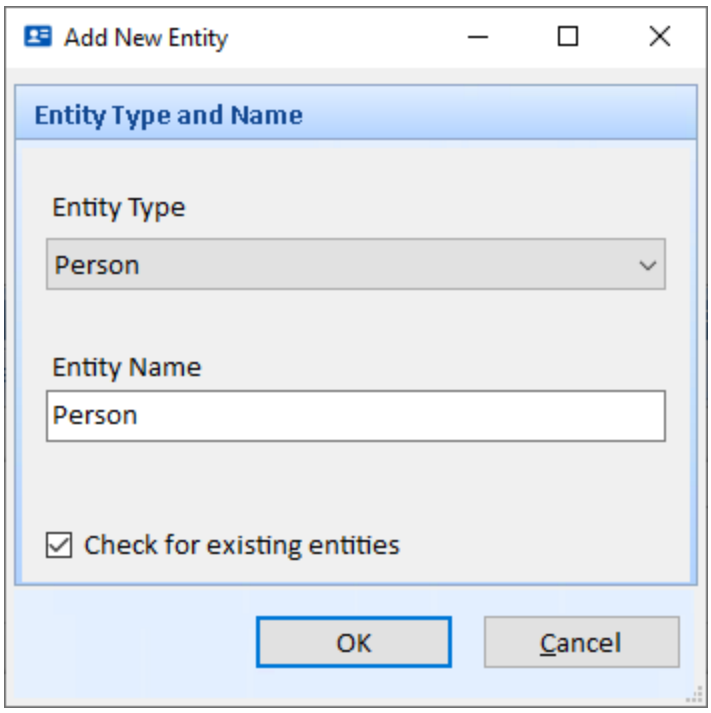

As with adding entities, you can right-click on the relationship to specify its type. When you are finished drawing the relationships, un-check [Draw Relationships] to turn off Add Relationship mode.

### Saving Added Items

All the unsaved added items are listed on the [Unsaved] tab located towards the bottom of the Visualizer.



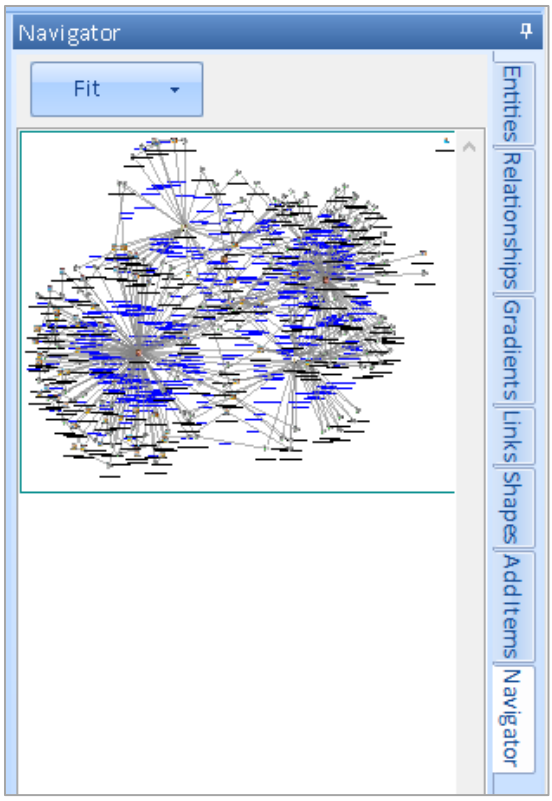

You can save individual items by clicking [Save] in the right column and add the new item.




To save all the added items, see **Saving and Loading Visualizer Diagrams** on page 123.

## Navigator

As you add entities and relationships to the diagram, the complexity can make it difficult to navigate. You may want to zoom in to see detail and zoom out to see patterns. The Navigator panel provides a thumbnail view that allows you both zoomed and un-zoomed windows.



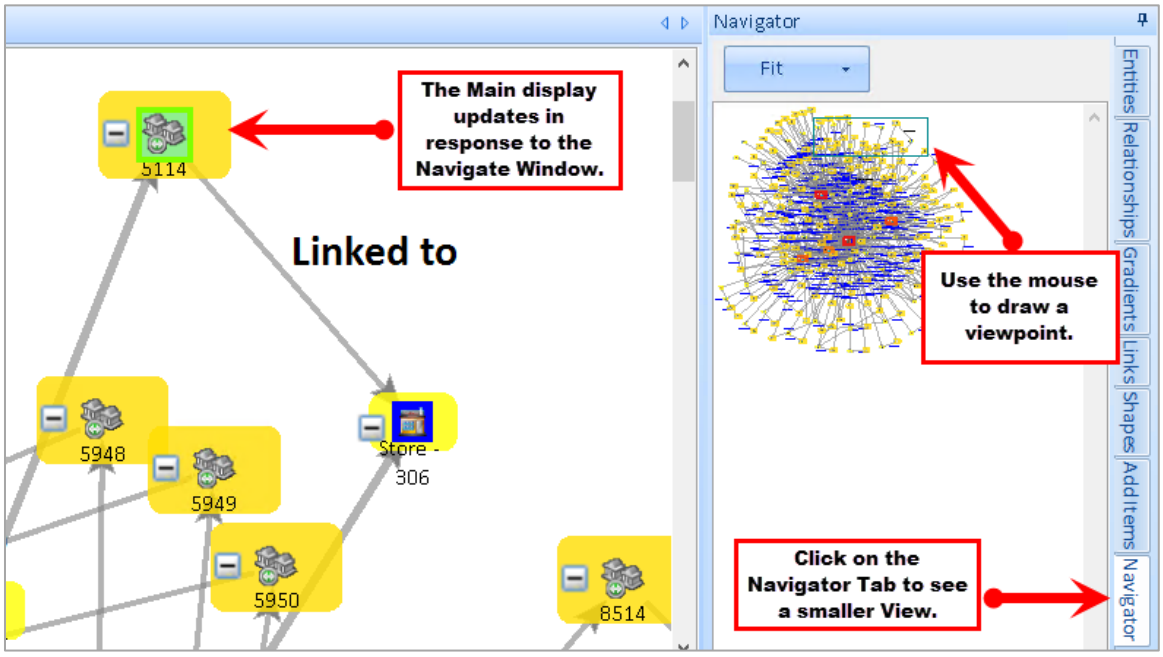

A drop down lets you see the control the size of the navigator display and can vary depending on the size and complexity of your diagram.

- "Fit to Tab" fills the Navigator panel with the entire width of the diagram. This can be very small compared to the diagram, but lets you see the whole diagram so you can select a portion of it.
- "Reset to Original" restores the scale to the setting when the Visualizer was opened.
- 100% scales it to full size
- "2 Times Fit" scales the diagram so that it twice the width of the navigator panel.
- Same for larger fits.

Use the Navigator to:

- **Change the viewport size:** Click anywhere in the Navigator window and hold down the left mouse button. As you drag, the Navigator draws a new viewport.

- **Change the viewport area:** Click on the Navigator window frame and hold the left mouse button down and drag. The main diagram repositions to be in sync with the Navigator area.
- **Zoom the Navigator window:** Hold down the [Control] key and rotate the mouse wheel up or down to zoom in or out.



# Chapter 14: Entity Metrics

*Entity Metrics are a key aspect of the Sentinel Visualizer automated analysis capabilities. Entity Metrics automatically analyze entities and relationships and generate useful numerical analysis in real-time. Using a combination of Social Network Analysis, statistical and graph theory, and custom algorithms, Entity Metrics give you the ability to rank entities by a variety of criteria.*

## Social Network Analysis (SNA)

Some of the key concepts of Entity Metrics come from the field of Social Network Analysis (SNA). SNA provides a set of methodologies and formulas for calculating a variety of criteria that map and measure the links between things. Using SNA, you can get answers to questions like:

- How highly connected is an entity within a network?
- What is an entity's overall importance in a network?
- How central is an entity within a network?
- How does information flow within a network?

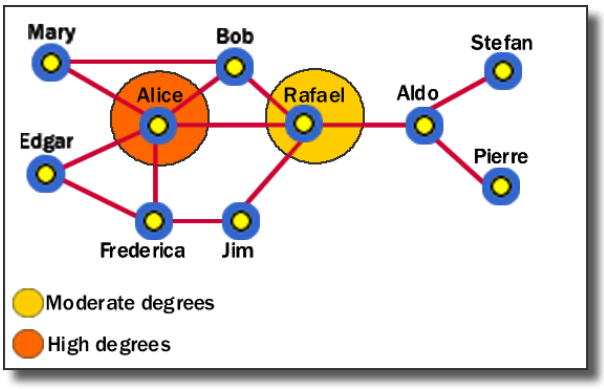
SNA provides a rich set of metrics, many of which are used in the Sentinel Visualizer Network Metrics functionality.

### Lines

Lines are the number of lines an entity has to other entities. Note that this is different from relationships because a line may represent multiple relationships.

Degree centrality is simply the number of direct relationships that an entity has. An entity with high degree centrality:

- Is generally an active player in the diagram.
- Is often a connector or hub in the network.
- Is not necessarily the most connected entity in the diagram (an entity may have many relationships, the majority of which point to low-level entities).
- May be in an advantaged position in the diagram.
- May have alternative avenues to satisfy organizational needs, and consequently may be less dependent on other individuals.
- Can often be identified as third parties or deal makers.




In our example, Alice has the highest degree centrality, which means that she is quite active in the network. However, she is not necessarily the most powerful person because she is only directly connected within one degree to people in her clique—she must go through Rafael to get to other cliques.

### Lines In

Number of incoming lines an entity has from other entities. A line is incoming where the entity is Entity 2 in a relationship

### Lines Out

Number of lines an entity has to other entities. A line is outgoing if the entity is Entity 1 in a relationship.

### Relationships

Number of relationships an entity has.

### Relationships In

Number of relationships where the entity is Entity 2.

### Relationships Out

Number of relationships where the entity is Entity 1.

### Network Size

Number of entities in a network. A network is a set of connected entities.

### Value

The value field for the entity. If an entity does not have a value, it is not included and becomes invisible.

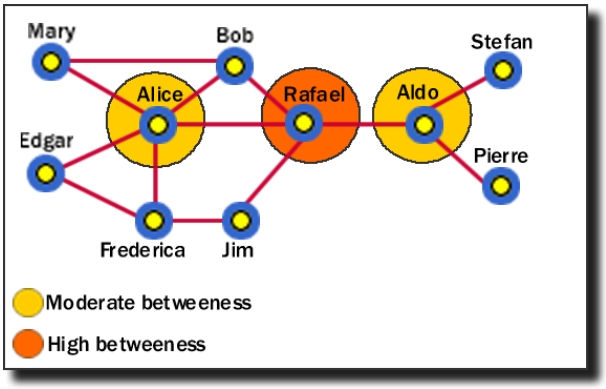
### Weight

Each entity has a Weight field. You can enter a value from 1 to 100 to weight the entity's importance based on your knowledge. The Weight value is used in the calculation of the overall network value.

## Betweenness

Betweenness centrality identifies an entity's position within a network in terms of its ability to make connections to other pairs or groups in a network. An entity with a high betweenness centrality generally:

- Holds a favored or powerful position in the network.
- Represents a single point of failure—take the single betweenness spanner out of a network and you sever ties between cliques.
- Has a greater amount of influence over what happens in a network.

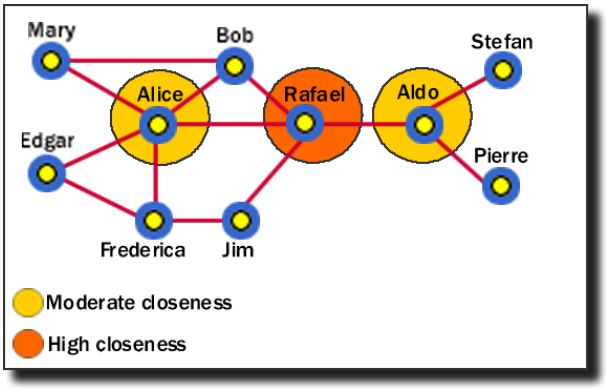



In this example, Rafael has the highest betweenness because he is between Alice and Aldo, who are between other entities. Alice and Aldo have a slightly lower betweenness because they are essentially only between their own cliques. Although Alice has a higher degree centrality, Rafael has more importance in the network in certain respects.

## Closeness

Closeness centrality measures how quickly an entity can access more entities in a network. An entity with a high closeness centrality generally:

- Has quick access to other entities in a network.
- Has a short path to other entities.
- Is close to other entities.
- Has high visibility as to what is happening in the network.



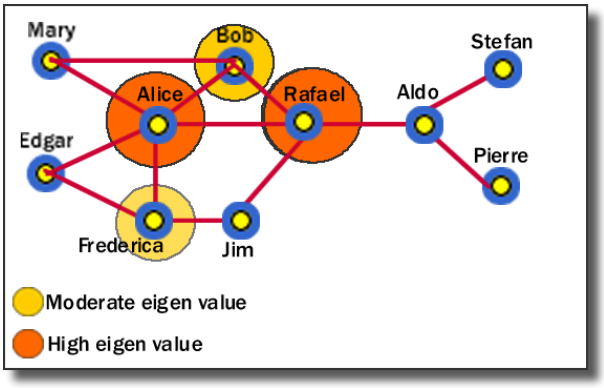

As with the betweenness example, Rafael has the highest closeness centrality because he can reach more entities through shorter paths. As such, Rafael's placement allows him to connect to entities in his own clique, and to entities that span cliques.

If the network contains any entities that are un-linked (i.e. not linked to any other entities), the Closeness value for all entities in the network is 0. This is due to formulas and algorithms established in Social Network Analysis.

## Eigenvalue

Eigenvalue measures how close an entity is to other highly close entities within a network. In other words, Eigenvalue identifies the most central entities in terms of the global or overall makeup of the network. A high Eigenvalue generally:

- Indicates an actor that is more central to the main pattern of distances among all entities.
- Is a reasonable measure of one aspect of centrality in terms of positional advantage.

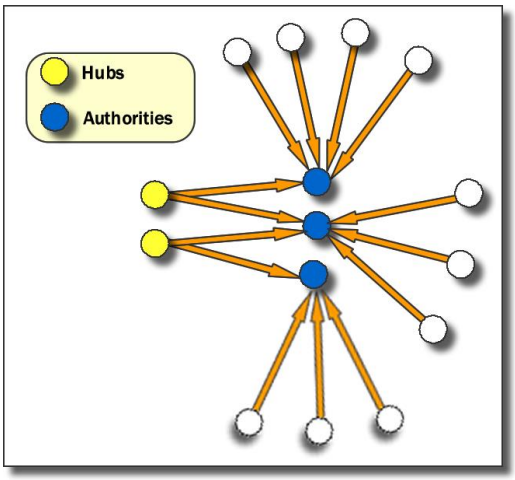



In this example, we can see that Alice and Rafael are closer to other highly close entities in the network. Bob and Frederica are also highly close, but to a lesser value.

## Hub and Authority

Entities that many other entities point to are called Authorities. In Sentinel Visualizer, relationships are directional—they point from one entity to another. If an entity has a high number of relationships pointing to it, it has a high authority value, and generally:

- Is a knowledge or organizational authority within a domain.
- Acts as definitive source of information.



Hubs are entities that point to a relatively large number of authorities. They are essentially the mutually reinforcing analogues to authorities. Authorities point to high hubs. Hubs point to high authorities. You cannot have one without the other.

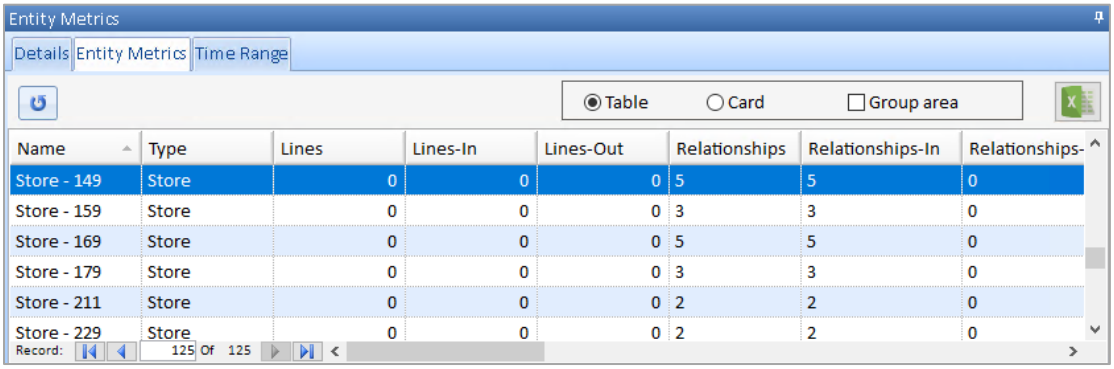
# Calculating Network Values

Sentinel Visualizer calculates the above-mentioned Social Network Analysis numbers, which are useful for identifying key players in a network according to a variety of criteria. Network Metrics extends this model by providing additional weighting and calculations. This section explains each of these metrics.

- **Type Weight:** The weight value defined for each entity type. For instance, people may have a higher type weight than phones.
- **Type Weight * Value:** The product of an entity's type weight and its value field. If an entity does not have a value, it is not included and becomes invisible.
- **Type Weight * Weight:** The product of an entity's type weight and its weight field.
- **Type Weight * Weight * Eigenvalue:** The product of the previous and the entity's SNA Eigenvalue.
- **Value * Weight:** The product of the entity's value and weight fields. If an entity does not have a value, it is not included and becomes invisible.

# Entity Metrics Tab

On the Visualizer window, the Entity Metrics tab on the bottom of the window provides SNA values by analyzing the entities and relationships on the diagram.




This tab shows a row of data for each entity in the diagram. As with other grids available in Sentinel Visualizer, you can sort the columns by clicking on the column headers. You can also group records by a particular column by checking [Group area] and dragging the appropriate column header to the group area.

## Calculating Values

For performance reasons, the numbers are not automatically updated as you work with the diagram. To update the Entity Metrics grid, click the calculate button. The time to calculate these values depends on the number of items in the diagram and your computer.

## Closeness

The Closeness algorithm can only be performed on fully connected networks. It is not calculated if your diagram has multiple networks. In this situation, the Closeness value for all entities is 0.

## Changes to the Database

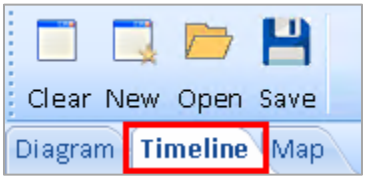
When you or other users make changes that affect Entity Metrics (e.g. Weight or Status), the numbers that appear in the Entity Metrics tab are not updated. You must re-open the Visualizer to get the latest values.

# Chapter 15: Timeline and Time Range Filter

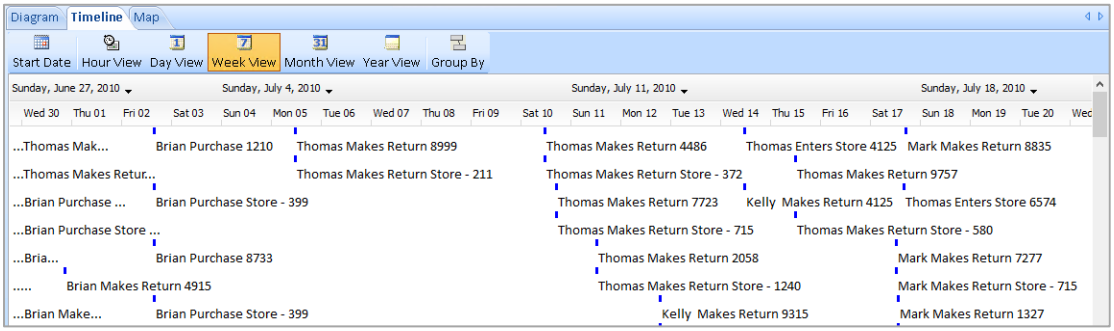
*Sentinel Visualizer supports storing start dates/times and end dates/times for entities and relationships and provides functionality that allows you to visualize and analyze the temporal nature of your data. The Visualizer form includes a Timeline tab to see the timeline of events for entities and relationships that have date/time information set. On the Diagram tab, there's a Time Range panel on the bottom to filter your data by date.*

## Starting the Timeline View

With the Visualizer open, click on the Timeline tab:




The Timeline view becomes active:

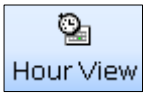
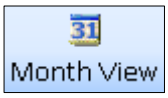
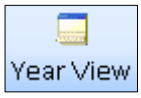
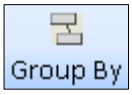



The Timeline view shows time bars for each entity and relationship currently on the diagram that has a value in the Start Date field of the entity or relationship. If only a Start Date/Time exists, the bar continues to the right. If a Start Date/Time and an End Date/Time exist, the bar represents that period in time.

### Using the Toolbar

The Timeline View has its own toolbar. This section explains each of the buttons and their functions.

| | |
|---|---|
| | Sets the left-most view of the Timeline to the date you specify. |

| | |
|---|---|
|  | Sets the view to Hours, allowing you to see time spans in the hour range. |
| | Sets the view to Days, allowing you to see time spans in the day range. |
| | Sets the view to Weeks, allowing you to see time spans in the week range. |
|  | Sets the view to Months, allowing you to see time spans in the month range. |
|  | Sets the view to Years, allowing you to see time spans in the year range. |
|  | Allows you to group the display by the data field you choose. |

## Setting the Display Range

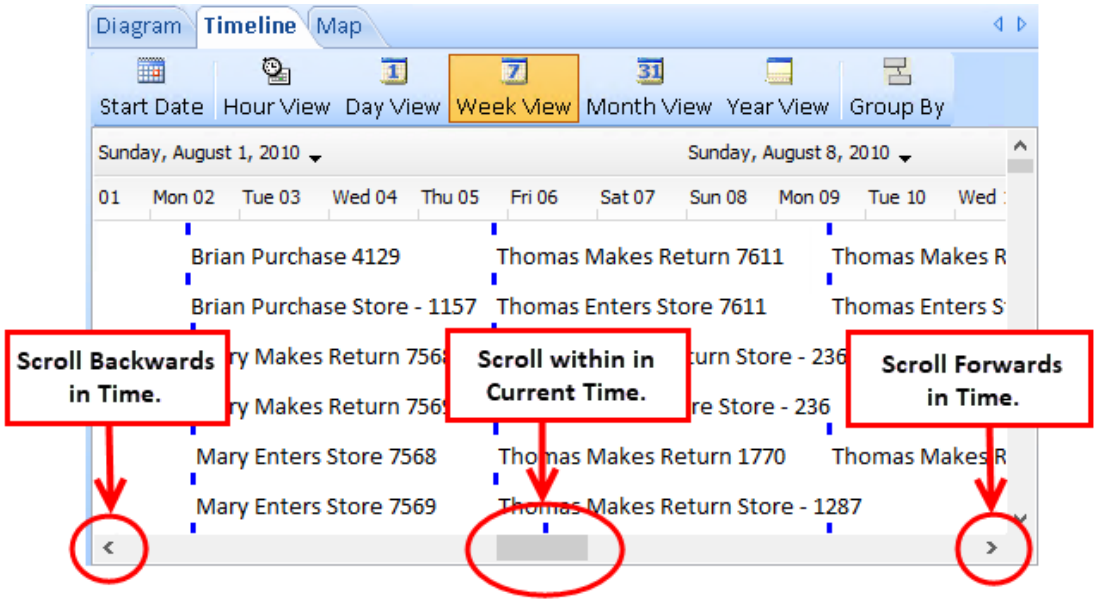
The Timeline View allows you to see time spans in minutes, hours, days, weeks, months, or years. You can select the view that best allows you to see the time spans for your data. For example, if you are looking at historical data about population information, a year view would allow you to see patterns better, as opposed to phone call records where minutes are more appropriate. To set the display range, click the toolbar button that corresponds to the desired view.

## Scrolling Through Dates

The scrollbar on the right of the Timeline View is used to scroll through the data itself—to move up and down through the list of entity-relationship-entity data sets that are currently in the timeline.

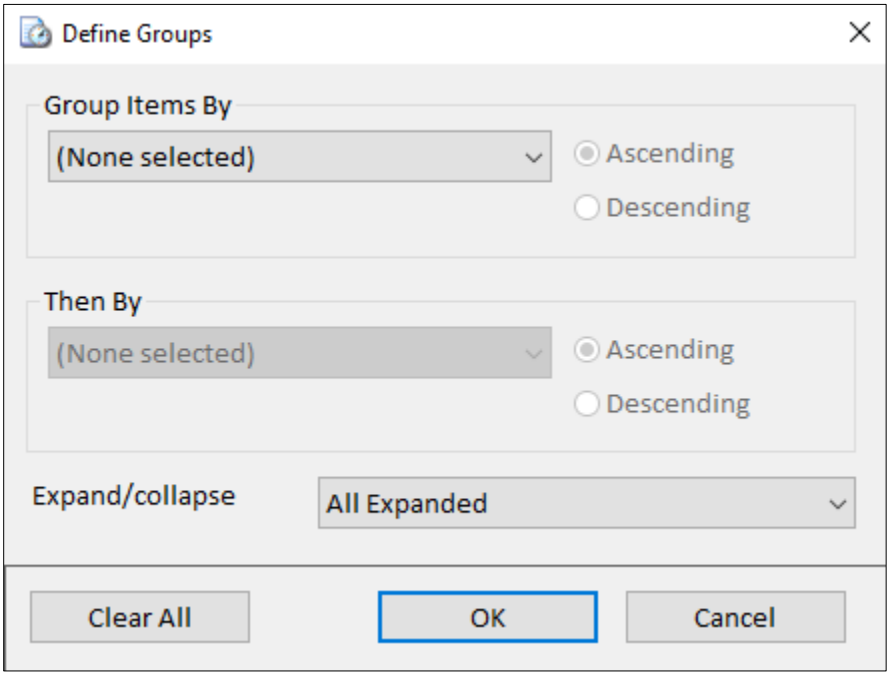
The scrollbar on the bottom of the Timeline View is used to move through time periods. To scroll within the current window range, use the scroll bar handle and move it left and right.

To scroll back or forward in time, use the left arrow and right arrow located at the end of the scrollbars.




### Defining Groups

The timeline allows you to define a field to group on. Grouping collapses groups of records into one expandable region. Click the [Group By] button on the toolbar and the Define Groups form appears:

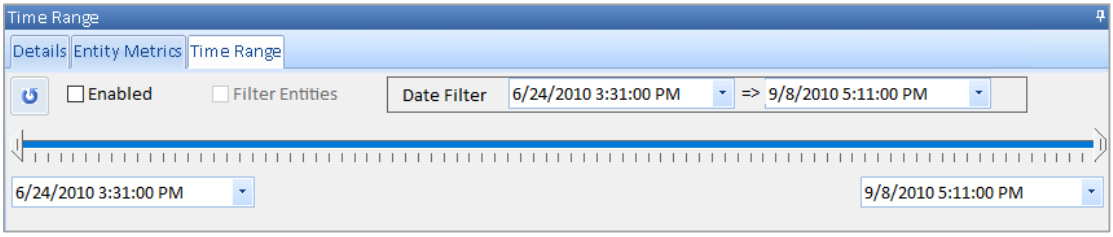



Use this form to select the field to group on and set the sort order and the initial Expand/Collapse state.

## Time Range Panel for Temporal Analysis

Entities and relationships both support start and end dates and times. The Visualizer can use these values to perform temporal, or time-based, analysis and visualization on networks. Define

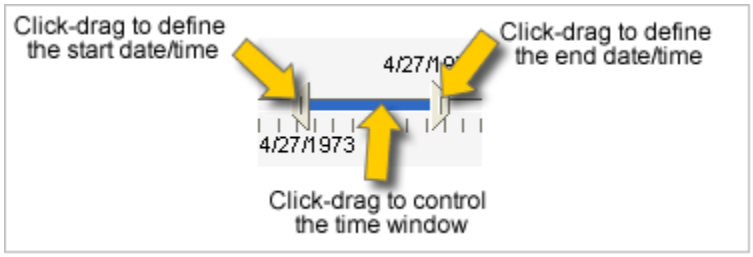
a slider control that represents a time range, and as you move that slider, entities and relationships appear or disappear on the diagram. Click on the Time Range tab, and the following options appear.




- **Refresh:** Resets the Start and End to the earliest and latest dates in the diagram.
- **Enabled:** Check this box to turn the time range filtering on.
- **Filter Entities:** Check this box to include entities in the time range filter. If this check box is not checked, only relationships are filtered.
- **Date Filter:** Defines the date range you want to filter. The start date and end dates are set by using the slider, explained below, or by manually editing the date ranges displayed next to the Date Filter.
- **Start:** Define your own start date. The start date is set by selecting the left button next to the time slider. The start date is set to the earliest date defined in the diagram. If there is no temporal data, the start date defaults to the current day.
- **End:** Define your own end date. The end date is set by selecting the right button next to the time slider. The end date is set to the latest date defined in the diagram. If there is no temporal data, the end date defaults to the current day.

## Using the Slider Control

- By click-dragging the left arrow, you change the start date/time. Entities and relationships with a start date/time before the left arrow's value disappear.
- By click-dragging the right arrow, you change the end date/time. Entities and relationships with an end date/time before the right arrow's value disappear.
- By dragging the main blue part of the control, you move the time “window” that you are looking for—entity and relationship items on the diagram appear or disappear depending on whether or not their start and end dates fall within this window.



# Chapter 16: Geospatial Tools

*Sentinel Visualizer includes a set of geospatial tools that integrate with the Visualizer to extend your data analysis into the physical world. This chapter explains the features and functions of the geospatial tools.*

## Geospatial Features and Sentinel Visualizer Versions

The availability of the Geospatial tools depends on your edition of Sentinel Visualizer. Geospatial tools are included in the following editions:

- Sentinel Visualizer Professional Edition
- Sentinel Visualizer Premium Edition
- Sentinel Visualizer Enterprise Edition

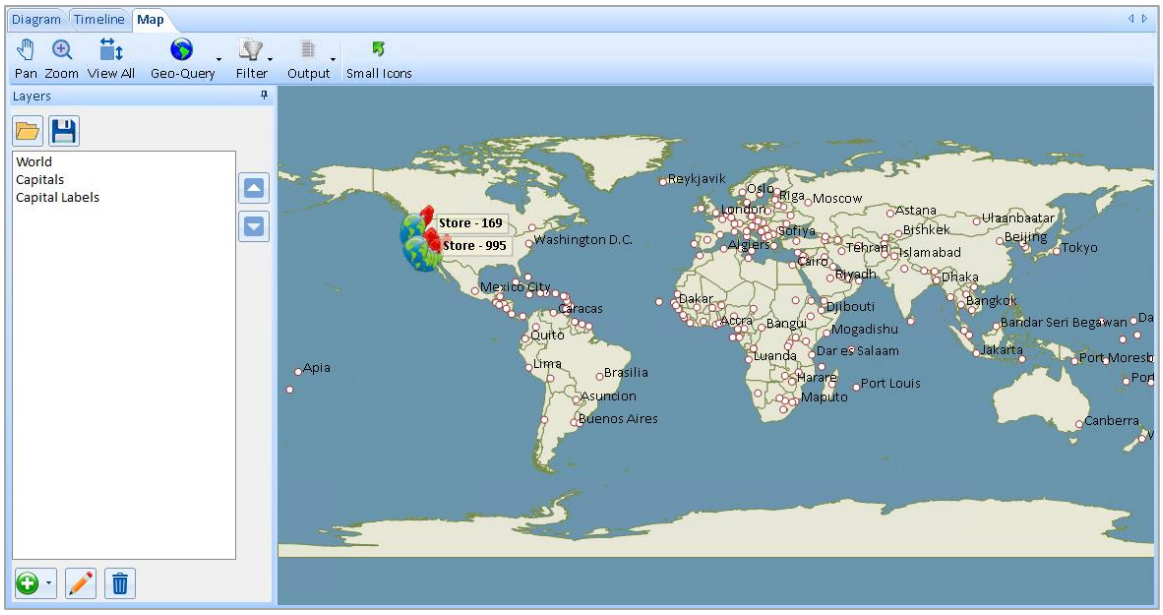
Sentinel Visualizer incorporates two specific geospatial tools:

- A geospatial viewer and tools directly integrated into the Sentinel Visualizer interface.
- Google Earth integration with the ability to export data to the Google Earth program.

## Starting the Sentinel Visualizer Integrated Geospatial Tools

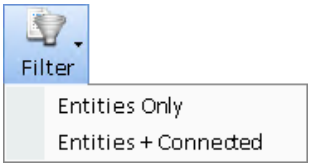
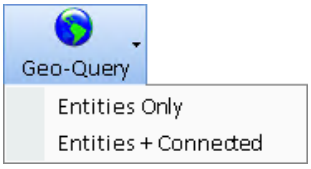
The Sentinel Visualizer Geospatial tools provide a map interface that shows the geographical location of entities on the diagram that contain latitude/longitude information.

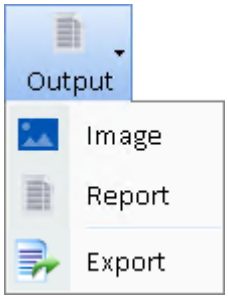
To see the Geospatial View, click on the Map tab at the top of the View:




## Integrated Geospatial Toolbar Items

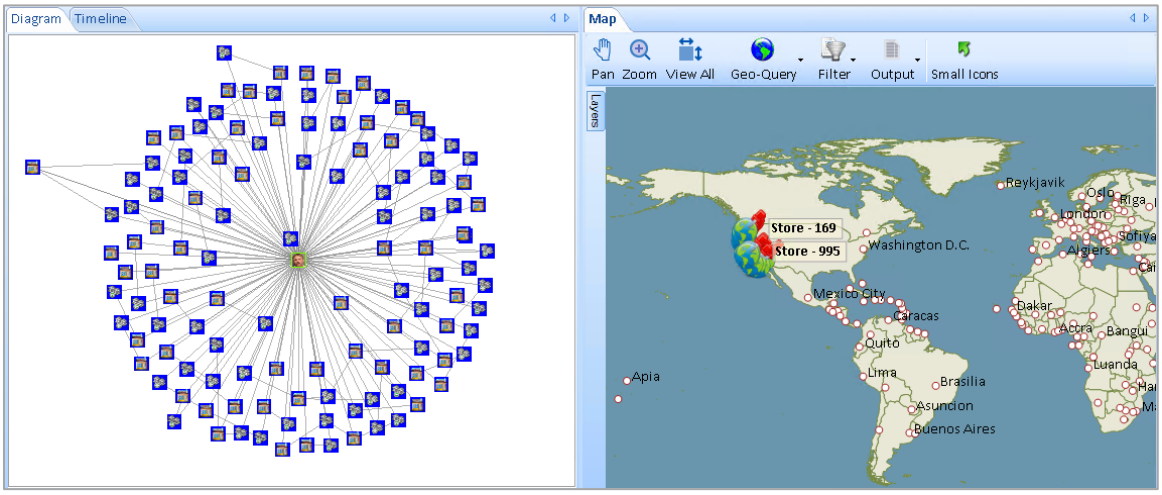
The following toolbar buttons are available:

| | |
|---|---|
| | Resets the zoom level to zero, showing the entire map. |
| | Switches the cursor mode to pan. When in pan mode, the mouse click-and-drag on the map moves the map surface and clicking the mouse on an entity marker displays additional information about the entity. |
| | Switches the cursor mode to zoom. When in zoom mode, clicking on the mouse zooms toward the area clicked. |
|   | Queries the database for Entities with Latitude and Longitude within the selection area. 0 Degree specified that only locations are returned. 1 Degree specifies that locations and all Entities directly connected to the locations are returned. |
|   | Selects new entities by drawing a specific radius circle. |

| | |
|---|---|
|  | Exports the current map view to an image file and allows you to print the current map view to an image or report |

## Using the Toolbar

When you add entities and relationships to the diagram using the Get Links and Add Entity functions, they are also added to the Geospatial pane if they have latitude and longitude. For example, this screenshot shows both the diagram and geospatial views of the same data:

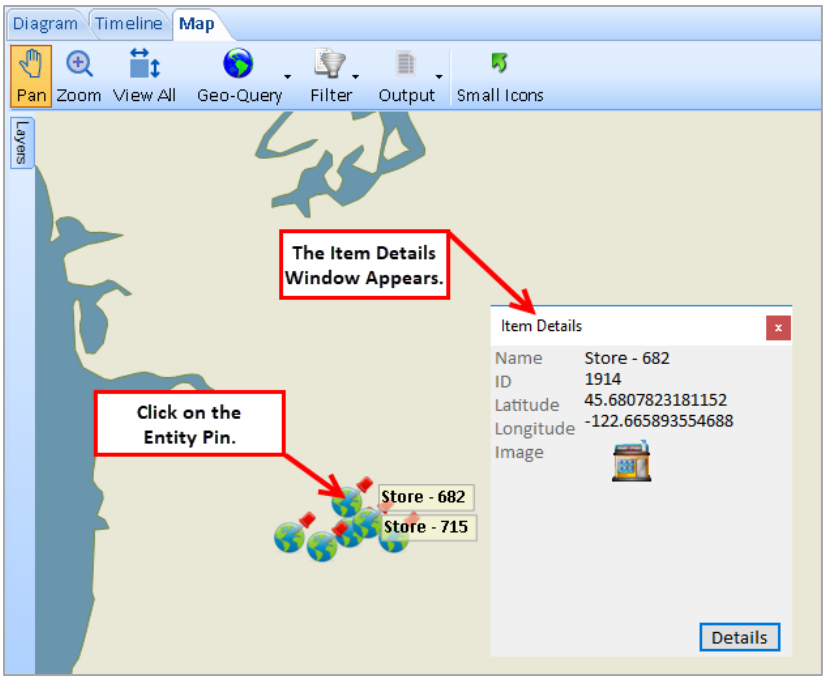



## Moving Around

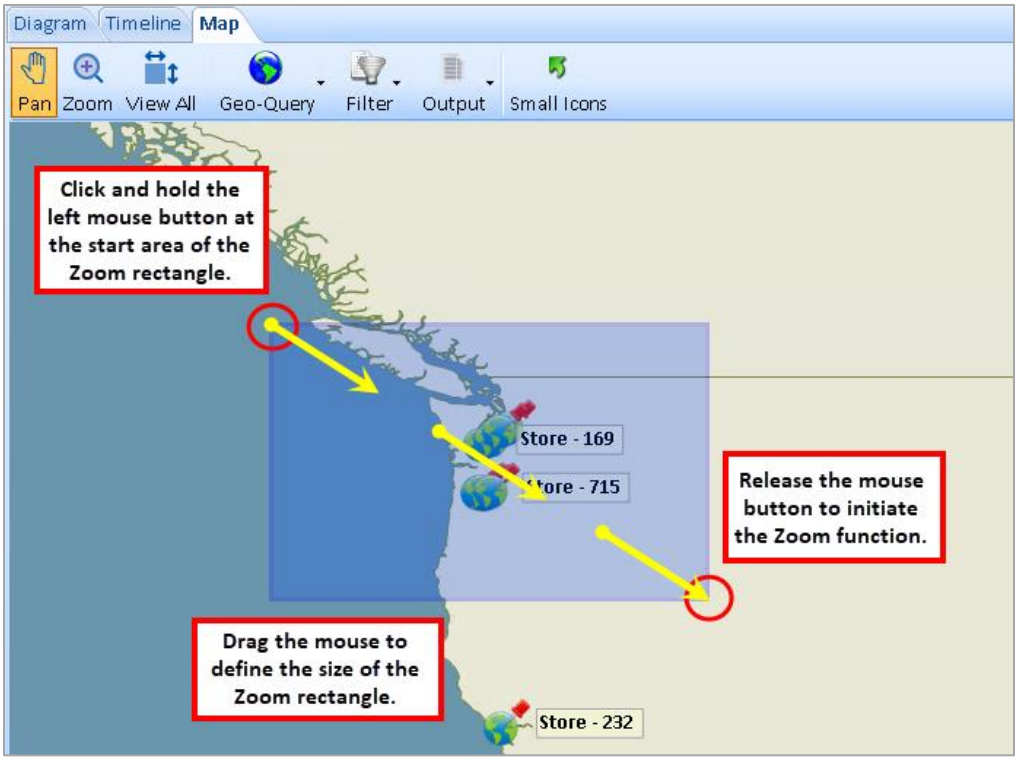
The mouse interacts with the map surface for the current mouse mode: Pan, Zoom, or Info.

In Pan mode, click the mouse and drag the map in the direction desired. Panning works in all directions.

To see entity information left click on an entity's icon.



In Zoom mode, you use the mouse to define a zoom rectangle. When you have defined the rectangle, the Geospatial view zooms in to that extent.



## Using the Geo-Filter

You can use the Geospatial view to filter or remove/hide information in the overall Visualizer form. For example, you can define an area around London, England with the geo-filter and Visualizer removes all entities and relationships from the current views that are not located in that area. The Filter operation makes no changes to your database—it merely shows or hides information in the Visualizer interface.

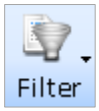
To use the Geo-Filter, click on the down arrow on the Filter button on the toolbar. Select 0 degrees or 1 degree:

- **0 Degrees:** Removes all items that are outside the filter radius.
- **1 Degree:** Removes all items that are outside the filter radius and all entities connected to those entities within 1 degree.

Click on the center of your desired filter radius and drag the mouse to define the filter size. Release the mouse button to activate the filter.

## Removing the Filter

You can remove the filter by pressing the Filter button again—it changes from a highlighted state to a regular one. Remember that you can also easily remove all filters by clicking the [Filter] button on the Visualizer form toolbar:



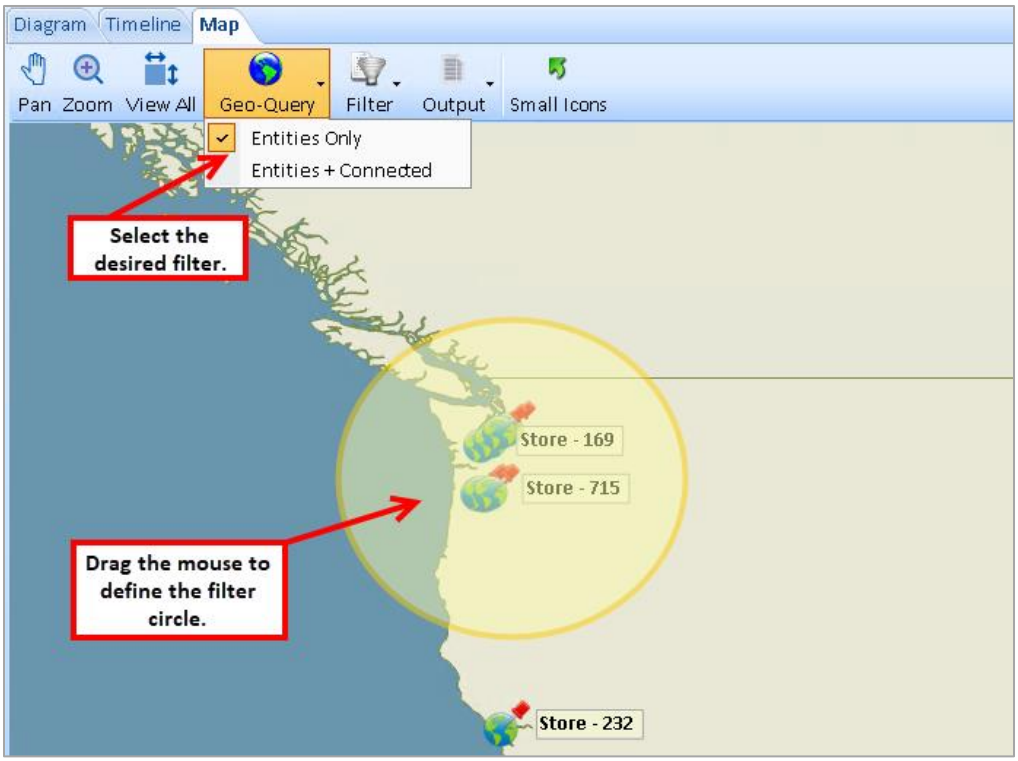

## Use the Geo-Query

You have already read about using the standard Visualizer Get Links feature to explore networks by retrieving additional relationships and entities from the database. You can use the Geospatial Tools as an additional way to retrieve connected data. The Geo-Query tool allows you to draw a circle area on the map and retrieve all entities and their relationships within that area.

To use the Geo-Query, click on the down arrow on the Filter button on the toolbar. Select 0 degrees or 1 degree:

- Geo-Query:
- **0 Degree**: Retrieves all entities whose latitude/longitude values are within the bounding area.
- **1 Degree:** Retrieves all entities whose latitude/longitude values are within the bound area, and all entities connected to those entities that have latitude/longitude information.

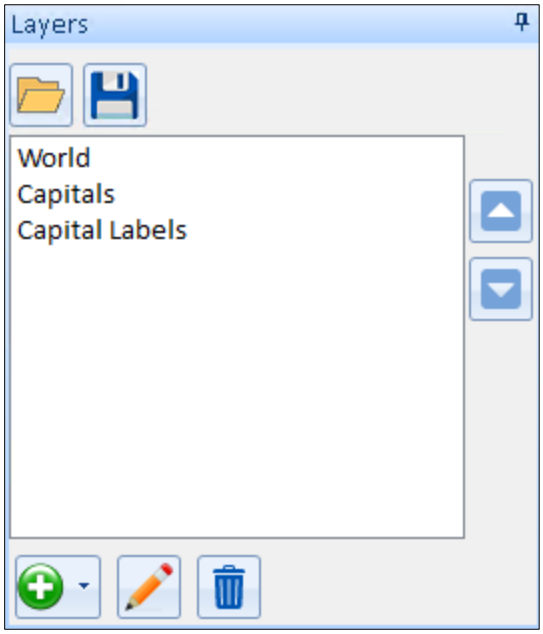
Once you have selected the degrees option, the cursor on the map surface changes to a crosshair. Click on the center of your desired geo-query radius and drag the mouse to define the size. Release the mouse button to perform the geo-query.




## Using Layers

The Map includes support for Shapefiles, ArcGIS server, and GeoTIFF. Shapefiles, links to ArcGIS server, and GeoTIFF's are managed through layers.

Layers are managed through the Layers control to the left of the geospatial display.




The Layers control includes the following options:

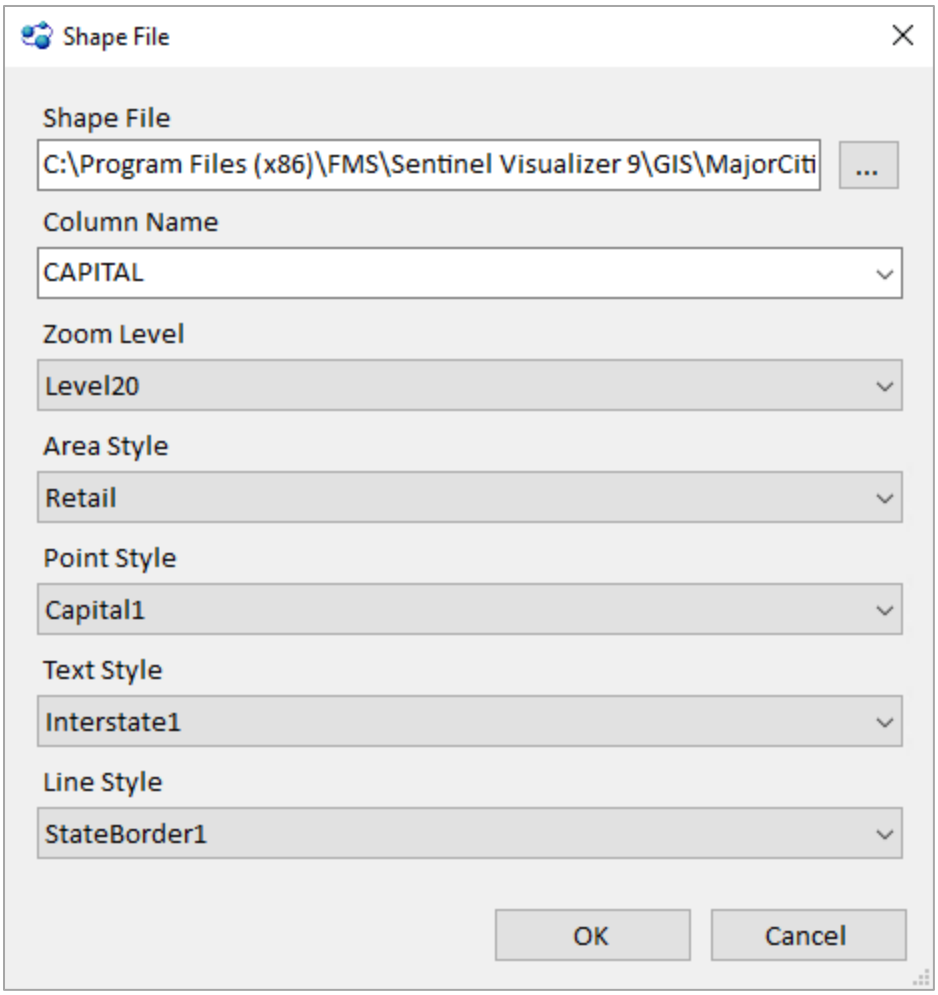
| | |
|---|---|
| | **Add a Layer:** Use the drop down to add a Shape or ArcGIS file. |
| | **Edit a Layer:** Use the pencil to edit existing layer. |
| | **Remove a Layer:** Use the trash icon to remove an existing layer. |
| | **Change the Order of Layers:** Layers are drawn from the top of the list to the bottom. You can re-order the list of layers to achieve the appearance you want. |
| | **Save Layers:** Save the current set of Layers to allow re-loading on a new instance of the Map control. |
| | **Open Layer:** Open (load) a saved set of layers into the Map. |

## Adding a Shape File Layer

Shape files are a common format for storing Geospatial data. Shape files support features such as points, lines, and text. For more information about shape files, please see http://SentinelVisualizer.com/support/Shapefile.htm.

To add a shape file, select the plus dropdown and select Shape.

The Shape File editor form appears:




The Shapefile Add/Edit form includes the following options:

- **Shape File:** The full path to the shape file.
- **Column Name:** The column within the shape file to display.
- **Zoom Level:** The zoom level to begin displaying the shape file. The zoom level can be set to None, which does not display the shape file, or from 1 to 20. Higher numbers indicate the zoom level the shape file data is displayed. For example, a zoom level of 1 only displays the shape file information when zoomed in very close, while a value of 20 always displays the shape file data.
- **Area Style:** The style to use for drawing areas, such as lakes.
- **Point Style:** The style to use for drawing points, such as a location
- **Text Style:** The style to use for drawing labels, such as state names.
- **Line Style:** The style to use for drawing lines, such as borders.

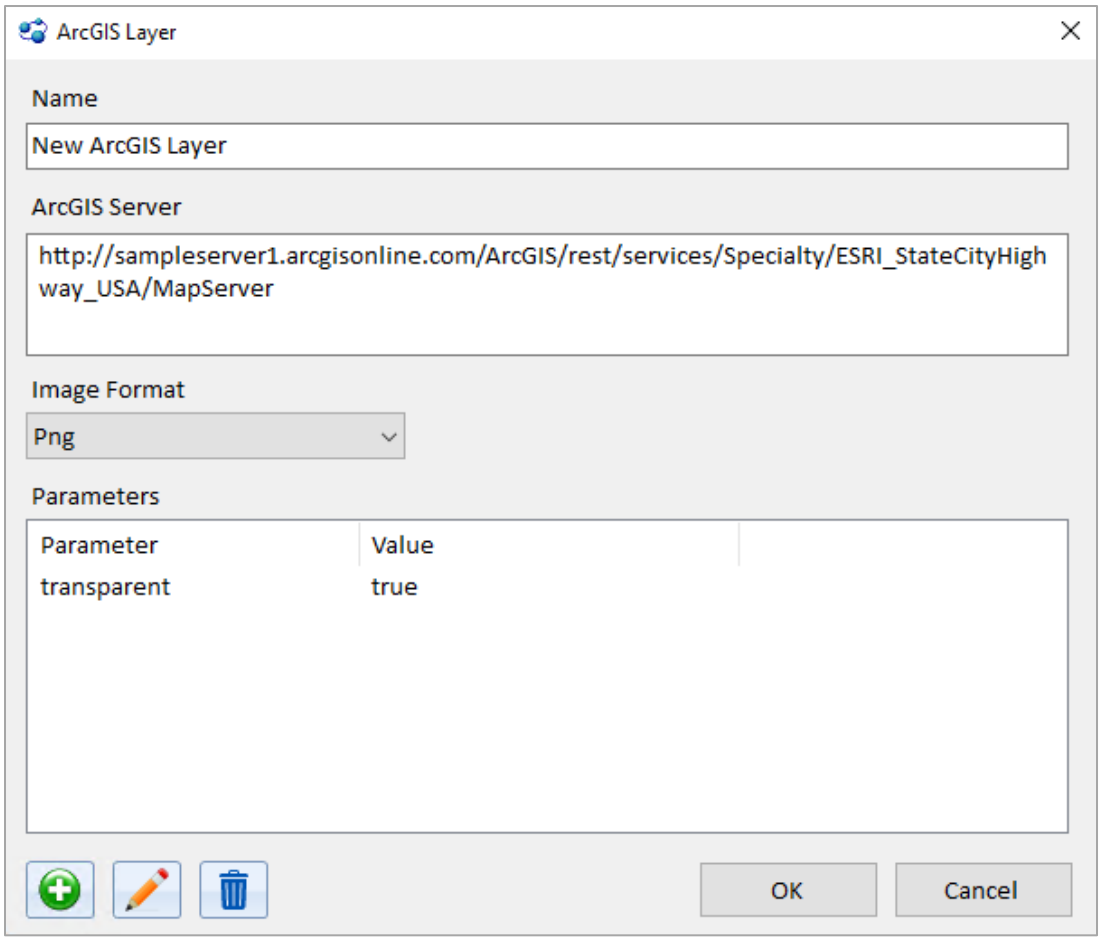
Select [OK] and the shape file is added to the map.

## Adding an ArcGIS Layer

ArcGIS is a geospatial system for working with maps and geographic information. ArcGIS is exposed through a standard Web based API, with different endpoints providing various maps. ArcGIS supports features such as lakes, power lines, and heat maps. For more information about ArcGIS, please see http://SentinelVisualizer.com/support/ArcGIS.htm.

To add an ArcGIS server, select the plus dropdown and select ArcGIS.

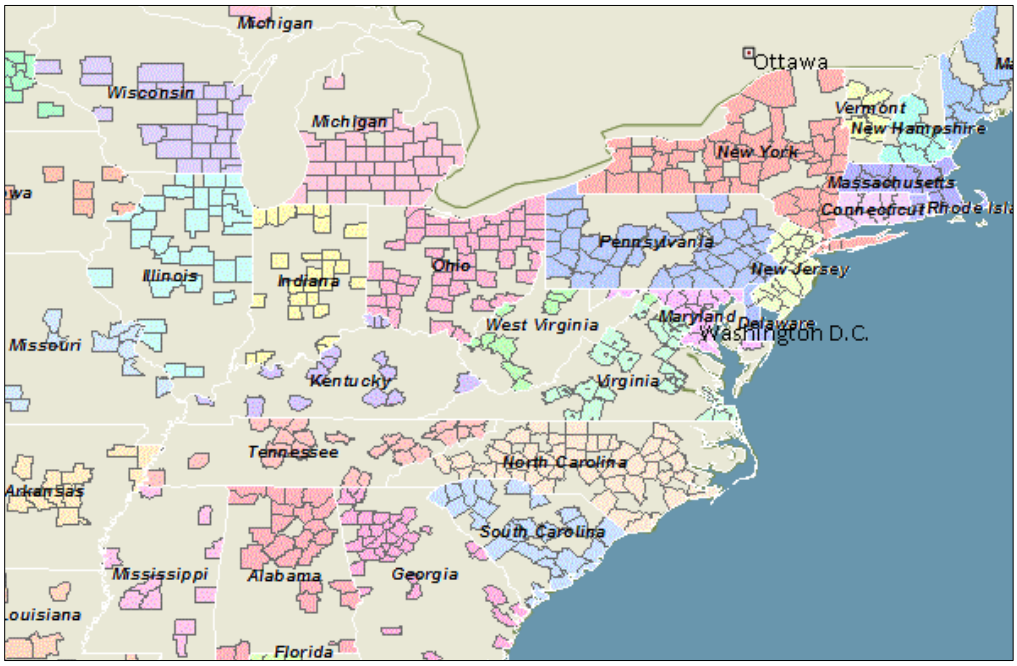
The ArcGIS editor form is displayed:




The ArcGIS Add/Edit form includes the following options:

- **Name:** The display name of the layer
- **ArcGIS Server:** The full URL of the ArcGIS service.
- **Image Format:** The image format returned from the ArcGIS server.
- **Parameters:** The parameters to pass to the ArcGIS server. Please refer to your ArcGIS server configuration to obtain the correct parameters and values.
  You can add, edit, and remove parameters using the following icons:

Select [OK] and the ArcGIS server is added to the Map.




### *Parameters*

ArcGIS can accept many different parameters. Parameter names and values are unique to different servers.

For example purposes we use the ArcGIS service located at http://sampleserver1.arcgisonline.com/ArcGIS/rest/services/Specialty/ESRI_StateCityHighway_USA/MapServer.

This service provides census information for U.S. cities and states including total population, racial counts, and more. It also includes highways.

This service displays all data by default, but you can also ask for specific information.

#### *Sub-Layers*

An ArcGIS service may contain one or more sub-layers, or layer ids. In this example service you can return only counties by specifying a layer id value of 2. The parameter name is **layers**, and the parameter value is show:2. The number in the parameter value is service dependent. To show multiple layers, specify the layer id's separated by a comma, such as **show:1,2.**

#### *Filter*

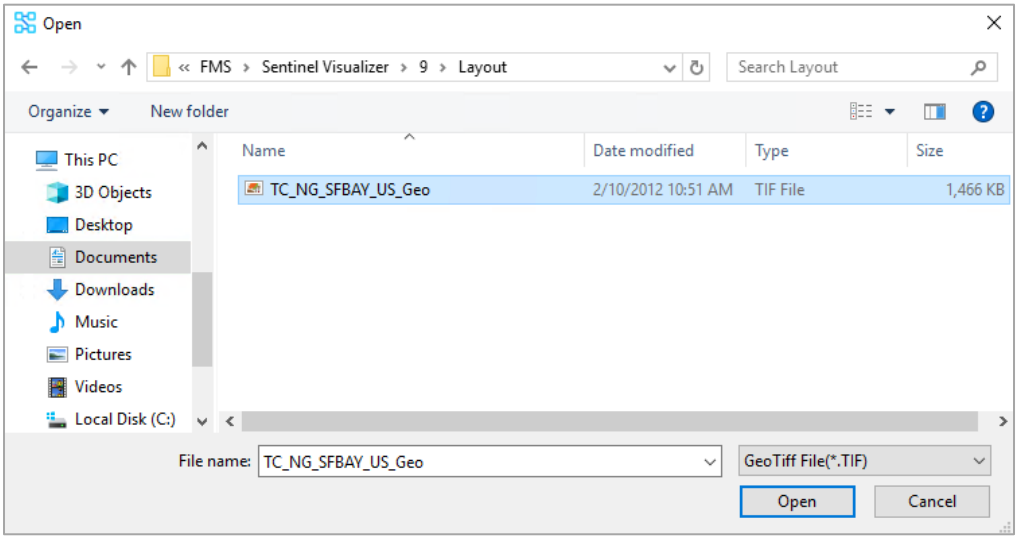
To apply a query filter to the returned data, you can specify a **layerdefs** parameter. In this example service you can query layer id 2 for counties with a population of greater than 50,000 in 1999. The layerdefs parameter value is **2:POP1999>50000**. To filter a layer by multiple criteria, enclose the individual criteria in parentheses and specify **AND or OR 2:(MALES>10000) AND (POP1999>50000)**. To filter multiple layers, you need to use the semi-colon separator. For example, **1:POP1990 > 10000000;2:POP1999 > 10000**.

## Adding a GeoTIFF File

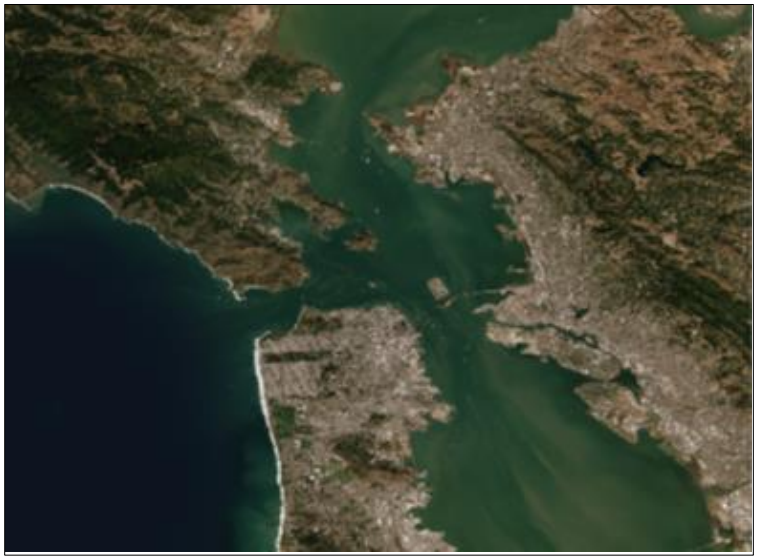
A GeoTIFF is an extended TIFF file that includes geospatial data. For more information about GeoTIFF files, please see http://SentinelVisualizer.com/support/GeoTIFF.htm.

To add a GeoTIFF file, select GeoTIFF on the toolbar

The GeoTIFF file selector is displayed:

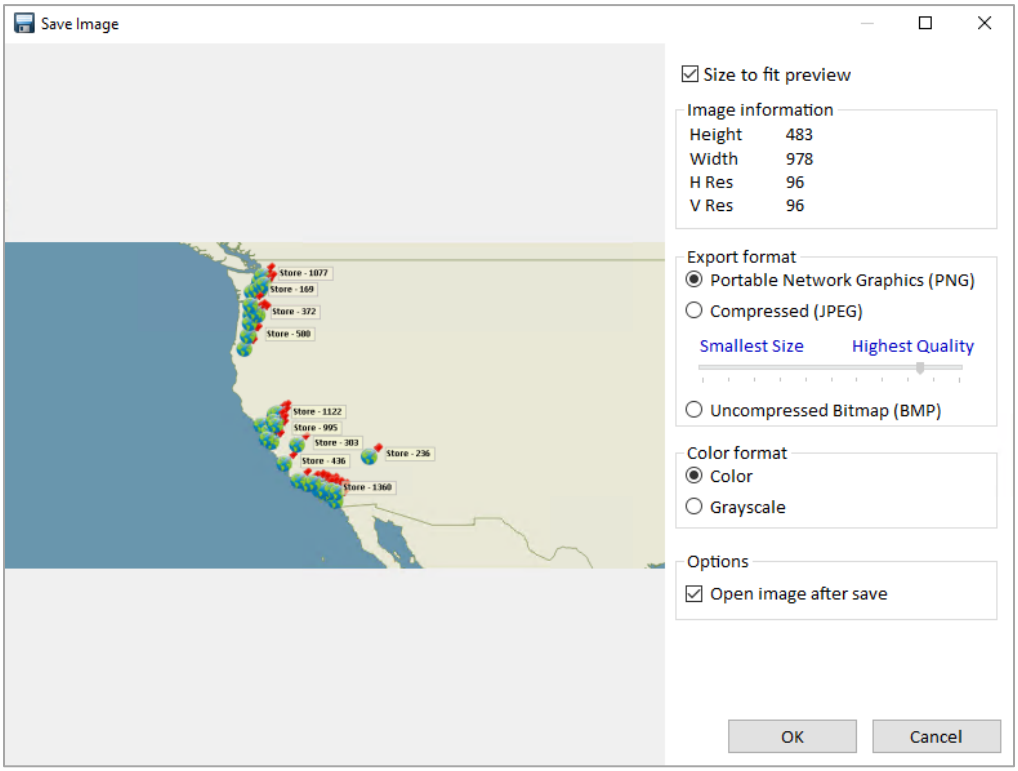



Choose the GeoTIFF file and select [OK].



# Exporting

You can export the current map image on the Geospatial tab by clicking the [Output] drop-down button on the toolbar and select [Export]. A form appears and contains options that are similar to the Visualizer Export tool described in the **Diagram Image File** on page 121.

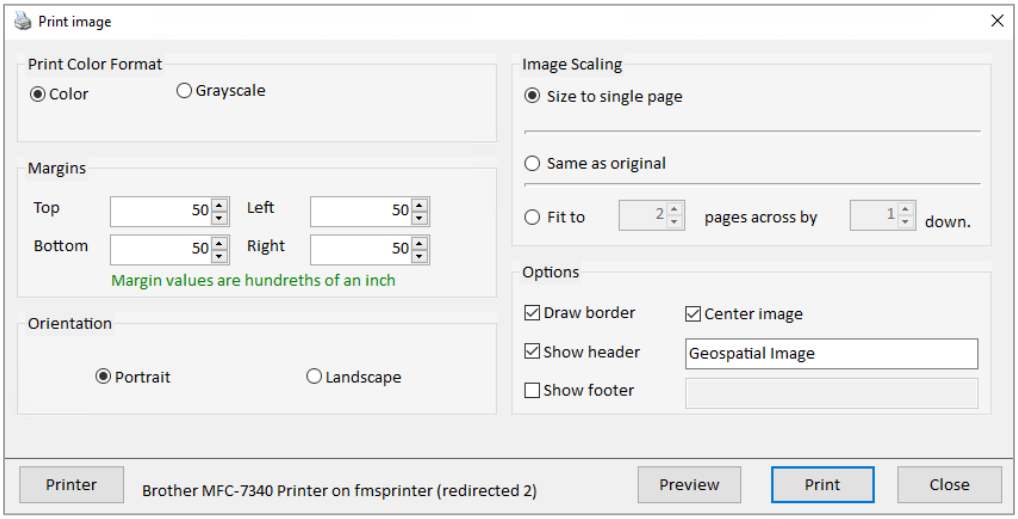



# Printing

You can print two different formats of the current Geospatial display.

## Printing the Image

The image print-out prints an exact copy of the current map image to the specified printer.



### *General Settings*

- **Print Color Format:** Select color or grayscale. This option is useful if you want to print in grayscale on a color printer.
- **Margins:** Set the margins in hundredths of an inch.
- **Orientation:** Select Portrait for standard 8 ½" x 11" printing, or Landscape for 11" x 8 ½" printing.

### *Image Scaling*

The Print form provides several options that control how your diagram is scaled before being sent to the printer:

- **Size to a single page:** Resizes the entire diagram to fit within the printable margins on a single page.
- **Same as original:** Performs no scaling on the image—the number of pages printed is dependent on the size of your diagram.
- **Fit to:** Allows you to scale the image to fit within the number of pages you specify.

### *Print Options*

- **Draw Border:** Draws a one-pixel border around the diagram image.
- **Center Image:** Centers the image within the printed page.
- **Show Header:** Allows you to add customized text to the top of each printed page.
- **Show Footer:** Prints the page position information at the bottom of each page and allows you to add customized text if desired.

### *Setting Printer Options*

Click the [Printer] button to display the standard Windows Printer dialog to set printer-specific options.

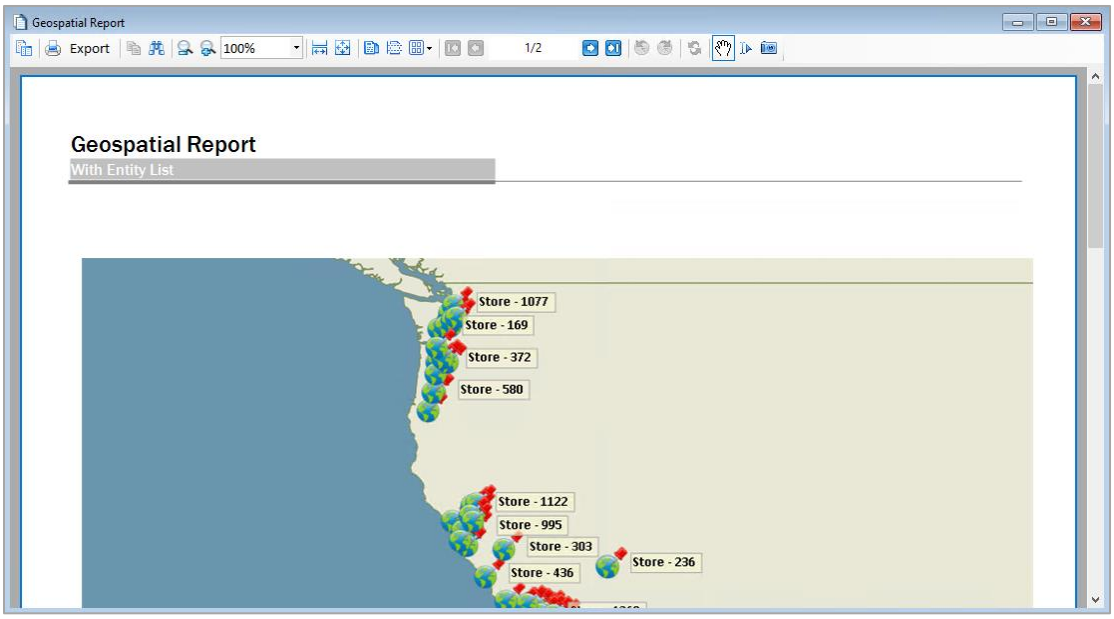
### *Previewing and Printing*

You may want to preview your diagram before sending it to the printer, especially for large diagrams that may require many pages. To do this, click the [<] button to display the Print Preview form.

This form allows you to zoom in and out, to preview each of the pages. To print your diagram, return to the Print form and click the [Print] button.

## Printing a Report

In addition to printing the image, you can print a report that contains the standard Sentinel Visualizer headers and footers. Select the Report option from the [Output] button on the Geospatial Window toolbar.




See **Report Viewer** on page **98** for more information about using the Report Viewer form.

# Google Earth Integration

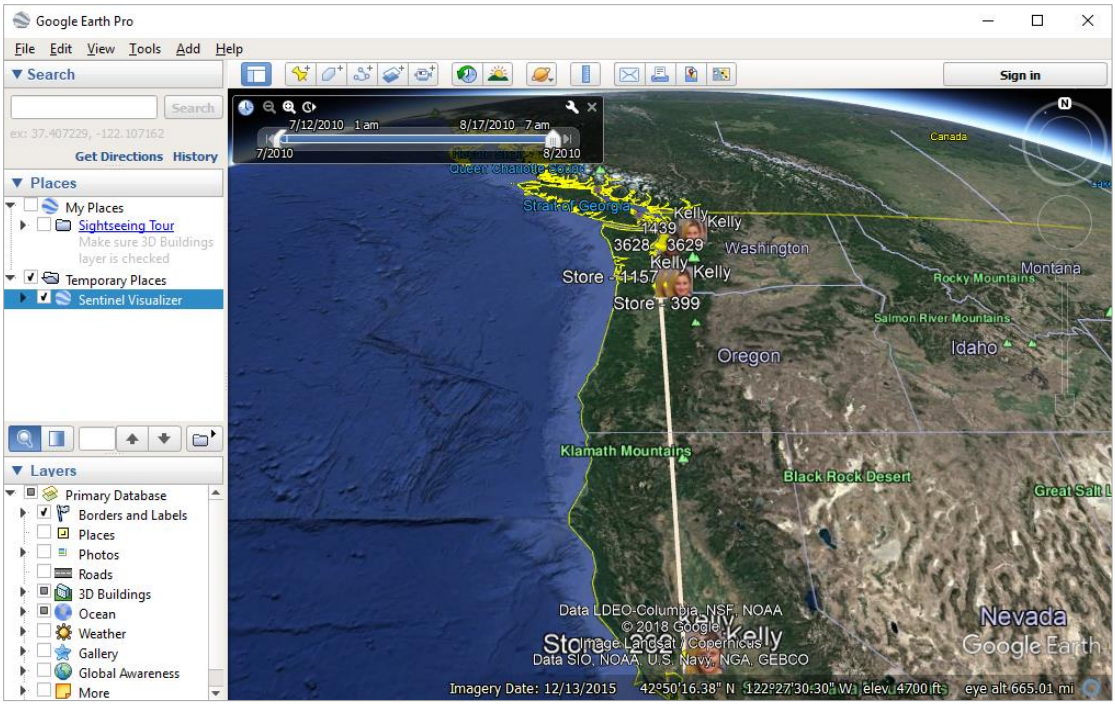
Sentinel Visualizer includes the ability to export data to the external Google Earth program. Google Earth is a standalone program that provides advanced 2D and 3D geospatial capabilities.

Google Earth must already be installed on your machine to use this feature. Google Earth can be installed from https://google.com/earth/

## Launching Google Earth Integration

This feature is available from the Sentinel Visualizer toolbar. To launch Google Earth integration, click the Google Earth button.

After a moment, Google Earth opens:




## Google Earth and Place Names

Unlike Sentinel Visualizer's Integrated Geospatial, Google Earth integration does not require that entity records have specific latitude and longitude values. Instead, if an Entity Type is flagged as a Location, Google Earth integration determines the latitude and longitude based on the Entity Name.

For the Google Earth integration to work correctly, the following conditions must occur:

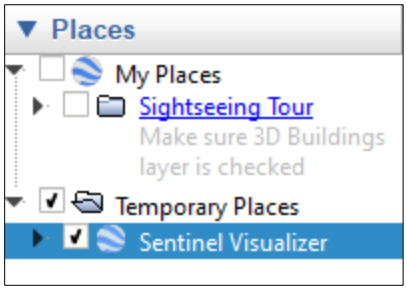
1. The latitude and longitude fields within the Entity record must carry a value, or
2. The Entity Type must be marked as a Location, and the Entity Name field must have enough address information for Google Earth to translate it correctly.

For example, if the Entity record does not have latitude/longitude values, then "London, England" is enough for Google Earth. The Entity is placed, in the center of the city. But "265 Camden Street" is not enough for Google Earth to translate. You would need, at least, the city/state/province and/or a postal code.

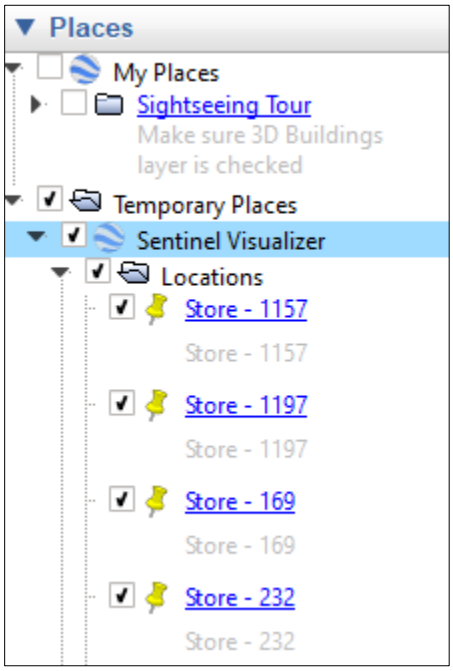
The address information must be placed in Entity Name.

## Using Google Earth Places

Using the Google Earth tabs on the left of the screen, you can see all items added by Sentinel Visualizer.



Under the Temporary Places folder, there is an item named “Sentinel Visualizer”. Click on the triangle to the right of the text to expand the list:



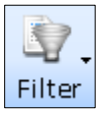

## How Sentinel Visualizer Exports Data

When you click the [Google Earth] button, Sentinel Visualizer gathers the following data from entities and relationships currently displayed on the Sentinel Visualizer screen:

- All entities.
- All relationships. Relationship line colors are generated randomly to provide good contrast with the underlying map graphics.
- Entities connected to locations are shown in the entities list in Google Earth.
- Entities marked as locations are shown in the locations list in Google Earth.
- Connecting relationships are shown as lines between entities.

Note that the data sent to Google Earth respects any filters you have active in Sentinel Visualizer. For example, if you have filtered out entities of a specific type, those entities are not exported to Google Earth.

If you want to see all items, return to Sentinel Visualizer and remove all filters. You can quickly remove filters by using the [Filtered] button on the Visualizer toolbar:



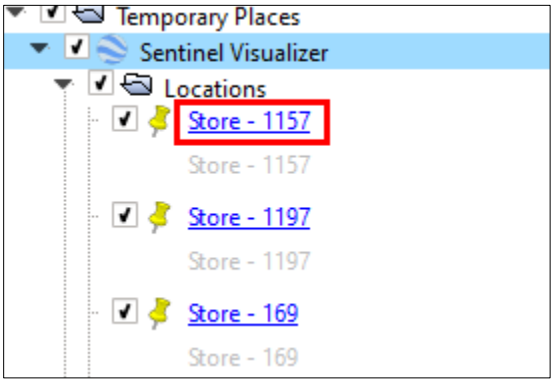

Non-location entities that are connected to locations are placed at the same location as the location Entity.

## Using Google Earth Tools

These Sentinel Visualizer-specific features are available in Google Earth.

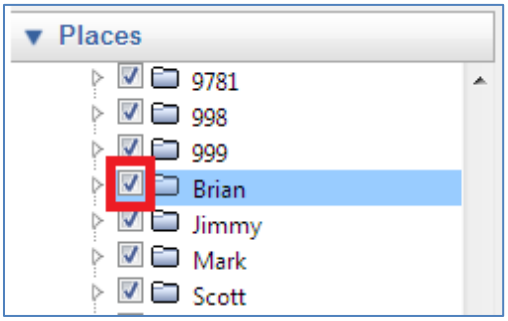
### *Navigating to an Item*

You can quickly navigate to any item in the Sentinel Visualizer list by clicking on the hyperlink for the location or the entity.




### *Hiding and Showing Items*

You can hide or show any item on the map by clicking on the check box next to the item.

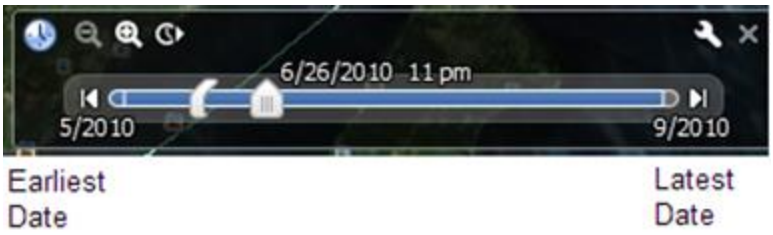



## Google Earth Timeline Tools

When Sentinel Visualizer exports data to Google Earth, temporal data is also included in the form of Start and End dates on relationships. You can use the Timeline tools to visualize the change over time of relationships.

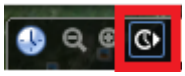
The Timeline tools are contained in the Timeline tool window:

The left extent shows the earliest date, and the right extent shows the latest date.



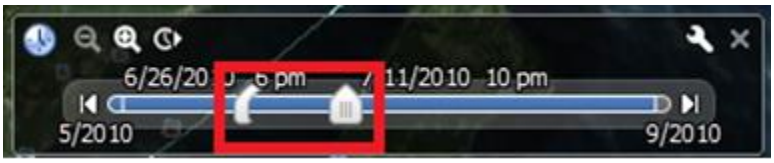

## Using the Play Feature

To play through the animation of relationship dates, click the timeline slider animation button.



## Changing the Time Window

The left and right extents of the time slider define the range from earliest to latest dates. However, the visible relationships are defined by the time window within the time slider.

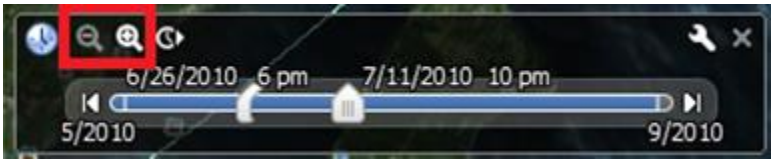



The visible relationships are those that occur within the time window. The time window is defined by the start date object on the timeline and the current position indicator. All relationships whose start/end dates exist between those positions are shown on the map.

To change the start date, click on the start date object and drag it left or right. To change the end date, move the current position indicator.

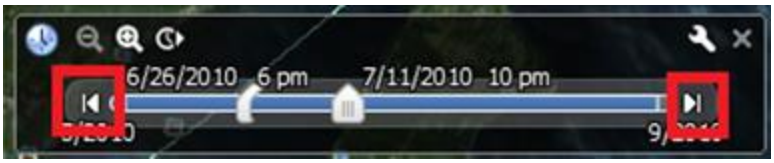
## Using the Zoom Feature

If you want to see more precision within the time slider, click the Zoom In button. To zoom back out, click the Zoom Out button.



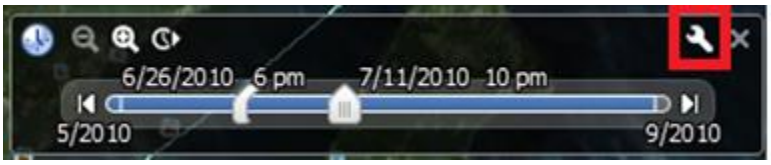

## Moving to the Earliest and Latest Dates

You can quickly move to the earliest and latest dates within the time range by clicking on the beginning and end buttons.

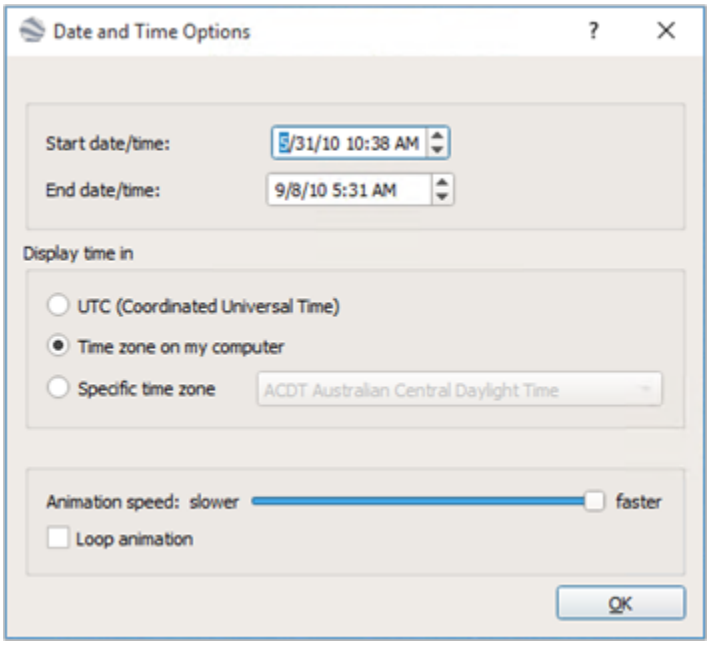



## Setting Options

You can set various options in Google Earth to better control the Timeline features. Click the wrench button on the toolbar.




The Date and Time options dialog appears.




The following options are available:

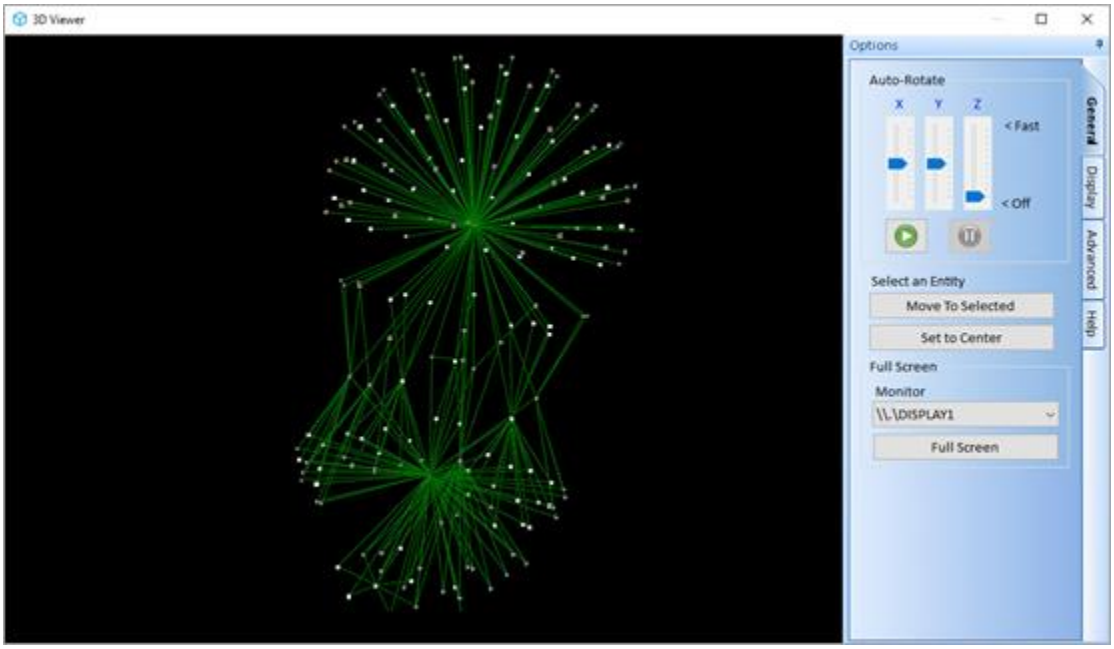
- **Start date/time:** View or set the earliest visible date/time.
- **End date/time:** View or set the latest visible date/time.
- **Display time in:** Set the time format to use. You can choose UTC, the time zone setting currently active on your computer, or a specific time zone from the drop-down list.
- **Animation speed:** Use the slider control to change the speed of the animation.
- **Loop animation:** Check this box to have the animation continuously loop.

# Chapter 17: Three-Dimensional Viewer

*Sentinel Visualizer allows you to visualize diagrams beyond the traditional two-dimensional link analysis view. With the 3D viewer, you can turn your static 2D network into a fully interactive 3D object, with pan, zoom, rotate, depth, and stereoscopic capabilities.*

## Launch the 3D Viewer

To invoke the 3D Viewer, click the [3D Viewer] button on the Visualizer toolbar. The system makes a copy of your current 2D network and displays it in the 3D Viewer. Note that the 3D viewer does not display filtered data—entities and relationships are unfiltered for the purpose of the 3D viewer.




### Navigating through Three Dimensions

The quickest way to use the 3D Viewer is with your mouse and keyboard. Click-drag anywhere in the 3D surface to pan left, right, up, or down. Use your mouse wheel to zoom in and out. To rotate, hold down the right mouse button as you move the mouse.

You can also select the entity that you want to act as the center point for rotation by double-clicking on it. For more information, click on the Help tab.

The 3D viewer options are located in the lower-right part of the screen. The following sections explain each of the options.

# General Settings

The General Settings tab offers these options:

### Auto Rotate

Define and control the auto-rotate feature. Move the sliders on the x, y, and z axes to control each dimension's speed. Click Play icon to begin auto rotating and Pause to stop it.

### Select an Entity

Double click to select an entity. It is highlight in red. Then select:

- [Move to Selected] to adjust the viewpoint to it and see the network from its perspective.
- [Set to Center] to center the entity in the 3D view. The Auto-Rotate feature then revolves around it.

### Full Screen

You can specify the monitor if you have multiple monitors and press [Full Screen] to send the 3D network fill your screen. Return by pressing the [Esc] key.

### Stereo Options

The following five settings are available only with the OpenGL Renderer:

- **Normal:** Standard display.
- **Side by Side:** Output to a video device that supports side by side stereoscopic.
- **Over/Under:** Output to a video device that supports over/under stereoscopic.
- **Anaglyph:** For 3D view with anaglyph glasses.
- **Red/Cyan or Cyan/Red:** Swap colors based on your Anaglyph glasses.

Additional options:

- **Inter-Pupillary Distance:** The distance between the eyes to adjust depth.
- **Swap Eyes:** Flips the left/right eye projections to accommodate dominant eyes.

# Color Settings

The Color tab offers these options:

- **Line Color:** Color for the relationship connector lines.
- **Label Color:** Color for Entity labels.
- **Selected Color:** Color to display the selected (highlighted) entities.

# Other Settings

The Other tab offers these options:

### Projection:

- Near clip
- Far clip
- ScreenZ

- Depth
- FOV

### Speed and Quality Adjustments

Control how the 3D Viewer adjusts for speed versus quality for these options:

- Perspective Correction
- Line Smoothing
- Polygon Smoothing

### Renderer

- **OpenGL:** Standard renderer.
- **Quad Buffered:** Provides active Stereoscopic with supported video card and monitor.
- **Direct3D:** Provides a Direct3D implementation, which may provide better performance on some video cards.

## Image Quality and Driver Issues

Any PC-based 3-dimensional graphic display you use is governed by the type of graphics adaptor installed in your computer. At a minimum, you should have a 3D accelerated video card that has at least 128 MB of memory.

The speed of the 3D Viewer is directly proportional to the speed of your graphics adaptor. If you find the performance of the 3D Viewer is too slow, consider upgrading to a new card.

### Driver-Related Issues

The 3D Viewer is based on the OpenGL, which is a multi-platform software interface to graphics hardware, supporting rendering and imaging operations. To ensure optimum performance, you should ensure that you are using the latest drivers available for your graphics adaptor. Contact your System Administrator for more information about driver updates.

# Chapter 18: Creating and Opening Databases

*Sentinel Visualizer stores information in a relational database using Microsoft SQL Server. Databases can be stored directly on your computer or on a server computer. Additionally, you can create any number of databases depending on how you want to organize your data.*

## Databases in Sentinel Visualizer

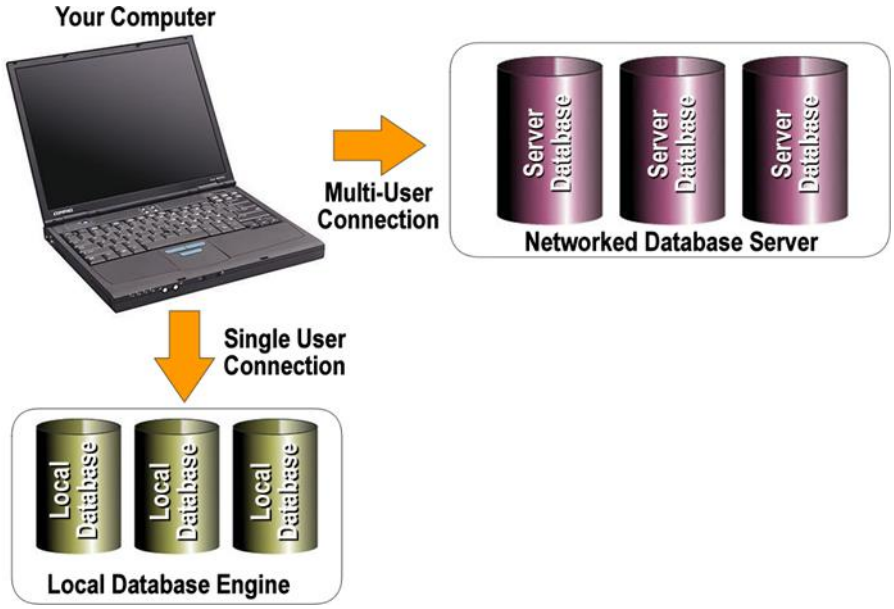
The following terms are used to describe Sentinel Visualizer database types:

### Local Database

A database is stored on your computer and managed by the database engine installed by Sentinel Visualizer. Local databases are single user only. You can create Local Databases with any edition of Sentinel Visualizer.

### Shared Database

A database is stored on a networked database server running Microsoft SQL Server. Shared databases have the same structure as Local Databases and are multi-user, which accommodates multiple concurrent Sentinel Visualizer users. You can create and access Shared Databases with the Premium and Enterprise Editions of Sentinel Visualizer.

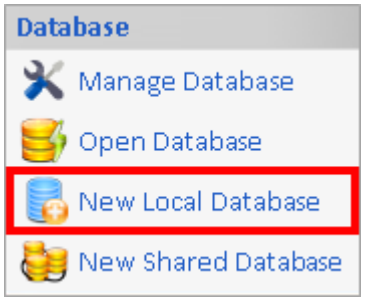


# Creating a New Database

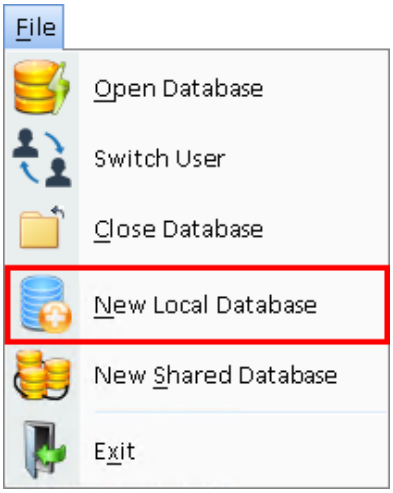
## Creating a Local Database

To create a new local database, select the Create a New Database option, available from the:

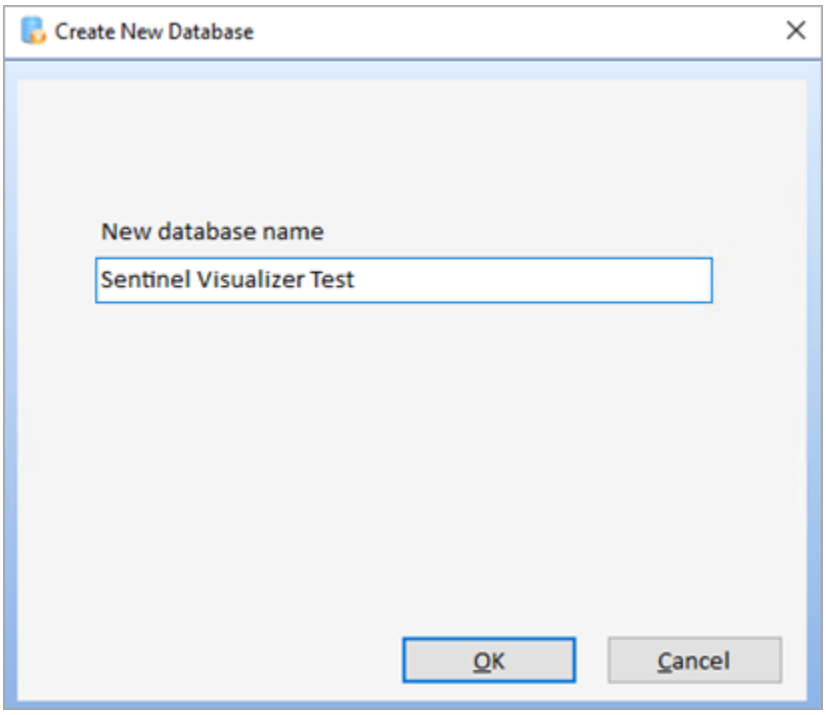
***Home Page Left Panel***




***Menu Toolbar***




Once the Create New Database form opens, type in a database name and click the [OK] button.




The database is created and maintained by the local database engine installed on your computer.

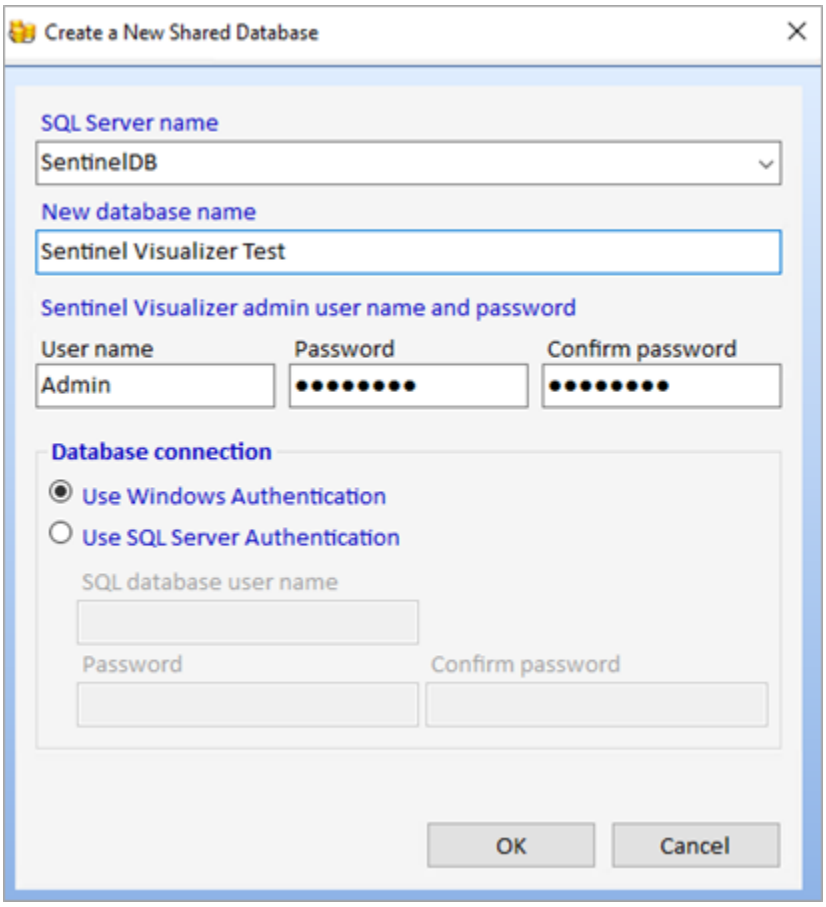
## Creating a Shared Database

The Premium and Enterprise editions of Sentinel Visualizer support the sharing of a multi-user database. Create the database on a shared server running Microsoft SQL Server 2012 or later.

Microsoft SQL Server must be installed and configured on a computer accessible to Sentinel Visualizer users through the network or Internet connection.

### *Creating the Database*

To create a new Shared Database, select [New Shared Database] from the Home page or the File Menu. The New Shared Database form appears.




Fill in the following information:

#### *Server Name*

Use the drop-down to see a list of SQL Server installations available on your network. Choose the server where the database will reside.

#### *Username*

Each Sentinel Visualizer user must have a user account to access a Shared Database. Users can be Administrative users with full rights to access the database and configure it, or Standard users without rights to configure the database (they can still edit the data). When you create a new database, specify the name for the first user, who by default is an Administrative user. Select a username or use the default “admin” value.

#### *Password*

Type in the password for the admin account and re-enter it in the second field.

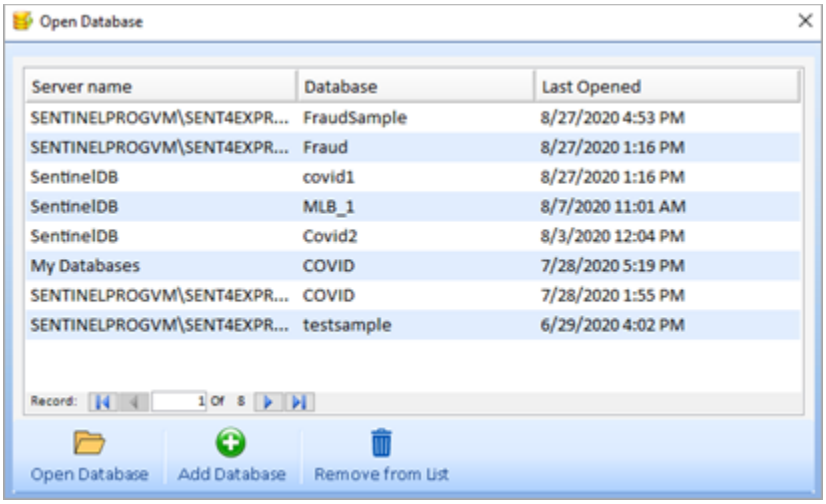
### *Database Connection Setup*

Specify the connection information for your Microsoft SQL Server installation. For more information, visit our webpage https://SentinelVisualizer.com/SQLServer/backup/index.htm.

**Note:** If you create a new Shared Database and use Mixed Mode/SQL Server Authentication, and you have Windows Authentication access to that server, you cannot see the new database unless your Windows User account also has permission to access the database. Please contact your SQL Server System Administrator to rectify this problem.

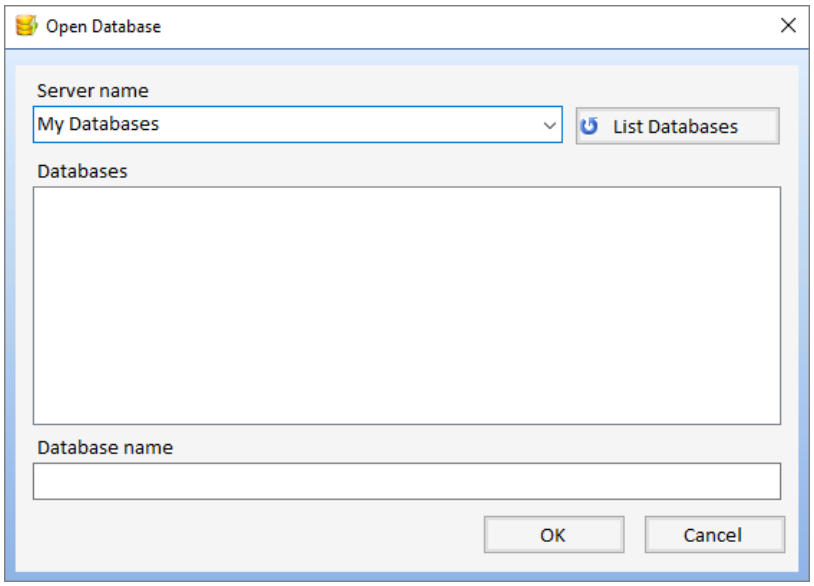
## Opening a Local Database

To open an existing Local Database, choose [Open Database] from the Database Menu. The Open Database form appears:




The top of the form contains a list of recently accessed databases, so you can quickly find recent items. If the database you want to open is in the list, select it and then click the [Open] button.

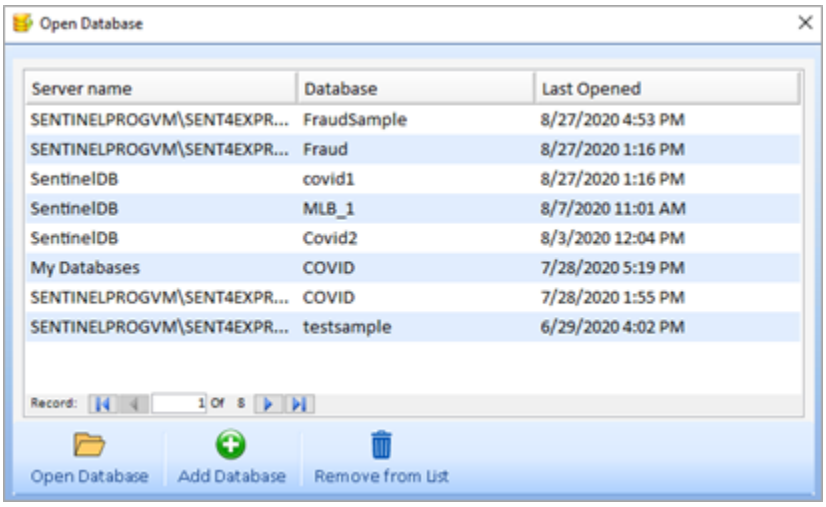
If the Local Database you want to open is not in the list, click the green [+] button.



Select the My Databases item in the drop down and click the [List Databases] button to see a list of available Local Databases. Select the database to open from the Databases list and click the [OK] button to open the database.

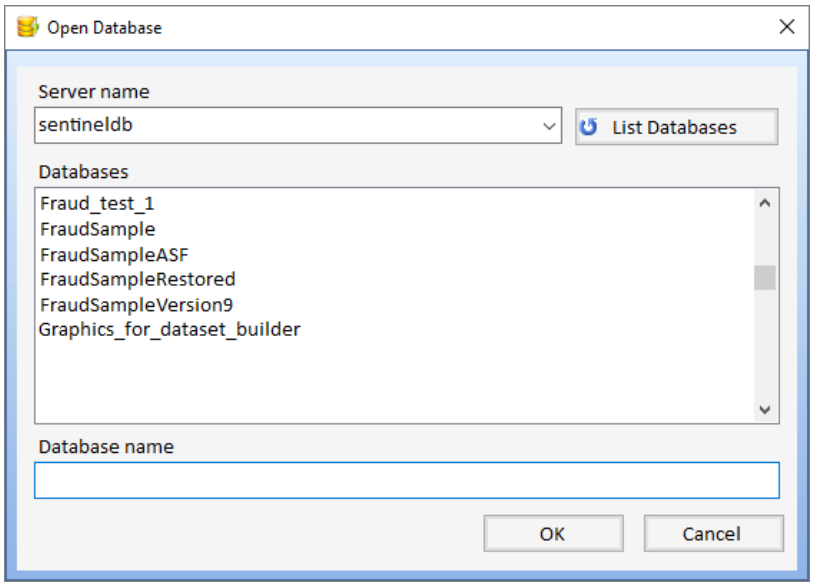
## Opening a Shared Database

To open a Shared Database, you must be running Sentinel Visualizer Premium or Enterprise Edition. From the Database Menu or the Home page, select the [Open Database] option. The Open Database form appears.




The top of the form contains a list of recently accessed databases, so you can quickly find recent items. If the database you want to open is in the list, select it and then click the [Open] button.

If the Shared Database you want to open is not in the list, click the green [+] button.



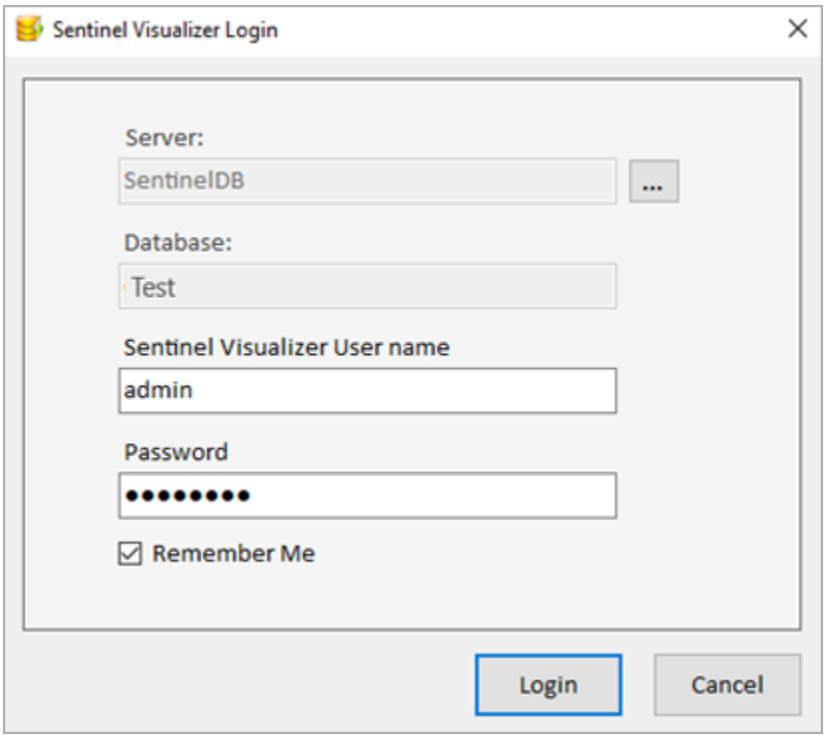

Use the drop-down to select the networked database server that contains the Shared Database you want to open. Then click the [List Databases] button to see a list of available Sentinel Visualizer databases that are on that server.

Select the Shared Database you want to open and click the [OK] button.

On this screen, select the connection method to access the networked database server. The method you choose is based on how your SQL Server installation has been configured. If your SQL Server installation is configured for Windows Authentication, choose that option. If SQL Server is configured for mixed authentication, you can choose either Windows Authentication or SQL Server authentication. Contact your system administrator to find out which option you should use.

### Your Username and Password

When you open a Shared Database, you must provide your username and password. These are assigned by the person who created the Shared Database you selected. When Sentinel Visualizer opens a Shared Database, it presents the following Login form:

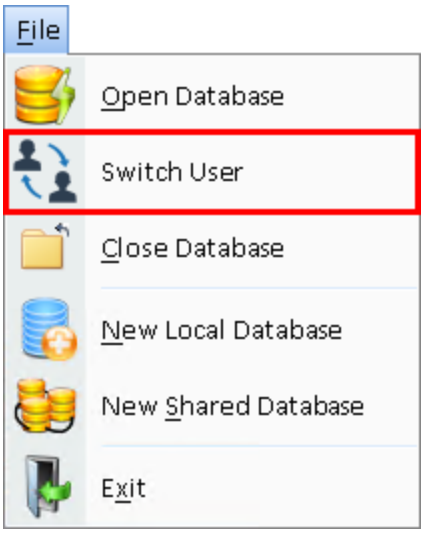



Enter your username and password and click the [Login] button.

Note that your username is not case-sensitive, but your password is. The system optionally remembers your login if you check Remember Me.

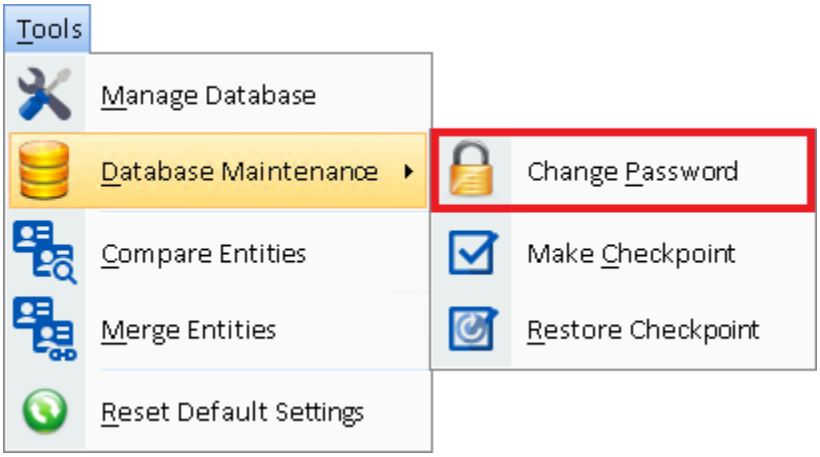
## Opening a Database as Another User

You can open a database under different login credentials by selecting [File] on the toolbar and clicking [Switch User].

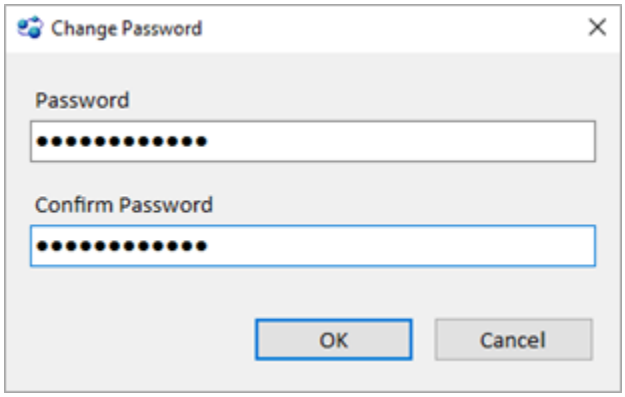



## Changing your password

To change your login password, from the Tools menu, select [Database Maintenance], Change Password.




The Change Password form appears:



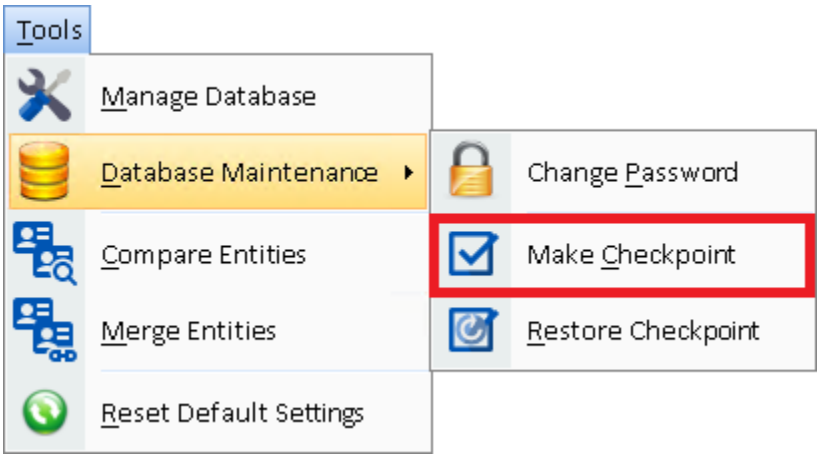
The form contains an entry box for your new password and requires the password to be entered a second time for verification. Once you have entered your new password, click the [OK] button.

# Creating and Restoring Checkpoints

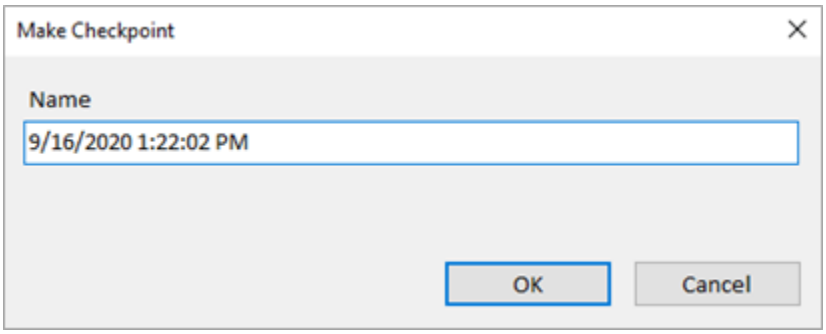
Sentinel Visualizer allows you to create and restore database checkpoints. A checkpoint is a complete snapshot of the current data in the database. Restoring a checkpoint returns the database to the state it was when the checkpoint was created.

## Create a checkpoint

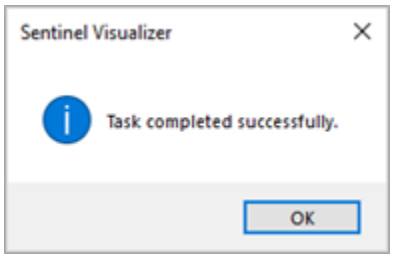
To back up a database, from the Tools menu, select Database Maintenance, Make Checkpoint. This is also available on the Manage Database form, under Maintenance.




On the Make Checkpoint form enter a description for the checkpoint, then click [OK].

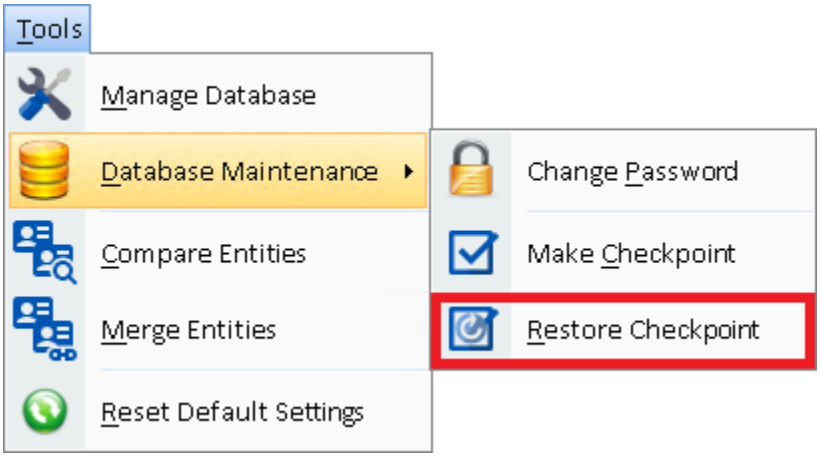



You are notified when the checkpoint is created.

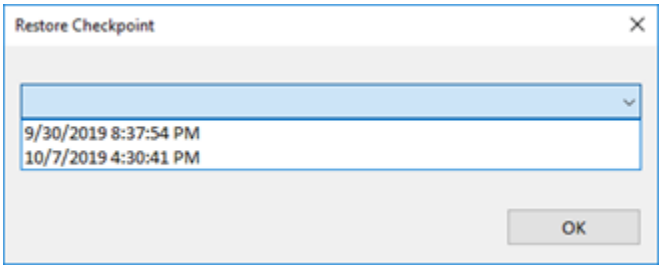


## Restore a Database

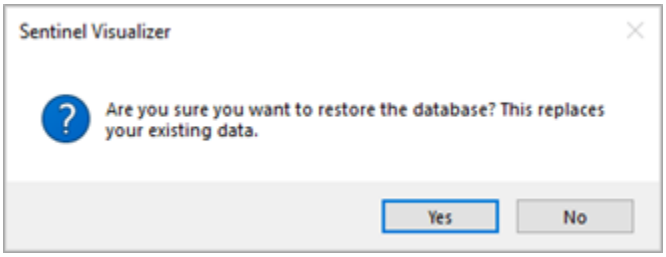
To restore a Sentinel Visualizer database, from the Tools menu, select Database Maintenance, Restore Checkpoint. This is also available on the Manage Database form.




Once the Restore Database form appears, select the checkpoint to restore. There may be checkpoints automatically created by Sentinel Visualizer during certain processes like Import. The date and time of the checkpoint (independent of the description) is displayed after you select it.




Select the checkpoint and click [OK]. It confirms overwriting the current database:




Click [Yes] and a prompt confirms the restore was completed.

# Chapter 19: Importing Data

*Sentinel Visualizer provides the ability to import external data into its database. You can import data from a variety of sources including text files, Access databases, and Excel spreadsheets.*

## Introduction to Data Imports

The Data Import feature allows you to import data from a variety of common formats. Formats supported are:

- Microsoft Excel
- Microsoft Access
- Text

Additional data sources, such as SQL Server are supported by linking to external data in Microsoft Excel or Microsoft Access.

The Data Import feature allows you to visually "map" columns from your input file to the appropriate fields in the Sentinel Visualizer database. The process for using this feature is summarized as follows:

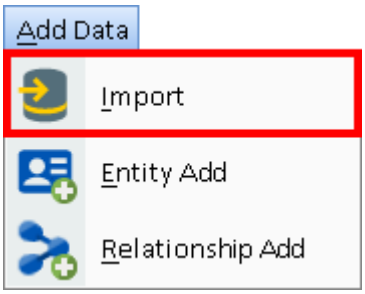
- Select your source data file
- Sentinel Visualizer reads the data file and detects the file schema.
- Connect your source data file to the Sentinel Visualizer fields
- Create new data types as necessary
- Import the data

## Open Import Data Tool

On the Home page, select [Import Data] from the Database area or on the menu toolbar, click the 'Add Data' tab and select [Import Data].

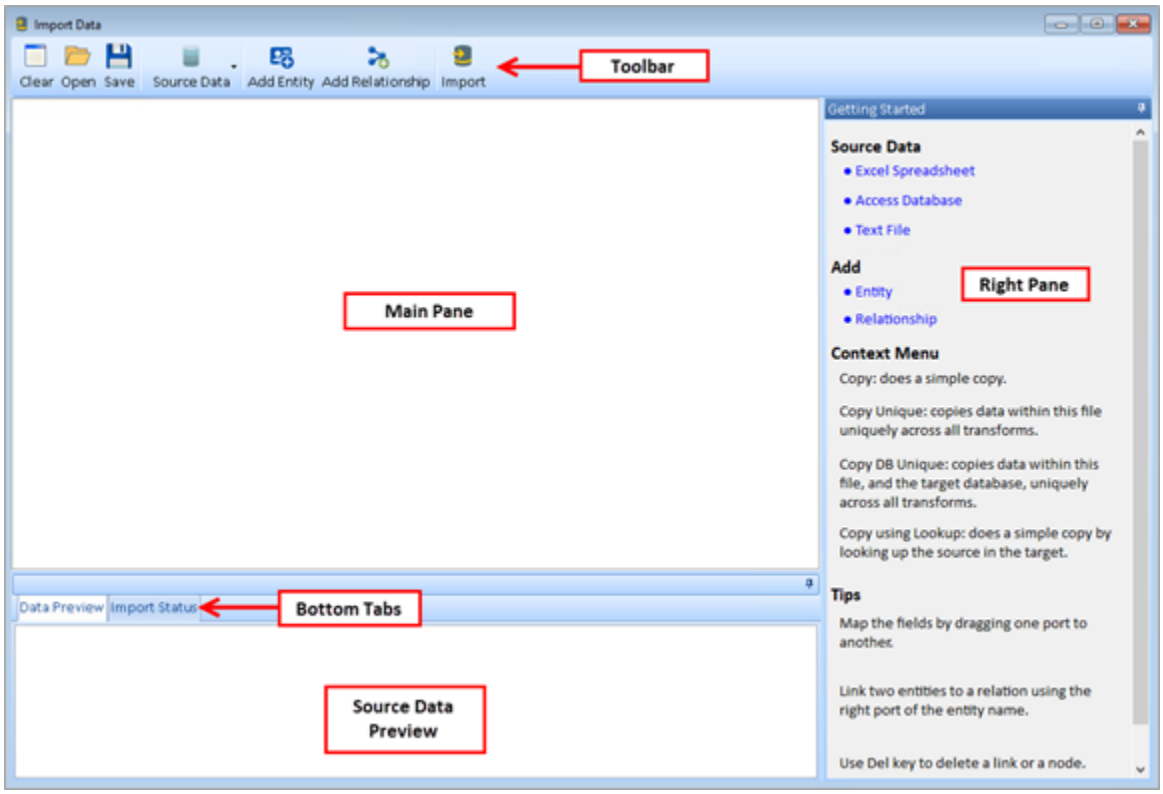
***Home Page Left Panel***

***Menu Toolbar***




The Import Data screen has five main areas:

- **Toolbar:** Access common tasks.
- **Main Pane:** Visually design your data import.
- **Source Data Preview:** View a preview of source data in a grid.
- **Bottom Tabs:** Switch between the Source Data Preview and the Import Status modes.
- **Right Pane:** See quick tips and shortcuts that make the import process easier.




## Import Data Toolbar

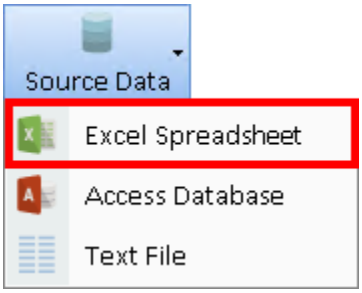
The following toolbar buttons are available:

- **Clear:** Clears all information from the main pane.
- **Open:** Open a previously saved diagram.
- **Save:** Saves your current diagram.

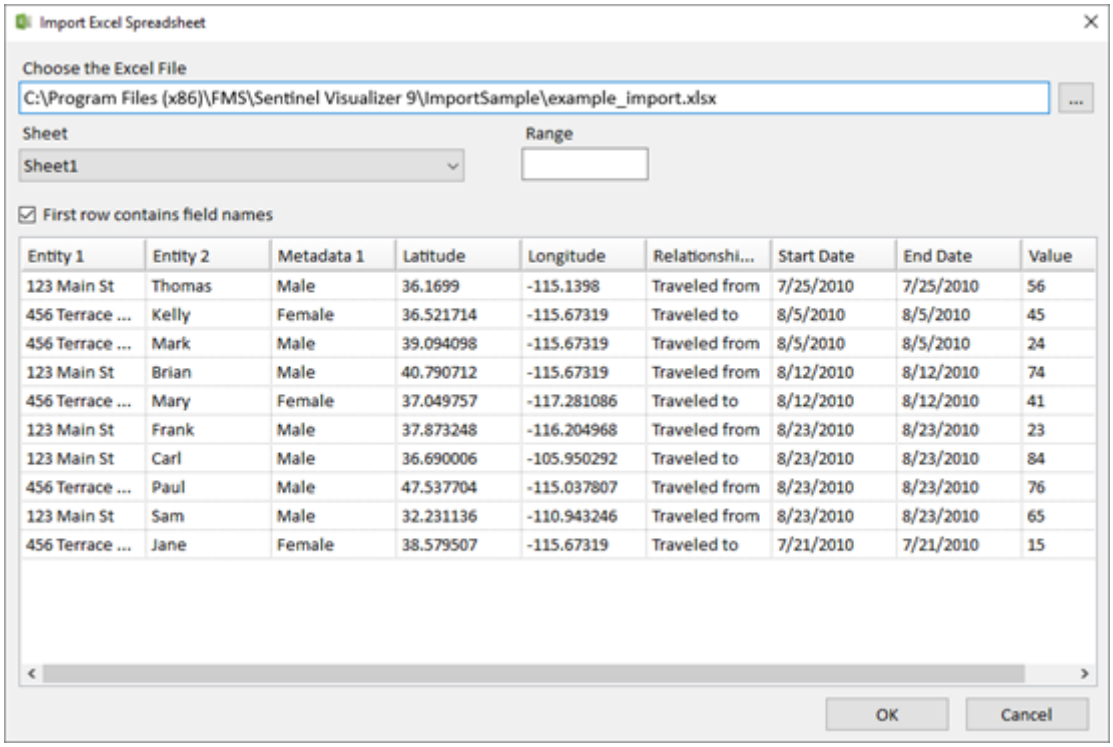
- **Source Data:** Import data from a variety of common formats.
- **Add Entity:** Add an entity to the main pane.
- **Add Relationship:** Add a relationship to the main pane.
- **Import:** Import information to Visualizer.

## Select Source, Excel Spreadsheet

Click the [Source Data] button on the toolbar and select [Excel Spreadsheet].




Use the […] button to locate and select an Excel file. When you select the source file, a preview of the data is displayed. Sentinel Visualizer only shows the first 25 rows of data in this screen but will import all the rows.

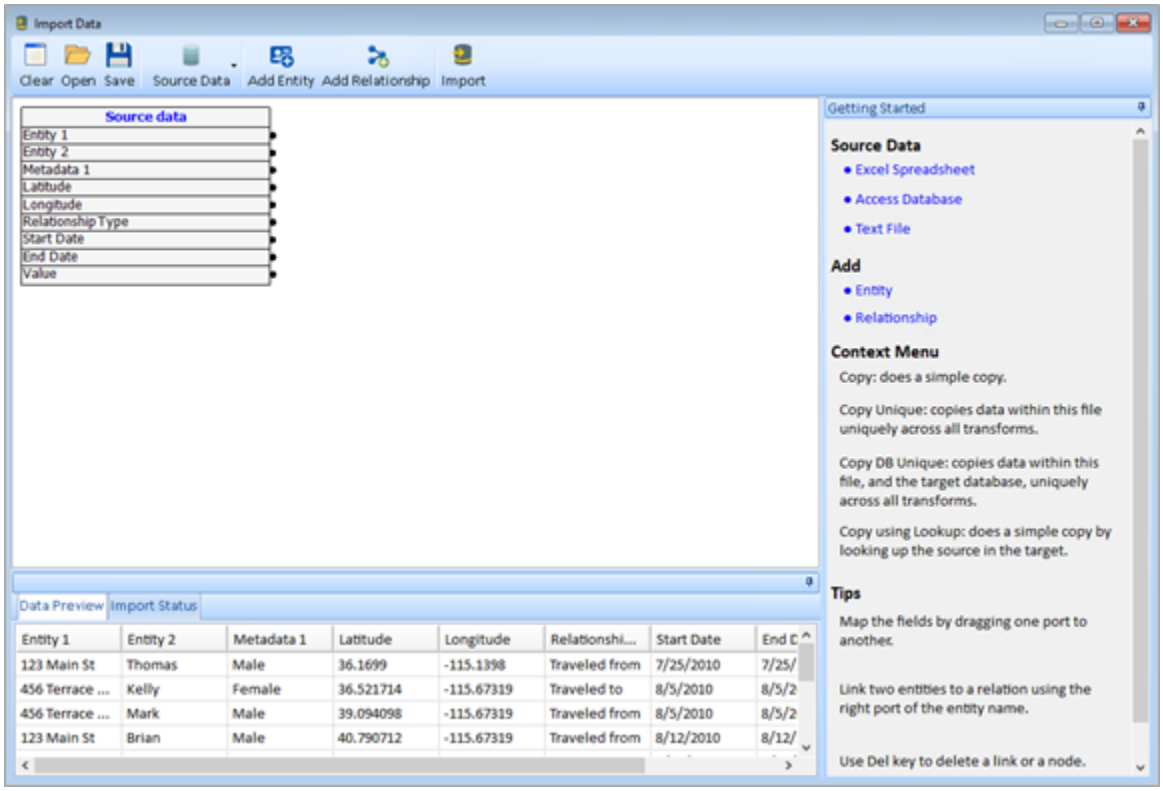



| Entity 1 | Entity 2 | Metadata 1 | Latitude | Longitude | Relationshi... | Start Date | End Date | Value |
|---|---|---|---|---|---|---|---|---|
| 123 Main St | Thomas | Male | 36.1699 | -115.1398 | Traveled from | 7/25/2010 | 7/25/2010 | 56 |
| 456 Terrace ... | Kelly | Female | 36.521714 | -115.67319 | Traveled to | 8/5/2010 | 8/5/2010 | 45 |
| 456 Terrace ... | Mark | Male | 39.094098 | -115.67319 | Traveled from | 8/5/2010 | 8/5/2010 | 24 |
| 123 Main St | Brian | Male | 40.790712 | -115.67319 | Traveled from | 8/12/2010 | 8/12/2010 | 74 |
| 456 Terrace ... | Mary | Female | 37.049757 | -117.281086 | Traveled to | 8/12/2010 | 8/12/2010 | 41 |
| 123 Main St | Frank | Male | 37.873248 | -116.204968 | Traveled from | 8/23/2010 | 8/23/2010 | 23 |
| 123 Main St | Carl | Male | 36.690006 | -105.950292 | Traveled to | 8/23/2010 | 8/23/2010 | 84 |
| 456 Terrace ... | Paul | Male | 47.537704 | -115.037807 | Traveled from | 8/23/2010 | 8/23/2010 | 76 |
| 123 Main St | Sam | Male | 32.231136 | -110.943246 | Traveled from | 8/23/2010 | 8/23/2010 | 65 |
| 456 Terrace ... | Jane | Female | 38.579507 | -115.67319 | Traveled to | 7/21/2010 | 7/21/2010 | 15 |

Click [OK] to see the source data presented on the import screen.

## View the Source Data

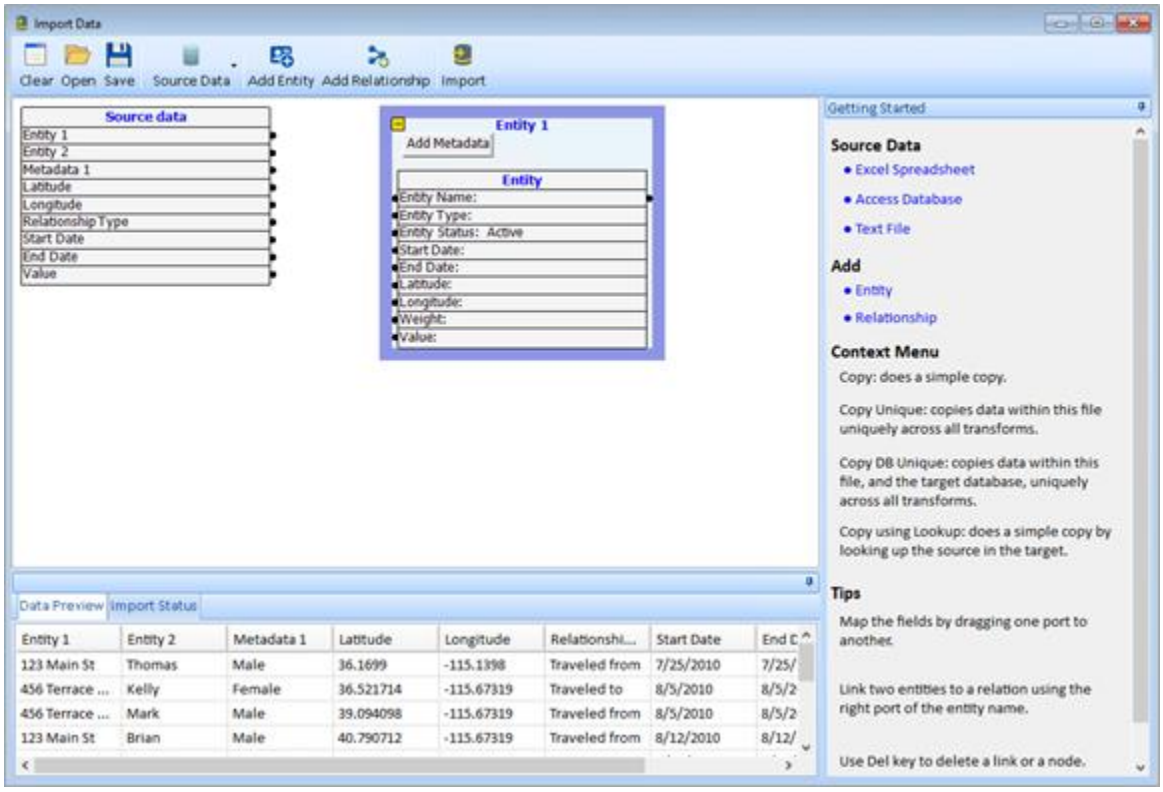
The Import Data screen now shows an object that represents the source data from the Excel file.




# Add Entity

Define which data from the Excel file is used to create entity records. Click on the [Add Entity] button to create a new entity mapping.

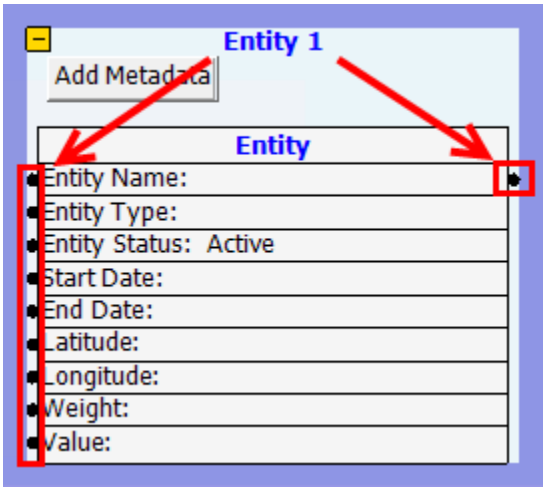
The Import Data tool creates a new, blank Entity definition for you.




To rename the entity box, click on the text that says “Entity 1”

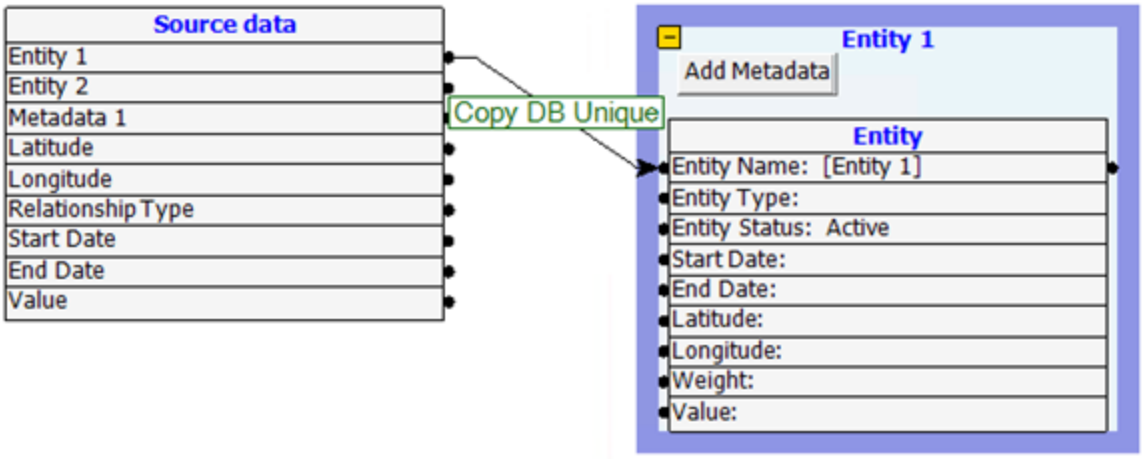
## Draw Connection Lines

Notice the small black circles to the left and right of the rows in the box. For more information on the entity fields, see **General Entity Fields** on page 45.




Click your mouse on a connection dot and drag it to another connection dot to create a link.

In this example, click on the connection dot to the right of a row in the Source Data, and drag it to the connection dot to the left of the Entity Name. It should look like this:




### Specify Behavior of Connection Lines

**Copy:** does a simple copy.

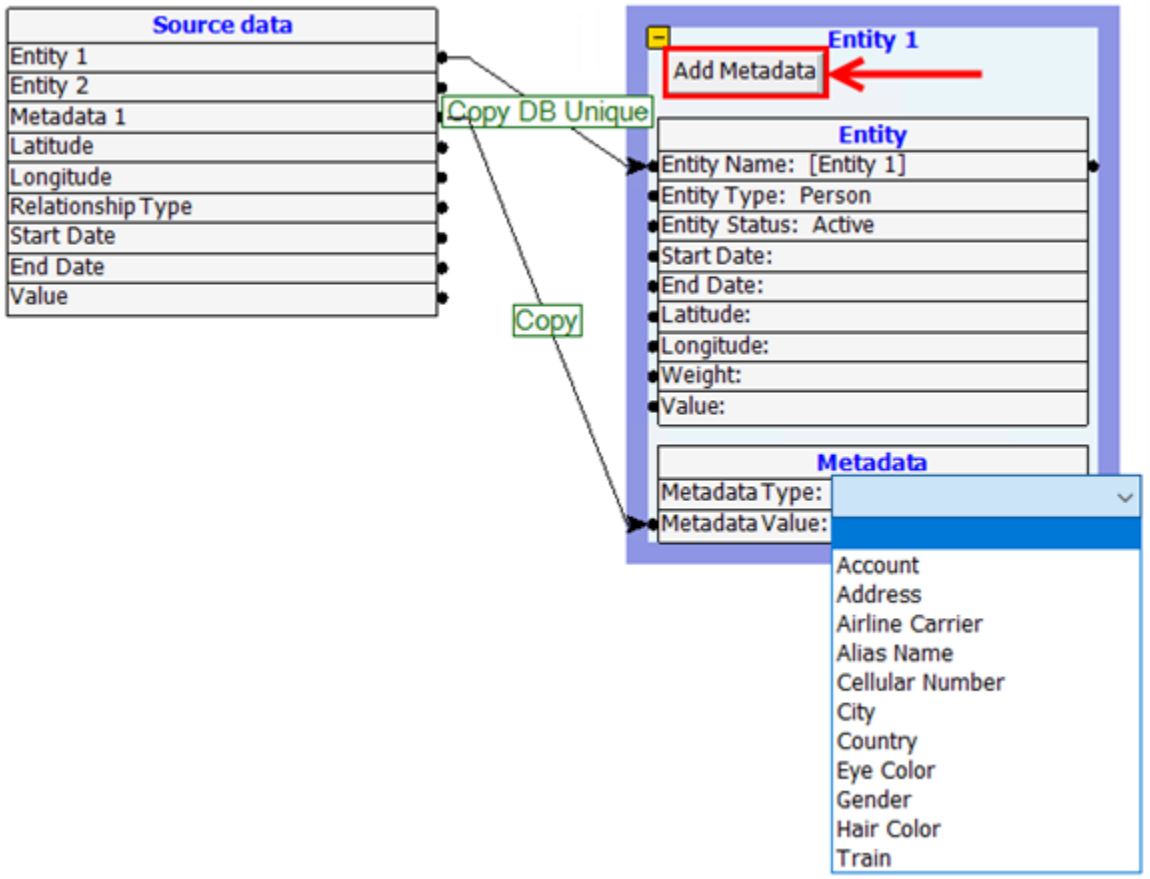
**Copy Unique:** copies data within this file uniquely across all transforms.

**Copy DB Unique:** copies data within this file, and the target database, uniquely across all transforms.

**Copy using Lookup:** does a simple copy by looking up the source in the target.

## Add Metadata

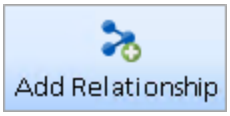
On the Import Data form, click the [Add Metadata] button on the entity definition. Set the Metadata Type field and connect to the Source data to. Click [Add Metadata] to add more values. For more information on metadata, see **Managing Metadata** on page 240.




## Add Relationships

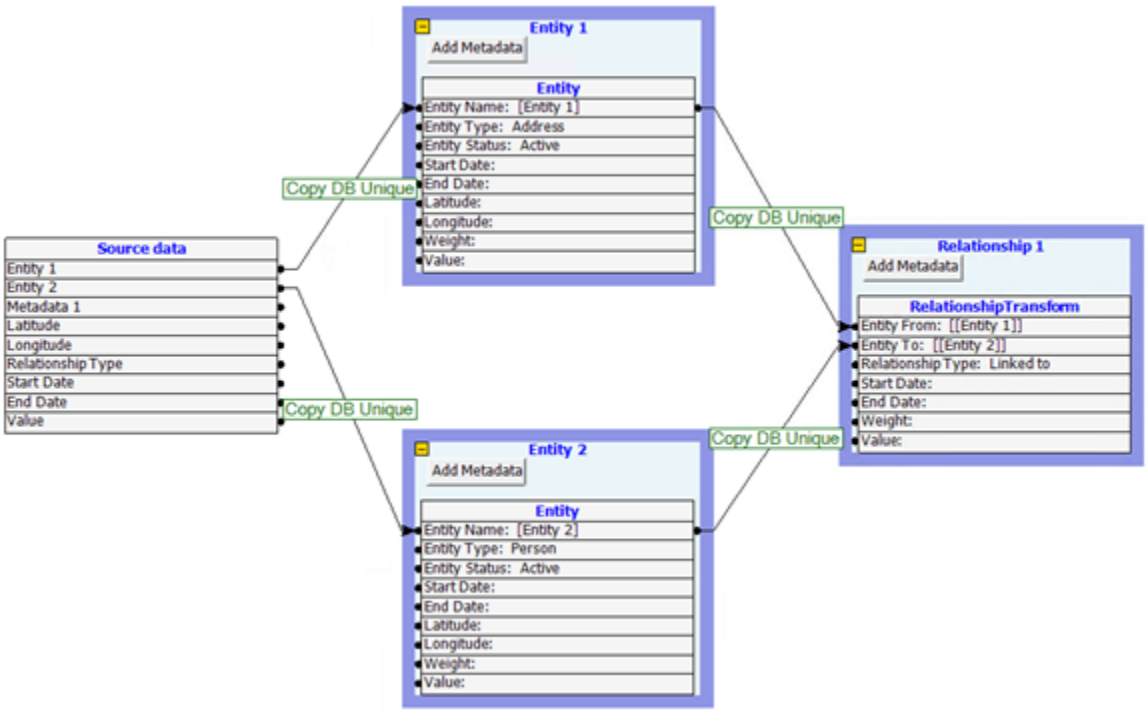
Import data as relationships and add additional data to the relationships. The relationship is what ties Entity 1 to the Entity 2.

1. Click the [Add Relationship] button from the toolbar.




2. Link 'Entity 1' from the Source data to 'Entity Name' in the Address box.
3. Set the 'Entity Type' to 'Address'.
4. Link 'Entity 2' from the Source data to 'Entity Name' in the Entity box.
5. Set the 'Entity Type' to 'Person'.
6. Set the Entity Name [Address] to 'Entity From' in the 'Relationship 1' box.
7. Set the Entity Name [Entity] to 'Entity To' in the Relationship 1 box.
8. Set the Relationship Type to [Linked to].

Your import definition should now look like this:

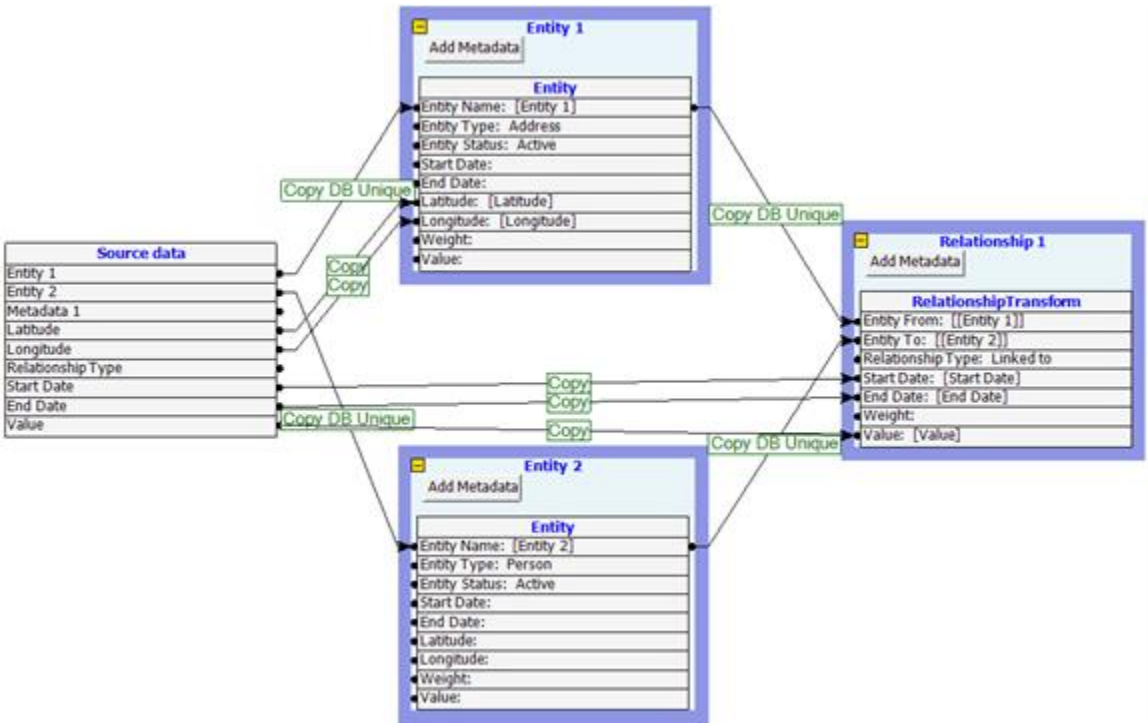



## Create Additional Data Mappings for the Relationship

After adding the Relationship definition, we can add attributes to the relationship:

- Connect Start Date in Source data to Start Date in Relationship 1.
- Connect End Date in Source data to End Date in Relationship 1.
- Connect Value in Source data to Value in Relationship 1.

Your Import Data Screen should look like this:



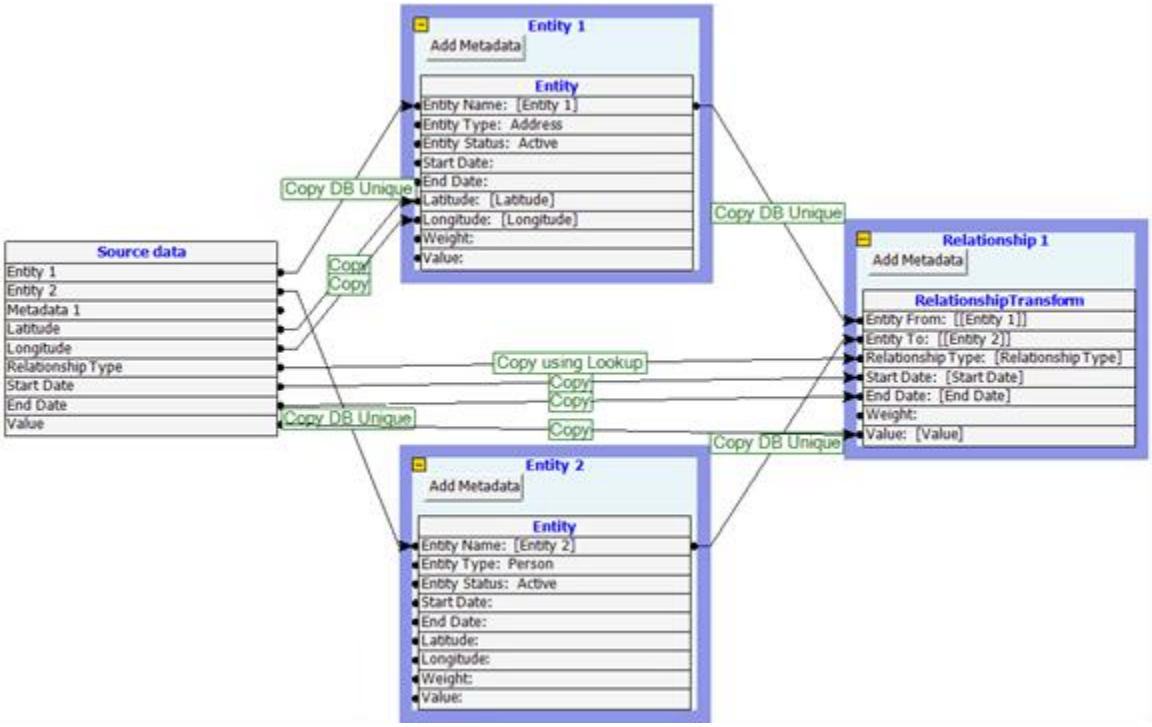
# Import Relationships with a Relationship Type

Use the data in the source file to identify a relationship type.

## Map Activity to Relationship Type

Specify that data needs to be mapped from Activity to the Relationship Type.

Do this by connecting the Activity in the source data to Relationship Type in the Linked Entities (relationship) definition. The following screen shows the mapping:

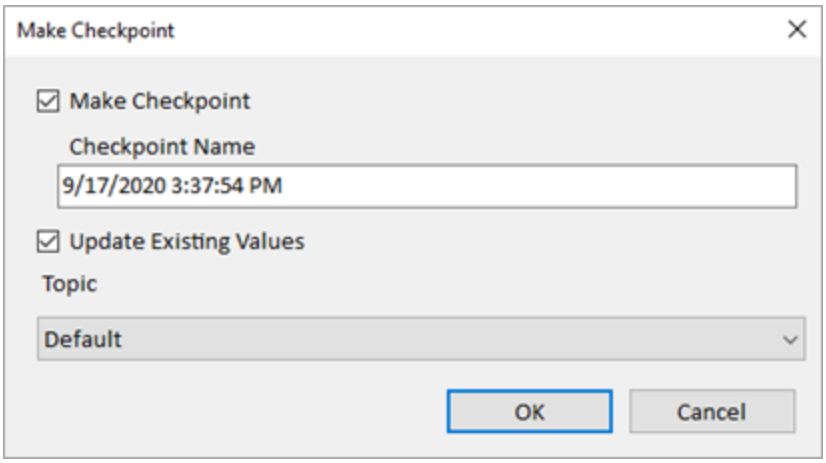



Note: Import Data can also map a row to Entity Type.

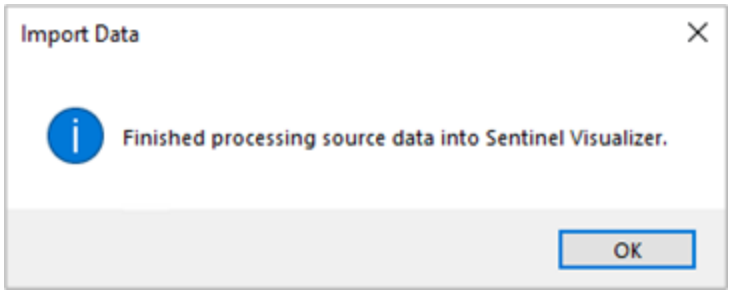
# Run the Import

Click the [Import] button to run the import process.

- You can optionally make a database checkpoint. See **Create a checkpoint** on page 212 for more information.
- You can specify whether to update values for existing entities and relationships.
- Specify the Topic for the newly imported items.

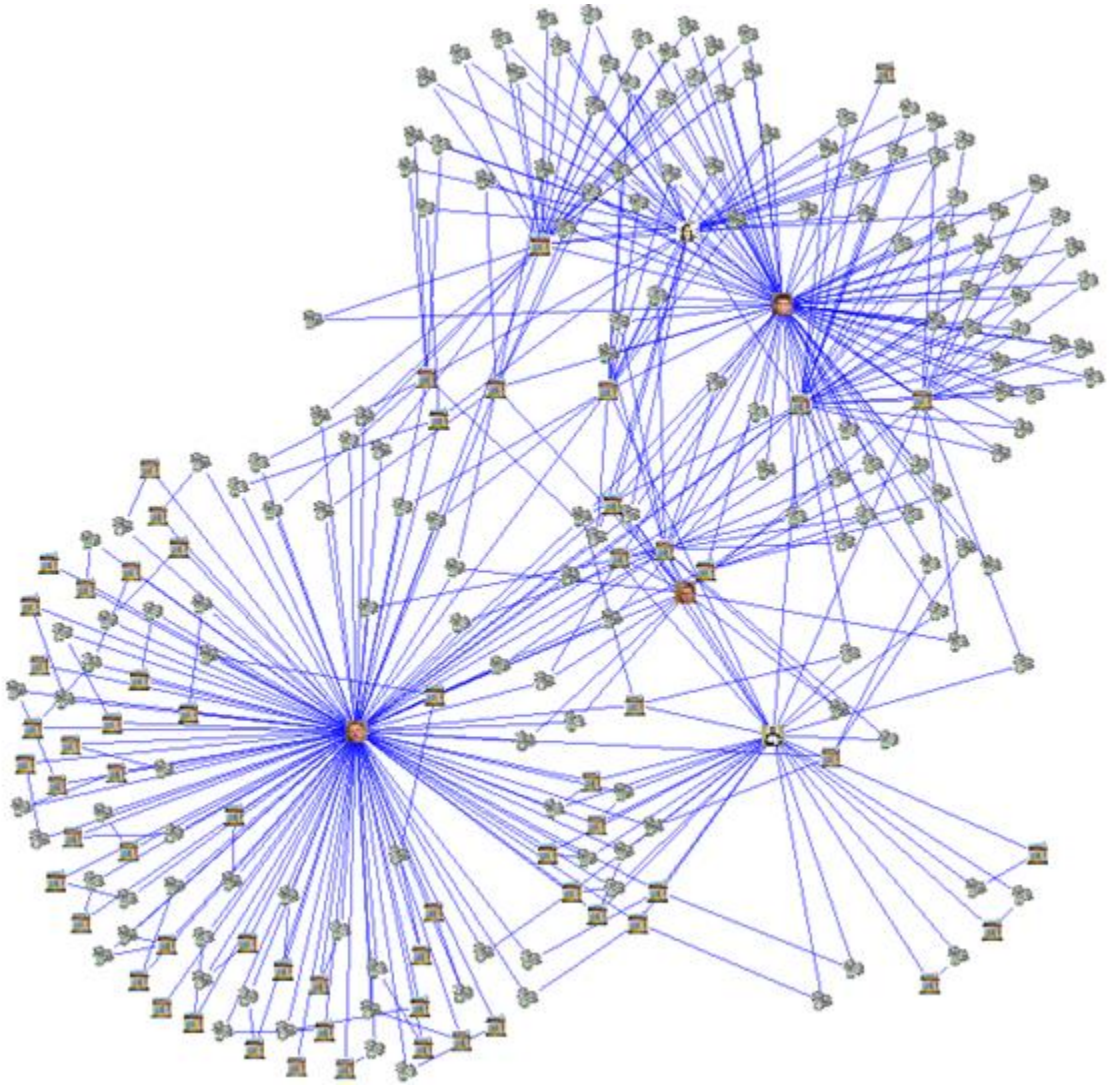



You are notified once your data is imported.




## Viewing Your New Data

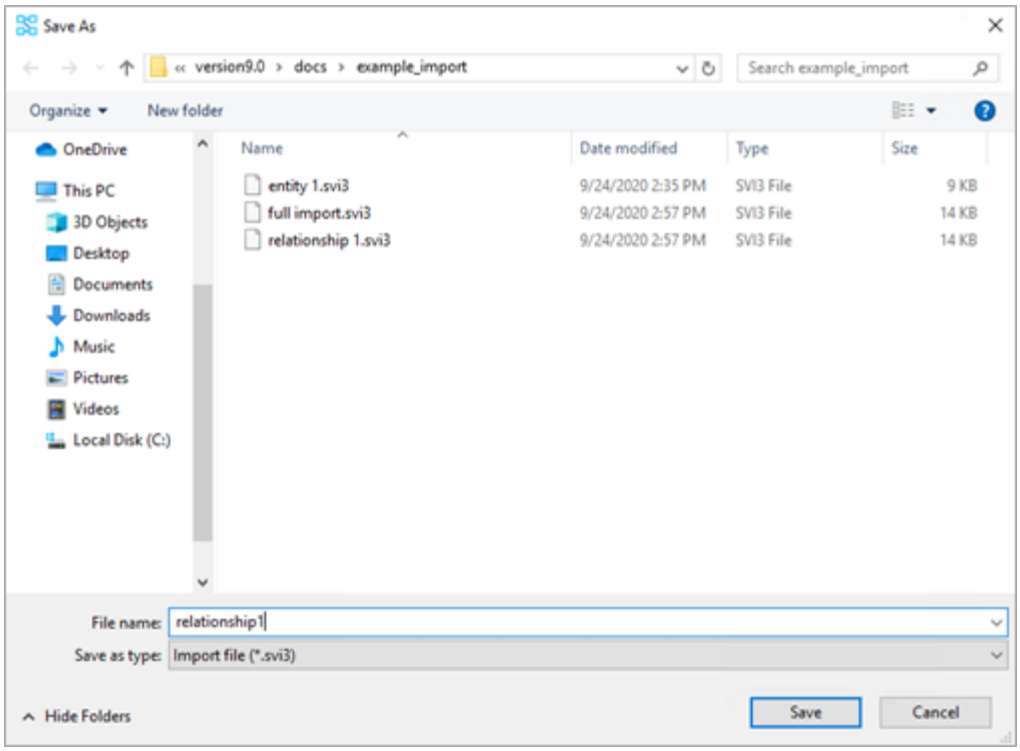
From the Home page, select [All to Visualizer] to see all your data on the Visualizer diagram.



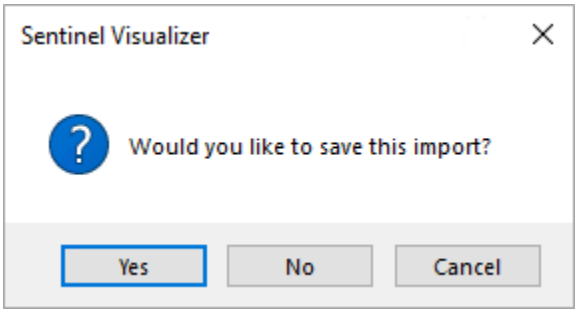
## Save the Import

To save the Import, click the [Save] button on the toolbar.

The import will be saved as an Import file (*.svi3).

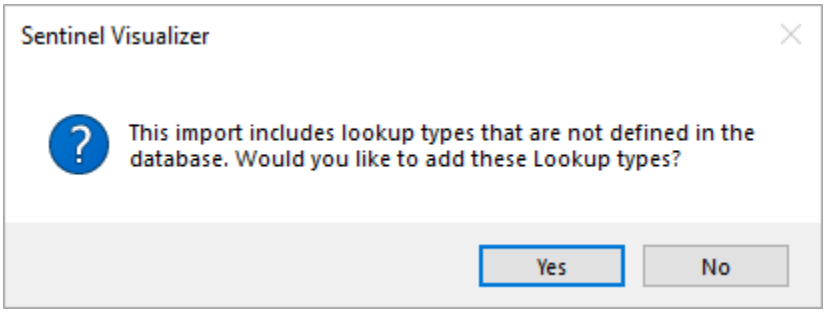



If the user tries to close the Import Data window without saving first, a save dialogue box will appear.




## Open an Import

Note that opening an import checks your database for the lookup types defined in the import file. If the lookups do not exist in your current database, you will be prompted to optionally have the types created for you.



# Chapter 20: Configuring and Managing Your Database

*Sentinel Visualizer Databases offer a great deal of flexibility for customization to manage your unique dataset. This chapter describes how to define, modify, and add your own Lookup values and Metadata to support your dataset, and how to specify type information for various database fields and create new fields. It also provides information about maintaining your database, backing it up, and moving it, along with the running of custom queries directly against your database.*

## Configuration Introduction

After you create your database, you should configure it to match the type of data you are going to be managing. You can perform this configuration at any time, even after the database is in use—but it is best to review the existing Lookup and Metadata configurations before you start entering or importing data.

### Lookups

Many of the fields in a Sentinel Visualizer are implemented as drop-downs—this allows you to select a field value from a pre-defined list called a Lookup. Lookups perform several important functions as opposed to free-form text fields:

- **Lookups make data entry easier.** Instead of typing in a value, you simply select it from a list.
- **Lookups prevent data issues.** By requiring the selection of a value from a pre-defined list, you ensure that all records have consistent values.

When Sentinel Visualizer creates a new database, it automatically adds a set of default values to all the Lookup Field lists. These defaults cover the basic types of data you most likely use, and you can edit and change these values.

### Metadata

Sentinel Visualizer is designed to create flexible databases—databases that allow you to add new data fields as you need them. This feature is known as Metadata. Metadata fields are fields that are available in entity and relationship records and allow users to add additional descriptive information. You can add new metadata fields to store information that is specific to your database needs.

As with Lookups, Sentinel Visualizer automatically adds a default list of Metadata types to each new database you create. You can then edit this list.

### Printing Lookup Table Reports

Sentinel Visualizer has a variety of reports available that allow you to preview, print, and export data. The list includes reports for each of the Lookup tables. For more information about running reports, see **Report Selection** on page 97.

## Configuration in a Multi-User Environment

Configuring Shared Databases is slightly different from configuring Local Databases. In general, changes to users, topics, lookups, and metadata types should only be performed on your database when all other users are logged out.

### Adding and Changing Values

For performance reasons, when Sentinel Visualizer opens a database (Local or Shared), it loads all the current Lookup and Metadata definitions into memory. These values are current only when the program started. Changes made to lookups and metadata are not automatically "refreshed" by the program application—you need to exit and reopen the database.

Because of this, it is important to configure lookups and metadata before users begin entering and editing information. Users cannot dynamically add values to a list. If a user needs to select a value, and that value is not available in the appropriate Lookup table, the user cannot continue until the Lookup table is edited. Of course, you can add or change Lookup table values after users have entered data—it is, however, a good idea to get as many values in place beforehand.

The best strategy for adding and changing lookup values is to do as much work as possible before making the database available to users. Later, as you need to add or change lookup values, ensure that all users are logged out of the database prior to making changes.

### Deleting Values

Sentinel Visualizer allows you to delete lookup and metadata values that are not used, but to avoid data inconsistencies; it does not allow you to delete values that are in use.

Assume you have an entity type of "widget," and users add new entity records with the type "widget." Later, you decide that this is no longer a valid type of entity, so you want to delete the entity type. If you did this, however, the entities with that type would then cause data to be inconsistent.

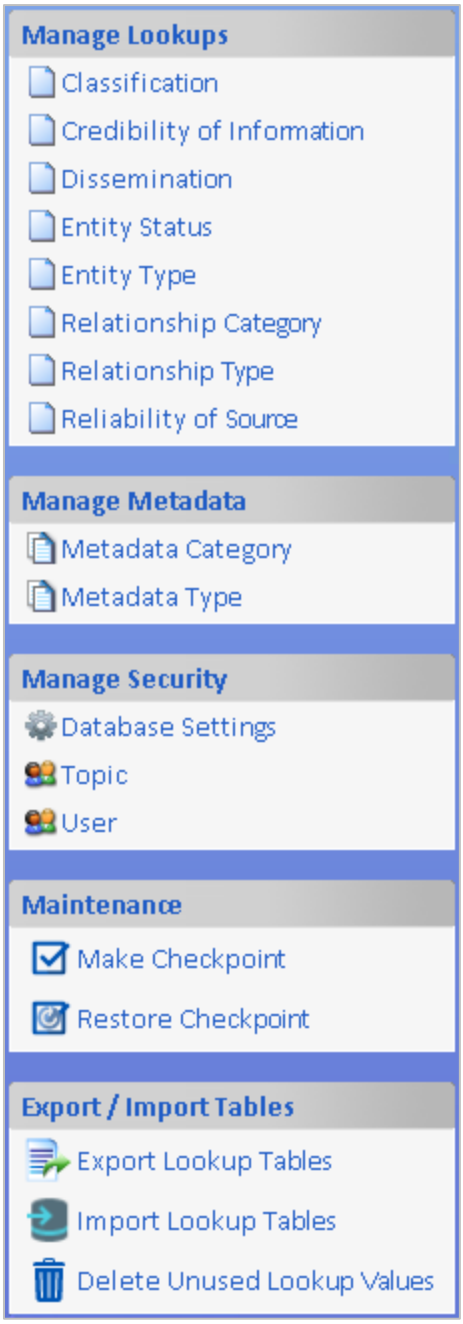
Sentinel Visualizer handles this by disallowing the deletion of any lookup or metadata value that is in use in an entity or relationship record. Instead of deleting the lookup or metadata values, you should generally edit the values to be more appropriate. In the "widget" example, the real issue is that the organization now calls the entities "parts" instead of "widgets." So instead of deleting the widgets lookup value, simply change its name to "parts" and the system updates accordingly.

If you need to delete a lookup or metadata value instead of editing it, you must:

- Change all entity and relationship records that use the lookup or metadata value from that which you need to delete to a value that will not be deleted
- Ensure that no Sentinel Visualizer users are connected to the database before you delete the value.

## Manage Database Form

Once you create your new database, use the Manage Database Form to perform configuration operations. Open your database and select [Manage Database] from the Home page or from the menu toolbar, select the [Window] drop-down and click [Manage Database].




## Manage Lookups

Sentinel Visualizer helps you maintain data integrity, accuracy, and consistency by using lookup tables (lists of acceptable values) for many of the fields related to entities and relationships. For example, when a user adds a new entity to the system, the user can specify the type of the

entity by selecting a value from a list. This makes data entry and editing easier, and results in data that is validated.

Sentinel Visualizer offers a variety of Lookup tables, each with a pre-configured set of default values. You can edit these lists, delete items, or add your own. Standard users cannot add to these lists—only Administrative users can manage Lookups.

## Sentinel Visualizer Lookup Tables

Below is a list of the Sentinel Visualizer Lookup tables:

| Lookup Table | Description | Typical Values |
|---|---|---|
| Classification | Levels of security classification that can be applied to entities and relationships | Confidential, Secret, Top Secret, etc. |
| Credibility of Information | A numbered system to rate the credibility of information of a relationship | Confirmed by other sources, Probably true, Doubtful, etc. |
| Dissemination | The dissemination of an entity or relationship | PROPIN, ORCON, NOFORN, etc. |
| Entity Status | The disposition of an entity | Alive, Dead, Incarcerated, Unknown, etc. |
| Entity Type | The type of an entity | Person, Organization, Location, etc. |
| Relationship Category | The category for a relationship type | Familial, Organizational, Transactional, etc. |
| Relationship Type | The type of a relationship | Placed a phone call to, Brother of, Leading member of, etc. |
| Reliability of Source | A numbered system to rate the reliability of the source that provided the information that establishes a relationship | Completely reliable, Fairly reliable, Unreliable, etc. |

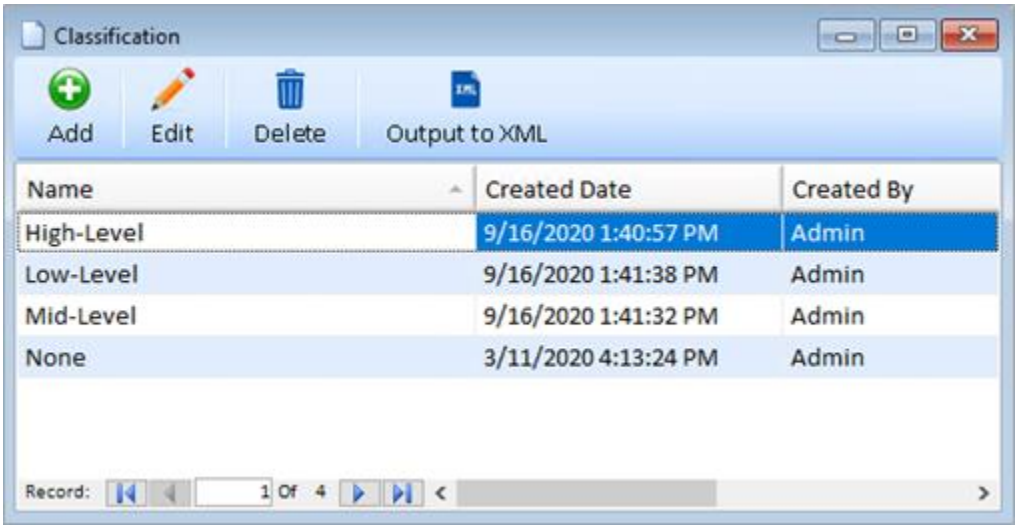
## Editing Lookup Lists

The lookup editor offers these options on the toolbar:

- **Add** - Add a new record to the lookup list.
- **Edit** - Modify the selected lookup record.
- **Delete** - Remove the selected lookup record if it is not being used.
- **Output to XML** - Export the entire list of lookup values to an XML file.

## Managing Classification Lookups

Classification is used for both entity and relationship records and denotes the classification level of the information contained in the record. To manage Classification lookups, click the [Classification] link on the left sidebar:



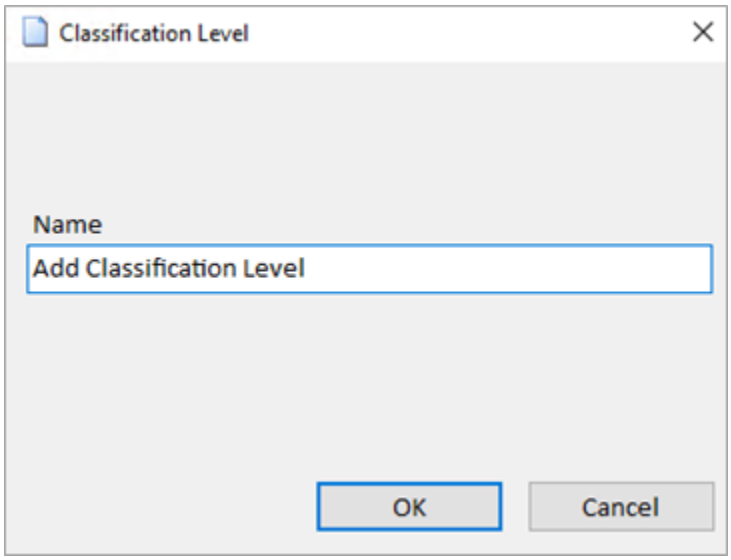

### *Classification Values*

Each Classification lookup record has a Value field that identifies its position in relation to all other Classification levels. This allows you to enter your Classifications and their rankings—the higher the number, the higher the Classification.

When you add new entities and relationships to Sentinel Visualizer, the Classification defaults to the item with the highest value.

### *Adding and Editing Items*

To add a new Classification item, click the [Add] button on the toolbar:

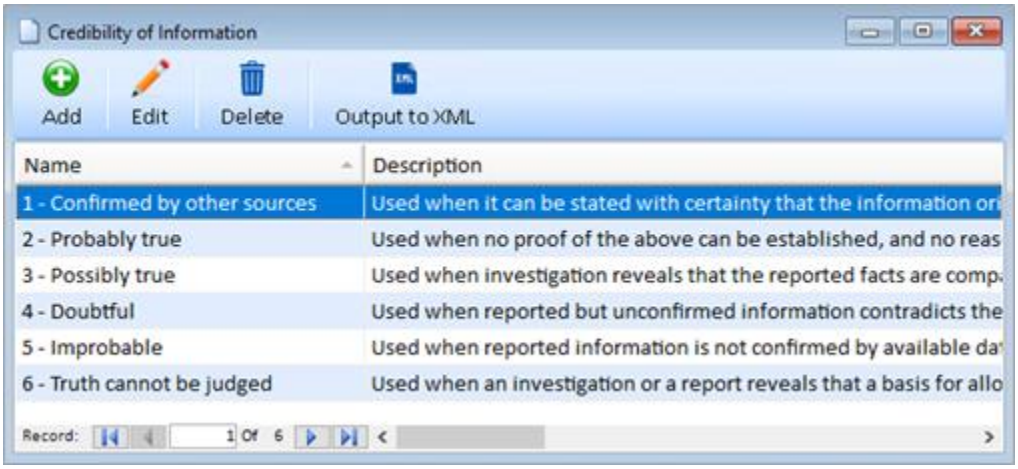



Type in a name and value and click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Classification item, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

## Managing Credibility of Information Lookups

Credibility of Information is used in relationship records to denote the credibility of the information that establishes the relationship. To manage Credibility of Information lookups, click the [Credibility of Information] link on the left sidebar, or select Lookups, Credibility of Information from the Tools menu:




### *Credibility of Information Weight*

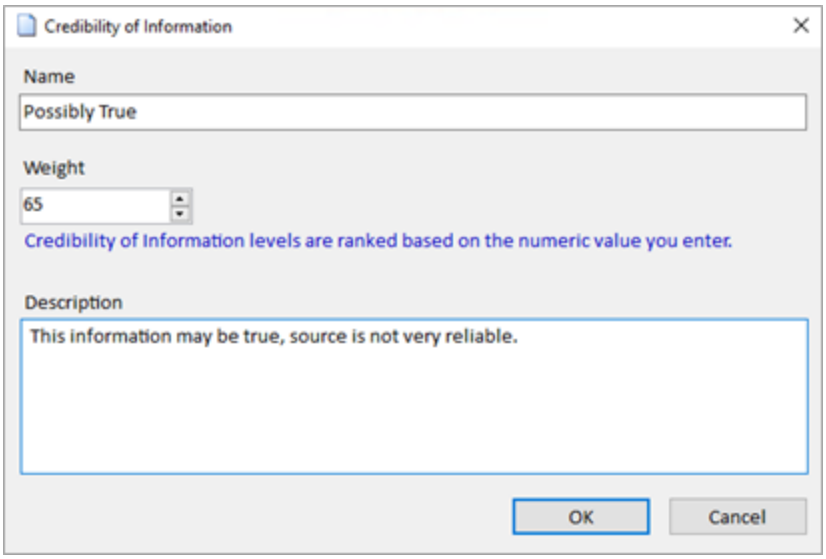
Each Credibility of Information lookup record has a Weight field that identifies its position relative to other Credibility of Information values. This allows you to enter your Credibility of Information levels and their rankings—the higher the value, the higher the Credibility of Information.

When you add new relationships to Sentinel Visualizer, the Credibility of Information defaults to the lowest weight.

Sentinel Visualizer uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 175.

### *Adding and Editing Items*

To add a new Credibility of Information item, click the [Add] button on the toolbar:

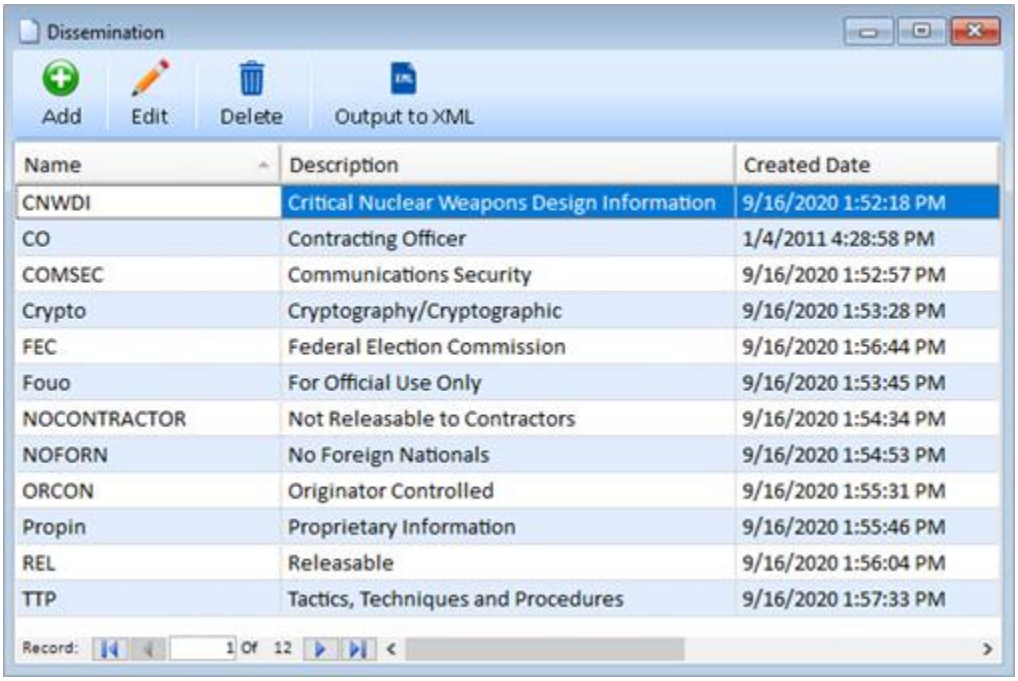



Type in a name, select a weight, and optionally type in a description. Click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Credibility of Information item, double click the row on the lookup editor form, or select the row and click the [Edit Item] toolbar button.

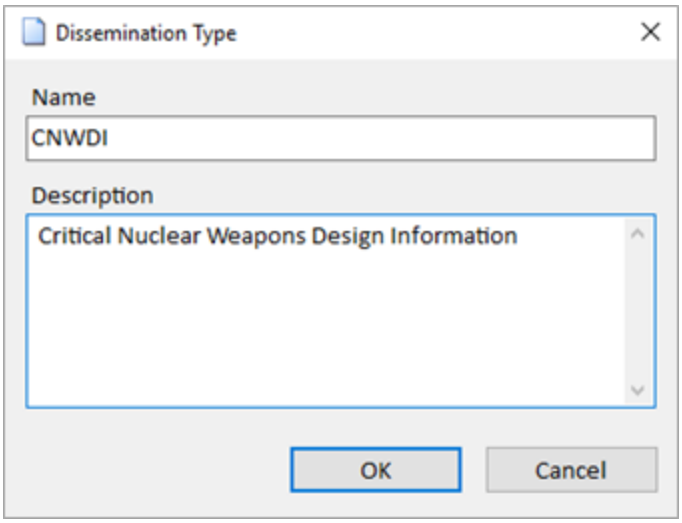
## Managing Dissemination Lookups

Dissemination is used in entity and relationship records to denote how the information may be passed on to external users or systems. To manage Dissemination lookups, click the [Dissemination] link on the left sidebar, or select Lookups, Dissemination from the Tools menu:




### *Adding and Editing Items*

To add a new Dissemination item, click the [Add] button on the toolbar:

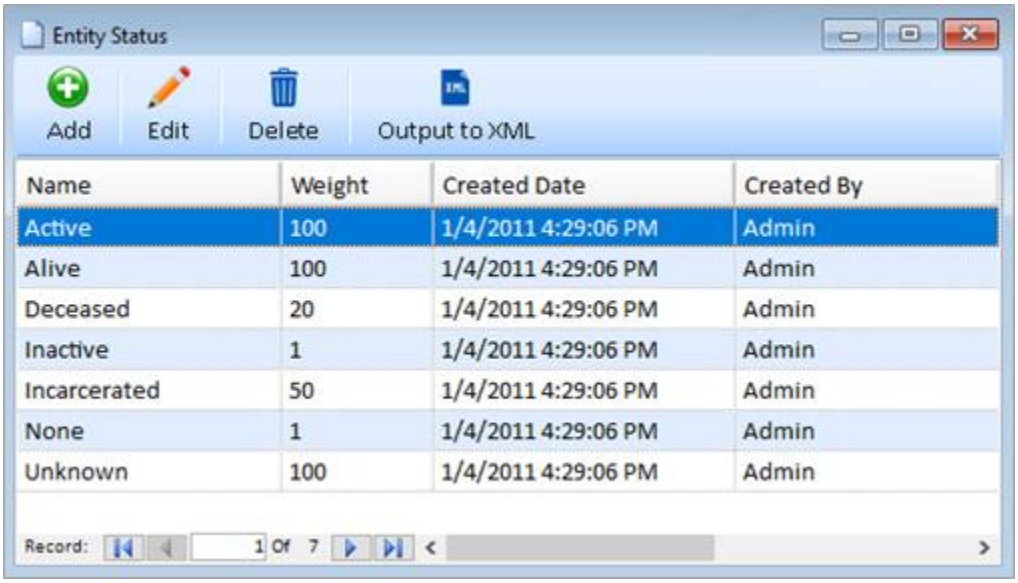



Type in a name, and optionally, a description, and verify the correct setting for the Is Obsolete field. Click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Dissemination item, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

## Managing Entity Status Lookups

Entity Status is used in entity records to denote the entity's current status. To manage Entity Status lookups, click the [Entity Status] link on the left sidebar, or select Lookups, Entity Status from the Tools menu:



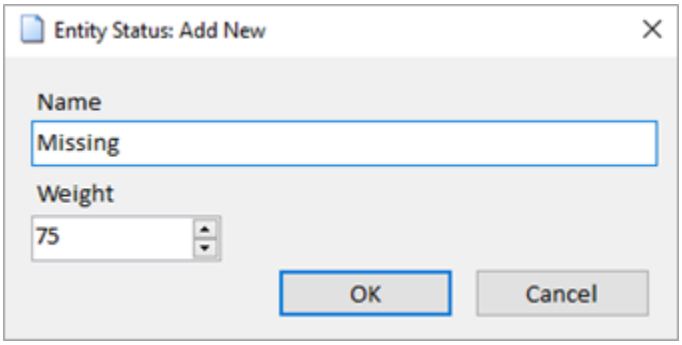

### *Entity Status Weight*

Each Entity Status lookup record has a Weight field that identifies its position in relation to all other Entity Status values. For example, an Entity Status of "alive" would have a higher weight than "dead."

Sentinel Visualizer uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 175.

### *Adding and Editing Items*

To add a new Entity Status item, click the [Add] button on the toolbar:

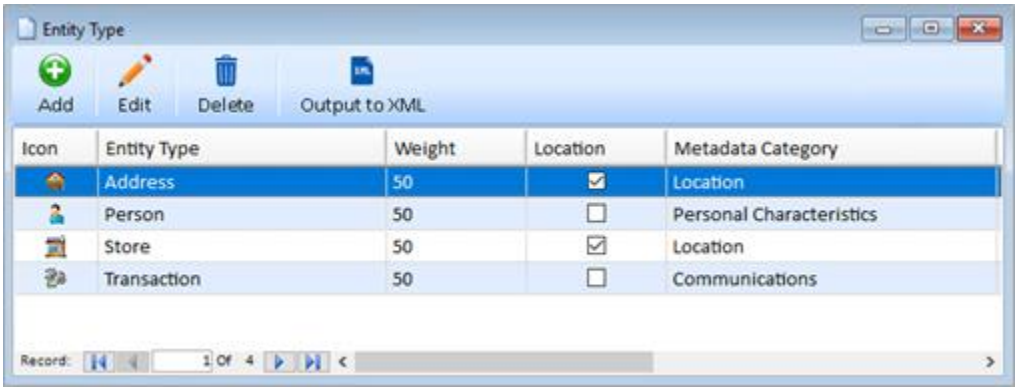



Type in a name and weight and click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Entity Status item, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

## Managing Entity Type Lookups

Entity Type is used in entity records to denote the entity's type. For example, an entity could be a person, a phone number, a bank account, etc. To manage Entity Type lookups, click the [Entity Type] link on the left sidebar, or select Lookups, Entity Type from the Tools menu:




### *Entity Type Weight*

Each Entity Type lookup record has a Weight field that identifies its position in relation to all other Entity Type values. This allows you the flexibility to enter your Entity Type levels and their ranking—the higher the value, the higher the importance of that Entity Type in relation to other types.

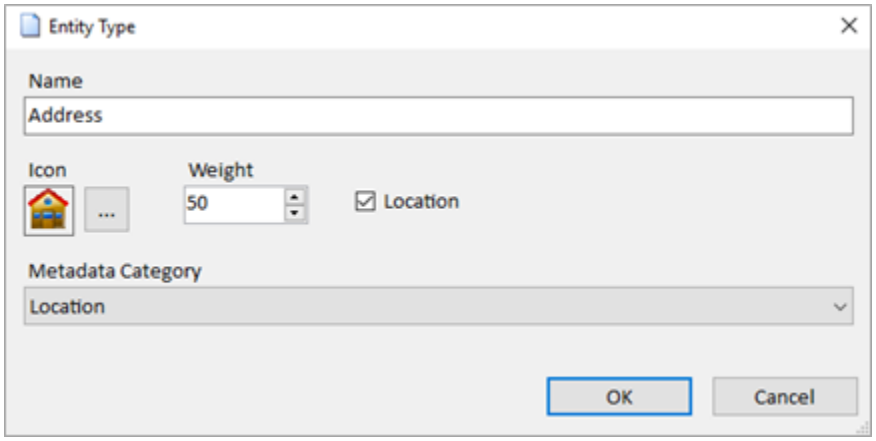
Sentinel Visualizer uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 175.

### *Entity Type Icon*

Each Entity Type lookup record has an associated icon, which is used to visually represent the type of entity. Sentinel Visualizer includes a variety of icons that can be used to represent different Entity Types. Note that if you specify a custom icon, the icon for that entry is blank on the form.

### *Adding and Editing Items*

To add a new Entity Type, click the [Add] button on the toolbar:



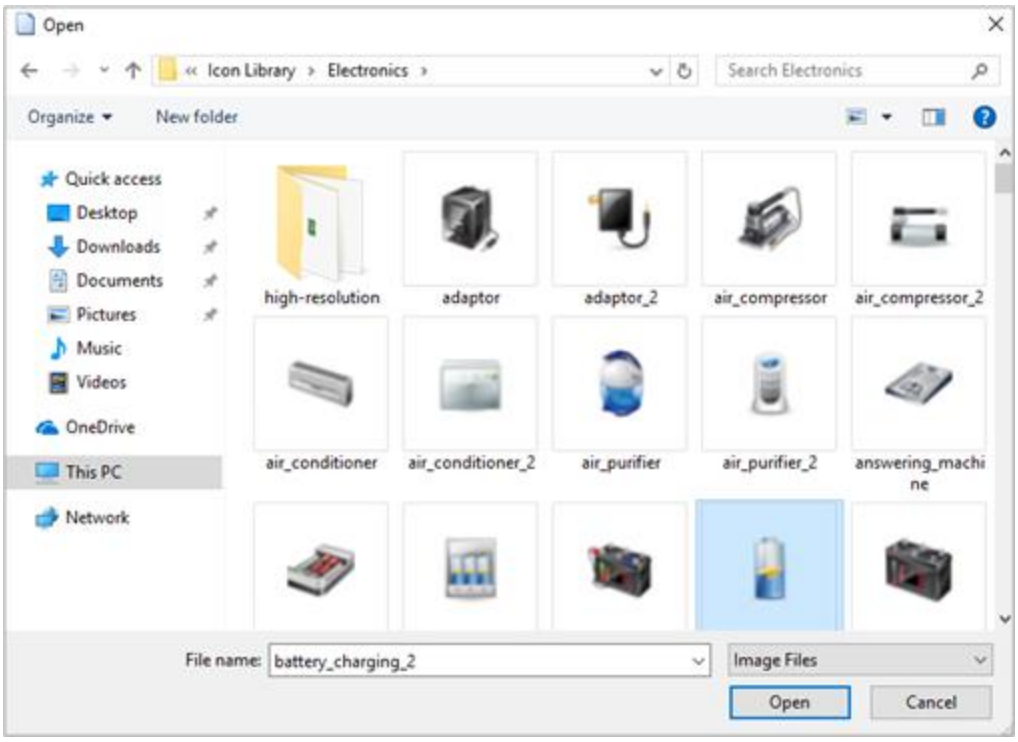

Type in a name, select a weight, and pick the icon that best represents the Entity Type.

You can also select the Metadata Category for this type of entity and Click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Entity Type, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

To choose an icon, use the [Select Icon…] button browse to an icon file. An icon library is included during installation. This is located in the Icon Library folder underneath the Sentinel Visualizer installation location. By default, this folder is selected when you browse for an icon file.

One method for finding an icon matching the entity is to use the search and view feature in the selection dialog. For example, if you are looking for a bank icon, type “bank” in the upper right search of the select icon dialog:

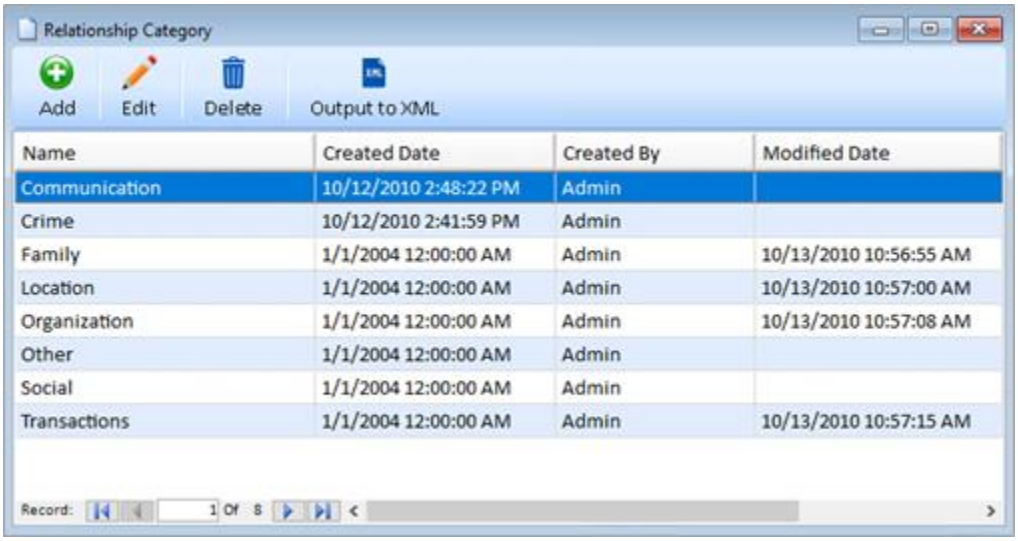



Sentinel Visualizer also allows users to upload their own png, ico and jpg files to their Icon Types.

## Managing Relationship Category Lookups

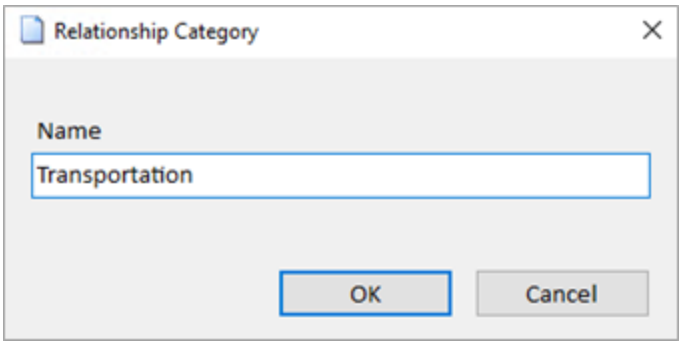
Relationship Category is used in relationship records to denote the category to which a Relationship Type belongs. Because Sentinel Visualizer supports a rich variety of Relationship Types, it is helpful to categorize them to make it easier to find and edit relationship records.

To manage Relationship Category lookups, click the [Relationship Category] link on the left sidebar, or select Lookups, Relationship Category from the Tools menu:




### *Adding and Editing Items*

To add a new Relationship Category, click the [Add] button on the toolbar:




Type a name for the Relationship Category, and click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Relationship Category, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

## Managing Relationship Type Lookups

Relationship Type is used in relationship records to denote the type of relationship. To manage Relationship Type lookups, click the [Relationship Type] link on the left sidebar, or select Lookups, Relationship Type from the Tools menu:

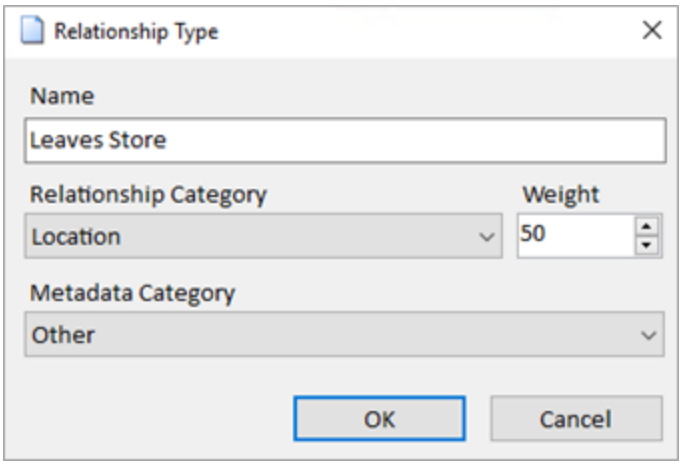
### *Relationship Type Weight*

Each Relationship Type lookup record has a Weight field that identifies its position in relation to all other Relationship Type values. For example, a Relationship Type of “Brother” would have a higher weight than “Acquaintance.”

Sentinel Visualizer uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 175.

### *Adding and Editing Items*

To add a new Relationship Type, click the [Add] button on the toolbar:

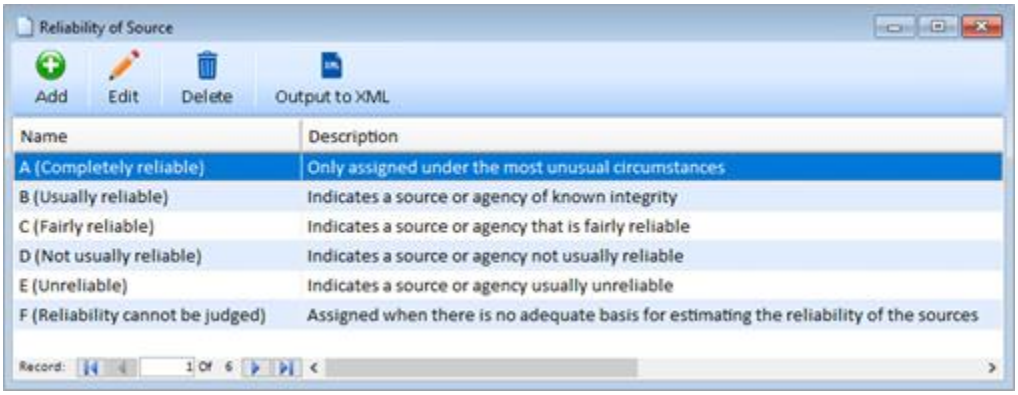



Type in a name for the Relationship Type and select the Category from the drop-down list. Remember that the list of categories comes from the Relationship Category lookup table—use that lookup table to add or edit categories. Enter a weight that signifies the Relationship Type's importance in relation to all other types. Click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Relationship Type, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

## Managing Reliability of Source Lookups

Reliability of Source is used in relationship records to denote the reliability of the source of the information that establishes the relationship. To manage Reliability of Source lookups, click the [Reliability of Source] link on the left sidebar, or select Lookups, Reliability of Source from the Tools menu:



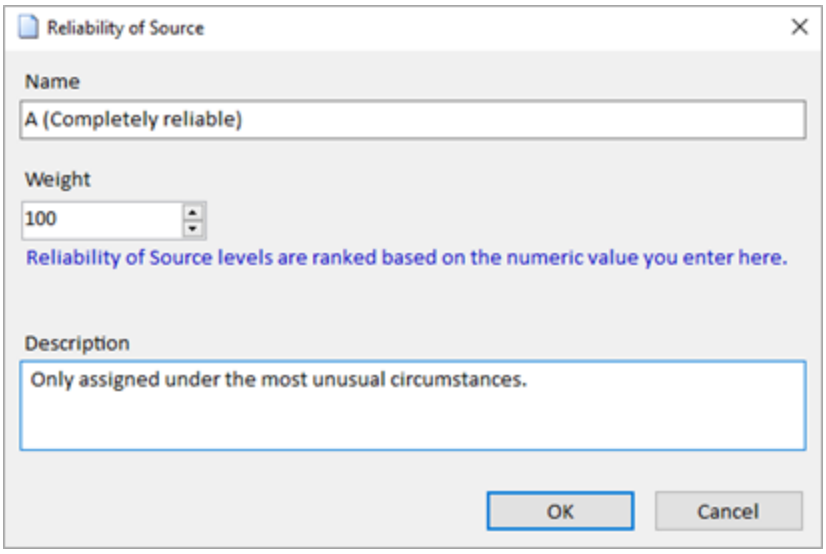

### *Reliability of Source Weight*

Each Reliability of Source lookup record has a Weight field that identifies its position in relation to all other Reliability of Source values. This allows you the flexibility to enter your Reliability of Source levels, and their ranking—the higher the value, the higher the Reliability of Source.

Sentinel Visualizer uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 175.

### *Adding and Editing Items*

To add a new Reliability of Source item, click the [Add] button on the toolbar:




Type in a name, select a weight, and optionally type in a description. Click [OK] to save your changes, or [Cancel] to discard them.

To edit an existing Reliability of Source item, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

# Managing Metadata

Sentinel Visualizer supports the concept of Metadata, which allows you to define additional data fields for entities and relationships. You can use Metadata fields to capture additional entity and relationship detail data that is not built into Sentinel Visualizer.

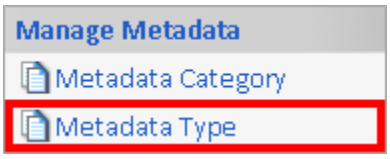
## Metadata Types and Categories

Metadata Types are the additional “fields” you add to your database. Metadata Categories are groupings of these types that facilitate the automatic addition of Metadata Types to new entities and relationships. You can create an unlimited number of Metadata categories and link them to entity and relationship types.

For example, for Person type entities, you may want metadata such as “eye color” or “favorite movie,” that are not included in Sentinel Visualizer. You can add these metadata fields, so they are available for all your Person entities.

## Managing Metadata Types

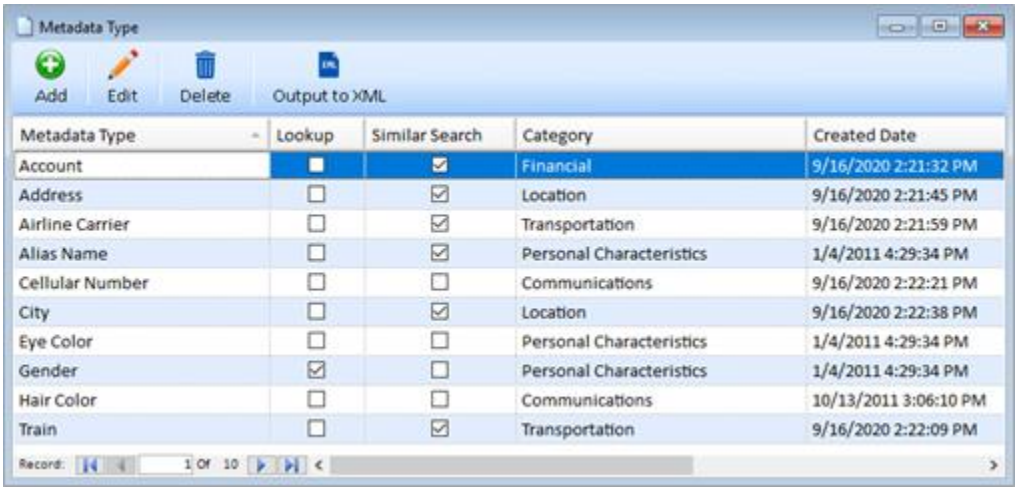
To manage Metadata lookups, click the [Manage Database] link on the left sidebar. Then, under the section labeled ‘Manage Metadata’, click the [Metadata Types] link.



### *Entity Metadata vs. Relationship Metadata*

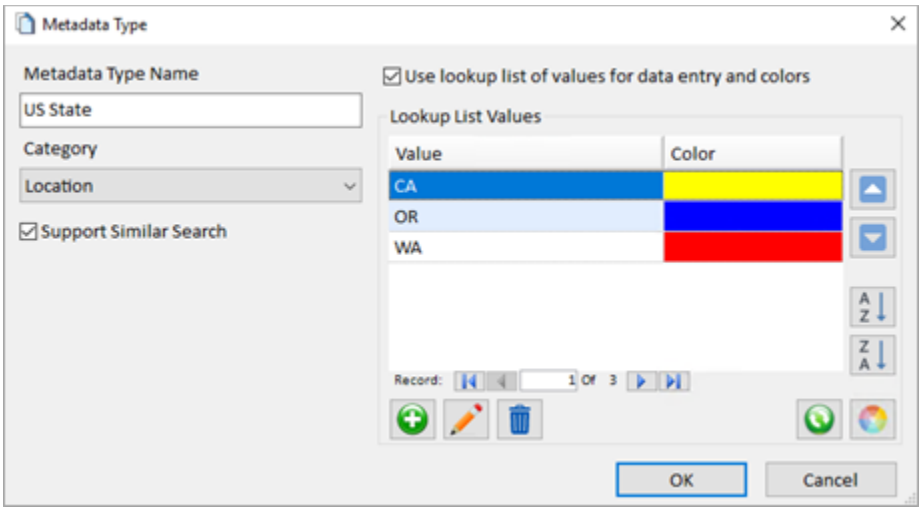
Entities and relationships each have their own list of Metadata types. Each built-in Metadata type that is installed with a new Sentinel Visualizer database is identified as being applicable to either entities or relationships. Similarly, when you create a new Metadata type, you specify whether it applies to entities or relationships.

If you have a Metadata type that applies to both entities and relationships, create two new Metadata types—one for entities, and another for relationships.




### *Metadata Type form*

Click the Add or Edit Button to open the Metadata Type form




- **Metadata Type Name:** Select a name for the Metadata Type. Although the same Metadata Type name can exist for entities and relationships, you cannot duplicate a name within entities, or within relationships.
- **Category:** Choose the Metadata Category for this type.
- **Support Similar Search:** Select this option to include Metadata values to use metaphone for searching as explained below. Note that this setting only applies to entity Metadata types. This option does not affect relationship searches.
- **Use Lookup List:** As previously noted, Metadata types can accept any value or be restricted to a list of values. Select the appropriate option for the Metadata type.

- **Lookup List Values**: If you select the lookup value option, use the Lookup List values section to add and sort the values.

When you are finished, click [OK] to save your changes, or [Cancel] to discard them.

### *Support Similar Search*

Sentinel Visualizer provides a feature to find entities based on various spellings of entity names. It does this by creating a metaphone index on name variations when you add or edit the entity record.

Phonetic variations can also be applied to Metadata types. For example, if an entity named "Robert" has a Metadata item for his alias "Bobby," you want the SearchAssist to find the entity when you search for "Bobby." To do this, check the [Support Similar Search] check box for the Alias Metadata type. This includes the Metadata value ("Bobby") and all similar spellings (e.g. "Boby," "Bobbi," "Bobbie," etc.).

When you select the "Support Similar Search" option for a Metadata type, you are opting to include Metadata values with that type in basic entity searches. In general, only use this option for Metadata types where name variations are a potential problem when searching.

### *Lookup List Metadata*

When you create a new Metadata type, specify whether users can enter any value or select from a list of acceptable values by checking [Use lookup list of values for data entry and colors]:

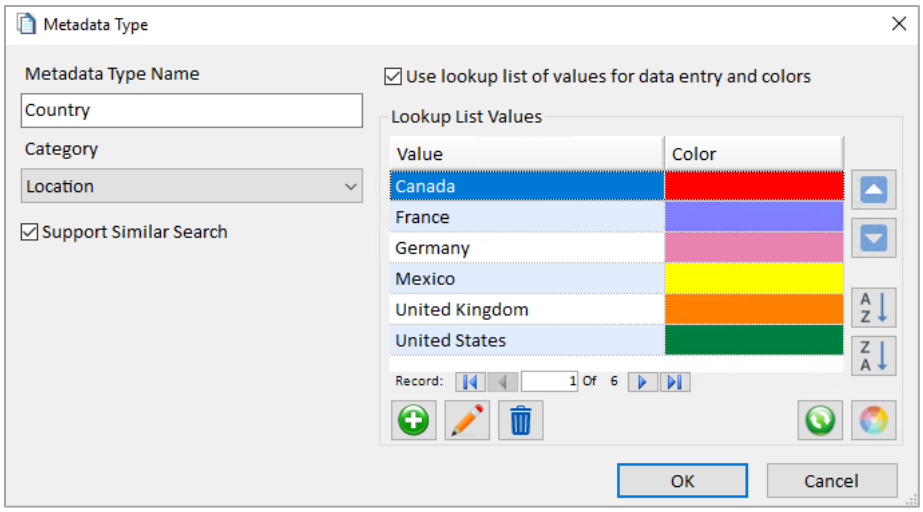
For example, this would not be used for a Metadata type of Alias that would be an unconstrained text value (string and/or number).

A Metadata type of Eye Color could be limited to black, blue, brown, green, etc. This would require the user to select only from a pre-determined list that you, as the System Administrator, define and eliminate their need to spell the colors.

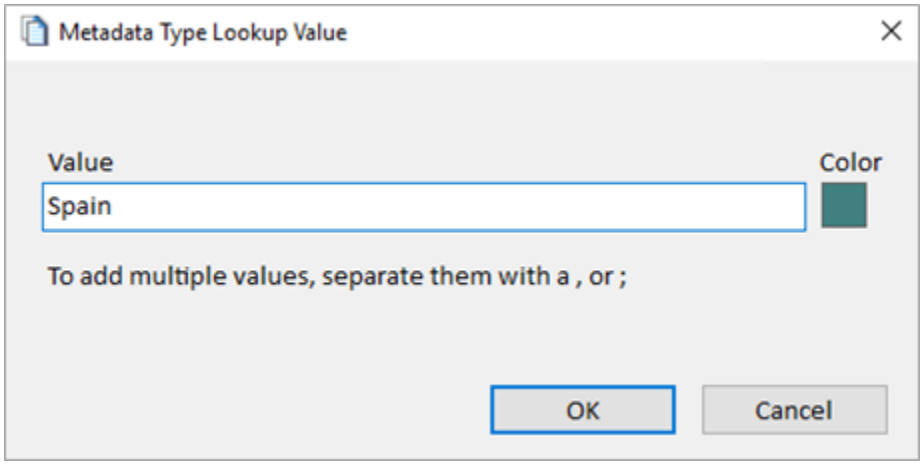
Note that the list of lookup values is only used to simplify the assignment of metadata values to entities and relationships. If you change a value in the lookup list, it does not update the previously assigned values.

### *Managing Lookup List Values*

The list of lookup values is displayed with their colors that can be used on the Visualizer diagram to color entities with that metadata type value:




Click the Add button to add a new item. A form appears to let you add a value and specify its color:




To add multiple values at one time, separate them with a comma or semicolon. If that's detected, you are prompted to split it into separate values. You can decline and have a metadata value with commas or semicolons.

Double click the item or click the Edit button to edit the selected item. Note that changing the value does not change the values already assigned to entities. This is just the lookup list for selecting values.

The Delete button prompts to delete the selected item or items.

The Refresh button looks for values in the current entity and relationship metadata tables for this metadata type. If there are any values not in the lookup list, you have the option to add it with a color you specify. This makes it easy to make sure your lookup list has all the values in your database.

### *Reordering Lookup Values*

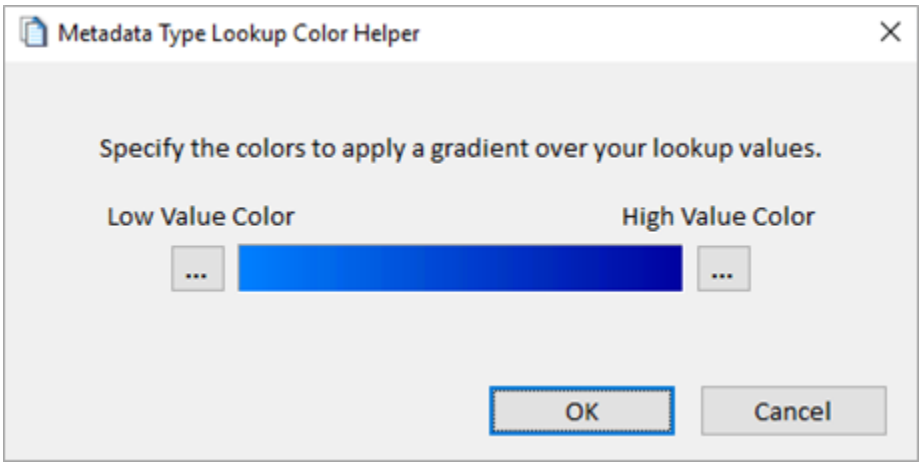
Use the Move Up and Move Down buttons to change the order of the current value in the list. The values are displayed in the order you set for this metadata type's combo box.

Use the alphabetical sort buttons to sort the values in ascending and descending order.

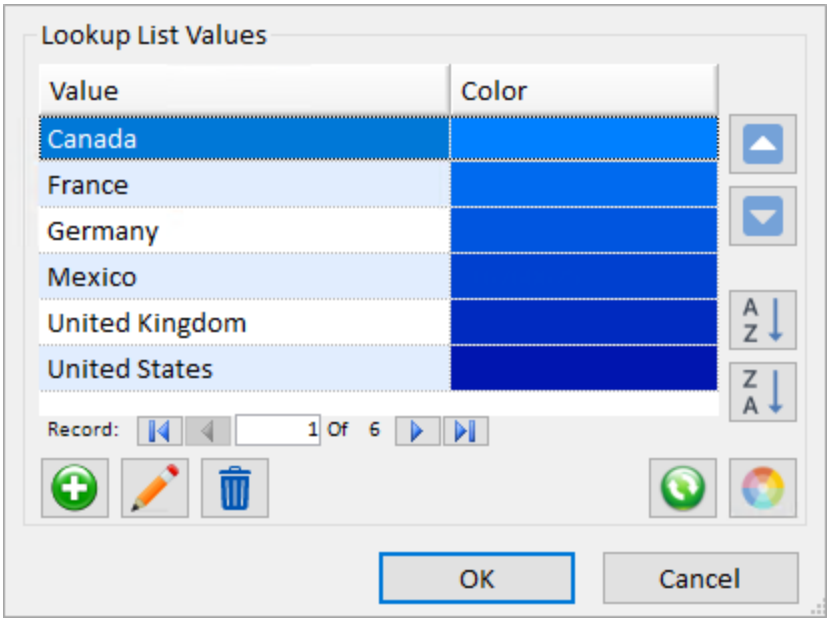
### *Metadata Type Colors*

The color option allows you to specify the color to use when coloring Entities by metadata in the Visualizer, such as Blue for Male, Red for Female, and Green for Unknown, etc.

If there are many values, it may be too cumbersome to set their colors individually. After sorting the list in the order, you want, use the Color button to assign all of them with a color gradient.




Pressing [OK] applies the gradient to the values:



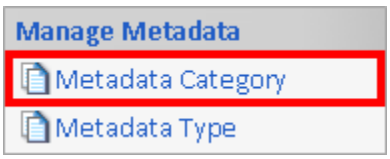

## Managing Metadata Categories

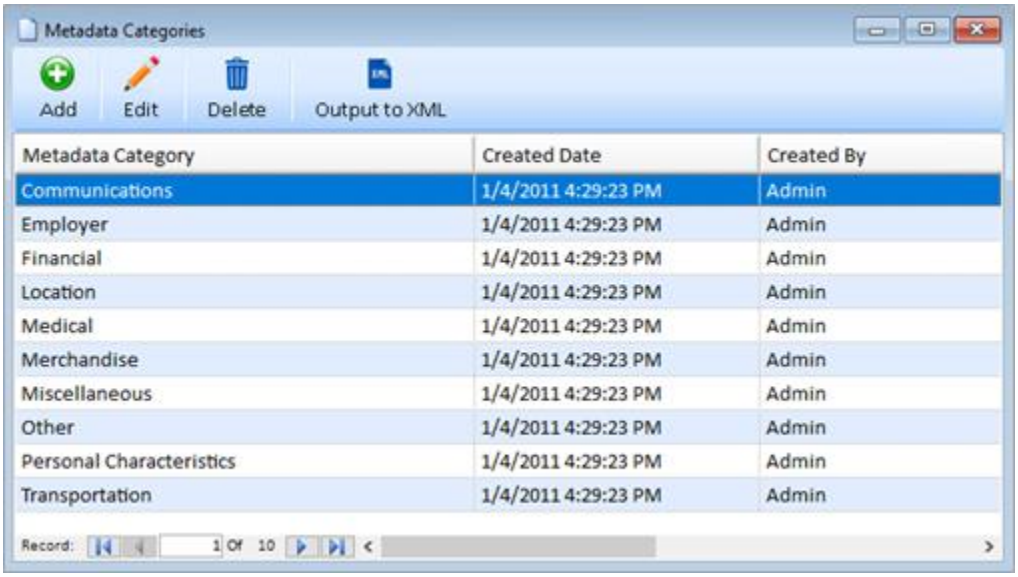
Metadata Categories are groupings of these types that facilitate the automatic addition of Metadata Types to new entities and relationships.

For example, for Person type entities, you would want to have Metadata types that relate to a person, such as “eye color”, or “favorite movie”, so that when you create a new person entity, these metadata types are automatically added for you.

You can create any number of metadata categories and link them to entity types.

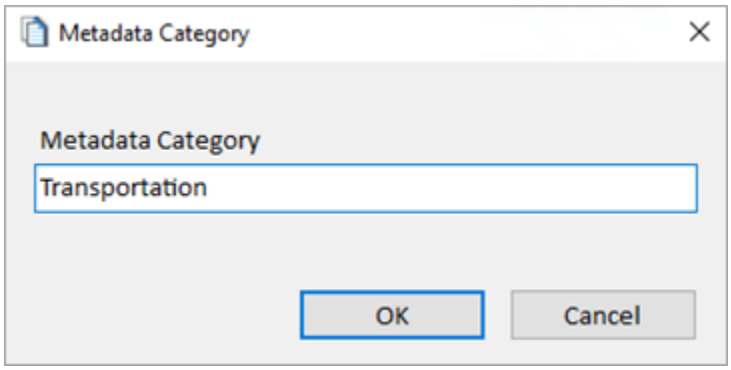
To manage Metadata Categories, click the [Manage Database] link on the left sidebar. Then, under the section labeled 'Manage Metadata', click the [Metadata Category] link.




### *Adding and Editing Items*

To add a new Metadata Category, click the [Add] button on the toolbar, enter the category name and click [OK]:

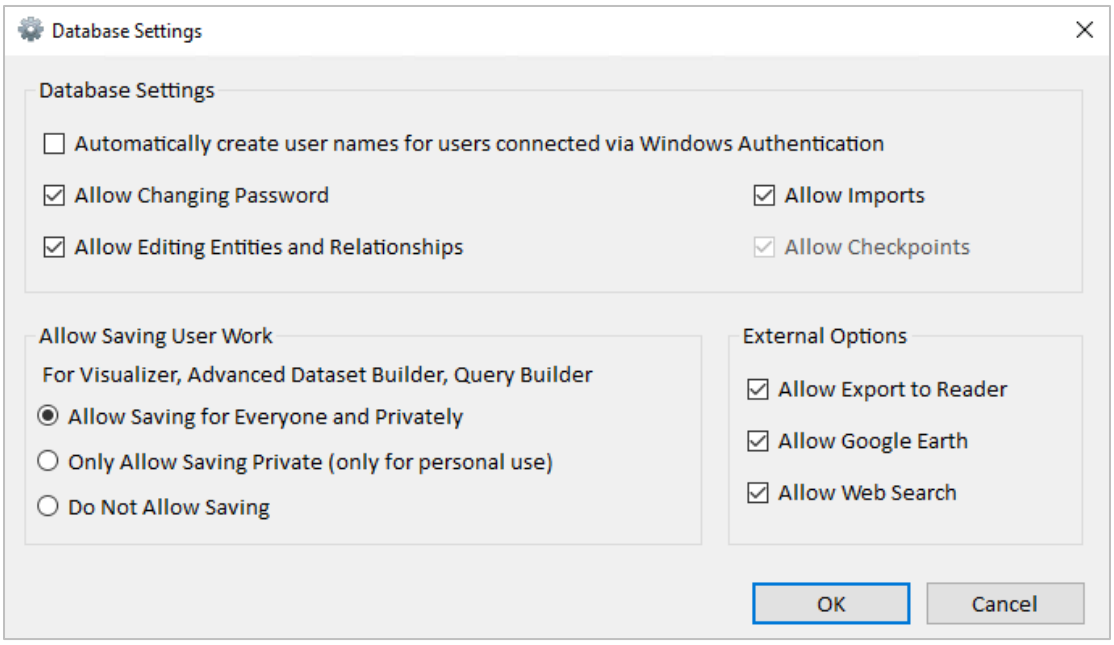



To edit an existing Metadata Category, double click the row on the lookup editor form, or select the row and click the [Edit] toolbar button.

# Managing Security

## Managing Database Settings

Database settings allow an Administrator to specify database security options.




### *Automatically create username for users connected via Windows Authentication*

This option enables automatic user creation when connecting to a database using Windows Authentication. When this option is enabled, users no longer have to enter a username or password when connecting to a shared server.

### *Allow changing password*

Disabling this option prevents user from changing their password.

### *Allow Editing Entities and Relationships*

Disabling this option makes the database read-only.

### *Allow Imports – Allow users to bring new information into the database*

Disabling this option prevents users from importing data.

### *Allow Checkpoints*

Disabling this option prevents from making checkpoints. Note that this option has be enabled when Allow Imports is enabled.

### *Allow Saving User Work*

- **Allow Saving for Everyone and Privately** – Users can save private diagrams and diagrams accessible to all other users.
- **Only Allow Saving Private (only for personal use)** – Users can only save private diagrams. No other users can see their saved diagrams.
- **Do Not Allow Saving** – Do not allow any Diagrams to be saved.

### *External Options*

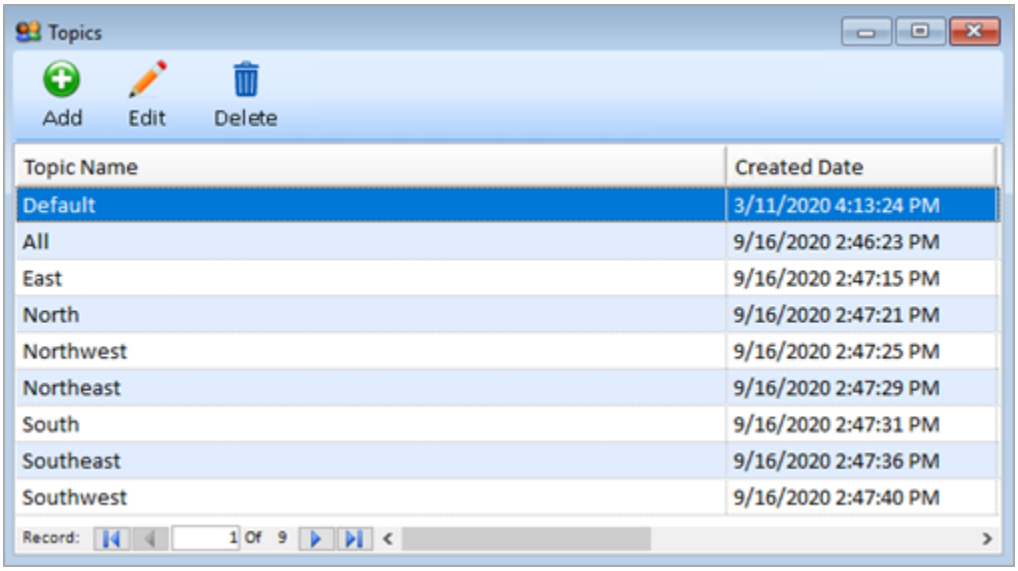
- **Allow Export to Reader -** Disabling this option prevents users exporting data to Reader files.
- **Allow Google Earth -** Disabling this option prevents users from exporting data to Google Earth.

- **Allow Web Search -** Disabling this option prevents users from performing web searches.

## Managing Topics

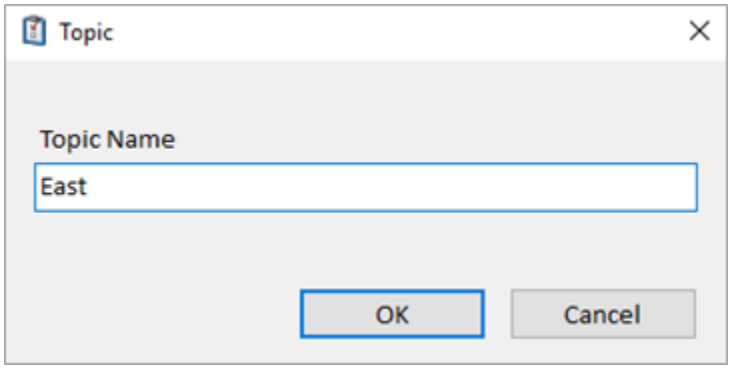
Topics are categories of information that allow you to categorize entity and relationship information.

To manage Topics, click the [Manage Database] link on the left sidebar. Then, under the section labeled 'Manage Security', click the [Topic] link.




### *Adding a New Topic*

Click the [Add] toolbar button to open the Manage Topics form:




Enter the name of your new topic and click the [OK] button. Each topic name must be unique.

### *Editing Topics*

To edit the name of an existing topic, double click on the topic on the Manage Topics form or select the topic and click the [Edit] toolbar button. Note that name changes in topics are automatically propagated throughout the system.

### *Deleting Topics*

To delete a topic, select it in the list and click the [Delete] button on the toolbar. You cannot delete a topic that is in use by any entity or relationship records.

## Managing Users

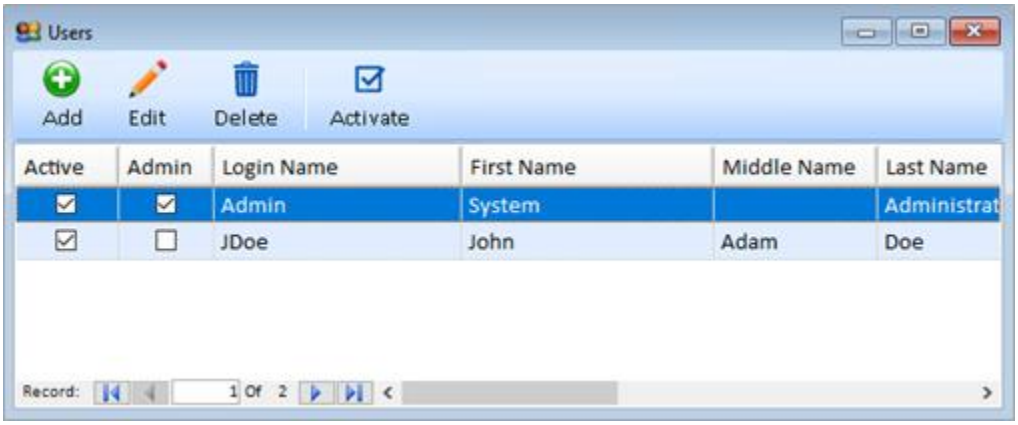
Each user who accesses a Shared Database must have a user account. From the Manage Database form, select [Users] under Manage Security. User accounts are stored per database.

### *User Types*

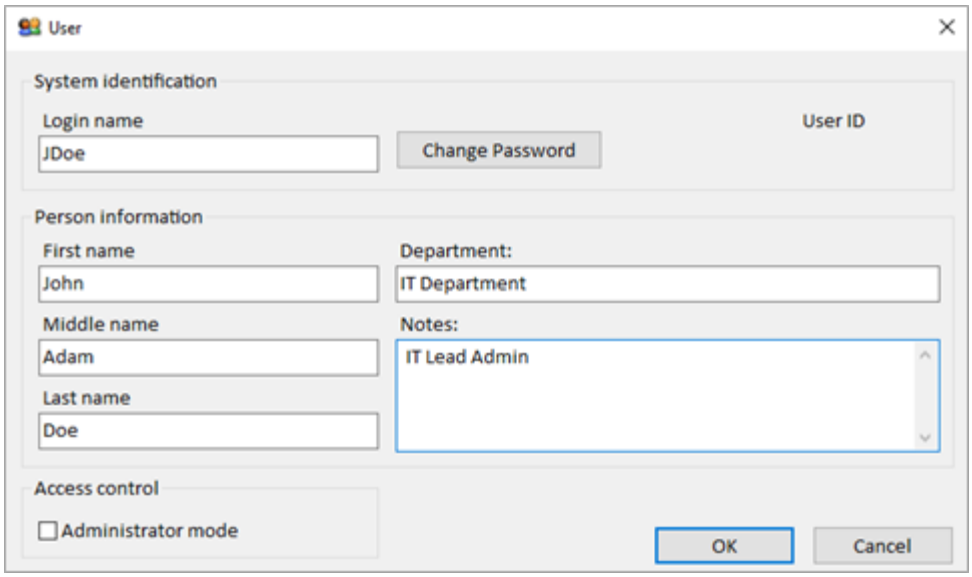
Sentinel Visualizer provides two types of users:

- **Standard Users:** Can access the database using Sentinel Visualizer but cannot make changes using the Manage Database form.
- **Administrative Users:** Have all the rights of Standard users and can also run the Manage Database form.

You can designate any Sentinel Visualizer user as either type or change the user type at any time. To manage the list of users, click the [Users] link on the left sidebar:




To add a new user, click the [Add] toolbar button and the Add New Users form appears:




- **User ID:** The User ID field is a unique numeric identifier for the user. This field is system-maintained and cannot be changed.
- **Login Name:** A unique login name for the user, typically a combination of the user's last and first name.
- **Change Password:** Click this button to set the user's password, and re-type the password to confirm. Follow your organization's existing password policy determining length, complexity, etc., and be sure to note the password in a safe place. The user needs this password to log in to the Sentinel Visualizer system.
- **Personal Information:** Enter basic information about the person. These fields are for informational purposes only—they are not used by the system. Note that First name and Last name are required, but all other personal information fields are optional.
- **Access Control:** Check the [Administrator mode] check box to make the user an administrative user, or leave it unchecked to make the user a standard user.

After entering the user information, click [OK] to save the new user account, or [Cancel] to return to the Manage Users form without saving changes.

### *Editing an Existing User*

To make changes to an existing user, double click on the user on the Manage Users form or select the user and click the [Edit] toolbar button. Make the appropriate changes on the Manage Users form, then click [OK] to save your changes.

### *Deleting and Deactivating Users*

Sentinel Visualizer allows you to delete existing users, but only if that user has not created or edited any records. Sentinel Visualizer keeps an audit trail of all database records that stores the ID of the user who created or last edited a record. For this reason, you cannot delete a user who is associated with any existing records.

To delete a user, select the user in the list and click the [Delete] button on the toolbar. The system checks to ensure that the user is not linked to any records. If the user is linked to any record, a notification message appears, and the user is not deleted.

If the user cannot be deleted but should no longer have access to the system, use the Deactivate feature. This retains the user information in the database but does not allow that user to access the system.

# Export and Import Lookup Tables, and Delete Unused Values

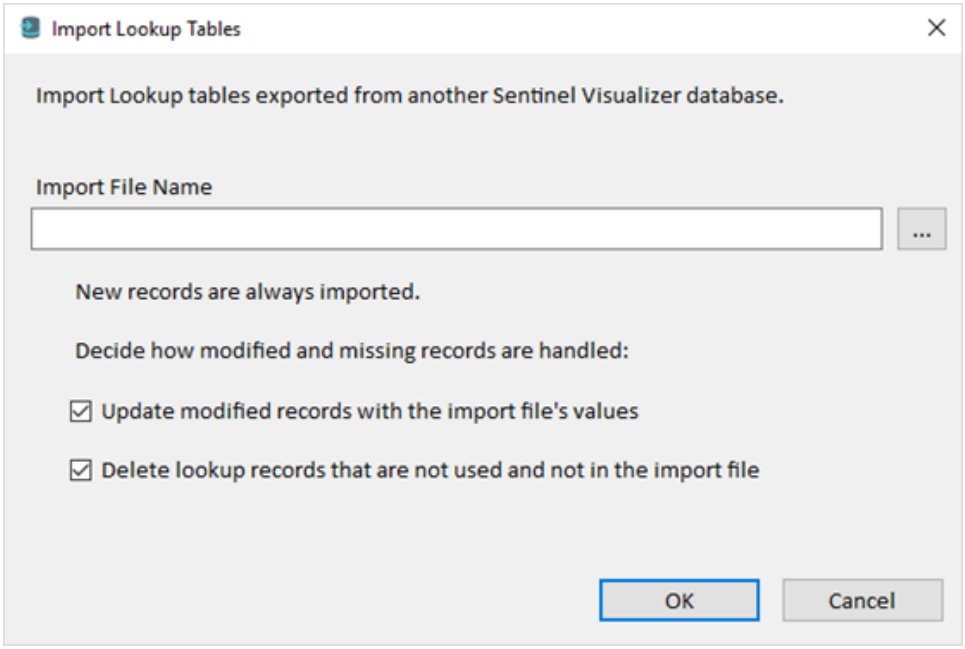
## Export Lookup Tables

All the values in your lookup tables can be exported to a Sentinel Visualizer Lookup file (*.SVL) that can be imported by another database. This is a quick way to update the lookup values across databases or create new databases with a custom set of lookup values.

During import, there are options to update and delete lookups in your current database from the import file.

## Import Lookup Tables

Import the lookup tables exported from another database. By default, all new lookup values are added.




You can optionally choose to update existing records and delete lookup records that are not used. Updates would reflect changes in lookup value descriptions and other fields.

If the Delete option is selected, the existing lookup values that are not used are deleted before the new lookup values are imported.

### Delete Unused Lookup Values

Delete all the lookup values in the current database that are not used. For instance, an Entity Type that is not used by any Entity is deleted.

# Chapter 21: Multi-User Shared Databases

*The Premium and Enterprise Editions of Sentinel Visualizer support multiuser, shared Microsoft SQL Server databases installed on a database server computer. When creating and using shared databases, there are several key concepts that differ from single-user Local Databases. This chapter provides information and strategies for working with Shared Databases.*

## Microsoft SQL Server

### Microsoft SQL Server Authentication Modes

Microsoft SQL Server provides two authentication modes that govern how it allows and disallows access to database objects.

#### *Mixed Mode*

In this mode, SQL Server allows SQL Server authentication and Windows authentication. SQL Server authentication means that SQL Server itself manages username and passwords. This mode is simple to implement but is not very secure because of password decryption issues. It is very likely that your organization does not allow mixed mode because of lack of robust security in SQL Server Security mode.

#### *Windows Authentication Mode*

In this mode, SQL Server only accepts credentials from existing Windows Domain users. Since this mode relies on the high level of security built into the Windows Server software, it is much more secure and accepted.

#### *Recommendations*

You can create Shared Databases on servers supporting either mode. However, it is recommended that you use the Windows Authentication mode for security purposes.

Note that detailed information about Microsoft SQL Server security, setup, and configuration issues is beyond the scope of the Sentinel Visualizer documentation. Please refer to the appropriate Microsoft-provided documentation for complete information.

### Backup and Restore SQL Server Databases

Backing up your Sentinel Visualizer databases is very important for protecting your data. Just like you would backup and relocate your Word, Excel, and other files in case of a hard drive crash, you should backup and store copies of your Sentinel Visualizer databases for safekeeping.

Another benefit of backing up your databases is that if a data-import fails, you can restore your database, make changes to the data-import map (svi3 file), and reimport the data.

For more information on how to backup and restore your SQL Server Databases, visit our webpage, https://SentinelVisualizer.com/SQLServer/backup/index.htm.

# Domain Groups and Users

To simplify the interaction between Sentinel Visualizer and SQL Server, this guide explains how to best set up your environment before creating a database.

To do this, set up a new domain group on your network, typically named SentinelVisualizer. This group must have the correct permissions to physically "see" your SQL Server system. You should inventory all your existing domain users and groups to identify who can use Sentinel Visualizer. Add these users to the SentinelVisualizer domain group.

When you create your database, identify your new domain group to the system. It then takes care of granting the correct permissions to the database object for that domain group.

## Steps to Grant Access to a Domain Group

1. Create a group in the Active Directory domain.
2. Add users who will access the Sentinel Visualizer database to the group.
3. In SQL Server Management studio:
    a. Add a login to the server for the Active Directory group created in step (1).
        i. Create a user in the Sentinel Visualizer database for the new login created in (3a).
    b. Add the user to the SentinelApp role in the Sentinel Visualizer database.
        i. Create a user in the master database for the new login created in (3a).
    c. Add the user to the SentinelApp role in the master database.
4. Open the Active Directory management console on your Active Directory domain controller.
    a. Under the Computers folder, right-click on the SQL Server computer and select Properties.
    b. Click on the Security tab.
    c. Click the [Add] button.
    d. Type in the Active Directory domain group used to access SQL Server (e.g., <domain>\<groupname> and click [OK].
    e. Highlight the Active Directory group in the list box on the Security tab and check the "Read" and "Write" check boxes under the "Allow" column in the Permissions list, then click [OK].

This is an overview of the basic steps required to configure a domain group to access SQL Server. Your network and Active Directory environment may require additional steps that are not covered here. Consult your Network Administrator for help if the above steps do not completely configure your domain group.

# General Planning Checklist

This section provides a general checklist for installing and planning a Shared Database environment for Sentinel Visualizer.

## Designating a System Administrator

Every system that has more than one user or shares data, should typically have a designated System Administrator. This person is responsible for installing and configuring the system, as well as performing general maintenance tasks.

The tasks outlined in this chapter are the purview of a System Administrator, so it is important to choose a person for this role before continuing. Ideally, your Sentinel Visualizer installation would have one designated System Administrator and one backup System Administrator.

These checklists and this guide in its entirety assume that you, the reader, are the designated System Administrator.

## Install and Configure Microsoft SQL Server

For detailed instructions on how to install Microsoft SQL Server Express, visit our webpage https://SentinelVisualizer.com/SQLServer/express_2019/index.htm.

## Plan Database Maintenance Tasks

- Your investment in your data is only protected as well as your organization's general database administration and maintenance plan.
- Create a data backup plan. Ensure that your SQL Server system is properly backed up. Sentinel Visualizer does not provide database administration and backup functions as these are available directly through Microsoft SQL Server or through a variety of third-party tools.

## Create the Sentinel Visualizer Domain Group

As discussed earlier, you need to create a new domain group that acts as the central authentication token that Sentinel Visualizer software uses to connect to the SQL Server installation. By convention, this group should be called **SentinelVisualizer**. Ensure that this group has the necessary permissions and settings so that it can connect to the server where SQL Server is running.

## Configure Microsoft SQL Server for Multiuser Environments

For detailed instructions on how to configure Microsoft SQL Server in a multiuser environment, visit our webpage https://SentinelVisualizer.com/SQLServer/multiuser/index.htm.

## Identify Sentinel Visualizer Users

Identify the initial set of Sentinel Visualizer users, including any users performing administrative roles on the database. You can add additional domain users to the domain group later, but it is helpful to identify your initial users and administrators up front.

## Add Domain Users to the Sentinel Visualizer Domain Group

Once you identify the list of existing domain users, you add them to your Sentinel Visualizer domain group. Use the standard Windows Server tools to accomplish this task.

# Data Access and Multi-User Concurrency

The Premium and Enterprise Editions of Sentinel Visualizer support connections to a Server Database that allows multiple users to concurrently access and change the data. To do this efficiently, it must manage a variety of conditions to ensure that both access and edit operations happen in a controlled and coordinated way.

As you work with the software in a multi-user environment, it is helpful to understand how Sentinel Visualizer manages this process.

## How Records are Accessed

The first thing to understand is how Sentinel Visualizer retrieves information. When you use one of the search functions or request entity or relationships information, the Sentinel Visualizer software installed on your computer sends your request to the Sentinel Visualizer database server. The server then determines how to handle the request, checks your user account against the Access Control Lists, and assembles data to send back to your computer, where it is displayed on your screen.

At this point, the connection between your computer and the database server is closed—you are looking at a local copy of the data on your computer as it existed on the shared database server when the request was made. This means that no "locking" has occurred. This non-locking design, as is typical in client/server system designs, ensures a high degree of data availability, and provides optimal performance, even with many concurrent users.

The important thing to understand is this:

> Your computer's copy of Sentinel Visualizer does not automatically refresh data.

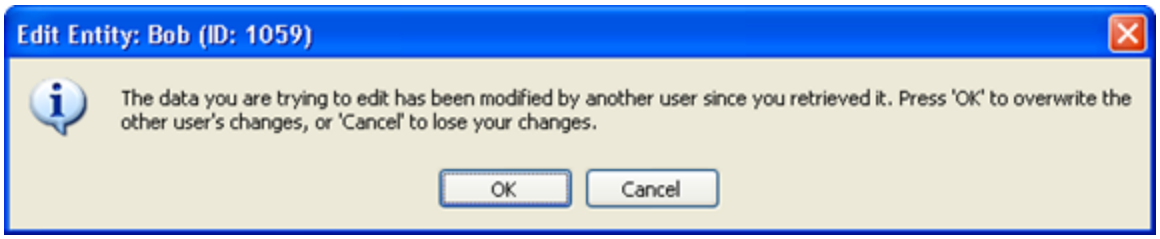
The data you see on your screen is only current as of when you issued the request. If you perform an Entity Search for "Bob" at noon, the system returns all known "Bob" records. If you step out for lunch and return an hour later, your screen does not automatically show you the new "Bob" records that others added while you are away.

Similarly, if you have a "Bob" entity record open, it shows information about Bob that was current when the Sentinel Visualizer database server retrieved it for you. Afterwards, another user may have edited that record, changing his name to "Robert."

If you want to be sure that your view of the data is current, do not rely on what was on your screen yesterday, or an hour ago—repeat the operation to retrieve the most current information from the server.

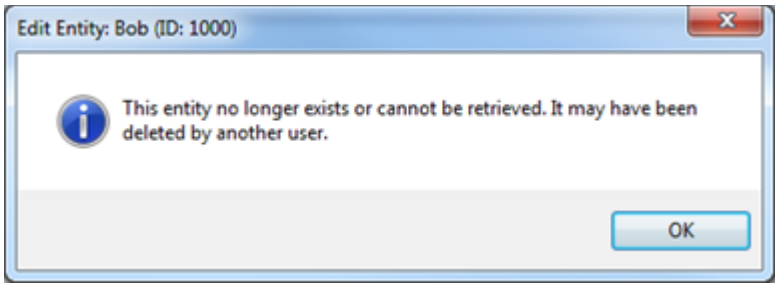
## Multi-User Concurrency

Sentinel Visualizer handles cases where multiple users are attempting conflicting operations. For example, assume you open the "Bob" entity record and edit it. Your changes take a while. Before you save, Mary down the hall opens "Bob," edits it, and saves her changes. Then you try to save. In this case, Sentinel Visualizer gives you a choice of whether to save your changes and overwrite Mary's, or to lose your changes and keep Mary's:




To keep your changes and lose the other user's changes, click the [OK] button. To keep the other user's changes, and lose yours, click [Cancel].

Similarly, assume that while you are in the process of editing a record, another user deletes the record, or changes permissions so you no longer have permissions to access it. Consider the case where you search for “Bob.” His entity record shows in the search results and you open it to make changes. In the meantime, Mary deletes the “Bob” record. When you try to save the entity, you are informed that you cannot save your changes:




Click [OK], and if necessary, add a new entity to replace the removed entity.

# Chapter 22: Compare, Merge and Clone Entities

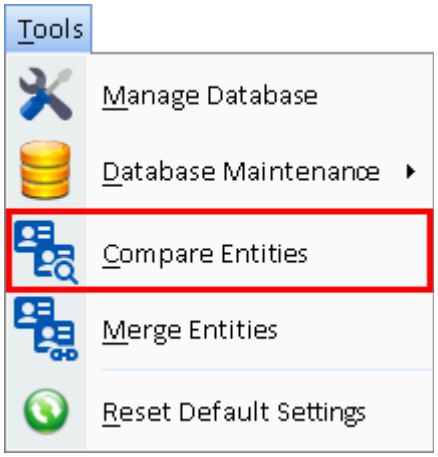
*As you work with entities, you may find similar or duplicate data. This chapter describes how to compare, merge, and clone entities.*

## Entity Compare

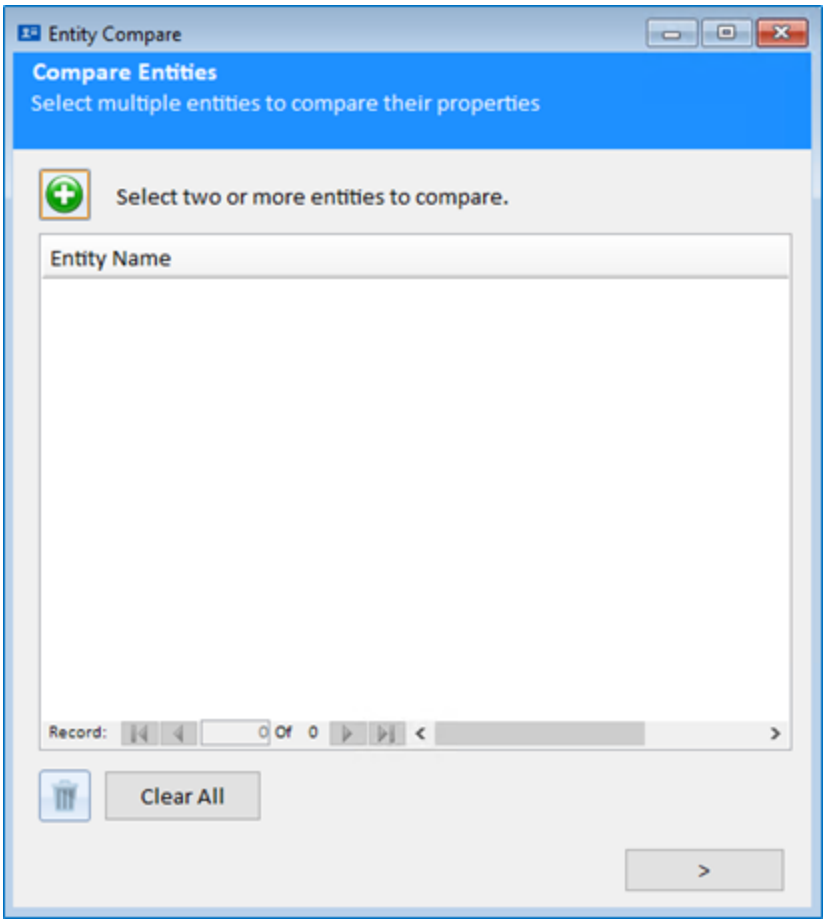
The Entity Compare tool allows you to see the metadata records for two or more entities side by side. This is useful when you are looking for similarity between entities or trying to find potential duplicate entities. By looking at metadata side by side, you can see patterns such as two different entities having the same driver's license number or phone number.

### Choose the Entities to Compare

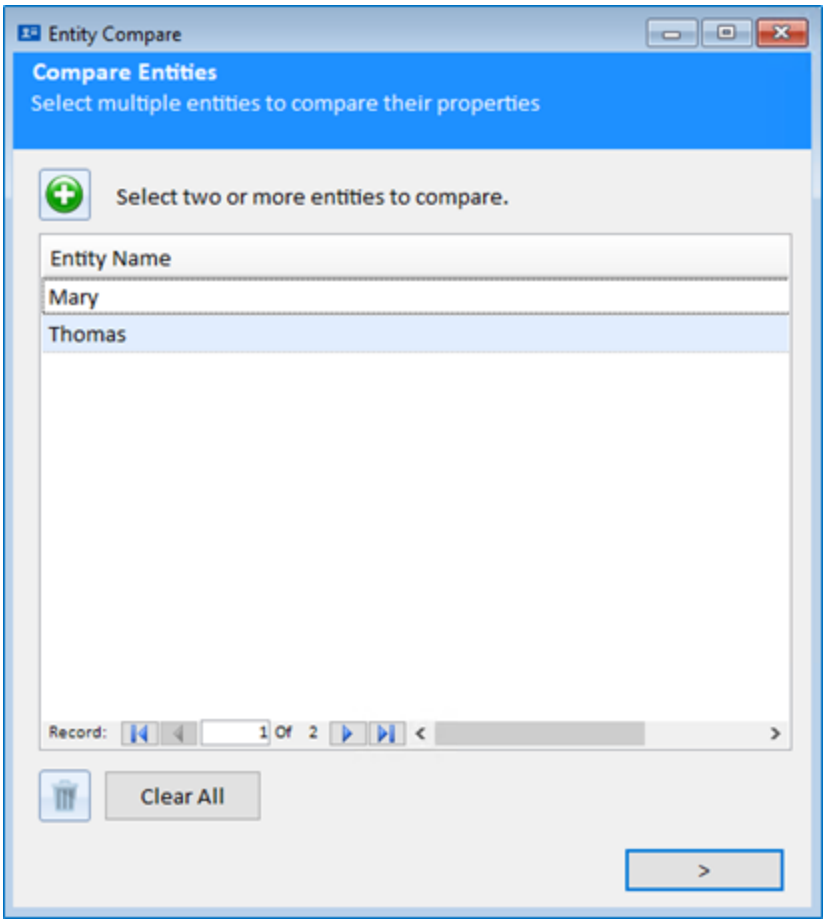
To run Entity Compare from the Home page, click the [Tools] drop-down on the menu toolbar and select [Compare Entities].




Click the green [+] button to add two or more entities for comparison.

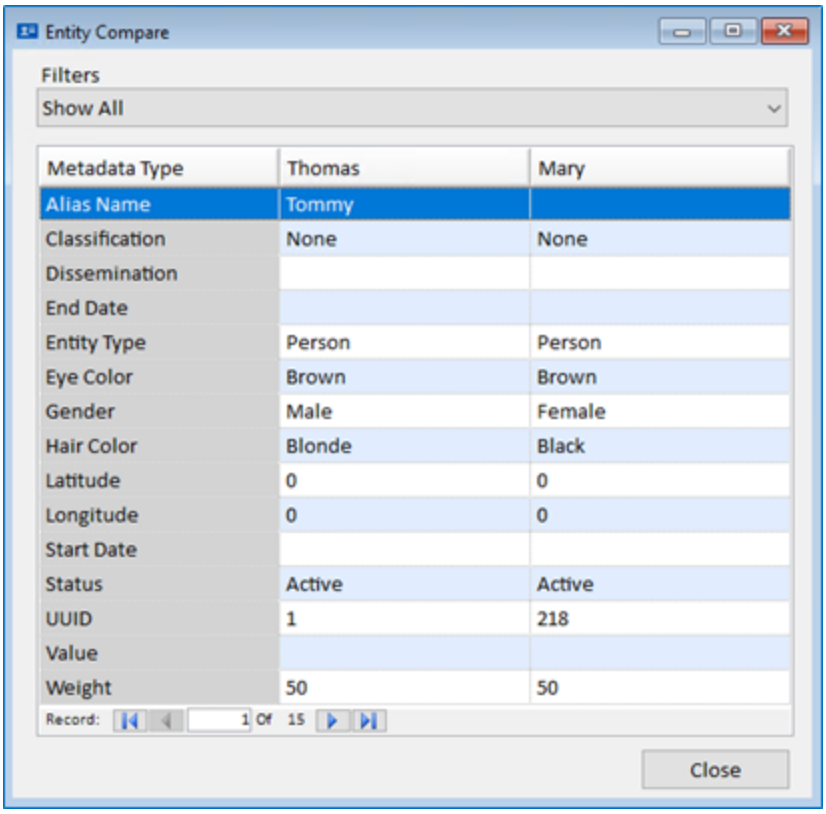



This opens the standard Entity Picker form that uses the search features described in **View Entity Information** on page 44. Select the entity you want to compare. Click on [OK] button. Each entity you add appears in the Selected Entities area of the form. Click on the green [+] button to add more entities to compare. You can use the Delete button to remove the selected entity from the list, or the [Clear All] button to remove all entities from the list and start the selection process over.

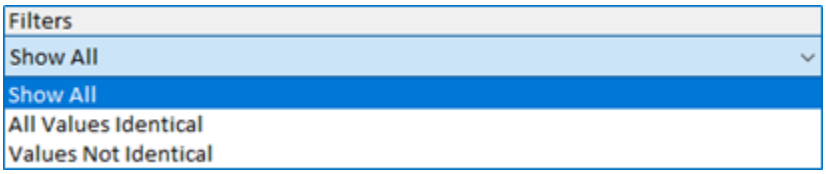



## Comparison Results

After selecting the entities to compare, click the [>] button. Sentinel Visualizer compares the metadata values for the entities and displays the results in a grid.




You can scroll through the list to find similarities and differences. The Filters allow you to easily change the view of the data.

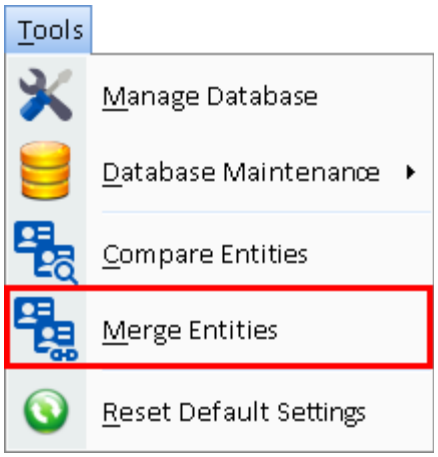



- **Show All:** Shows all metadata values for each entity.
- **All Values Identical:** Shows only the metadata values that are identical.
- **Values Not Identical:** Shows only the metadata values that do not match.

## Entity Merge

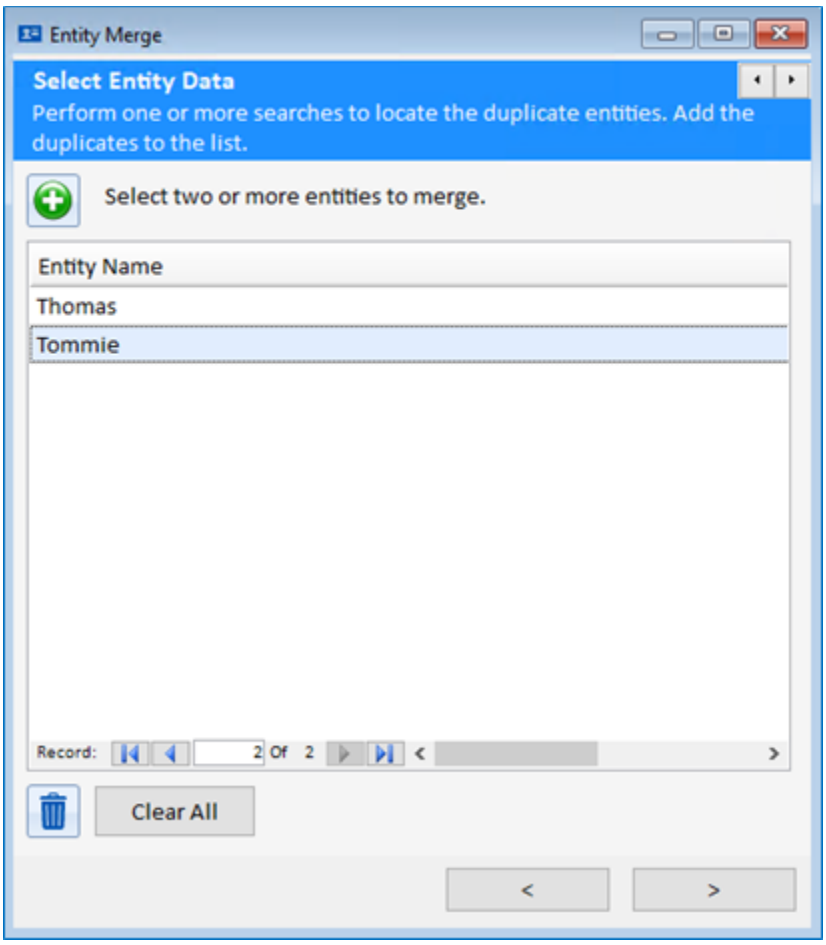
Entity Merge allows you to select two entities and merge them into one record. This is useful when you find duplicate entities that contain different data or relationships, and you want them merged into a single record.

To run Entity Merge from the Home page, click the [Tools] drop-down on the menu toolbar and select [Merge Entities].




## Select Entities to Merge

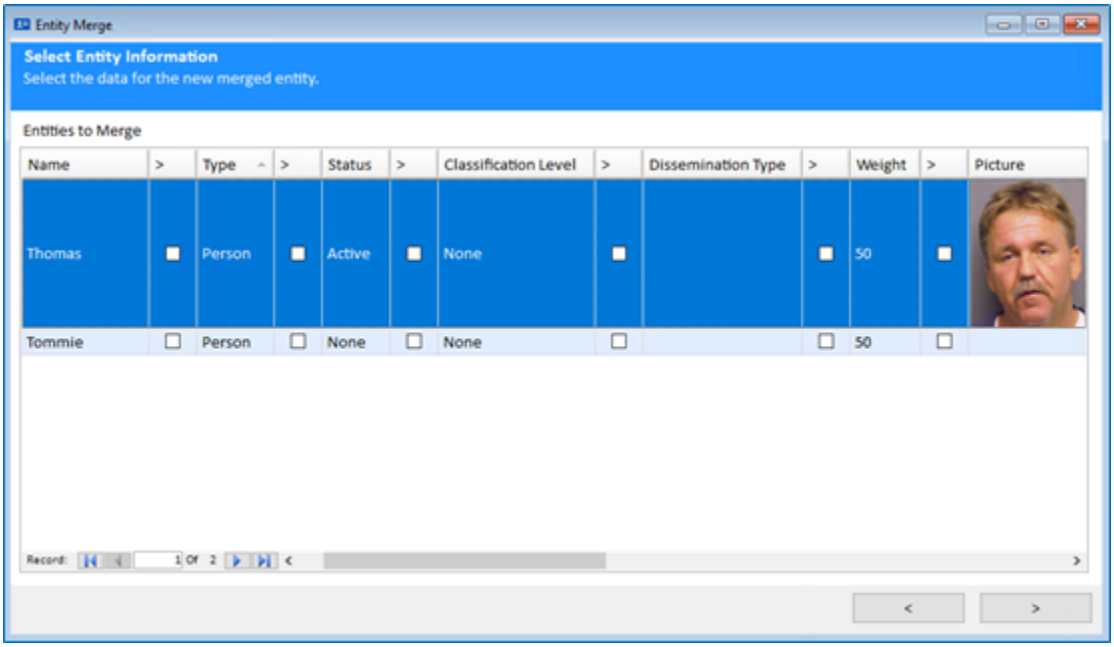
Click the [+] button add an entity to merge. This opens the standard Entity Picker form that uses the search features described in **View Entity Information** on page 44. After locating the first entity to merge, click [OK] and then use the [Select Entity] button again to add the second entity. You can add an unlimited number of entities to merge into one.




After selecting two or more entities to merge, click the [>] button. The Select Entity Data page appears.

## Select Field Values to Merge

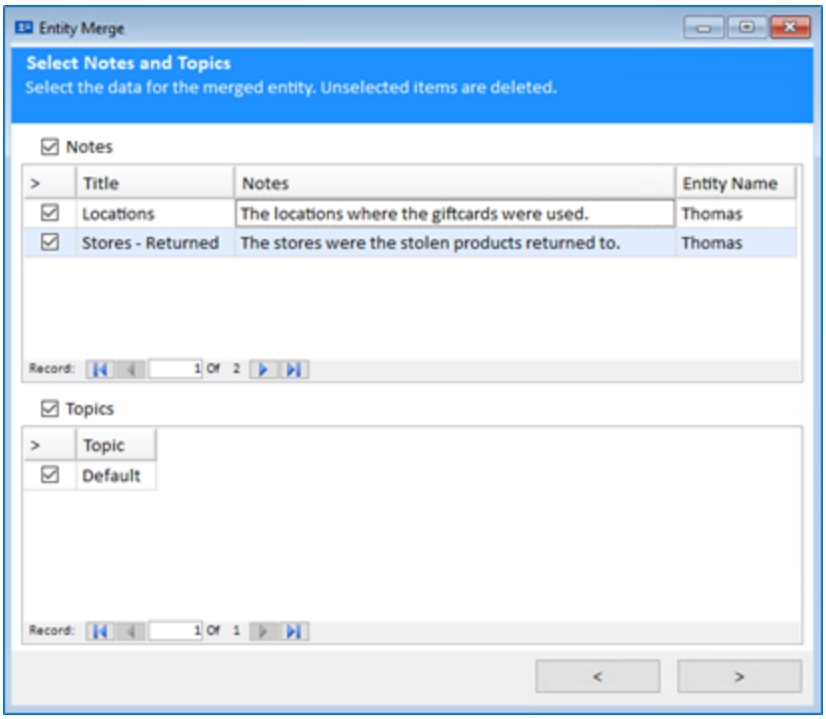
Select the individual fields from each entity record that you want to store in the final merged entity. This allows you to choose pieces of information from the original entities to include in the new entity record.




The first checkbox allows you to select or de-select all fields in that row. Each field also has a checkbox that allows you to select that specific field for that row. Once you have selected the fields for each entity, click the [>] button.

## Select Note and Topic Data

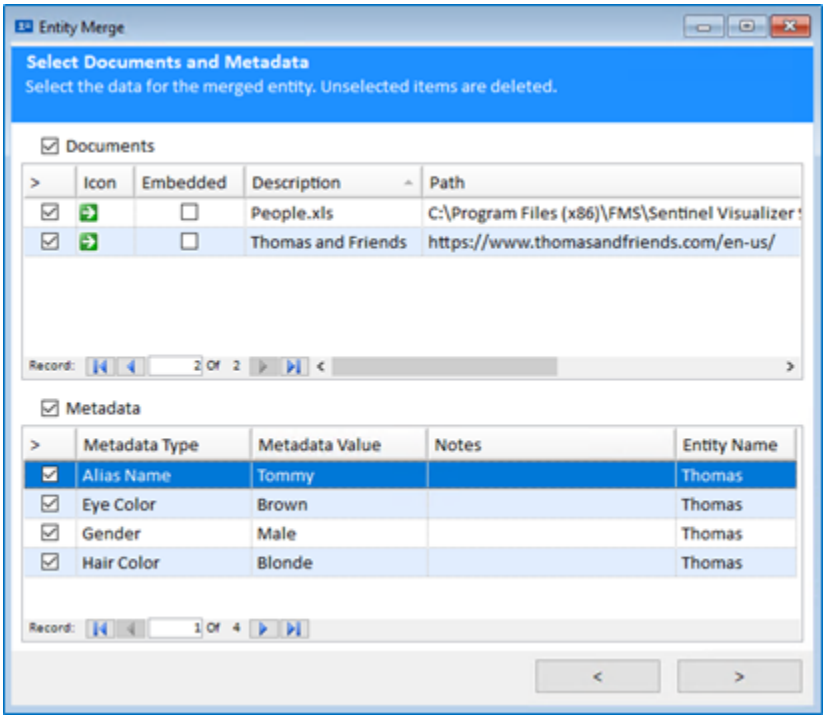
The Select Note and Topic Data page appears:




Select all the Note records you want to store in the final merged entity by checking the checkbox for the row. Similarly, check the Topic records to include in the final merged entity. When you have finished your Notes and Topics selections, click the [>] button.

## Select Document and Metadata Data

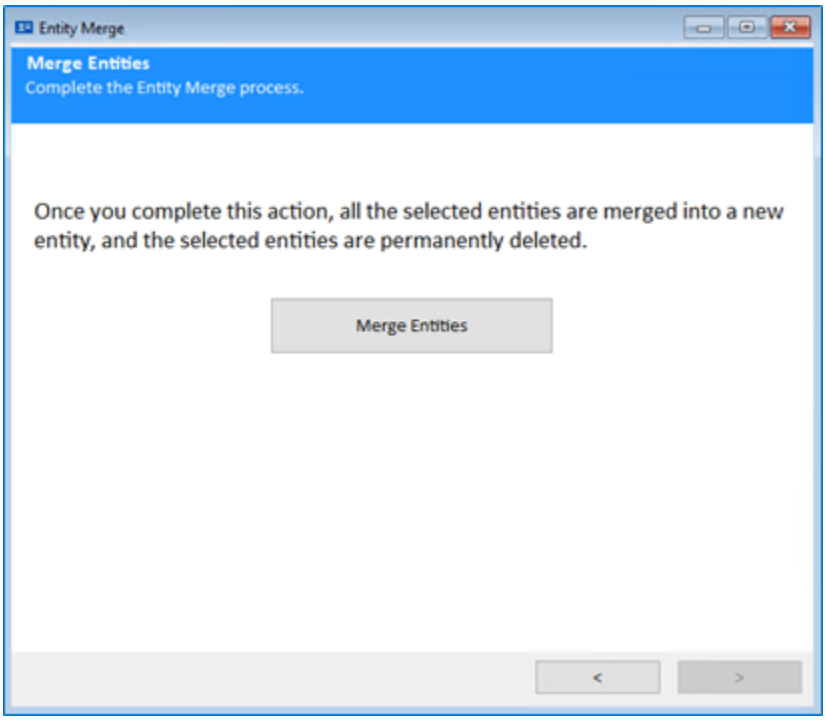
The Select Document and Metadata Data page appears:




As with the previous form, use the checkboxes to select the individual rows to store in the final merged record. When you have made the appropriate selections, click the [Next] button.

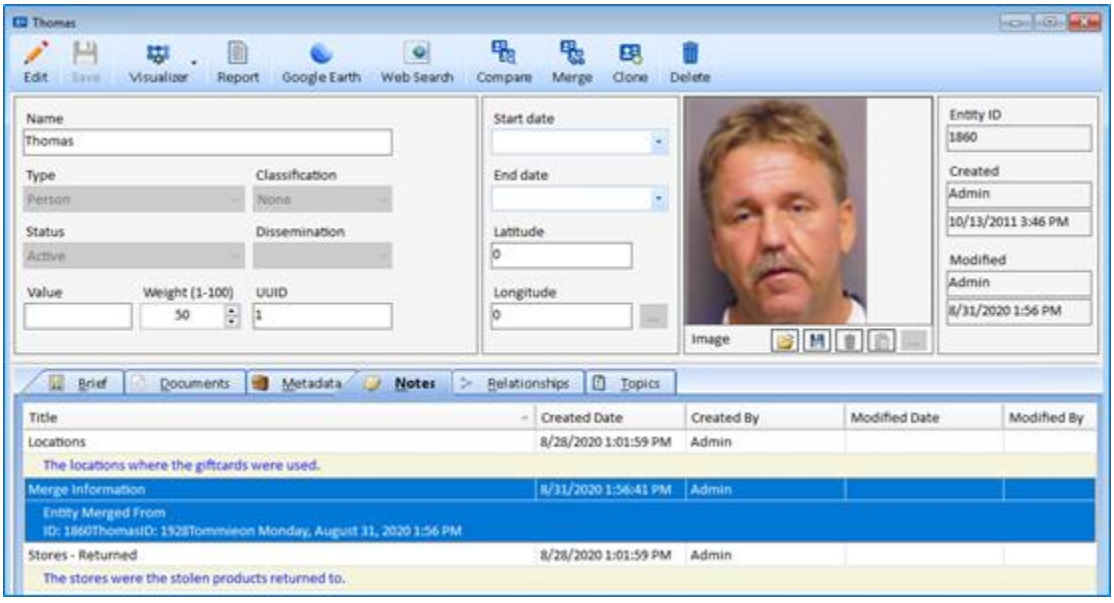
## Entity Merge Confirmation

The final Entity Merge page appears:




To perform the final merge, click the [Merge Entities] button. The selected entities are deleted from the database and a new Entity created. All relationships for the merged entities are moved to the new entity.

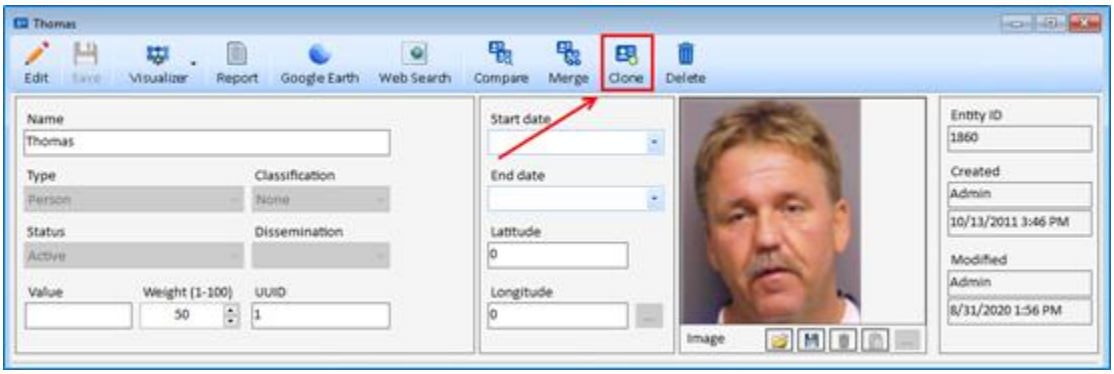
After merging the entities, the new entity has the data you selected, along with a new Note record titled “Merge Information.”



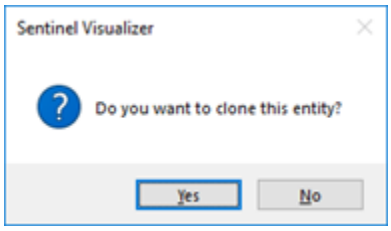
# Entity Clone

Entity Clone allows you to make a copy of an Entity. This is useful when you determine that a single entity is two entities. For example, you have a person type entity named Bob Jones and by comparing metadata, you see that there are two different people named Bob Jones. In this case you would use Entity Clone to make two records.

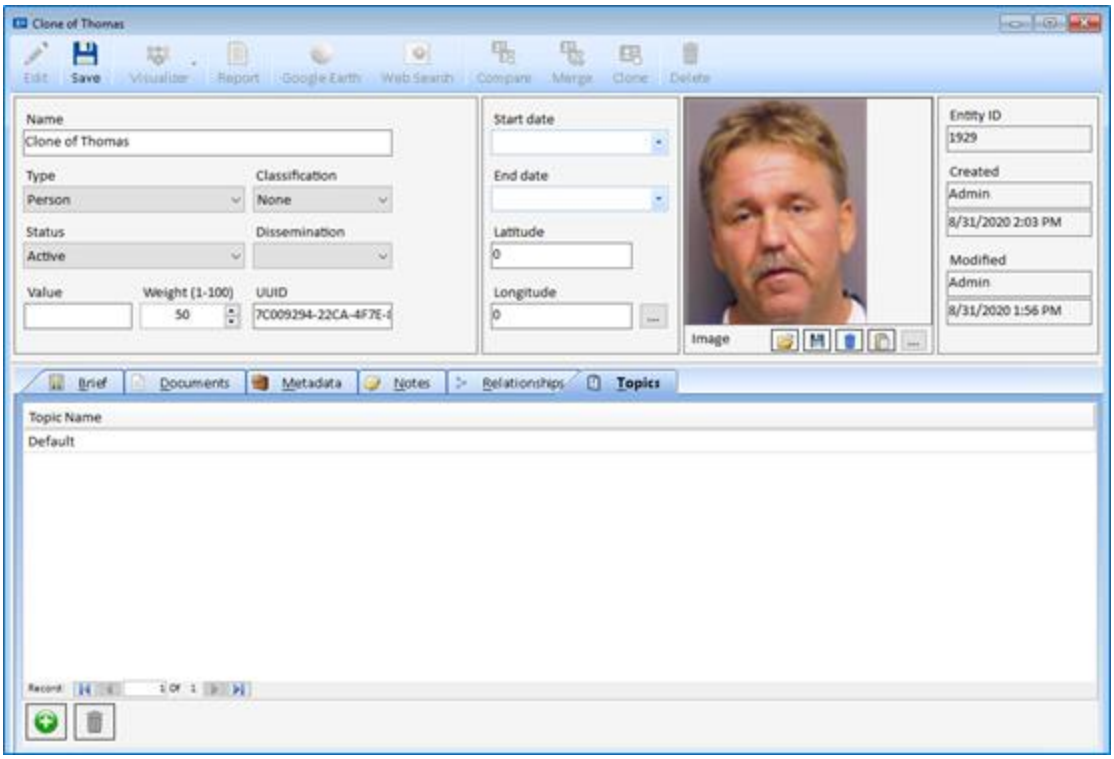
To use Entity Clone, open the Entity on the entity you want to copy. Once the entity is open, click the [Clone] button on the Entity Viewer toolbar.




Sentinel Visualizer asks if you want to clone this entity. When you click [Yes], the new copy is opened using the Entity Viewer.




Sentinel Visualizer opens the new cloned entity.



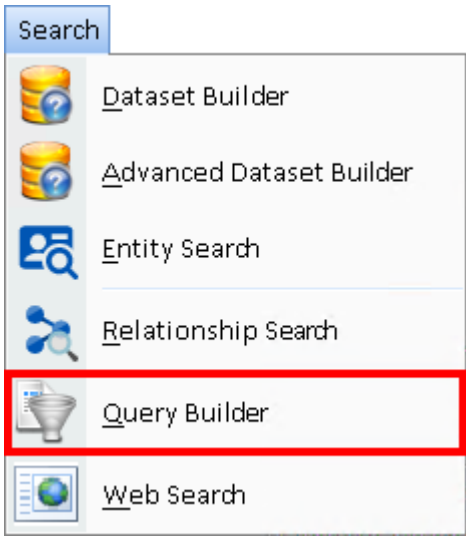

**Note:** The Entity Clone operation copies all information for the entity record, but it does not copy relationships.

# Chapter 23: Query Builder

*Sentinel Visualizer provides a powerful query tool to ask complex questions about entities and relationships. The Query Builder allows you to visually "draw" a query and specify entity and relationship criteria. The Query Builder then builds a result set that can be previewed, or sent to the Visualizer, reports, or an XML file.*

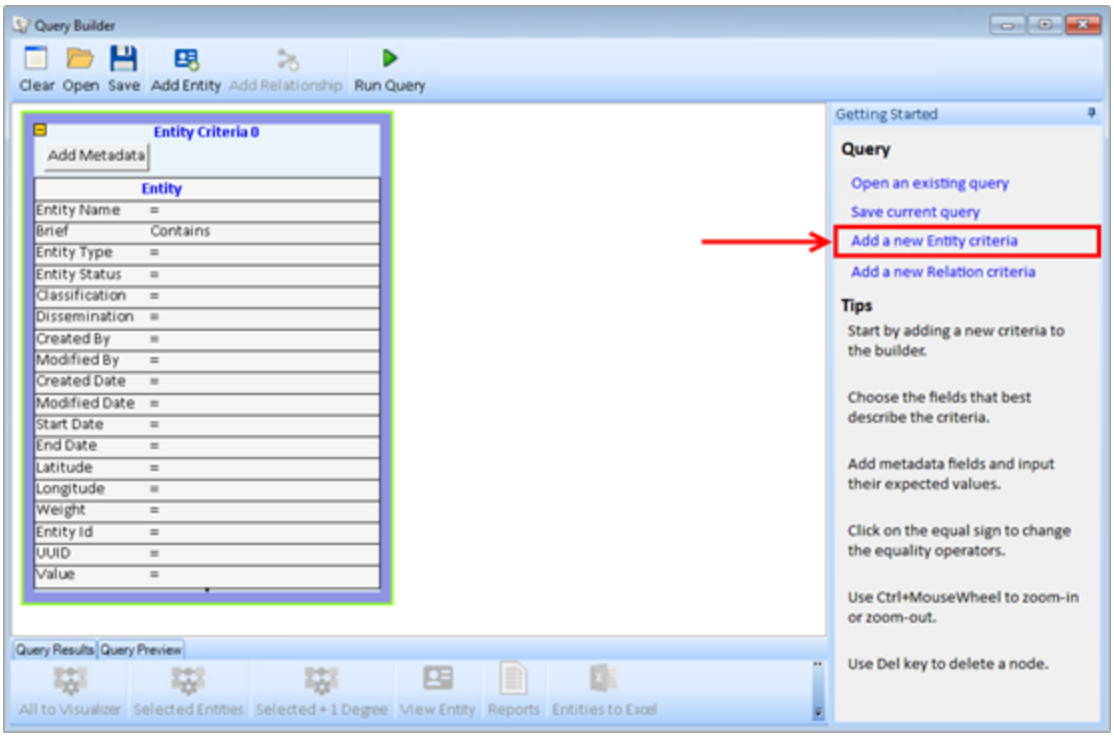
## Launch the Query Builder

To launch the Query Builder, click the 'Search' tab on the Tools menu and select [Query Builder].

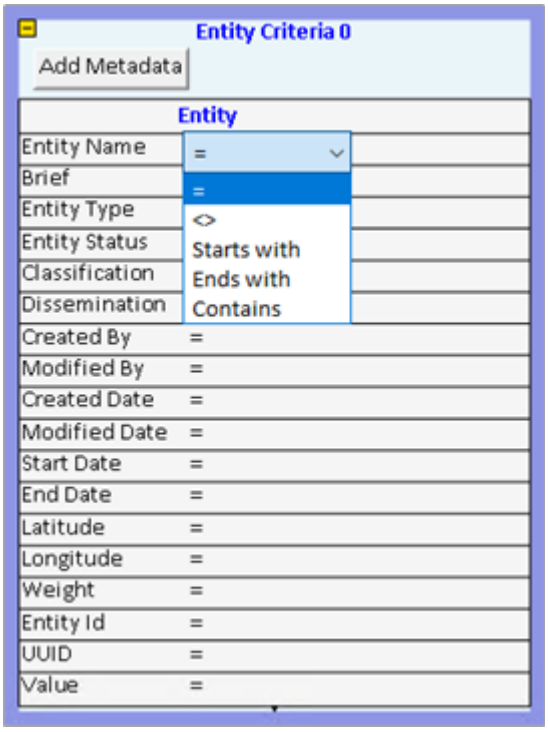



### Add Entity Criteria

You can add any number of entity criteria to your query. To add a new entity criteria block, click [Add a new Entity criteria] in the right toolbar. A new entity criteria block appears in the design area:




The Entity Criteria block is used to define the conditions for finding entities.




The left part of the block lists the entity field names. The operator section provides operators and the right section is where you type in criteria.

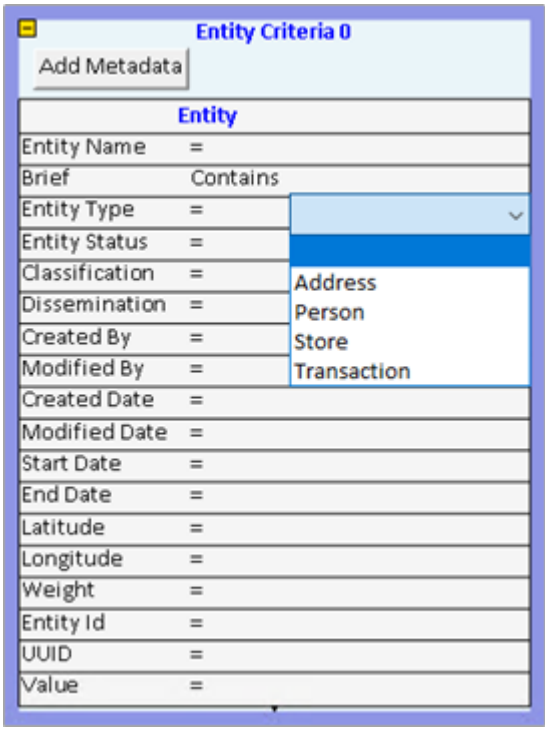
## Operators

The default operator is =. To specify a different operator, click on the = sign and select the appropriate value from the drop-down list. The following operators are available:

| Operator | Function |
|---|---|
| = | Exactly equal |
| <> | Not equal |
| Starts with | Matches phrases that start with the specified criteria |
| Ends with | Matches phrases that end with the specified criteria |
| Contains | Matches phrases that have the specified criteria anywhere in the string |

## Criteria

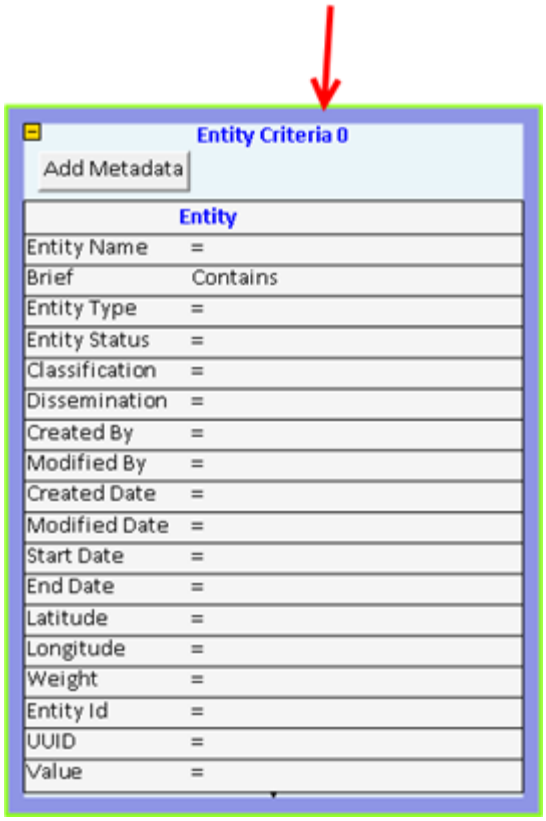
Double Click on the blank area to the right of the operator to enter criteria. If the field is a lookup field, a drop-down list of values appears. Otherwise, a text box appears for you to type in criteria values.




Specifying Criteria with a drop-down list.

## Removing an Entity Criteria Block

If you want to remove an Entity Criteria block, click on its blue border to select it. A green highlight appears around the block. Click the [Del] key to delete the block.

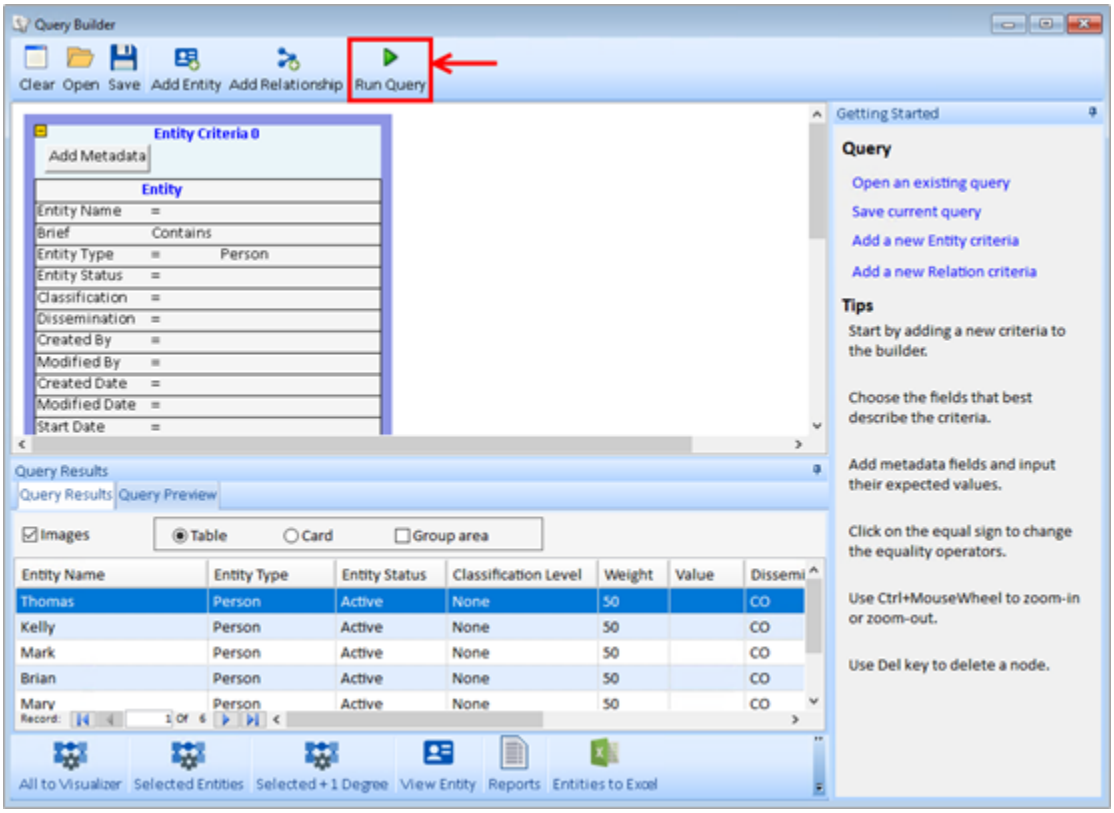



## Multiple Entity Criteria Blocks

You can add any number of Entity Criteria blocks. Each one creates an AND condition. For example, the following criteria return all entity records where the Entity Type is Location and all entity records where the Entity Type is Person:

## Run a Simple Query

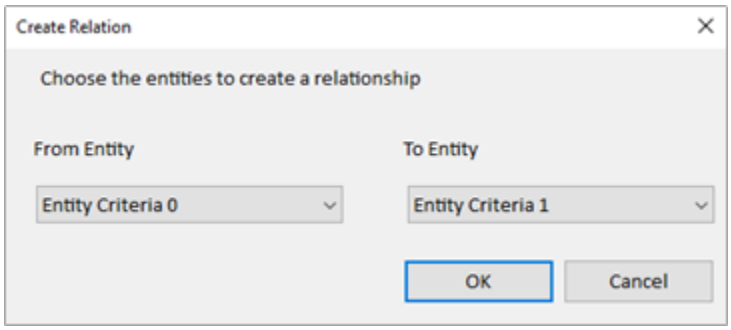
In this example, you create a single entity criteria box. Leave the operator set to =. In the Entity Type field, select “Person”. You have now defined a query that retrieves all entities from the database where the Entity Type field is set to Person. Click the [Run Query] button. After a moment, the Query Results area is updated with the results of the query.




### Adding Relationship Criteria

Adding relationship criteria allows you to query for entities and relationships. To add a new Relationship Criteria block, click the [Add a new Relation criteria] option in the right toolbar.

The first step is to identify to which Entity Criteria blocks the new Relationship Criteria should apply. A Relationship Criteria must point to two Entity Criteria blocks. When you press the [New Relation Criteria] option, the Create Relation dialog appears:




Select the From Entity and the To Entity values from the drop-down lists and click the [OK] button. The Query Builder creates a new Relationship Criteria block and draws lines to join the two selected Entity Criteria blocks.

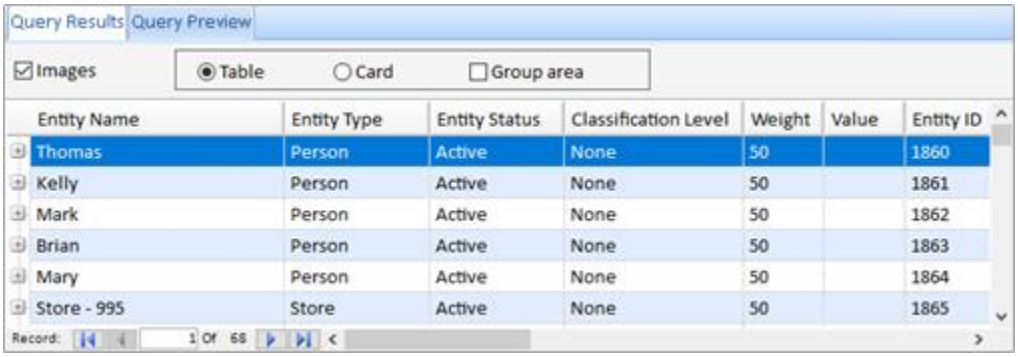
## Specifying Relationship Criteria

The Relationship Criteria block functions similarly to the Entity Criteria block. The left side lists the fields, the middle section contains operators, and the right side contains criteria.

The following query would return all Person entity records that have a “committed at” relationship to any Location entity records where the entity name is Oregon:

## Query Results

After defining the query criteria, click the [Run Query] button on the Query Builder toolbar to run the query. The amount of time it takes to run the query is dependent on the size of your data and the complexity of the query. After a few moments, the Query Results pane is updated with the results.




### *Sorting*

You can sort the results by any of the fields by clicking on the column’s header area. For example, to sort by Entity Name, click on the Entity Name header. The first click sorts the data in ascending order. Click the same column header again to sort the data in descending order.

### *Grouping*

You can group the results by any of the fields by checking the [Group area] check box to show the group area bar and dragging a column header onto the group bar. To un-group, simply drag the column header back to the row of column headers. Each group appears with a [+] / [−] button next to it. Note that you can also sort fields while grouping, and that you can group by multiple fields by dragging additional column headers onto the Group Area.

### CardView

The default view for the grid is TableView. To see more details about entities, you can switch from TableView to CardView by selecting the [CardView] option.

### Using the Query Results

Once you have defined and run your query, you can send the results to various functions. Click the arrow on the [Output To] button to see a list of output destinations:

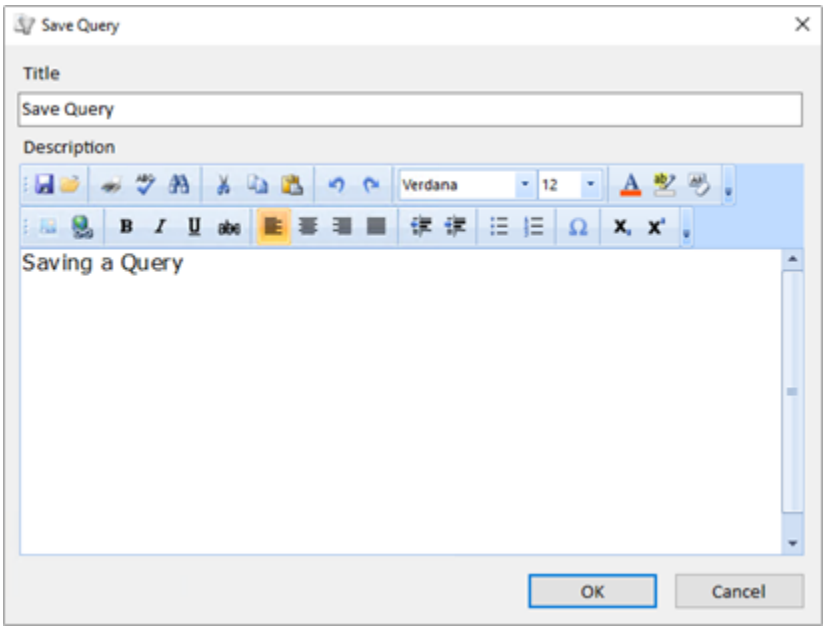
- **All to Visualizer:** Send all the results of the query to Visualizer for analysis and visualization.
- **Selected Entities:** Send selected Entities from the query to the Visualizer.
- **Selected +1 Degree:** Send selected Entities and their linked entities (+1 degree) to Visualizer.
- **View Entity:** Open the Entity form for the selected entity.
- **Reports:** Send the results of the query to a report.
- **Entities to Excel:** Export a list of selected Entities to an Excel file with details on each entity.
- **Relationships to Excel:** Export a list of selected Relationships to an Excel file with details on each relationship.

## Save and Load Queries

You can save your query for use at a later time.

### Saving a Query

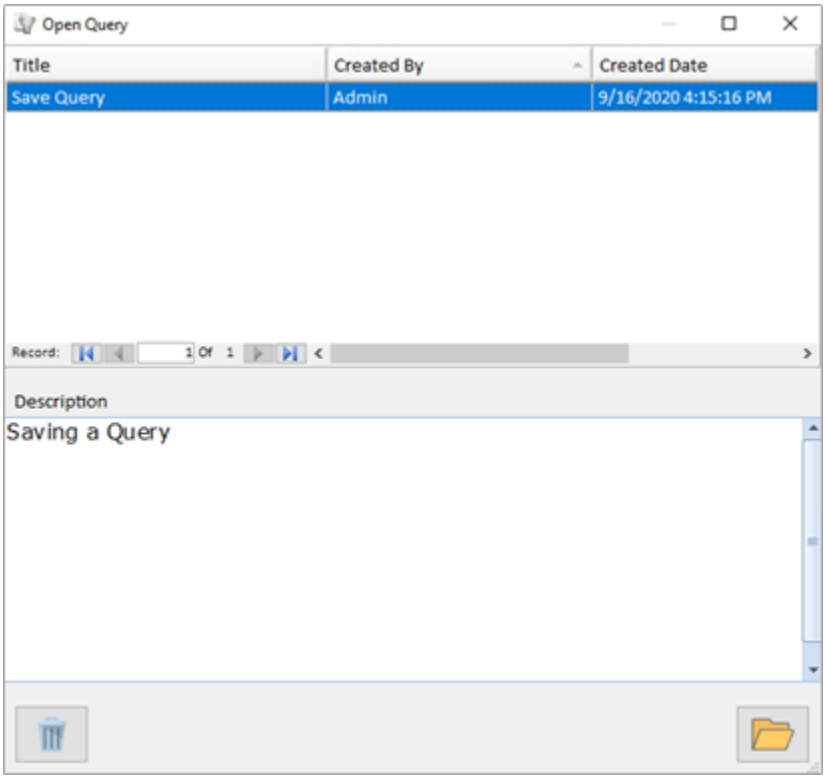
Click the [Save] button on the Query Builder Toolbar. The Save Query Form appears:



Specify a name for your query, and optionally type descriptive notes in the Description field. When ready, click the [OK] button to save the query. Queries are saved directly in your database.

## Opening a Query

To load an existing query, click the [Open] button on the Query Builder toolbar. The Load Query form appears:




Select the query to load and click the [Open] button.

## Deleting a Saved Query

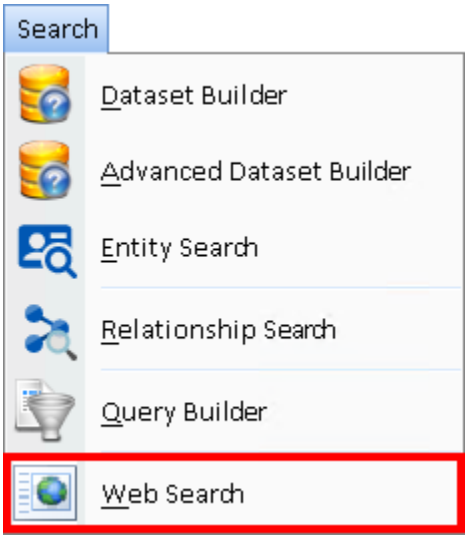
To delete an existing Saved Query, click the [Open] button on the Query Builder toolbar. When the Open Query form appears, select the Query that you want to delete, and click the [Delete] button in the bottom left corner.

# Chapter 24: Additional Tools

*The Sentinel Visualizer features in this chapter are secondary tools which are on the Tools menu but not the Home page's left border and using the command line options for launching Sentinel Visualizer.*

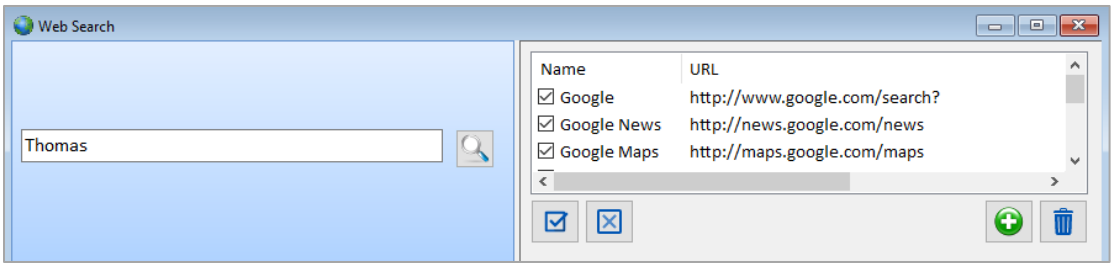
## Web Search

Sentinel Visualizer can search the web for information across multiple search engines at one time. The Web Search feature is available from the 'Search' tab, on the Menu Tool bar.

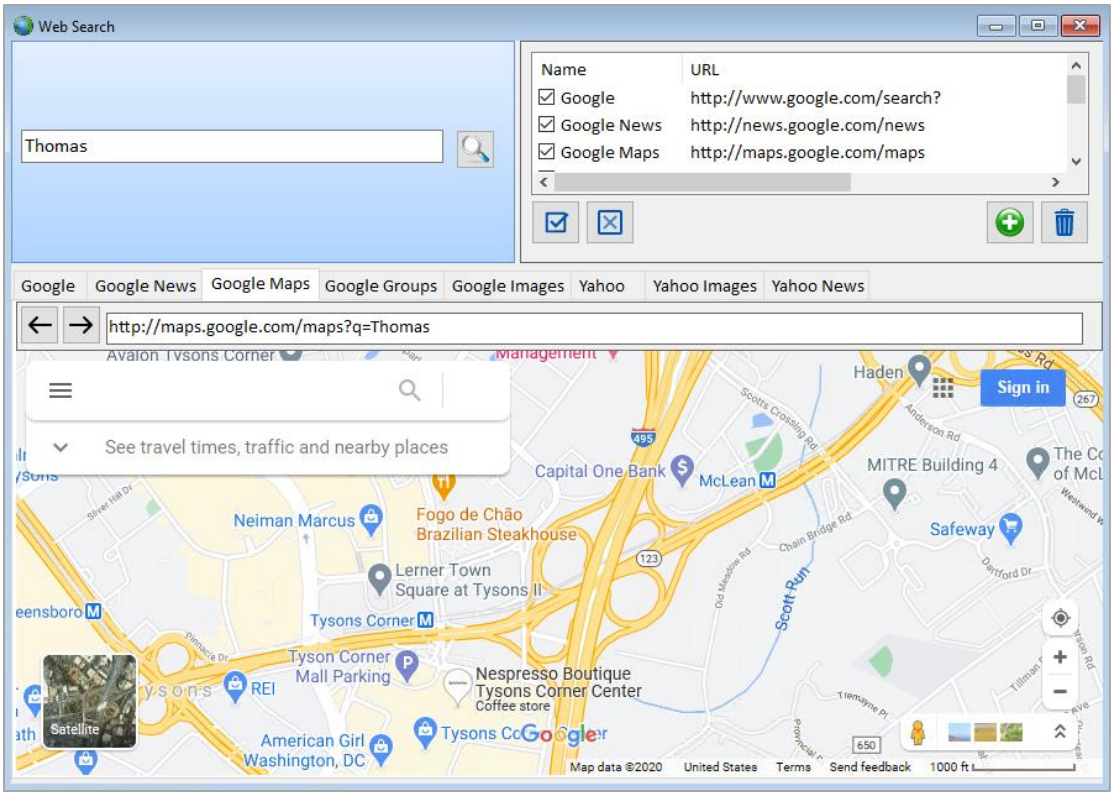



It is also available from the Entity form's toolbar:

If launched from the entity, the Web Search form appears with the name of the entity in the search field:




Click the Search icon and Sentinel Visualizer searches for the value in all the search engines selected on the right side. For each search engine, a separate tab is created:



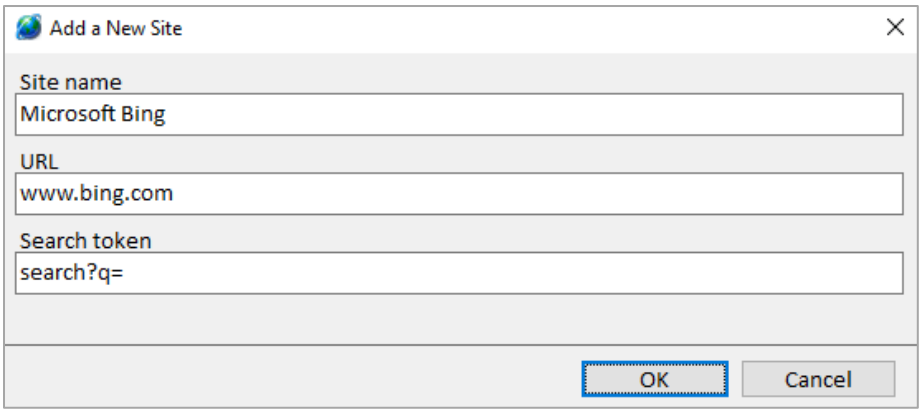

Click on each tab to see the results found.

## Customizing Search Engine List

You can use the checkboxes next to each site name to include or exclude specific sites. The Select All icon checks all the sites, while the Clear All icon removes all the checks.

## Adding and Editing Search Sites

Add new sites by clicking the green [+] button. The Add Site form appears:

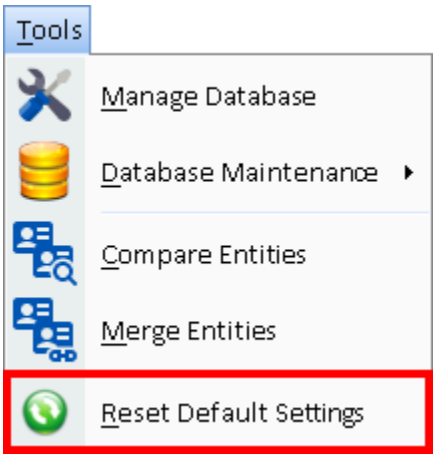



- Enter a descriptive name for the website in the Site Name field.
- Enter the URL of the search site in the URL field. The search token field should contain the special characters used by that search site. For example, Google uses ?q= as the search string token.
- The easiest way to determine the search token for a site is to use your web browser to navigate to the site and enter a search string. After the site returns its results, look for the characters preceding your search string in the browser's address URL.

You can also delete search sites using the trash can icon.

## Restore Default Settings

Sentinel Visualizer automatically saves adjustments you make to the program. For instance, on grids, you can resize the columns. To reset these, from the menu, select Tools, Restore Default Settings feature:




## Launching Sentinel Visualizer from Other Applications

Sentinel Visualizer offers the ability for other software applications to launch Sentinel Visualizer outside of the Sentinel Visualizer user-interface. The commands are executed via the Command Prompt and/or a BAT file and/or within the other software's application.

## User-Case Scenario

A User of another software application might be looking at an entity/record and would like to view that entity's information and/or link chart within Sentinel Visualizer without having to re-enter the entity name in the search form of Sentinel Visualizer. If the other software package "knows" the entity's identification number* (as it is defined in the Sentinel Visualizer database), then that other software package can perform various functions, as follows.

*An Entity's identification number can be found in two places:

- in the ID field of the Entity record (in the Sentinel Visualizer software)
- in the EntityID field in the dbo.Entity table (at the database level)

To assure that the correct server and database are opened, we urge you to include the server and database names in every string. However, the commands do not require that you include the server and/or database name(s).

The following commands assume that the executable file is in this folder:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe"

Please confirm and modify the string if your computer's path is different.

## Command Line Options

### *Launching Language Versions*

To launch the (default) language-version (and the most recently opened database) of the Sentinel Visualizer software that is installed on the computer:

Example string:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe"

### *To open a specific database on your computer's local (not shared) server:*

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /database nameofdatabase /server .\SENT4EXPRESS

### *To open the most recent database on a server other than the default/local server:*

```
/server - specify a server
```

Example string:

```
C:\Program Files (x86)\FMS\Sentinel Visualizer 9 /server nameofserver
```

### *To open a specific database on a specific server:*

```
/server – specify a server
/database – specify a database
```

Example string:

```
"C:\Program Files (x86)\FMS\Sentinel Visualizer
9\SentinelVisualizer.exe" /server nameofserver /database nameofdatabase
```

### *To open a database other than the most recently opened database:*

```
/database – specify a database
```

Example string:

```
"C:\Program Files (x86)\FMS\Sentinel Visualizer
9\SentinelVisualizer.exe" /database nameofdatabase
```

### *To log-in to a shared database:*

/user – specify a username (this is the SQL Server username – not the username in the Sentinel Visualizer database)

/pwd – specify a password (this is the SQL Server password – not the password in the Sentinel Visualizer database)

Example string:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /user username /pwd password

or

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /server sentineldb /database Test22 /user sa /pwd S3ntinElL0gin:7@FMS

where sentineldb is the name of the server, Test22 is the name of the database, sa is the SQL Server username, and S3ntinElL0gin:7@FMS is the SQL Server password.

### */es – search for an entity (using the Entity's Name field)*

Example string:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /es "20.24.9.183"

Specify a server, a database, and search for an entity:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /server .\SENT4EXPRESS /database Cyber_Threats /es "20.24.9.183"

where .\SENT4EXPRESS is the name of the (local) server, Cyber_Threats is the name of the database, and the entity's name is 20.24.9.183.

Please note: If there is a space in the Entity Name, you must wrap it in quotation marks. Example: you'd type John Smith as "John Smith"

### */ev = entity view (using the Entity's ID number) in the last-opened database*

"Entity ID"

Example string that opens the entity record that has 1920 as its Entity Identification Number:

```
"C:\Program Files (x86)\FMS\Sentinel Visualizer
9\SentinelVisualizer.exe" /ev "1920"
```

Note that this string does not specify a database. The string assumes that you want to open/view the most recently opened database.

* an Entity's identification number can be found in two places:

- in the ID field of the Entity record (in the Sentinel Visualizer software)
- in the EntityID field in the dbo.Entity table (at the database level)

### */ve – visualize an entity, expanded to one degree (using the Entity's ID number*)*

Example string that visualizes the entity record that has 1920 as its Entity Identification Number:

```
C:\Program Files (x86)\FMS\Sentinel Visualizer
9\SentinelVisualizer.exe" /ve "1920"
```

* an Entity's identification number can be found in two places:

- in the ID field of the Entity record (in the Sentinel Visualizer software)
- in the EntityID field in the dbo.Entity table (at the database level)

### *To launch a language version of the Sentinel Visualizer other than the default language:*

```
/la = Language
```

Available languages:

- en English
- es Spanish
- kr Korean
- fr French
- ru Russian
- tr Turkish

Example string to launch Sentinel Visualizer in Spanish:

"C:\Program Files (x86)\FMS\Sentinel Visualizer 9\SentinelVisualizer.exe" /la es

### *For opening a Sentinel Reader file (.svx file):*

```
/filename
```

Example string:

```
"C:\Program Files (x86)\FMS\Sentinel Reader 9\SentinelVisualizer.exe"
/filename "C:\Users\Documents\filename.SVX"
```

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