



SENTVI

Find the Poisoned Apple

VERSION 10 USER GUIDE

The Standard for Data Visualization and Analysis

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Chapter 1: Welcome to SentVi

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

SentVi System

SentVi is a cost-effective, commercial-off-the-shelf (COTS) platform that offers cutting-edge technologies based on a standard, non-proprietary database management system. The appeal of SentVi 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 mapping tools, SentVi provides the latest generation in visual display of complex data.
Flexible, Purpose-Designed Database	Import, store, and manage large amounts of data that describe objects and their connections in an open standard Microsoft SQL Server database.
Multiuser Design	By storing data in a consistent format in a scalable multiuser 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	SentVi enables group and mission collaboration among team members, regardless of whether all team members are using the SentVi software.

SentVi Editions

SentVi is available in several editions. 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 multiuser 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 multiuser databases stored on Microsoft SQL Server on premise or in the cloud by platforms like Azure or AWS.

Ultimate Edition

The Ultimate edition includes all the features of the Premium edition, while 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 Ultimate, 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 Ultimate, 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 any licensed edition of SentVi. With the Reader, the User can view a link chart (SVX file), drill-down to the details of entities and relationships, and more. Visit this webpage for more details:

<https://SentinelVisualizer.com/LinkAnalysis/reader>.

About this User Guide

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

- **Chapter 2: New Features in Version 10** – New features added in this version.
- **Chapter 3: Getting Started** – A quick introduction to starting SentVi and opening the sample database.
- **Chapter 4: Home Page and Top Menu** – Home page layout and features.
- **Chapter 5: Entities** – Entity data details, and how to view, add, edit, and delete them.
- **Chapter 6: Entity Search** – Basic and advanced entity searching.
- **Chapter 7: Relationships** – See how relationships connect entity data for powerful visualization and analysis capabilities.
- **Chapter 8: Relationship Search** – Basic and advanced Relationship searching.
- **Chapter 9: Selecting Dates and Editing Rich Text** – Shared resources across entities and relationships to select dates and edit notes and documents.
- **Chapter 10: Dataset Builder** – Query and send the output to a variety of formats.
- **Chapter 11: Reports** – See how to select, preview, print, and export reports.
- **Chapter 12: Visualizer** – Powerful visualization and analysis capabilities, options, and how to print, export, and save your work.
- **Chapter 13: Visualizer Layouts, Transform and Zoom** – Apply automatic layouts to your entities and relationships diagram, perform transformations, and zoom in and out.
- **Chapter 14: Visualizer Tool Panels** – Use the Tool Panels on the right side of the Visualizer diagram to control entity and relationship displays, perform filters and show gradients, find networks and cliques, add items and shapes, navigate, etc.
- **Chapter 15: Entity Metrics with Social Network Analysis (SNA)** – How Social Network Analysis and other techniques provide automated real-time analysis.
- **Chapter 16: Timeline and Time Range Filter** – View temporal data using the Timeline.
- **Chapter 17: Geospatial Mapping Tools** – Geospatial tools to show entities on a map.
- **Chapter 18: Three-Dimensional Viewer** – Use the 3D viewer to visually navigate through complex networks in three dimensions.
- **Chapter 19: Additional Searches** – Combine multiple saved searches, multiple saved diagrams, and perform web searches.
- **Chapter 20: Query Builder** – Use the Query Builder for more advanced questions than the Dataset Builder.
- **Chapter 21: Creating and Opening Databases** – Create a new database and open them.
- **Chapter 22: Importing Data** – Import external data into your SentVi database.
- **Chapter 23: Configuring Your Database** – Add your own data types and lookup values, configure and maintain your database.

- **Chapter 24: Multiuser Shared Databases** – Set up Microsoft SQL Server to work with SentVi and create shared databases.
- **Chapter 25: Compare, Merge and Clone Entities** -- Compare entity data, merge several entities into one, and duplicate entities.
- **Chapter 26: Command Line Options** – Advanced information for launching SentVi from a command line.

Chapter 2: New Features in Version 10

Version 10 offers many significant enhancements to SentVi. It includes new features across the entire application with improved functionality and usability.

New Feature Summary

Many features are added in version 10:

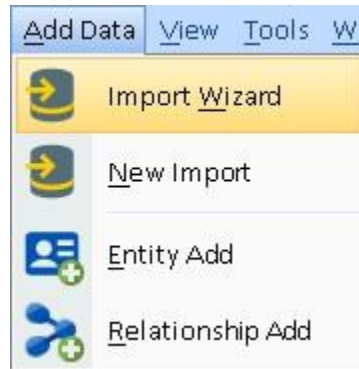
- Import Enhancements with a new Wizard.
 - Import data from SQL Server database tables and views.
 - Filter source data records with customizable WHERE clause.
 - Import additional entity columns such as brief, image files, unique ID etc.
 - Import additional relationship columns such as brief, credibility, reliability, etc.
 - Use Unique IDs to differentiate duplicate entity names.
 - Assign values directly to columns instead of assigning a value from source data.
 - New saved file format includes source data to be optionally loaded when opened.
 - When Source Data Changes, Column Assignments are Preserved.
 - Preview data before import.
 - New menu items, undo and redo, user interface enhancements, and much more.
- Online Maps with Microsoft Bing Maps to zoom into any place around the world.
- Visualizer Diagram Enhancements
 - Entities and Relationships with custom properties and labels.
 - Entity Replace to consolidate entities.
 - Curved relationship lines.
 - New 9500+ high-resolution icon file library.
 - Add items select among Entity Types limited to database.
 - Layout grouped by Entity Type.
 - Directional Get Links to only add links FROM or TO entities.
 - Refresh button to update the diagram when data changes.
 - Timeline Enhancements with new Month and Year views.
 - Social Network Analysis calculation's 1000 entity limit removed.
- Search Enhancements
 - Redesigned and enhanced Query Builder with results in separate forms
 - Combine Multiple Searches to find all, common, and most common entities.
 - Entity Distance Search from central location.
 - Metadata Search for any Metadata Type assignment and/or wildcard searching.
- Lookup Table Management with text search and adding multiple values at once.
- User Interface Enhancements
 - Home Page with images on MRU list and improved toolbar and left panel.
 - Reorganized Menus with more options; Text Filter on many forms

Import Enhancements

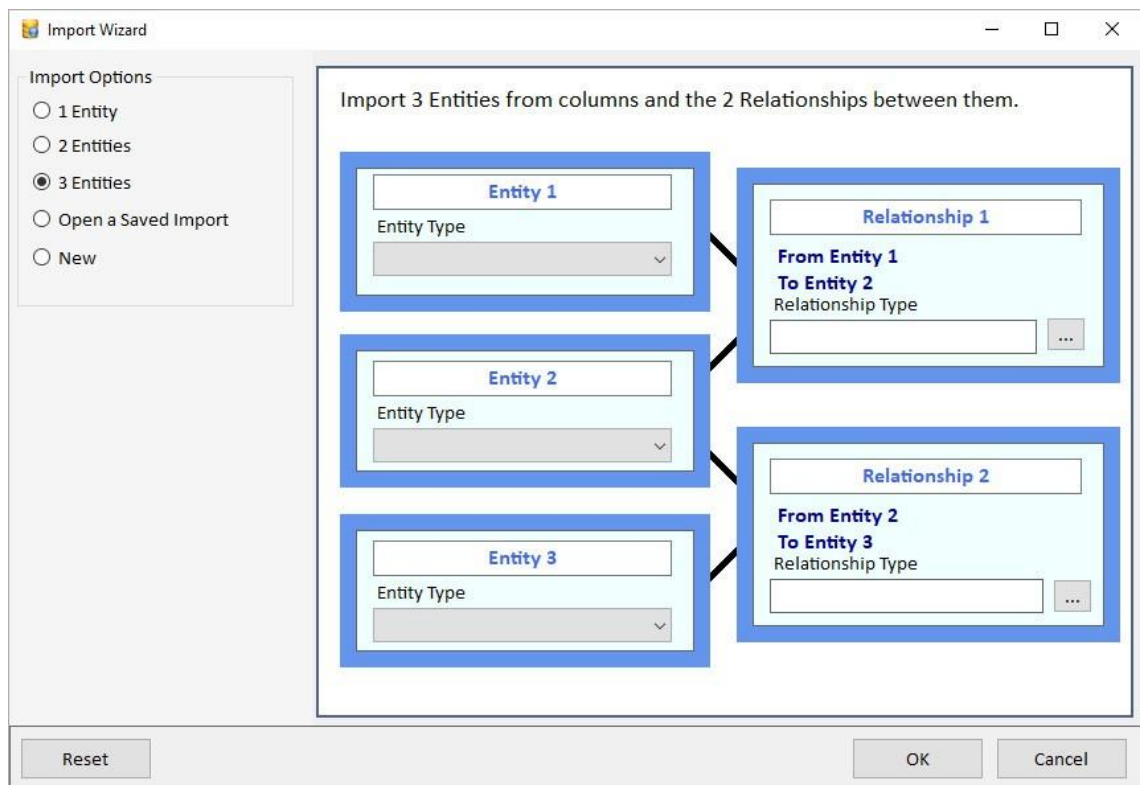
The Import feature is faster with a significantly improved and redesigned user interface.

New Import Wizard

The Add Data menu offers a new Import Wizard:



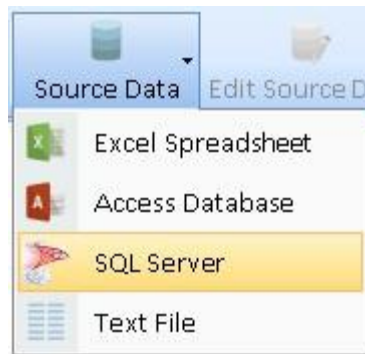
Use the Wizard to create a new import for one entity, two entities and a relationship, or two relationships.



Easily specify the types and titles before adding them to the Import form

Import SQL Server Data

Import data directly from a SQL Server database by choosing among its tables and views.

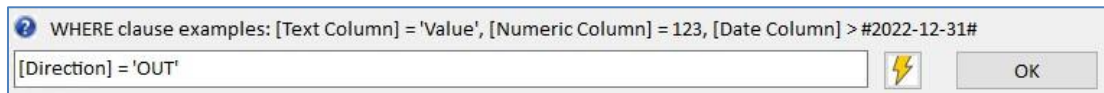


New SQL Server item

The SQL Server and Access database dialogs have options to list only tables, only queries/views, or both for your selection.

WHERE clause to Limit Source Data

Apply an optional WHERE clause on your Source Data (Excel, Access, SQL Server, and Text files) to limit the records to import.

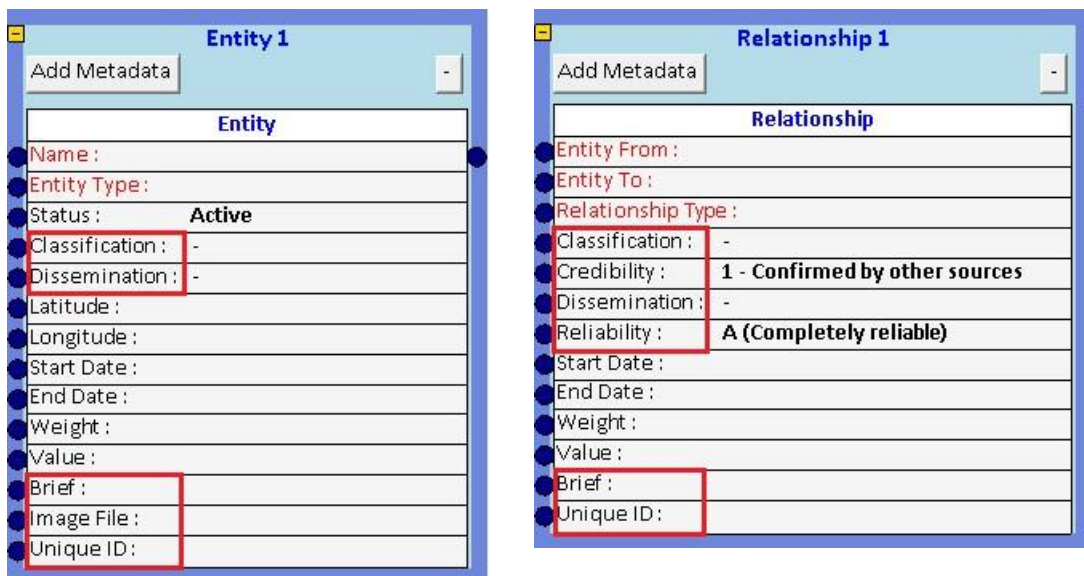


The WHERE clause can be exact matches on values, ranges, and even wildcard matching using the LIKE statement.

This simplifies the process of designing different imports for subsets of your Source Data. It eliminates the previous need to create separate copies of your import file with different records.

Import Additional Columns

All the Entity and Relationship level columns can now be imported by assigning a source data column to them or specifying a value.



- 5 for Entity: Classification, Dissemination, Brief, Image File, and Unique ID.
- 6 for Relationship: Classification, Credibility, Dissemination, Reliability, Brief, Unique ID.

Define Entities by Unique ID

Choose among three options for the columns defining an entity. You can have entities with the same name differentiated by their Unique ID field.

Import Settings

General Matching Replace

The Unique ID field differentiates entities with the same name.

Choose the combination of Entity fields to determine an Entity's uniqueness:

- Entity Type and Name (Unique ID is ignored)
- Entity Type and Unique ID (name is from the first time the Unique ID is imported)
To save ignored Entity names for the Unique ID, choose a Metadata field to store them:
(not specified)
- Entity Type, Name and Unique ID (combination of all three fields define each entity)

Relationships match on Entity From, Entity To, Relationship Type, Start Date, End Date, and Value.

Entities are Duplicates if they have the same Type, Name and Unique ID

Choose which Fields to Update

If an imported entity or relationship exists in the database, the Import Settings let you control if the existing records are updated and if so, which columns.

Import Settings

General Matching Replace

New records are created when there is no match.

If there is a match

- Don't replace any data in existing records
- Replace fields

Entities

- Status
- Classification
- Dissemination
- Latitude
- Longitude
- Start Date
- End Date
- Weight
- Value
- Brief
- Image File
- Unique ID

Relationships

- Classification
- Credibility
- Dissemination
- Reliability
- Value
- Brief
- Unique ID

OK Cancel

Replacement Options for Matching Entities and Relationships

Assign Values Directly to Columns

In addition to assigning a column based on a field from the Source Data, you can now assign a value directly for all your imported records:

Latitude :	38.9166
Longitude :	-77.22717
Start Date :	10/10/2022
End Date :	12/31/2023
Weight :	90
Value :	2145.45

When Source Data Changes, Column Assignments are Preserved

When updating an existing source data, the new one may have different columns from the current one. Previously, all the columns needed to match to preserve assignments. Now, assignments for matching columns are preserved and only unmatched ones deleted.

New Saved Import File Format Includes Source Data

Import files are saved in a new encrypted format (*.SVIX) with source data specifications to offer the option to load the data when opened. It also has improved support for localized versions.

Open Saved Import File with MRU List and Options to Load Source Data

When opening a saved import file, a new form lists the previously opened files for selection. If the SVIX file has a Source Data, a prompt asks to load it. If it has lookup values that don't exist in the database, a list of the missing values is shown with a prompt to add them to the lookup lists.

Preview Data Before Import

Preview the entity and relationship import records (first 500) before importing it. Quickly ensure your column assignments are correct before updating your database.



New Toolbar Buttons

- [Undo] and [Redo] changes to your actions.



- [Edit Source Data] to change the data options such as its WHERE clause or database table.

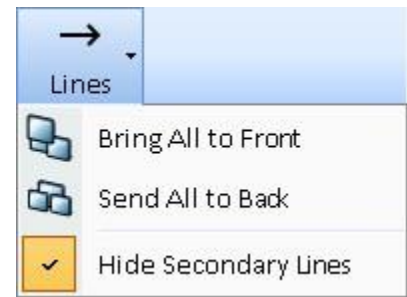


- These buttons are on the right side of the toolbar:



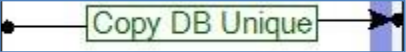
- [Import Settings] centralizes the options for Data Format, matching, and replace.
- If the lookup data changes (e.g. Entity Type, Metadata Type, etc.), click the [Refresh Lookups] button to update the lookup lists in the entity and relationship boxes.

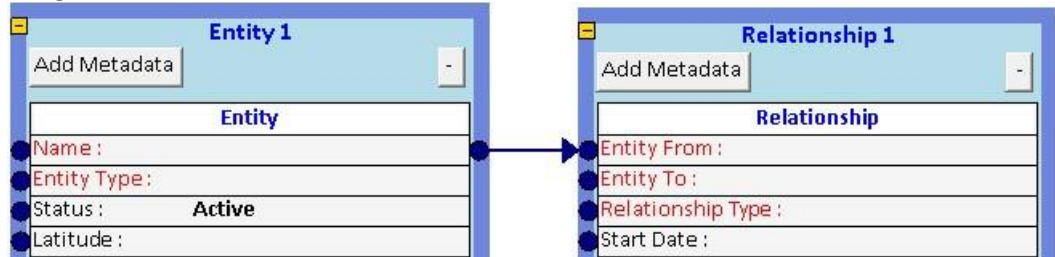
- Line options
 - Move lines to the front/ back
 - Hide secondary column assignments so only entity name lines are visible.
- Zoom to different levels and fit to page.



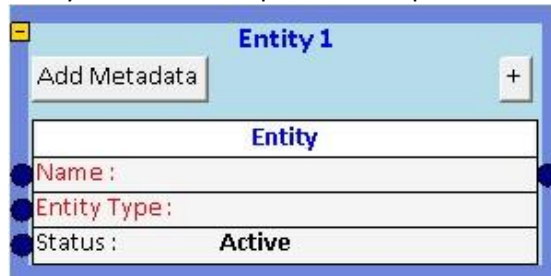
User Interface Enhancements

The user experience is improved with many new features.

- Adding a relationship box adds two entity boxes connected to the relationship.
- New entity and relationship boxes are placed in empty spots and not over existing boxes.
- Line and port enhancements
 - Thicker lines and arrows to simplify assignments and selections.
 - Larger ports moved to the edge of the boxes.
 - Lines between boxes are cleaner by eliminating labels on lines. Prior versions had labels like this: 
 - Side panel simplified to no longer explain them.
- Required columns are red until they are assigned.
 - Assigned column names or values are bold.



- “Drag col here” text on Relationship boxes is eliminated.
- Entity and relationship boxes collapse their heights to declutter complex imports.

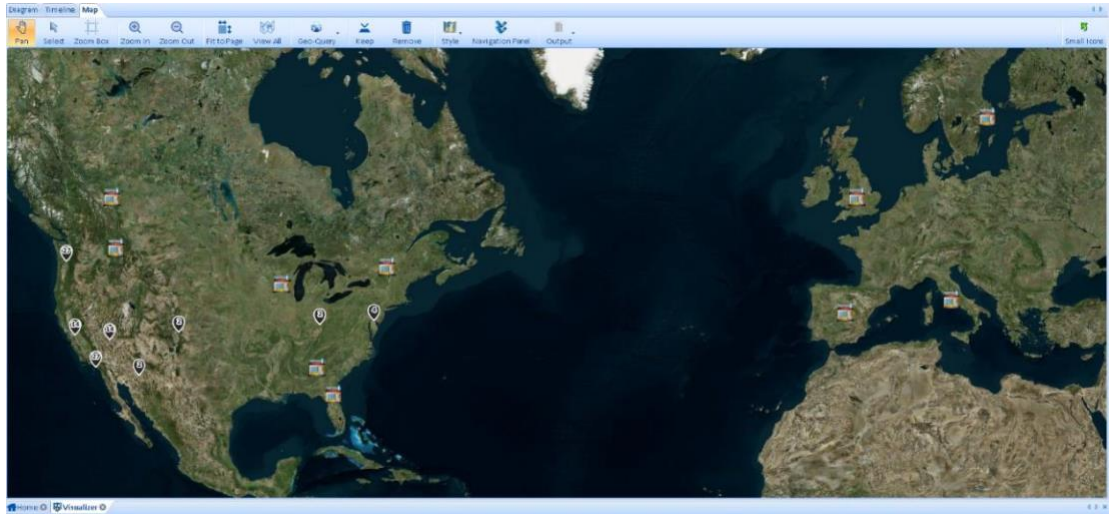


- Box widths are resizable including the metadata grid.
- Boxes are more opaque.
- Bottom panel displays Source Data record columns and import status better.
- Opening a saved import addresses some UI issues with the layout of the boxes and lines.

Visit [Chapter 22: Importing Data](#) on page 255 for details.

Visualizer: Online Maps

Entities with latitude and longitude can be plotted on the Visualizer map. With an Internet connection, online maps from Microsoft Bing offer high resolution topography and road styles for any part of the world.



Online Maps with Imagery Style

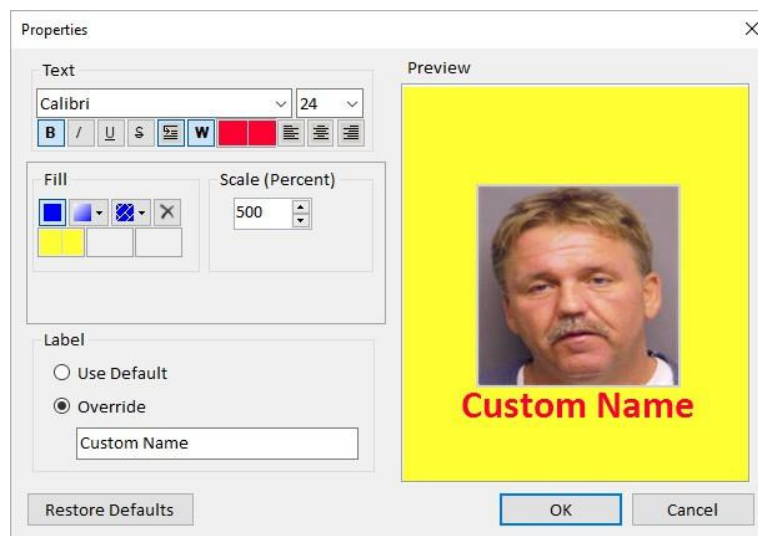
Zoom in and out of your map. Fit to Page automatically adjusts the map to show all your mapped items. Perform Geo-Query in a circle or rectangle to add entities in that region.

Offline maps are still supported including the use of shape files. For more information, visit [Chapter 17: Geospatial Mapping Tools](#) on page 201.

Visualizer: Custom Properties and Labels

On the Visualizer, Entity and Relationship lines can be customized individually or by type with different fonts, colors, size, line widths, etc. Labels can also be customized to display information like Metadata value, metrics, dates, etc. Custom properties can also be saved.

Entity Properties



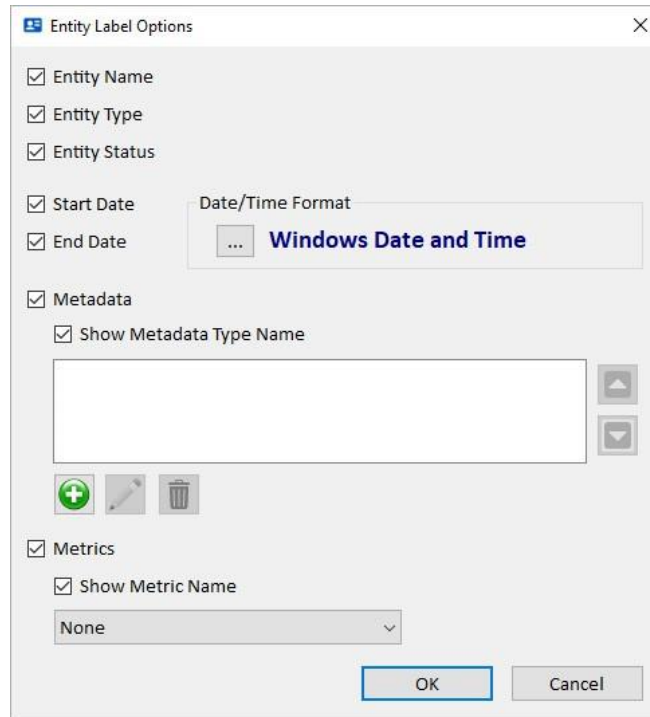
Custom Entity Properties: Yellow Background, Larger Red Bold Text with Custom Name

Individual entities can be customized with a label overriding the name, font, and color. The size and background color can also be set.

Properties can be saved to the entity to become its appearance on future diagrams.

Entity Label Options

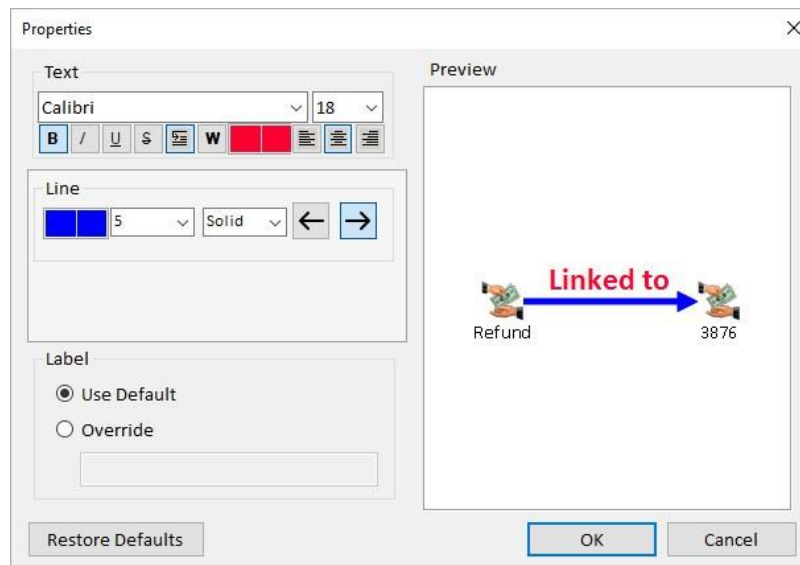
By default, Entity Labels show the Entity Name. In version 10, other values such as Entity Type, Status, Start and End Dates, Metadata Values and Metrics can also be shown.



Entity Label Options

For the Start and End Dates, you can set their Date/Time format. Also, Metadata Types and Metrics can optionally show their names. Visit [Entity Label Options](#) on page 168 for details.

Relationship Line Properties



Relationship Line Properties

Lines can be customized with a label overriding the name, font, and color. The line thickness, style and color can also be set. Single relationship properties can be saved to the relationship to become the default appearance when it appears in future diagrams.

Relationship Label Options

By default, labels on single relationship lines show the Relationship Type. In earlier versions, if a line has more than one relationship, the number of relationships is shown (e.g. "5 Relationships"). In Version 10, if all the relationships are the same relationship type, the line says the number with the Relationship Type. There are also options to list the count of multiple relationship types, Start and End Dates, and Metadata Values.

Relationship Label Options

Relationship Type

Lines with Multiple Relationship Types

Summary (# Relationships)

Count by Relationship Type

3 Maximum Relationship Types

Sum of Relationship Values on a Line

Numeric Format

Start Date

Date/Time Format

End Date

Windows Date and Time

Metadata

Show Metadata Type Name

OK Cancel

Relationship Label Options

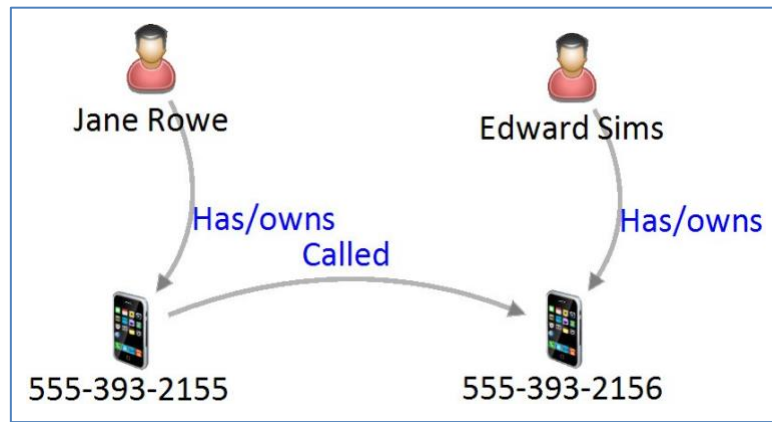
Visit the Relationships Panel, [Show Labels Options](#) on page 171 for details.

Entity and Relationship Type Properties

Entity Types can have custom properties. All entities of that type without its own custom properties, use the type's custom properties. The same exists for Relationship Types.

Visualizer: Entity Replace

Entity Replace lets you keep and hide entities based on their types and relationships. This is powerful way to create higher-level views of your network and eliminate clutter. For instance, you may have telephone call data showing calls between phone numbers and the owner of each phone. Entity Replace lets you replace the phones with their owners to show the connection between the people rather than phones.



Original Diagram Before Replace

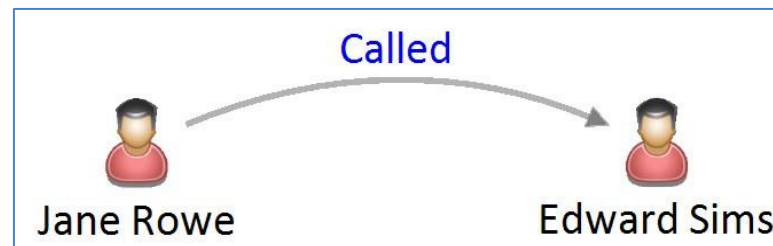
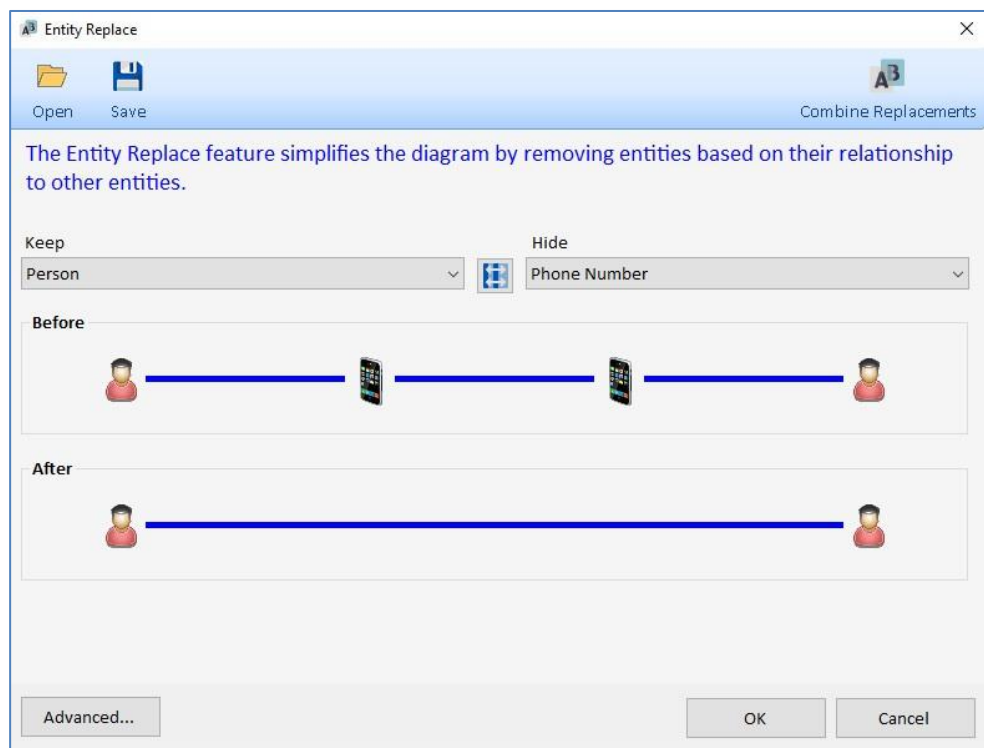


Diagram After Replacing Phones with Owners

Replace Added to Visualizer Entities Menu

The Replace Entities Settings form lets you specify the entity types to keep and replace:



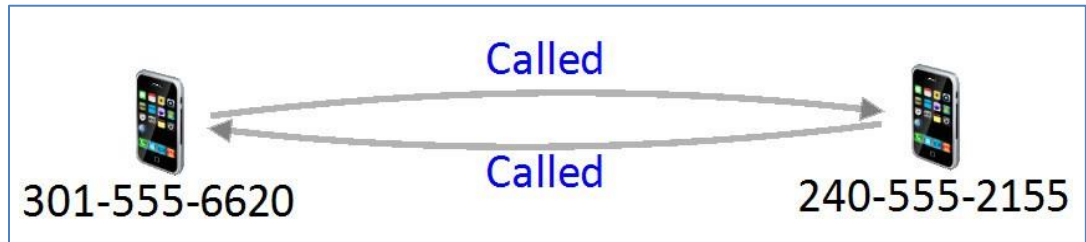
Replace Entity Type Phone Number with Person

The [Advanced...] button opens a Wizard to select multiple Entity and Relationship Types to keep and hide. Selections can be saved for future use. Multiple saved replacements can be combined.

Entity Replace acts like a filter. Once it is set, if you add new entities to your diagram, like Get Links, the replacement is applied to the new entities. Turn off the Entity Replace to see to all your entities again. Visit [Replace Entities](#) on page 124 for details.

Visualizer: Curved Relationship Lines

Relationship connections can now be a curve rather than a line. This is particularly useful for relationships in both directions to show the two lines with arrows:



Relationship Lines with Style as a Curve



Relationship Lines with Style as a Line

This is set on the Relationships panel. Visit [Style](#) on page 173 for details.

New 9500+ High Resolution Icon File Library

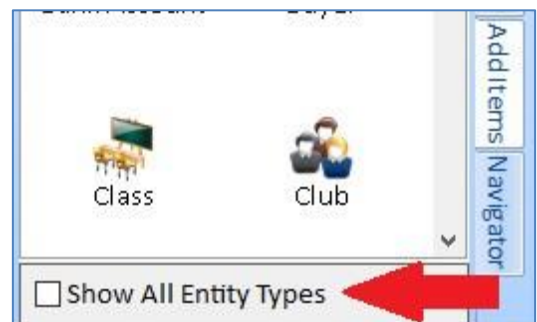
A new collection of 9,500+ high resolution images is included for your use on Entity Types and individual entities.

The new icons are 128x128 pixel PNG files and replace a much smaller collection of 32-pixel ICO files. For new databases, the default list of Entity Types has the higher resolution graphics.

The Visualizer diagram and other forms support the higher resolution graphics for a richer and more visually appealing appearance.

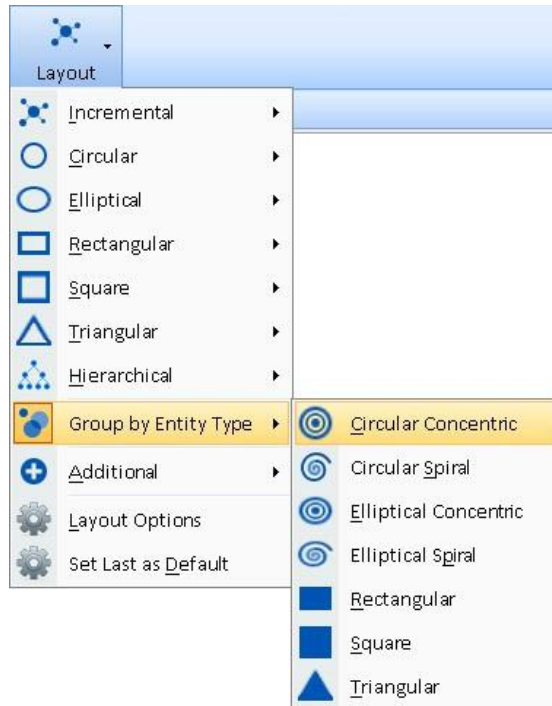
Visualizer: Limit Entity Types to Database

When adding entities to the Visualizer diagram, the Add Items panel has a new [Show All Entity Types] checkbox to limit the icons to your most likely selections. Uncheck the box to only show the icons of entity types used by entities in your database. If checked, all the entity types in your lookup table are shown, which is the previous behavior.

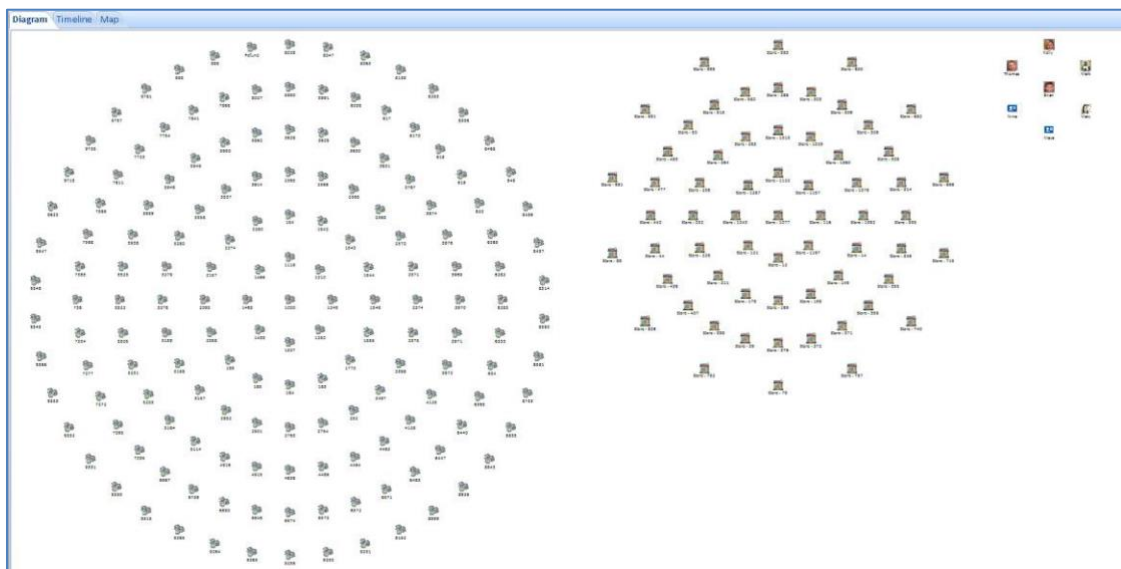


Visualizer: Layout Group by Entity Type

Layout automatically reorganizes the entities on the diagram. A new feature lets you easily see all the entities by entity type. Under Layout, a new [Group by Entity Type] item moves your entities into a variety of shapes for each entity type:



Each entity type is treated as a separate network arranged from largest to smallest, sorted by name within each type. For example, three entity types (transactions, stores, people) in concentric circles:



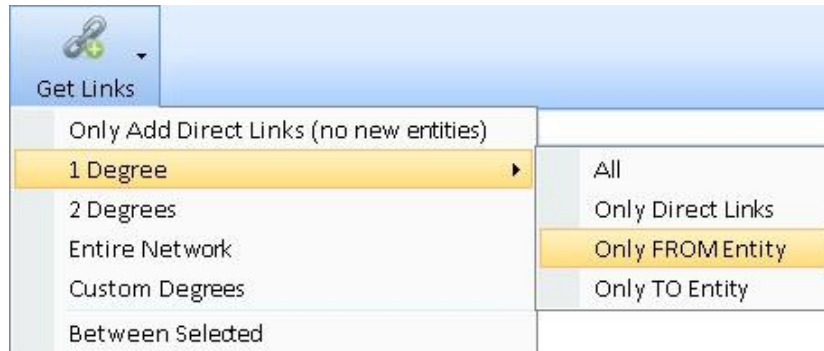
Layout by Entity Type in Concentric Circles and Hidden Relationship Lines

Easily select the entity types you don't want and remove them or select the ones you want and send them to a New Visualizer under Output.

For more information, visit [Group by Entity Type](#) on page 155.

Visualizer: Directional Get Links

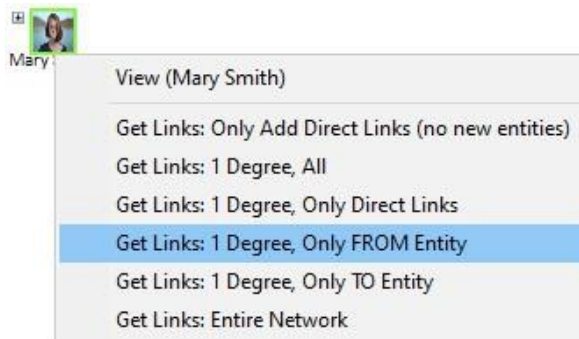
In the Visualizer, using Get Links 1 Degree adds all the entities with relationships to an entity. In Version 10, there are new options to just add links with relationships FROM or TO the entity. This is useful if you want to see flows like money in a particular direction.



Get Links, 1 Degree with 4 Options

- [All] adds all linked entities plus links among the linked entities.
- [Only Direct Links] only adds the linked entities without links among them.
- [Only FROM Entity] only adds entities with relationships FROM the selected entities.
- [Only TO Entity] only adds the entities with relationships TO the selected entities.

From the Diagram, the right click menu for an entity also offers the Get Links: 1 Degree options:



Right click context sensitive menu for an Entity offers Get Links 1 Degree options

For more information and examples, visit [Get Links](#) on page 129.

Visualizer: Refresh and Panels Buttons

A new [Refresh] button updates the data for the entities and relationships on the Visualizer. This appears on the far right of the toolbar with the Panels and Options buttons.



Visualizer Buttons on Top Right

Refresh is helpful if you or someone else updates the database. Refresh retrieves the latest data such as entity name image, properties, metadata, relationship type, etc. and updates your screen accordingly. Any filters, gradients or replace settings are applied against the new data.

The new [Panels] button toggles the right and bottom panels.

Visualizer Timeline

The Visualizer’s Timeline tab has new toolbar options for Month View and Year View to better control the width of time periods. Month has a new Daily option which is wider than the weekly option. Year has new wider options for semi-annual, quarterly, bimonthly, and monthly.



Date View Time Spans, Expanded

Examples of the width zooming into smaller and smaller periods of time from years to days:

Year Views

Year 2010					Year 2015					Year 2020				
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024

Year View, Annual with the Top Summary Label Every 5 Years (example 15 years)

Year 2022				Year 2024				Year 2026			
2021-12	2022-06	2022-12	2023-06	2023-12	2024-06	2024-12	2025-06	2025-12	2026-06	2026-12	2027-06

Year View, Semi-Annual with Summary Label Every 2 Years (example 6 years)

Year 2022				Year 2023				Year 2024			
2021-12	2022-03	2022-06	2022-09	2022-12	2023-03	2023-06	2023-09	2023-12	2024-03	2024-06	2024-09

Year View, Quarterly with Summary Label for each Year (example 3 years)

Year 2022						Year 2023					
12	2022-02	2022-04	2022-06	2022-08	2022-10	2022-12	2023-02	2023-04	2023-06	2023-08	

Year View, Bimonthly with summary Label for each Year (example 20 months)

Year 2023											
2023-01	2023-02	2023-03	2023-04	2023-05	2023-06	2023-07	2023-08	2023-09	2023-10	2023-11	2023-12

Year View, Monthly with the Summary Label for each Year (example 1 year)

Month Views

January 2023				February 2023				March 2023				April 2023			
01-01	01-08	01-15	01-22	01-29	02-05	02-12	02-19	02-26	03-05	03-12	03-19	03-26	04-02	04-09	04-16

Month View, Weekly with the Summary Label for each Month (example 4 months)

February 2023																											
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Month View, Daily (example 1 month)

Start and End Dates By default, the Start and End Dates are the earliest and latest dates among your entities and relationships. A new End Date button sets the right edge. If an item has a missing start or end date, the label starts with an * if the Start Date is blank, and at the end for a missing End Date.

Visit [Chapter 16: Timeline and Time Range Filter](#) on page 195 for details.

Visualizer: Social Network Analysis Entity Limit Removed

Previously, SNA metrics were calculated for networks with fewer than 10,000 entities. The limit is removed. It may take a while to calculate SNA metric, but it is no longer limited.

Visit [Chapter 15: Entity Metrics with Social Network Analysis \(SNA\)](#) on page 189 for details.

Query Builder Redesign and Enhancements

The Query Builder is revamped to be more powerful and easier to use.

More Advanced Queries

- Relationships can be searched on its own without entities.
- Relationships can have entity criteria on one or both sides of the relationship.
- Relationships can now search on Relationship ID, and like Entities, Created Date, Created By, Modified Date, Modified By, and Brief.
- Combine multiple, disconnected entity and relationship boxes as UNION queries.
- Search multiple values and wildcards on entity name and metadata values.
- Search for Blank and Not Blank values.
- Search for a metadata type (any value) or all metadata types with a specified value.

Enhanced User Interface

- Adding a new Relationship automatically adds two entities.
- For Relationships, a new [Edit Links] button to reassign entity boxes, and optionally include or exclude TO/FROM entities.
- Lines between entities and relationships are thicker, at top instead of middle, and have arrows indicating TO/FROM direction.
- Criteria entries are validated for its column to be a date, number, integer, etc.
- Reordered columns for entities and relationship boxes for easier use and consistency.
- Collapse boxes to reduce their height to the last specified column value.
- Improved user interface for managing metadata criteria.
- Save and open retain the layout more accurately.

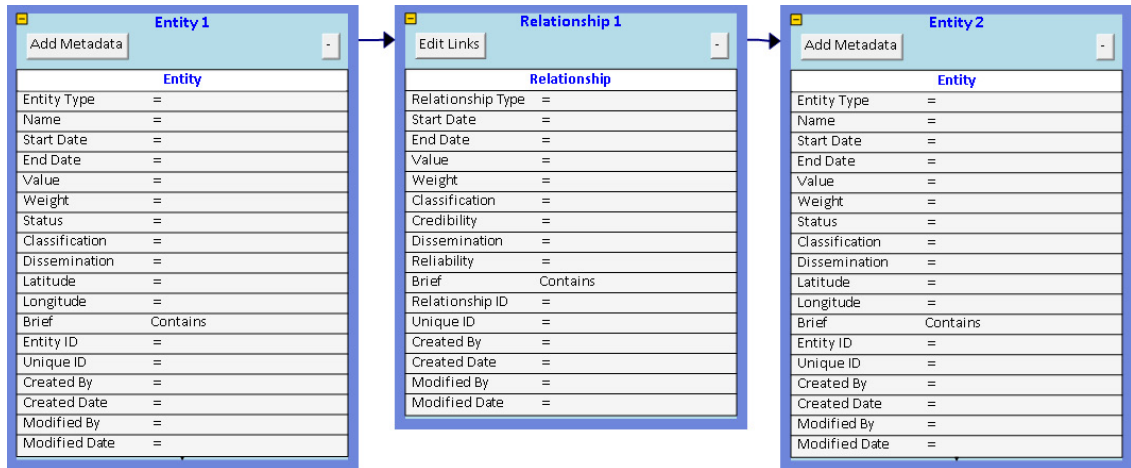
Query Results

- Each Run Query result is displayed on a separate form (instead of the bottom of the screen) so more data on a full screen can be shown and multiple results compared.
- Results form has text filter and options to send items to the Visualizer and Excel.

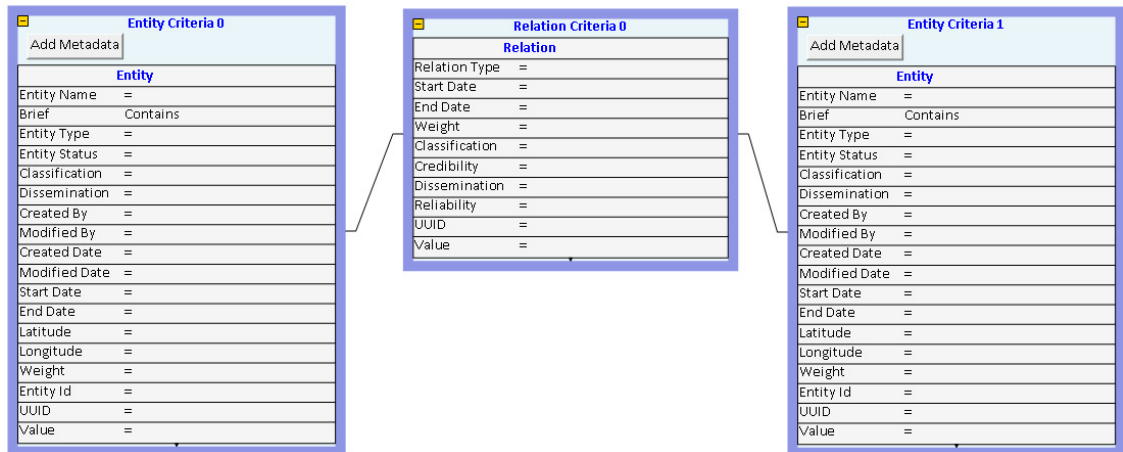
User Interface Examples

Version 10

More columns for criteria, thicker lines with arrows between boxes, Edit Links button for relationships, collapsible boxes, cleaner layouts.



Version 9



For more information, visit [Chapter 20: Query Builder](#) on page 235.

Combine Multiple Searches

Searches for entities and relationships can be saved. Under Search, the new [Combine Multiple Searches] item lets you select and perform analysis among them.

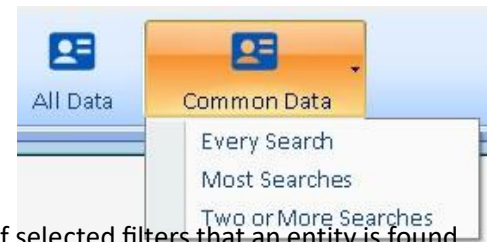
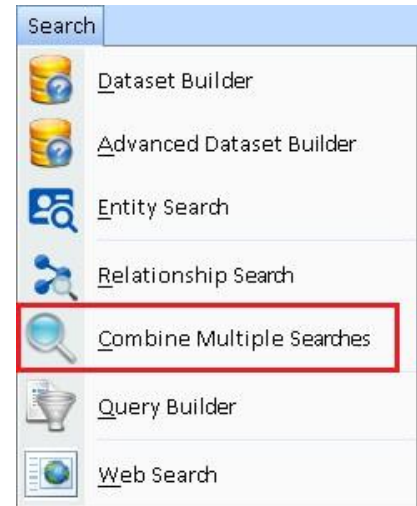
Unlike saved Visualizer Diagrams which save specific items, saved searches are applied against your current database, so its results change with your data. Combine multiple filters to show their Entities and Relationships.

For instance, you may have saved a search for each crime scene selecting entities around a particular location and time. As your database is updated, each search retrieves new results. Wouldn't it be interesting to find entities that appeared at all or most of the crime scenes?

After selecting the saved searches, choose the Common Data options:

- **Every Search:** Find Entities and Relationships that are in every selected search. These are the highest value targets.
- **Two or More Searches:** Entities that are in at least two of the searches.
- **Most Searches:** Determine the maximum number of selected filters that an entity is found and show them. For instance, 10 filters are selected, but no Entities are in all 10. SentVi finds that the most filters an entity appears is 7, so it shows the entities (and relationships) that are in 7.

For more information, visit [Combine Multiple Searches](#) on page 227.



Entity Distance Search

Entity search finds entities based on its distance from a location.

Distance from Location	
Distance	<input type="text" value="10"/>
Units	<input type="text" value="Miles"/>
Latitude	<input type="text" value="38.91648"/>
Longitude	<input type="text" value="-77.22663"/>

Entity Distance Search



Specify the distance in miles or kilometers, and the latitude and longitude of the center point. All the entities with latitude and longitude in the circle are selected.

For more information, visit [Advanced Entity Search](#) on page 67.

Metadata Search Improvements

Entity and relationship metadata search is enhanced to find items with a metadata type regardless of value and wildcard searching on values.

All Items with a Metadata Type

For the entity and relationship metadata search, you can select a Metadata Type and leave the Value blank to find all the items that have that Metadata Type regardless of its value.



Metadata Type	Entity Type	Value
Alias Name	(not specified)	

Find Entities or Relationships with a Metadata Type

Previously, a value was required which did not support searching for any value for the type.

Metadata Wildcard Search

Wildcard searches support finding values that start with a letter(s), contain letters, and/or end with letters. The percent sign (%) is the wildcard character which symbolizes any characters. For instance, enter:

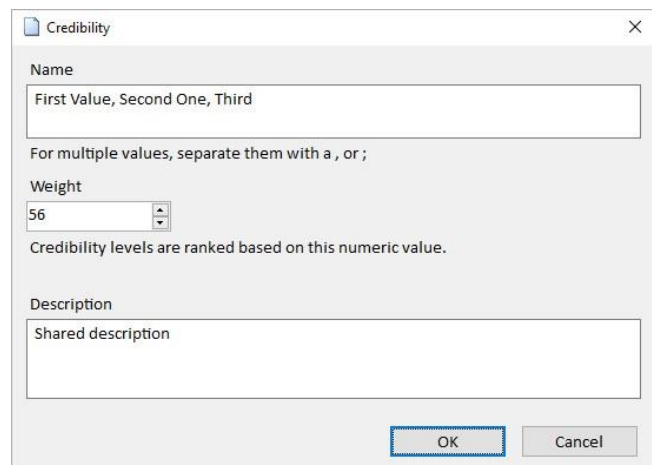
- A% for all values that start with the letter “A”.
- US% for all values that start with “US”.
- %a% for all values that contain the letter A (the search is case insensitive).
- %N for all values ending with the letter N.

For more information, visit [Metadata and Lookups Search](#) on page 69.

Lookup Tables: Add Multiple Values at Once

Under Tools, Manage Database, you can set the values of the Lookup tables. Lookup tables are lists of values for some entity and relationship fields such as type, classification, dissemination, credibility, reliability, users, topics, etc.

Previously, each lookup value was added one at a time. For most of the lookups, you can now enter multiple values at once. Multiple values can be added by entering them separated by commas or semicolons, or as rows (pasted from Excel). If there are other values like Weight or Description, they are applied to each of the new items.



Credibility

Name
First Value, Second One, Third

For multiple values, separate them with a , or ;

Weight
56

Credibility levels are ranked based on this numeric value.

Description
Shared description

OK Cancel

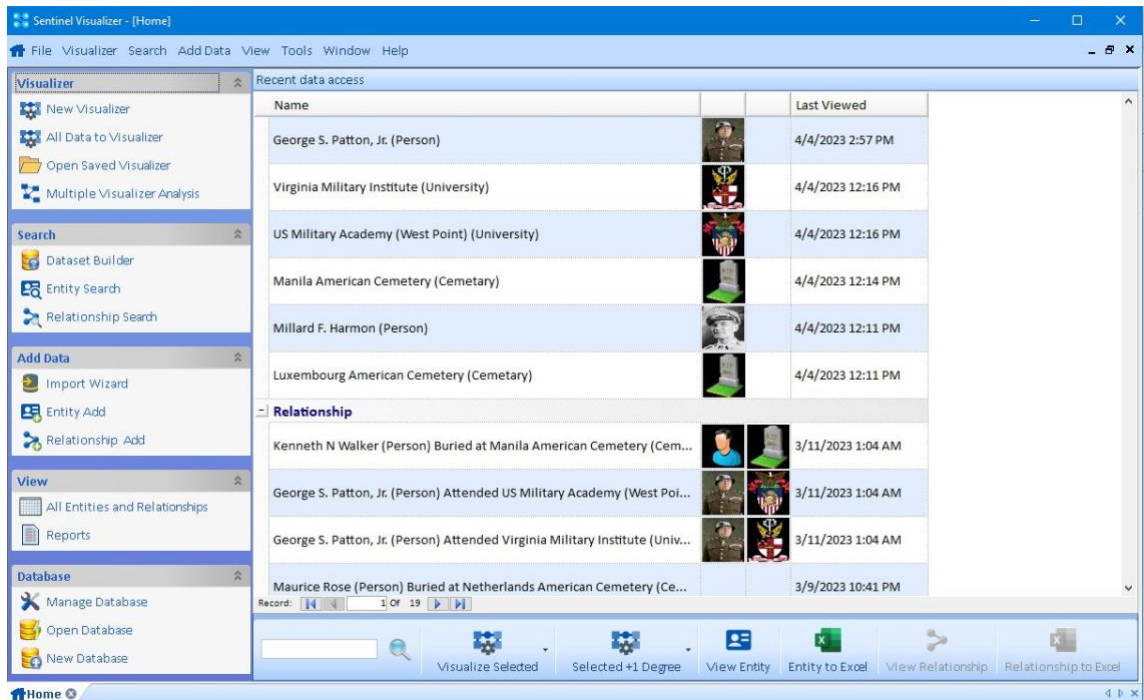
Larger Images for Entity Types

In addition to text searches for lookup tables, Entity Type supports larger image files which also appear as larger icons on the Entity Type grid. For more information, visit [Overview of Editing Lookup Tables](#) on page 275.

Home Page Enhancements

Images on Most Recently Used (MRU) Entities and Relationships

When you select an entity or relationship to add to the Visualizer or view its details, it is added to the MRU list. The list is prominently displayed on the Home Page and search forms to easily perform actions on your most frequently accessed items.



Home Page with MRU List showing Entity Images







Enhanced MRU List with Images

In version 10, a picture is displayed for each entity using its picture or its entity type icon. Relationships show the images of both entities in the relationship. This makes it easier to identify the entities and relationships.



MRU Entity List with some Images

For Relationships, the pictures of the FROM and TO entities are displayed.

Relationship	
Kenneth N Walker (Person) Buried at Manila American Cemetery (Cem...	 
George S. Patton, Jr. (Person) Attended US Military Academy (West Poi...	 
George S. Patton, Jr. (Person) Attended Virginia Military Institute (Univ...	 

MRU Relationship List with Entity Images

Select one or more entities and relationships to perform tasks on them from the toolbar.

Toolbar

The toolbar at the bottom lets you perform actions on your selected MRU items.



Home Page Toolbar

- Type a few letters in the new filter feature to reduce the MRU list by their names.
- [Visualize Selected] sends the selected items to the Visualizer.
 - If more than one entity is selected, there is an option to include the relationships between them:

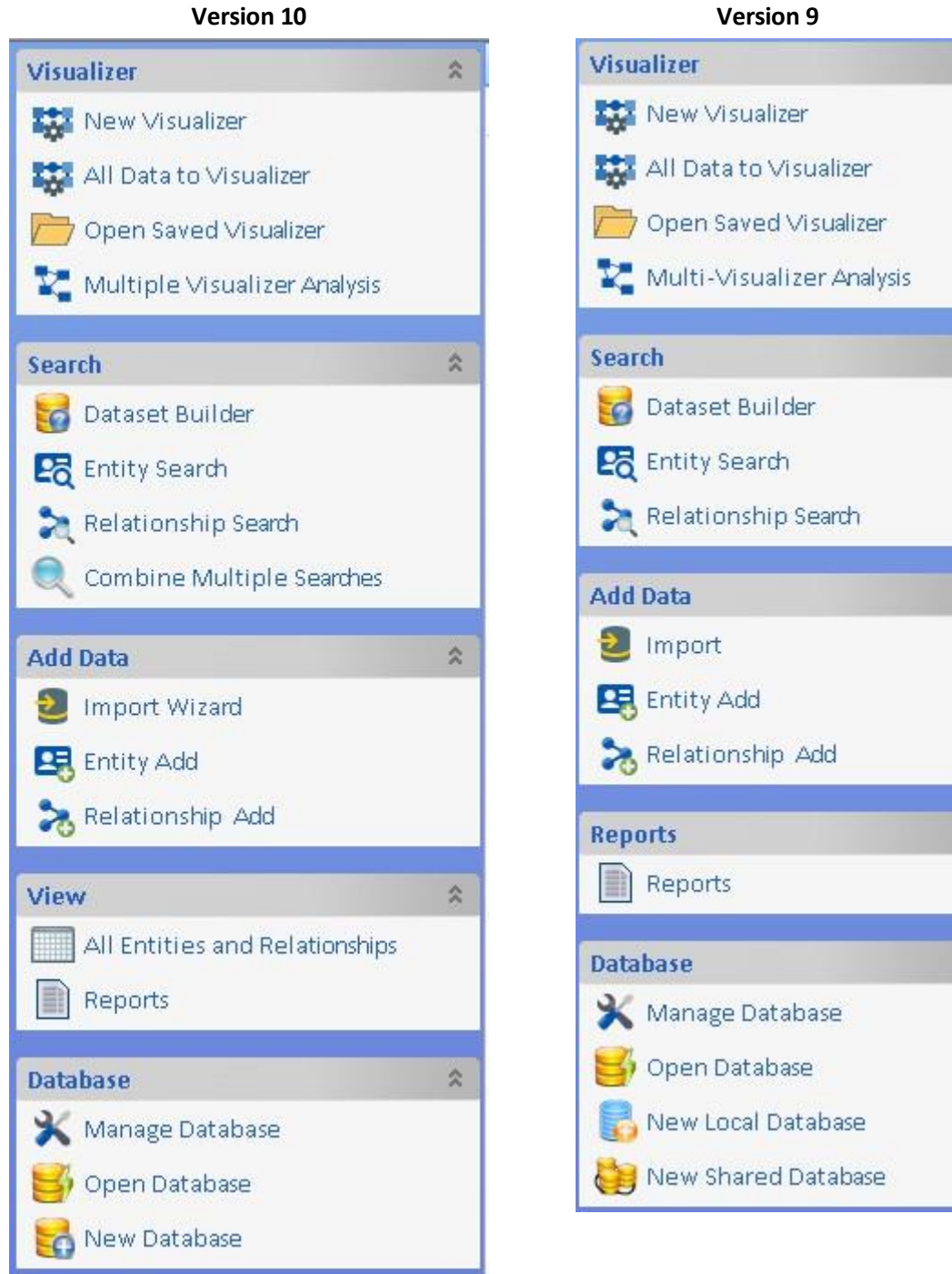


- [Selected + 1 Degree] lets you send the selected items to the Visualizer and add their connections to other entities (one degree links). Includes the new Directional links.



Reorganized Left Panel

Left panel options are the most common items from the top menu.



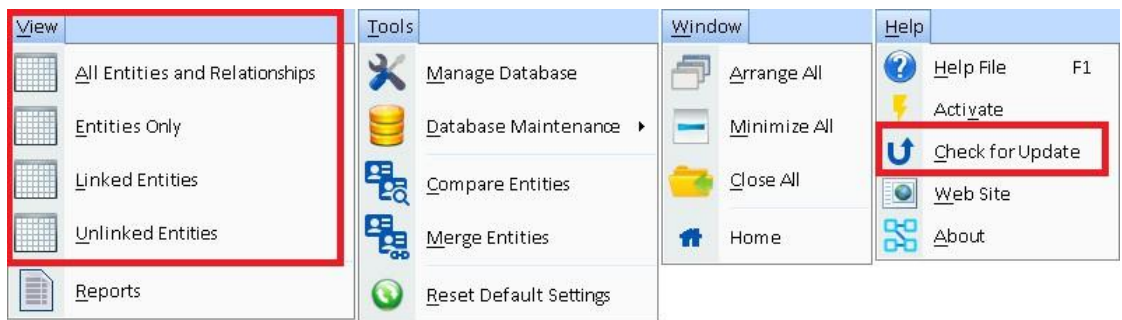
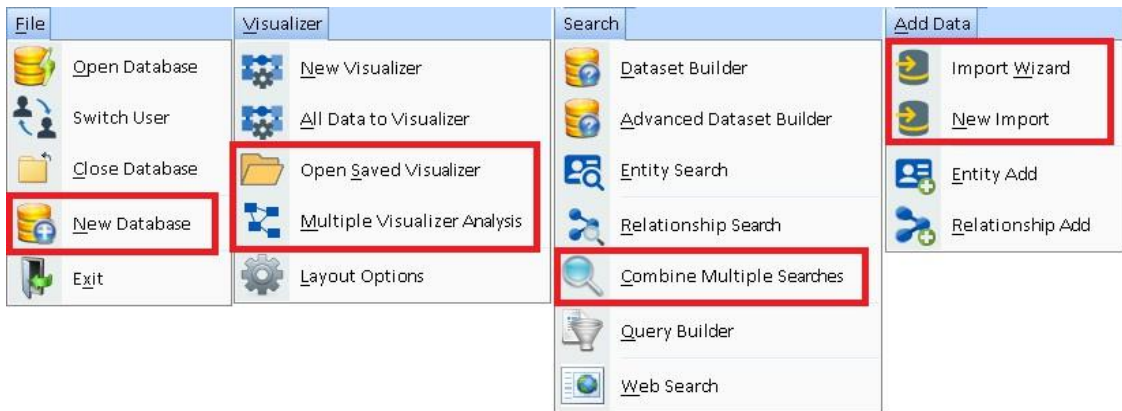
- Search has [Combine Multiple Searches] to find common items across your saved searches.
- Add Data has the new [Import Wizard] replacing [Import]. For the old feature to open a blank import form, use the menu and select [New Import] under Add Data.
- View has a new [All Entities and Relationships] to see the list of all of them. [New Database] combines separate items for local and shared databases.

Each section can be minimized by clicking  in their top right corner.

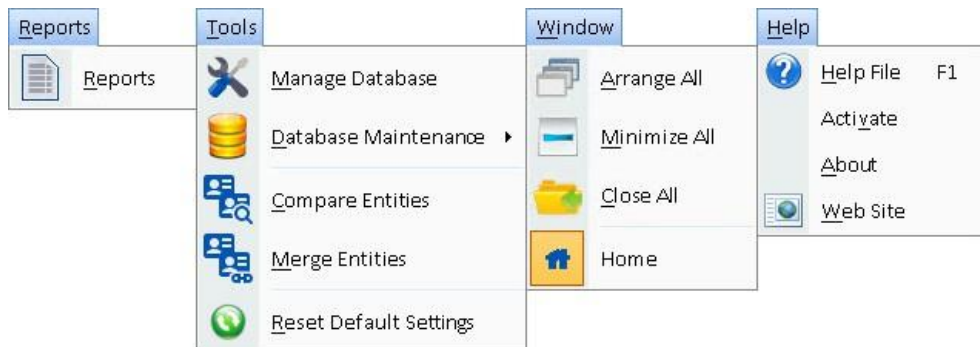
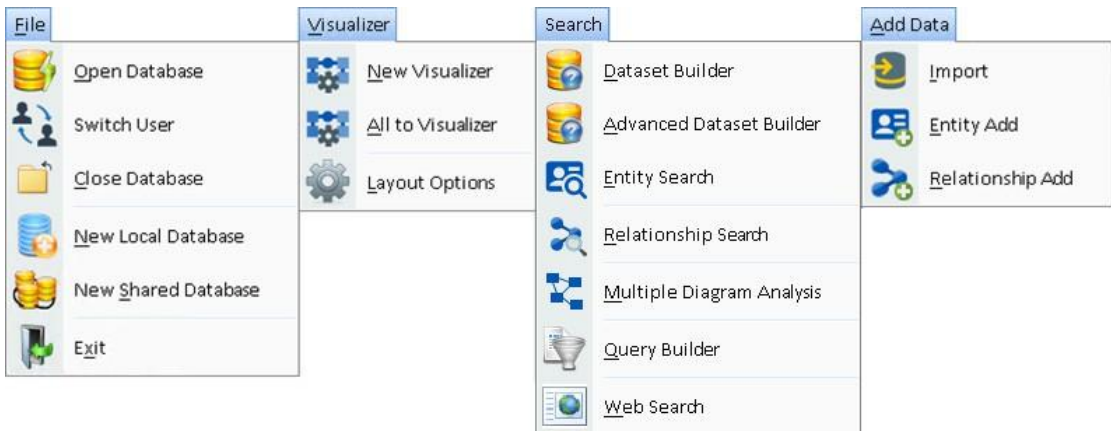
Menu Enhancements

The top menu is reorganized to match left border of the Home Page:

Version 10 Menus



Version 9 Menus



Menu Changes

File

- [New Database] combines [New Local Database] and [New Shared Database] into one.

Visualizer

- [Open Saved Visualizer] opens a saved diagram without opening the Visualizer first.
- [Multiple Visualizer Analysis] combines and compares multiple saved diagrams (previously under Search).

Search

- [Combine Multiple Searches] selects multiple saved entity and relationship searches to show all or only common items among them.

Add Data

- [Import Wizard] simplifies creating a new import with a Wizard.
- [New Import] is the button that opens an empty Import form.

View (replaces Reports)

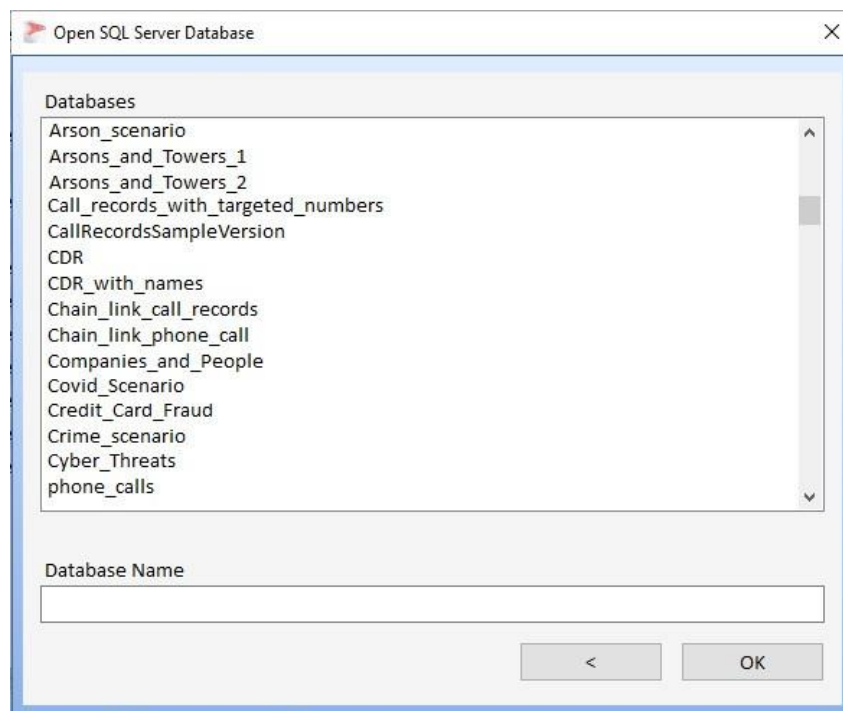
- New items to view lists of entities and relationships without using the dataset builder.

Help

- [Check for Update] to see if you are running the latest version of the program.

Open Database Wizard

When opening a database, a dialog appears with your most recently opened databases. If your database is not in the list, add it with a new Wizard that simplifies the selection process. Enter your server and credentials, if any, then see the list of databases to select.

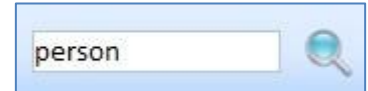


Select a database from the list or type letters in the Database Name box to filter it before selecting one and pressing [OK].

For more information, visit [Open a Database](#) on page 250.

Text Filter on Many Forms

In addition to the Home Page, a search box makes it easy to filter the records in several grids by typing in a few letters.



This exists on the entity and relationship search pages, dataset builder results, query builder results, lookup table management, import preview, and other forms.

Enhancements in Earlier Versions

For lists of enhancements in version 9 and earlier, please visit our web site:

Sentinel Visualizer Version	Function
9	http://SentinelVisualizer.com/go.aspx?id=9
8	http://SentinelVisualizer.com/go.aspx?id=8
7	http://SentinelVisualizer.com/go.aspx?id=7
6	http://SentinelVisualizer.com/go.aspx?id=6
5	http://SentinelVisualizer.com/go.aspx?id=5

Chapter 3: Getting Started

SentVi 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.

Installation

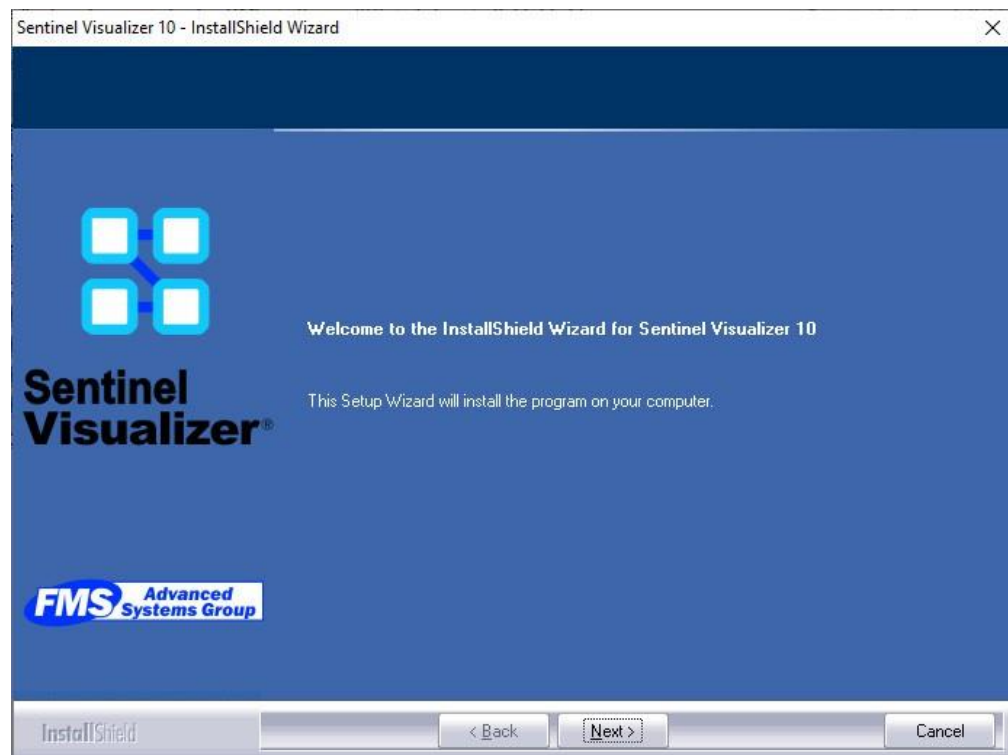
Optionally Install Microsoft SQL Express for SentVi

SentVi supports local databases with Microsoft SQL Express, the free version of SQL Server. If you are only using shared databases hosted by another machine and don't want the sample database, you do not need to install SQL Express and can skip this step.

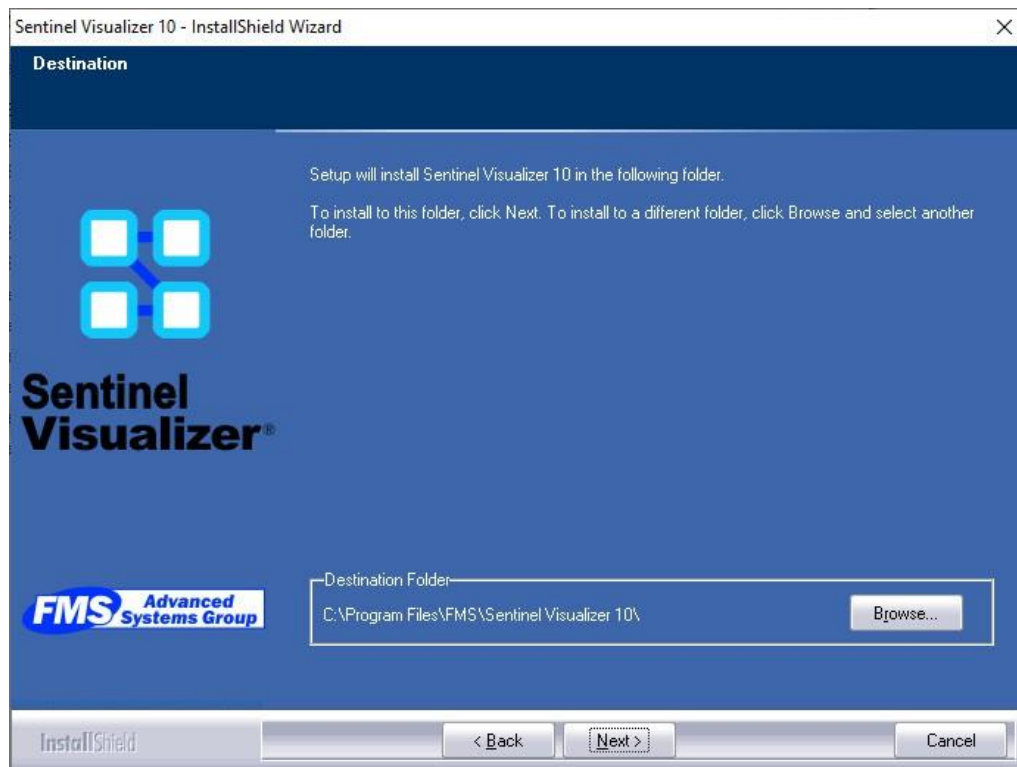
Download the SQL Express version for your Windows operating system, then follow the installation instructions online at: https://sentinelvisualizer.com/SQLServer/Express_2019/.

Install SentVi

Download the SentVi setup program based on your operating system, then run it:

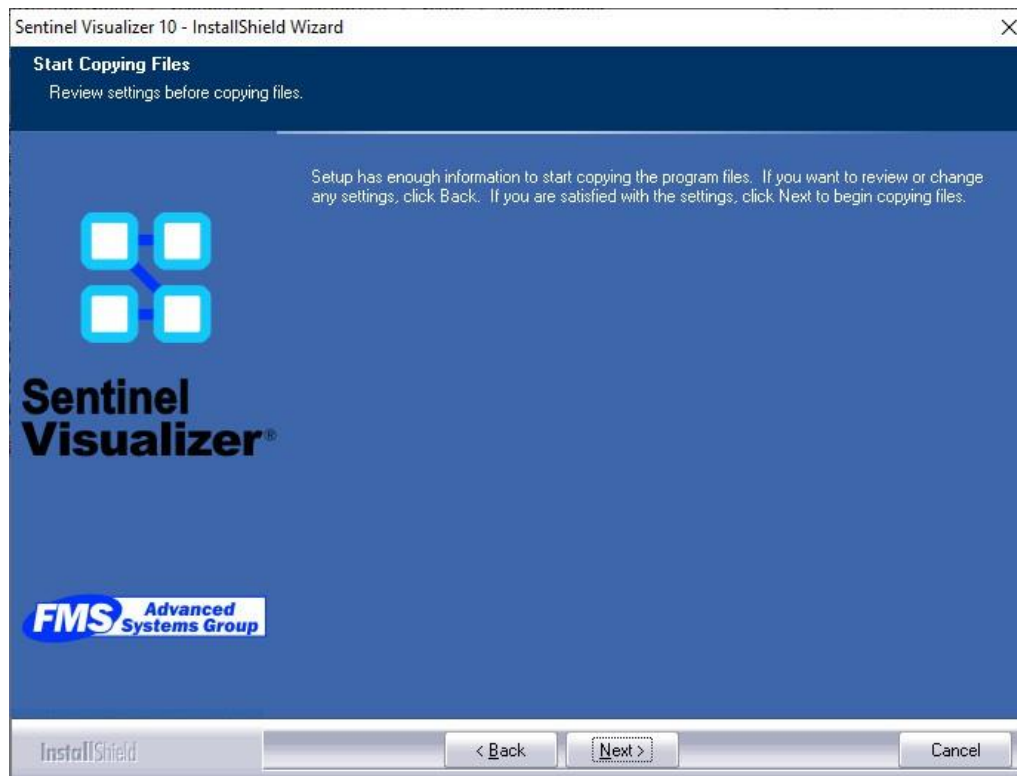


Click [Next >] to see the license page. Click [Yes] to agree. The next screen lets you select another installation folder with the [Browse...] button:



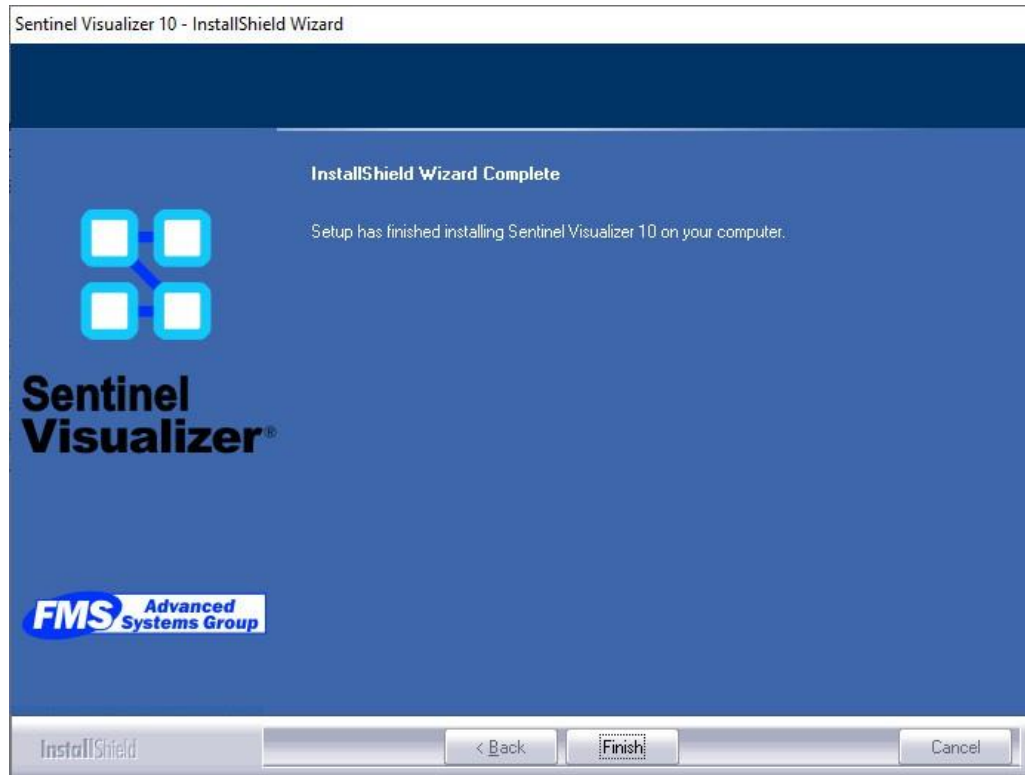
Choose another Installation Folder

Click [Next >] to see the confirmation:



Confirmation Screen Before Installing Files

Click [Next >] to start installing the files. When completed, this screen appears:

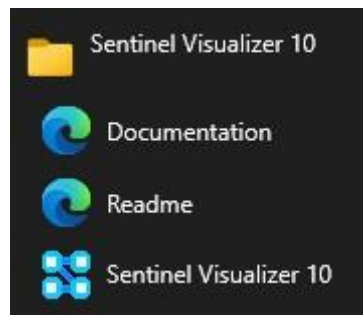


Installation Completed

SentVi is successfully installed. Click [Finish] to close the installation program.

Start the Program

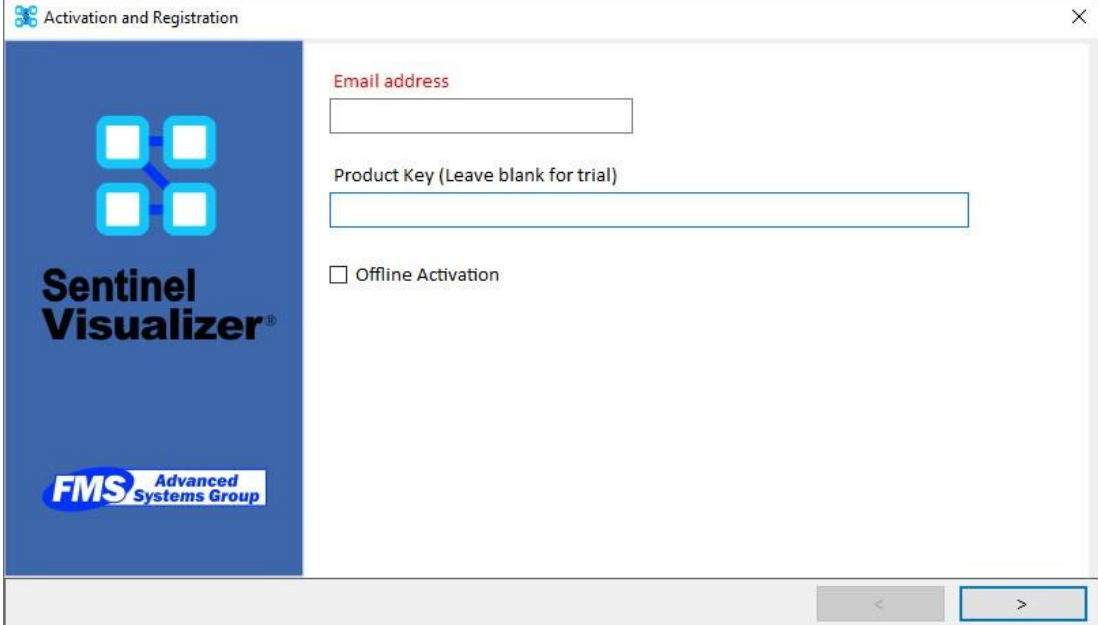
SentVi provides all user functionality in one program. To launch the software, go to the Windows Start Menu, under Sentinel Visualizer 10, and select [Sentinel Visualizer 10]:



Windows Start Menu

Activation

The first time you run SentVi, the activation wizard appears.



The screenshot shows a dialog box titled "Activation and Registration" with a close button (X) in the top right corner. On the left side, there is a blue vertical panel containing the Sentinel Visualizer logo (four squares in a 2x2 grid) and the text "Sentinel Visualizer®" and "FMS Advanced Systems Group". On the right side, there are three input fields: "Email address" (with a red error message above it), "Product Key (Leave blank for trial)", and a checkbox labeled "Offline Activation". At the bottom right, there are two buttons: a grey "<" button and a blue ">" button.

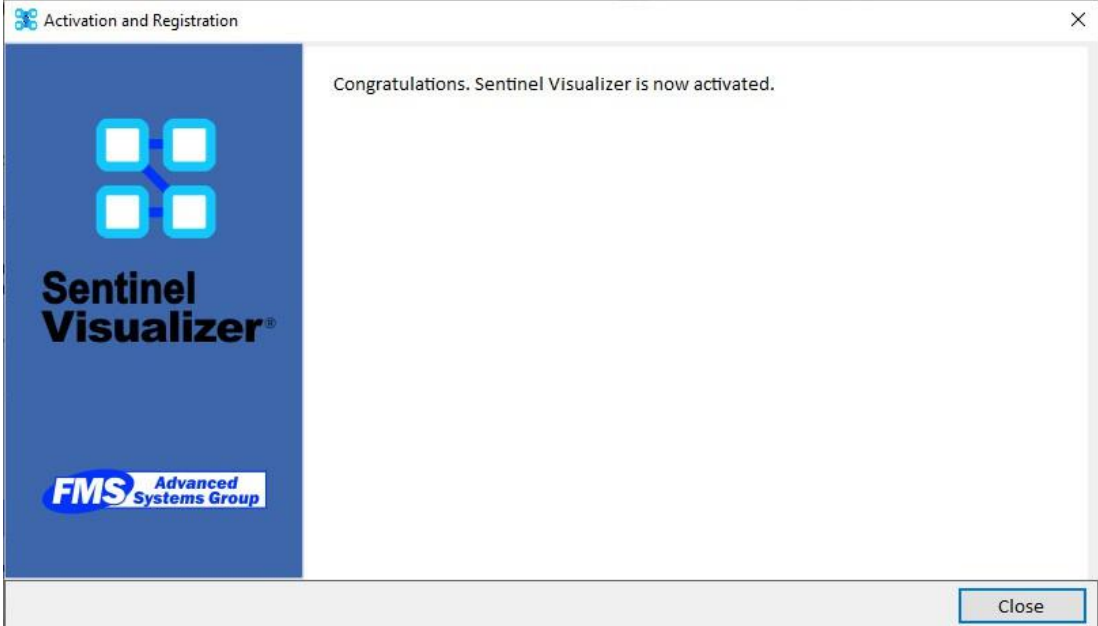
Activation Form for Trial or Licensed Copy

There are two ways to activate the software:

- **Trial:** Activate a trial by entering the email address registered for the trial.
- **License:** With a license serial number, enter it in the Product Key field.

If you don't have an internet connection, click the [Offline Activation] box and follow the instructions on the subsequent screens.

Click [>] to continue. With an internet connection, wait a moment to see a confirmation screen.



The screenshot shows the same "Activation and Registration" dialog box, but now it displays the message "Congratulations. Sentinel Visualizer is now activated." in the main area. The left side with the logo and branding remains the same. At the bottom right, there is a single "Close" button.

Activation Completed

First Time Welcome Screen

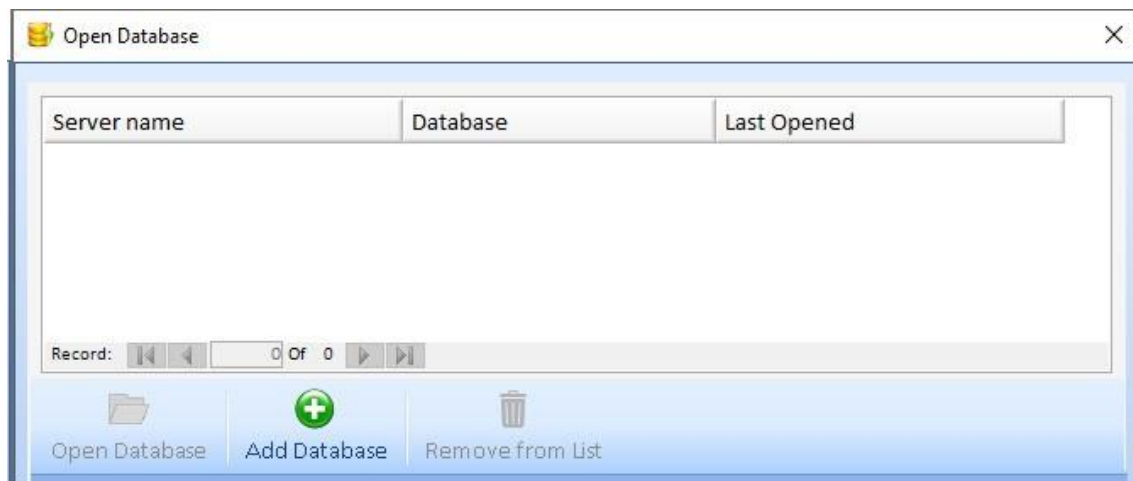
The first time you run SentVi it displays the Welcome screen:



Use this form to open an existing database or to create a new database. You can open an existing database or create a new one.

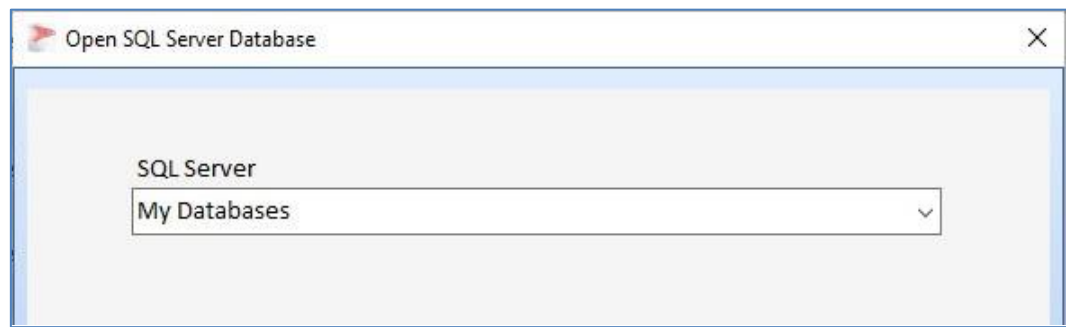
Open the Sample Database

If you installed SQL Express for SentVi, a sample database is installed on your PC. Click "Open a SentVi database" (or later from the File menu, Open Database):



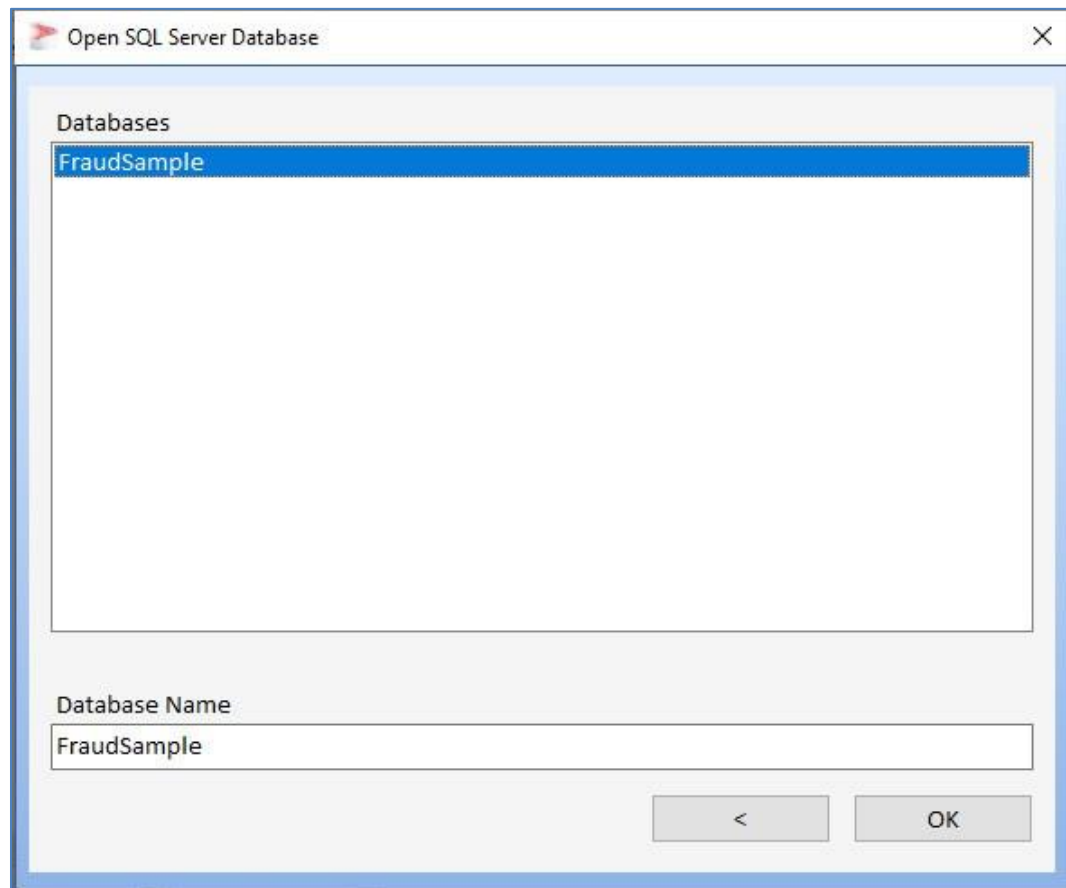
Since no databases were opened yet, the Most Recently Used (MRU) list is empty. Press the [Add Database] button to select a database server and database.

If installed, it defaults to the My Databases server:



Open a SQL Server Database

My Databases is a collection of databases stored on your computer and includes the SentVi FraudSample database. Press the [>] button to see the sample database in the list:



Select the **FraudSample** database and click [OK].

What to Do Next

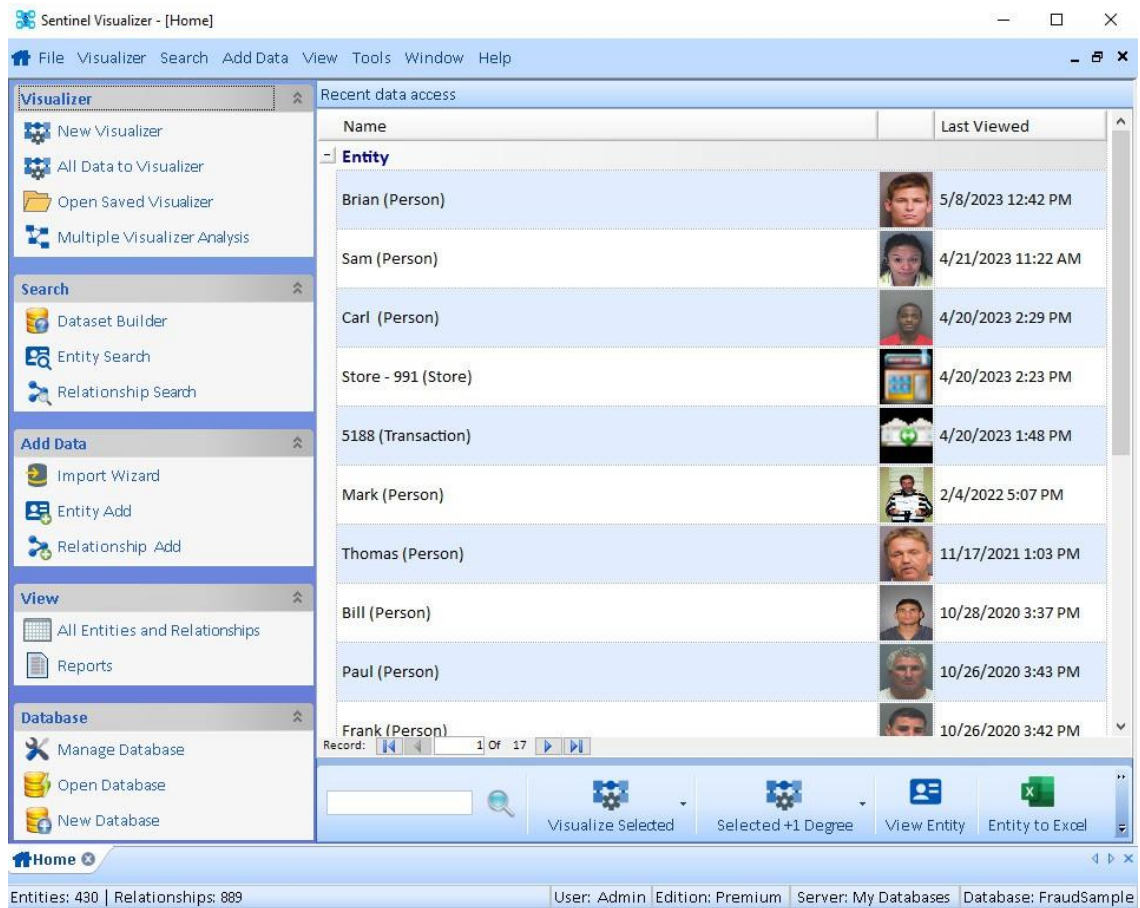
Use the SentVi menus to explore the sample database, look at the data, run the Visualizer, and see how the various features work.

When you are ready to create your own database, import data, customize the lookups and metadata, and run your own queries, read:

- **Chapter 22: Importing Data**
- **Chapter 23: Configuring Your Database**

Home Page

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.



Home Page

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 SentVi. Click “New Visualizer” to create a new, blank Visualizer, or “All Data to Visualizer” to send all your entities and relationships to the Visualizer. Visit [Chapter 12: Visualizer](#) on page 109 for details.

Top Menu

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

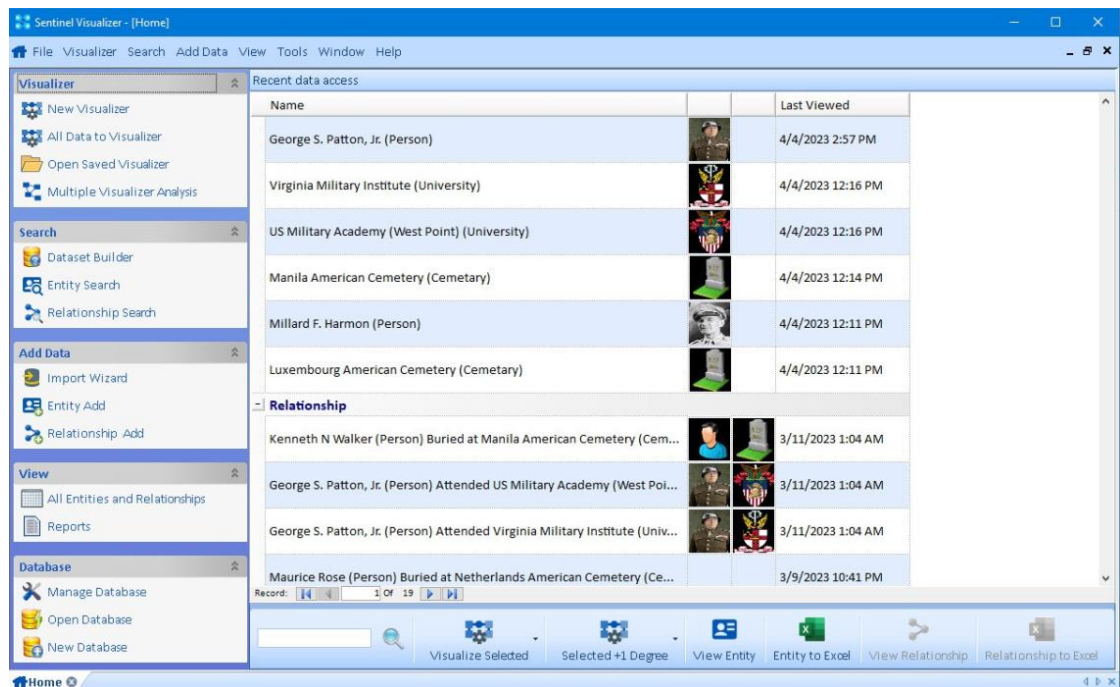
Details about the Home Page and Menu are in the next chapter.

Chapter 4: Home Page and Top Menu

The Home Page is the starting point for all the options to view and analyze your database. The MRU lists the most recently opened entities and relationships, a toolbar lets you perform actions on them, a panel of common commands are on the left, and status bar disclosing the currently opened database is at the bottom. The top application menu, which is available from any form, is described.

Home Page Overview

After opening a database, the Home Page appears:



Home Page with MRU List showing Entity Images

Most Recently Used (MRU) Entities and Relationships

When you select an entity or relationship to add to the Visualizer or view its details, it is added to the MRU list (up to 50). The list shows the entity/relationship name, images of the entity or its type, and when it was last used. This makes it easy to perform actions from the Toolbar on your most frequently accessed items.

MRU Toolbar

The Toolbar below the MRU list provides options on the MRU list. You can filter the list by typing a few letters or select one or more MRU items and send them to the Visualizer, view its details and export to Excel.



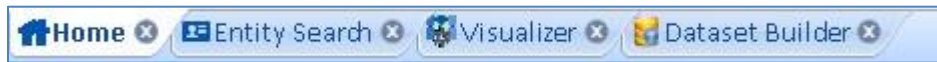
Home Page Toolbar

Left Panel

The left panel has common commands divided into sections like the top menu: Visualize, Search, Add Data, View, Database.

Form Tabs

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



Quickly see a list of all open forms and click on the one you want. You can always return to the Home form and close a form.

Status Bar

The Status Bar is at the bottom of the window. On the left, the number of entities and relationships in the database are shown.

Entities: 430 | Relationships: 889

Number of Entities and Relationships in the current database

On the right, your SentVi user name and edition, SQL server, and database are shown:

User: Admin | Edition: Premium | Server: My Databases | Database: FraudSample

Status Bar: Right side with your user and database information

Most Recently Used (MRU) Entities and Relationships







Images on Most Recently Used (MRU) Entities and Relationships

In version 10, a picture is displayed for each entity using its picture or its entity type icon. Relationships show the images of both entities in the relationship. This makes it easier to identify the entities and relationships.

George S. Patton, Jr. (Person)	
Virginia Military Institute (University)	
US Military Academy (West Point) (University)	
Manila American Cemetery (Cemetery)	
Millard F. Harmon (Person)	

MRU Entity List with some Images

For Relationships, the pictures of the FROM and TO entities are displayed.

Relationship	
Kenneth N Walker (Person) Buried at Manila American Cemetery (Cem...	 
George S. Patton, Jr. (Person) Attended US Military Academy (West Poi...	 
George S. Patton, Jr. (Person) Attended Virginia Military Institute (Univ...	 

MRU Relationship List with Entity Images

Select one or more entities and relationships to perform tasks on them from the toolbar.

Toolbar

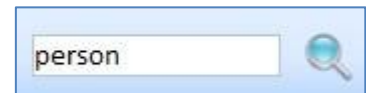
The toolbar at the bottom lets you perform actions on your selected MRU items.



Home Page Toolbar

Text Filter

The search box makes it easy to type a few letters and filter the MRU records.



Visualize Selected Button

Select items from the MRU list by clicking on one or use the [Ctrl] Click to select multiple items or [Shift] Click to select items from the current one to that one.

[Visualize Selected] sends the selected item(s) to the Visualizer which displays the link chart of entities and relationships.





One Entity Sent to the Visualizer Diagram

If more than one entity is selected, the dropdown offers an option to include the relationships among them.

If you just click the button [Visualize Selected], each of the selected entities is displayed without any relationship lines between them. If you choose [Add Direct Links Among Selected], their relationships lines are shown.



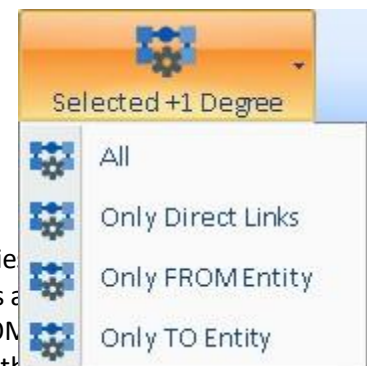
If you don't choose [Add Direct Links Among Selected], you can always add the relationships later in the Visualizer under Get Links, Only Direct Links.

Selected + 1 Degree Button

[Selected + 1 Degree] lets you send the selected items to the Visualizer and add their relationships to other entities (one degree links).

There are four options:

- [All] adds all linked entities plus links among the linked entities
- [Only Direct Links] only adds the linked entities without links
- [Only FROM Entity] only adds entities with relationships FROM the selected entity
- [Only TO Entity] only adds the entities with relationships TO the selected entity



For more information and examples, visit [Get Links](#) on page 129.

View Entity

Open the View Entity form for each selected entity to display its details including properties such as name, entity type, status, value, weight, unique ID, start date, end date, latitude, longitude, image, and a rich text brief describing the entity. There can be an unlimited number

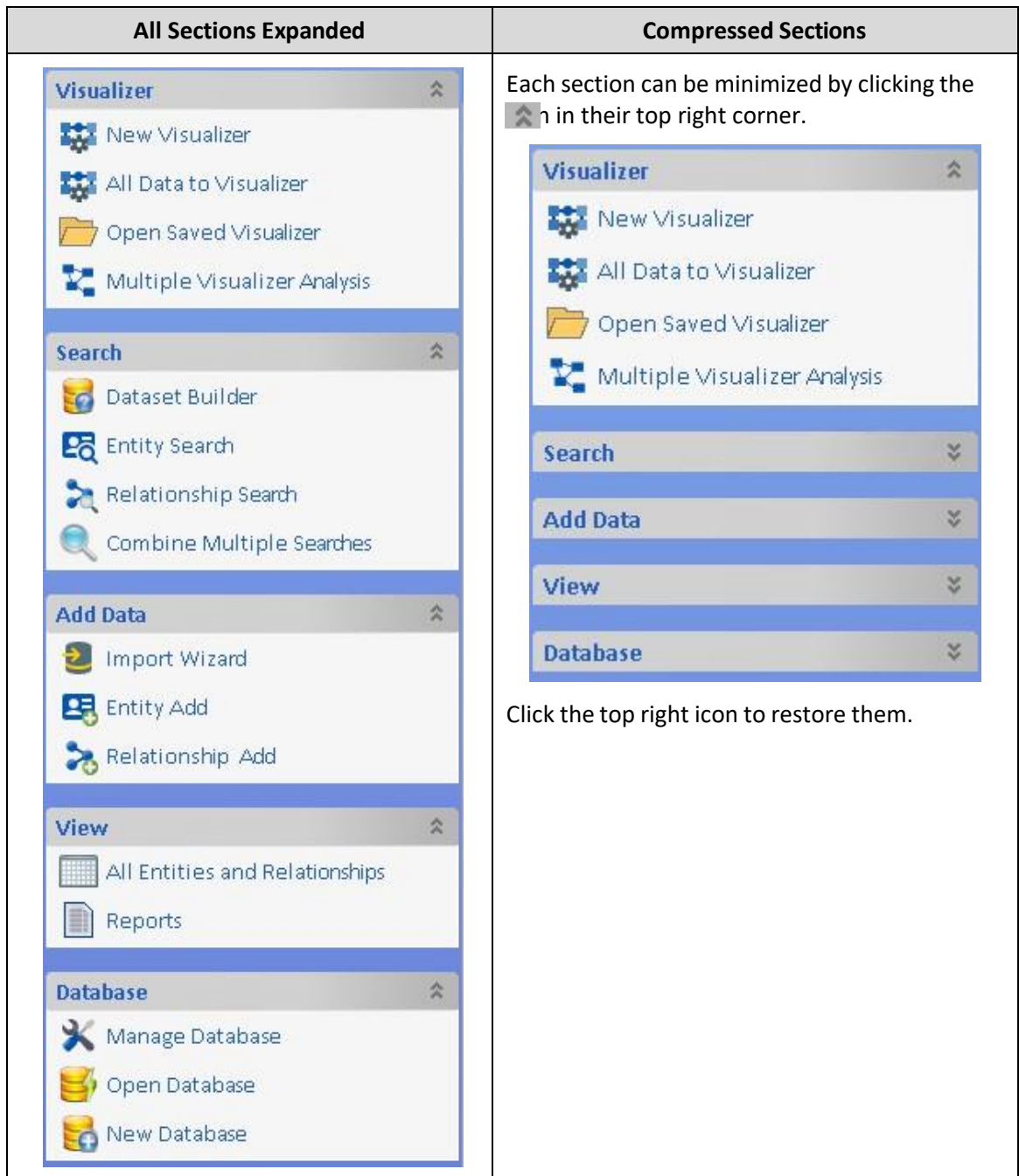
of linked and embedded documents, metadata types and values, user notes, relationships to other entities, and topics. For more information, visit [View Entity Information](#) on page 52.

Entity to Excel

Send a list of the selected entities to an Excel spreadsheet.

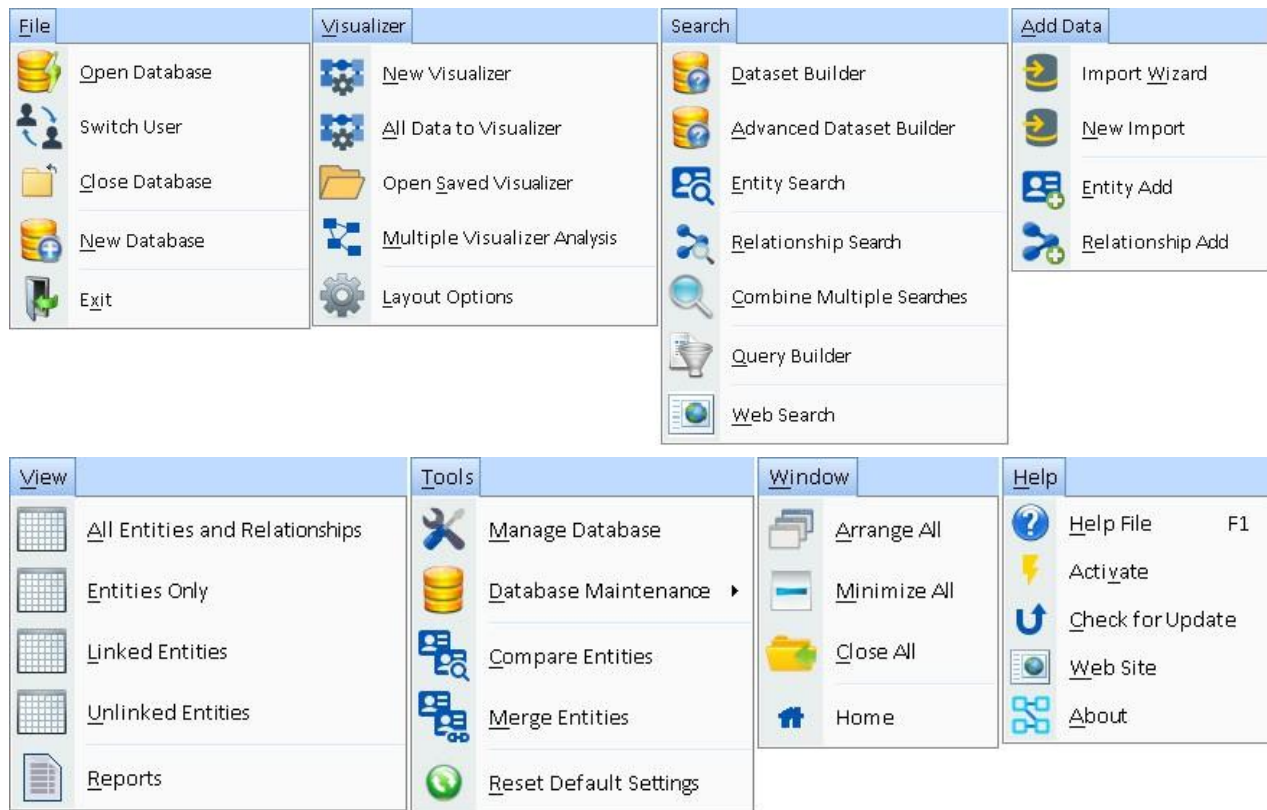
Left Panel Options

Left panel options are the most common items from the top menu. New items include [Open Saved Visualizer], perform [Multiple Visualizer Analysis], and to view [All Entities and Relationships]. [New Database] combines separate items for local and shared databases.



Application Menu


The Application Menu at the top is available from any part of the program. It has everything on the home page's left panel, plus less frequently used items:



The Menu is organized into 8 sections.

File	
Open Database	Open another SentVi database. Visit Open a Database on page 250 for details.
Switch User	Change the username for your current SentVi database. Visit Switch User Name on page 251 for details.
Close Database	Close the currently opened database.
New Database	Create a new database in the local or shared SQL Server. Visit Create a New Database on page 248 for details.
Exit	Quit SentVi.
Visualizer	
New Visualizer	Create a new, blank Visualizer. Visit Chapter 12: Visualizer on page 109 for details.
All Data to Visualizer	Send all entities and relationships to a new Visualizer using the default layout type and options.
Open Saved Visualizer	Select a previously saved Visualizer diagram and open it.

Multiple Visualizer Analysis	Analyze multiple saved Visualizer diagrams to combine all or just common data among them. Visit Multiple Visualizer Analysis on page 229 for details.
Layout Options	Visualizer layout options. Visit Layout Options on page 158 for details.
Search	
Dataset Builder	Open dataset builder to select entities and relationships by their characteristics. Visit Chapter 10: Dataset Builder on page 97 for details.
Advanced Dataset Builder	Open the Advanced Dataset Builder to select data based on a Wizard to specify filters by entity, relationship, and how they are linked to each other. Results can be viewed in lists or sent to the Visualizer. Visit Advanced Dataset Builder on page 98 for details.
Entity Search	Find entities by selecting them from an MRU list, a simple name search, or advanced options for all entity columns including metadata, documents, and notes. Visit Chapter 6: Entity Search on page 63 for details.
Relationship Search	Find relationships by selecting them from an MRU list, a simple entity search, or advanced options for all relationship columns including metadata, documents, and notes. Visit Chapter 8: Relationship Search on page 81 for details.
Combine Multiple Searches	Combine multiple entity and relationship searches for all, common, or most common data. Visit Combine Multiple Searches on page 227 for details.
Query Builder	Visually query the database for entity and relationship criteria. Visit Chapter 20: Query Builder on page 235 for details.
Web Search	Search entity info across web search engines. Visit Web Search on page 232 for details.
Add Data	
Import Wizard	Launch the Import Wizard to start the import form with common entity and relationship layouts. Visit Chapter 22: Importing Data on page 255 for details.
New Import	Open a blank Import form.
Entity Add	Add one entity. Visit Add New Entity on page 59 for details.
Relationship Add	Add one relationship. Visit Add a New Relationship on page 74 for details.
View	
All Entities and Relationships	List of all entities and relationships in the database.
Entities Only	List of all entities in the database.
Linked Entities	List of all entities linked to other entities (has relationships).
Unlinked Entities	List of all entities without links to other entities (has no relationships).

Reports	Select among the available reports. Visit Chapter 11: Reports on page 105 for details.
Tools	
Manage Database	Manage your database lookup values, users, checkpoints, and import/export lookup values with other databases. Visit Chapter 23: Configuring Your Database on page 273 for details.
Database Maintenance	Visit Change Your Password on page 252 and Make and Restore Checkpoints on page 252 for details.
Compare Entities	Compare two or more entities to see their differences. Visit Compare Entities on page 297 for details.
Merge Entities	Combine two or more entities into one by selecting property values from the entities. Visit Merge on page 299 for details.
Reset Default Settings	SentVi saves adjustments you make. For instance, you can sort and resize grid columns. For forms, such as Visualizer panels, your selections when you close the form are saved for the next time you open it. This menu item sets all of these back to their default values.
Window	
Arrange All	Resize every open form to see all of them. Reset by maximizing one of them.
Minimize All	Shrink all open Windows to small, minimized windows at the bottom: 
Close All	Close all open forms except the Home Page.
Home	Go to the Home Page.
Help	
Help File	Link to website with this user manual.
Activate	Open form to enter the product key to convert a trial to retail version.
Check for Updates	See if the current build of SentVi is the latest one.
Web Site	Visit the SentVi website.
About	Details of the current build of SentVi.

Chapter 5: Entities

The core of SentVi'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

SentVi supports a wide array of information for each entity. These values are shown in the entity viewer, search results, reports, and other places. Advanced routines are available to search the values.

Entity Properties

Many values can be set for each entity:

- **Entity Name:** The name for the entity and the default value that appears on entity lists and when it's displayed on the Visualizer. The name is usually unique for each entity type but can also be duplicated if uniqueness is based on the unique ID value.
- **Entity Type:** Each entity has a type such as person, place, or organization. SentVi offers a long list of types that you can customize.
- **Lookup Values:** for Classification, Status and Dissemination values that can be customized in their lookup lists.
- **Start and End Dates:** Start and end dates are available for entities (and relationships), to visualize and analyze the temporal nature of your data. For instance, for a person, it may be the start and end dates or employment, or birth and death dates. Used by the temporal timeline.
- **Weight:** An integer between 1 to 100 to rank the importance of each entity
- **Value:** A value associated with the entity.
- **Unique ID:** An optional ID value (string) that could be helpful to identify it from its source or a unique value such as a serial number.
- **Latitude and Longitude:** Geospatial location for the entity to appear on the map.
- **Image:** Each entity can have its own picture on the Visualizer and lists. Without a picture, the entity uses the images for its entity type.
- **Brief:** A rich text summary about the entity.

Tabs for Unlimited Related Data

The bottom of the entity form has tabs for more data. There's only one Brief, but the other tabs support an unlimited number of items.



Entity Tabs

Documents

Link or upload an unlimited number of documents to an entity. These documents can be text files, Word documents, PDFs, Excel spreadsheets, videos, or any other file type recognized by the Windows operating system. The entity search can find text in certain file types (e.g. Word, Excel, PDF, text, etc.) if your file is uploaded to the database and SQL Server is configured for searching inside documents.

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

Add unlimited notes to an entity with automatic tracking of who added or edited a note.

Relationships

See the list of relationships that the entity is a part of either as the primary or related entity. Select an entity and open it to see its details.

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.

Metadata Type	Metadata Value	Notes
Hair Color	Blonde	
Eye Color	Brown	
Gender	Male	
Alias Name	Tommy	

Entity View and Edit Form

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 dropdown contain the acceptable lookup values. For more information on adding new Entity Types, Statuses, etc., see [Overview of Editing Lookup Tables](#) on page 275. 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 SentVi 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.

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.

Unique ID: The Unique ID is an identifier (string) 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 SentVi when it performs analysis using the Visualizer feature. Contact your SentVi System Administrator for information about how weight is handled for your installation of SentVi. 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.

This application stores latitude and longitude as decimal degrees.

Latitudes **north** of the equator are expressed as **positive** numbers between 0 and 90.

Latitudes **south** of the equator are expressed as **negative** numbers between 0 and -90.

Longitudes **west** of the Greenwich Meridian are expressed as **negative** numbers between 0 and -180.

Longitudes **east** of the Greenwich Meridian are expressed as **positive** numbers between 0 and 180.

Enter Latitude and Longitude in Decimal Format

Latitude: Longitude:

Convert Degrees Minutes Seconds to Decimal

If your coordinate data is in degrees, minutes and seconds format, use this panel to convert it to the decimal degrees format for this application.

	Degrees	Minutes	Seconds	
Latitude	<input type="text"/>	<input type="text"/>	<input type="text"/>	West
Longitude	<input type="text"/>	<input type="text"/>	<input type="text"/>	North

Convert to decimal degrees

OK Cancel

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:

- **Entity ID:** The unique number that identifies the entity within the database.
- **Created by:** The SentVi username who created the entity.
- **Created date:** The date and time the entity was created.
- **Modified by:** The SentVi 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 Ultimate version to restrict who has access to this information.

Editing Data in Tabs

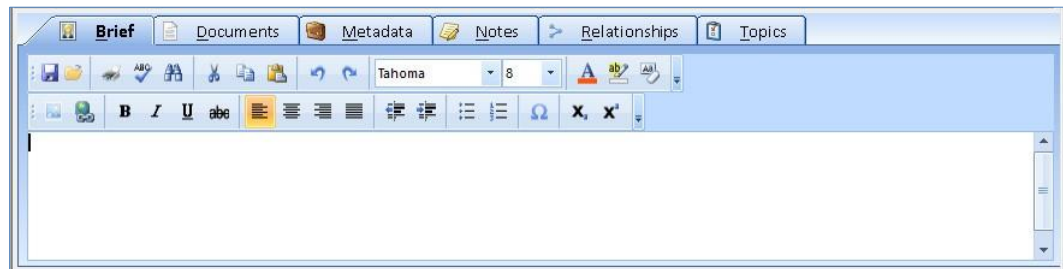
In Edit mode, with the exception of the Brief tab which you can just fill out directly, the other tabs may have multiple values and a set of buttons to manage them. These let you:



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

Brief Tab

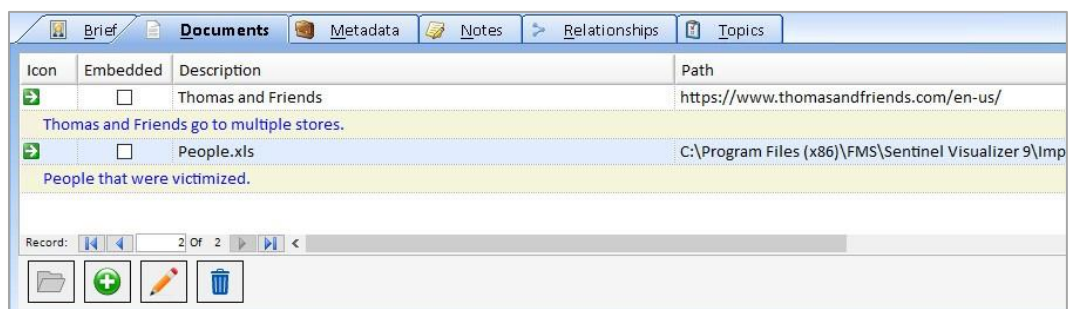
A rich text summary of your entity. It can be used to store “official” information about the entity separate from ad-hoc or non-official data that are stored in Notes.



Enter your information and use the toolbar buttons to change fonts and other formatting options. Complete information about using the Text Editor is in **Rich Text Editor** on page 87.

Documents Tab

SentVi 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.

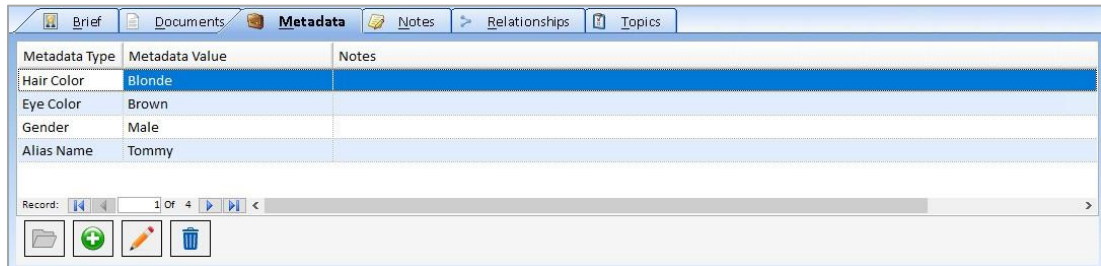
Select any document record and click the Open icon to open the document. Windows automatically launches the program associated with its file type. For example, an Excel spreadsheet opens in Microsoft Excel. If you do not have a program on your computer that is compatible with the document's file type, 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 91.

Metadata Tab

Metadata is typically used to add types of information that are specific to your data and analysis needs. SentVi 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.



The screenshot shows the Metadata tab interface. It features a table with three columns: Metadata Type, Metadata Value, and Notes. The table contains four rows of data:

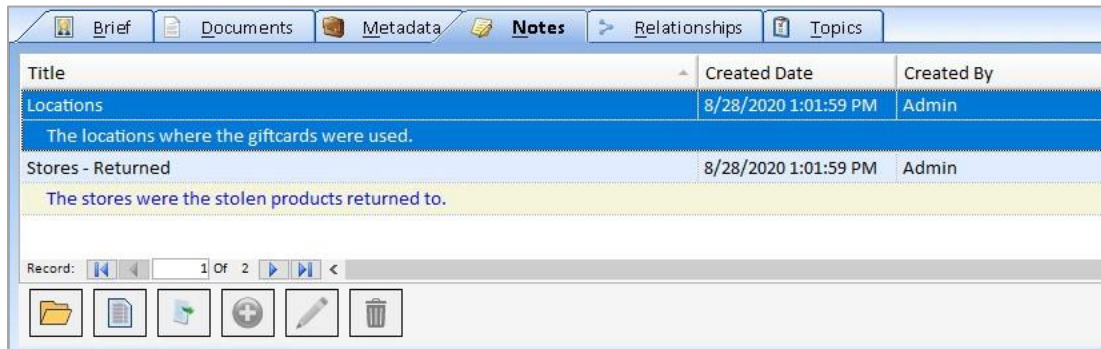
Metadata Type	Metadata Value	Notes
Hair Color	Blonde	
Eye Color	Brown	
Gender	Male	
Alias Name	Tommy	

Below the table is a record navigation bar showing "Record: 1 Of 4" and a set of icons for adding, editing, and deleting records.

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.

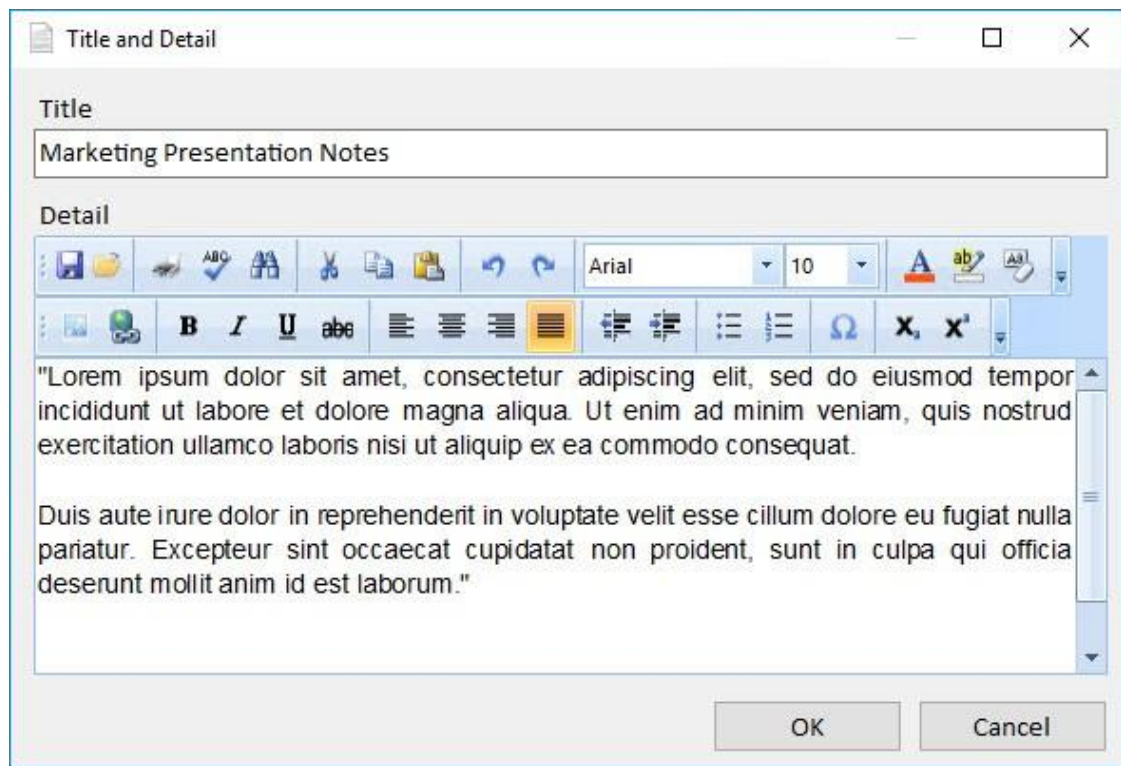


The screenshot shows the Notes tab interface. It features a table with three columns: Title, Created Date, and Created By. The table contains two rows of data:

Title	Created Date	Created By
Locations The locations where the giftcards were used.	8/28/2020 1:01:59 PM	Admin
Stores - Returned The stores were the stolen products returned to.	8/28/2020 1:01:59 PM	Admin

Below the table is a record navigation bar showing "Record: 1 Of 2" and a set of icons for adding, editing, deleting, and opening notes.

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



Additional information about notes is in [Chapter 9: Selecting Dates and Editing Rich Text](#).

Relationships Tab

See all the relationships that the entity participates in.

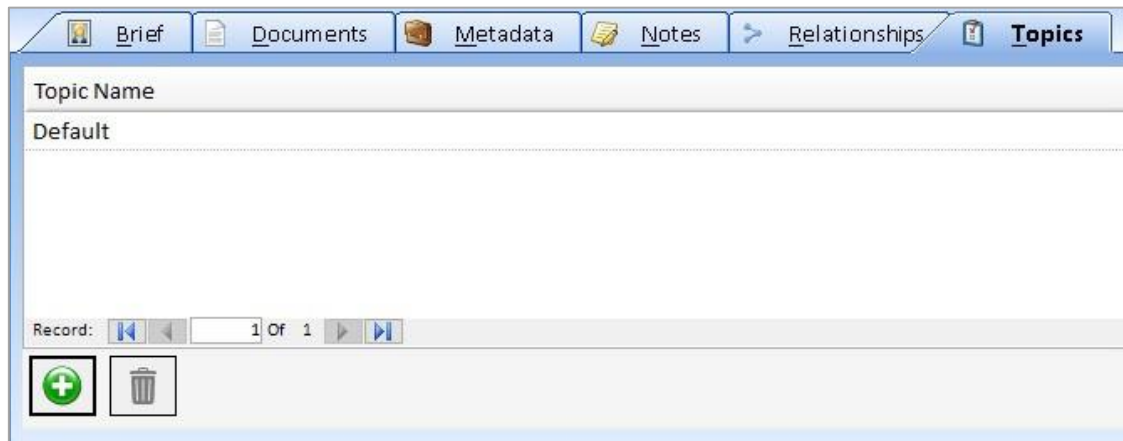
Entity 1 Name	Relationship Type	Entity 2 Name	Start Date	End Date
Thomas	Enters Store	5114	8/26/2010 11:56:00 AM	8/26/2010 12:56:00 PM
Thomas	Makes Return	4638	9/8/2010 4:11:00 PM	9/8/2010 5:11:00 PM
Thomas	Makes Return	4486	7/10/2010 11:12:00 AM	7/10/2010 12:12:00 PM
Thomas	Enters Store	4125	7/14/2010 11:23:00 AM	7/14/2010 12:23:00 PM
Thomas	Makes Return	3876	6/24/2010 3:31:00 PM	6/24/2010 4:31:00 PM

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 7: Relationships](#) on page 71.

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.



Cancel

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

SentVi 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

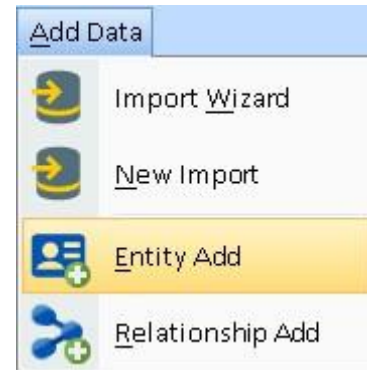
Since the SentVi database acts as your central repository of entity information, you want to be sure that the data it contains is accurate and does not contain duplicates. To help this process, SentVi provides a feature that makes it easy to check if an entity already exists before you add it.

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 and enter the entity name.

A screenshot of the 'Add New Entity' dialog box. The dialog has a title bar with the text 'Add New Entity' and standard window controls. The main content area is titled 'Entity Type and Name' and contains the following elements: a dropdown menu for 'Entity type' with 'Person' selected, a text input field for 'Entity name', and a checked checkbox labeled 'Check for existing entities'.

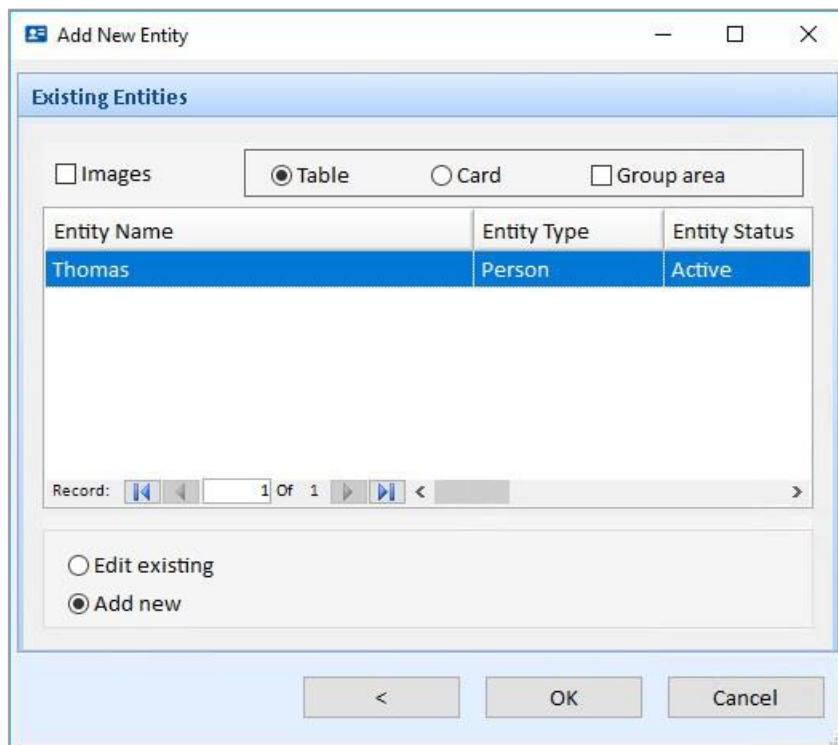
Specify the new Entity Type and Name

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 [Overview of Editing Lookup Tables](#) on page 275.

Check for Existing Entities Option

By default, SentVi checks for existing entities with similar type and name. You can turn this option off if you know the entity being added 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.

Delete 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.

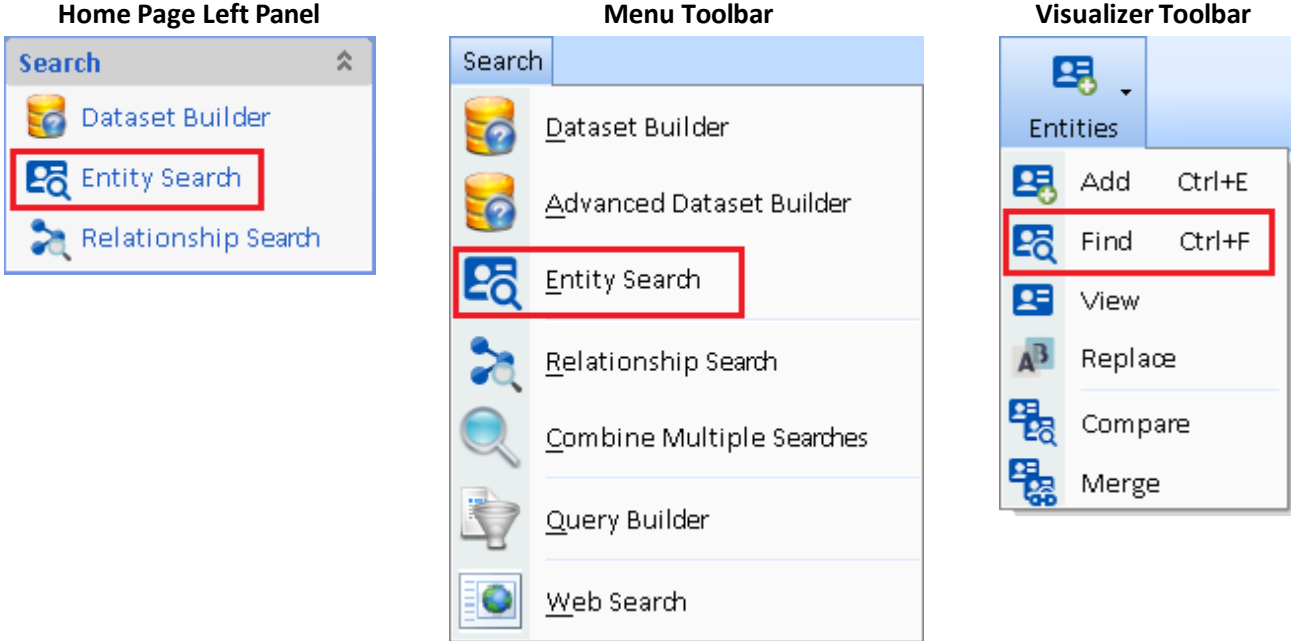
If the entity participates in one or more relationships, all those relationships are deleted but the corresponding entities related to it are not touched.

Chapter 6: Entity Search

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

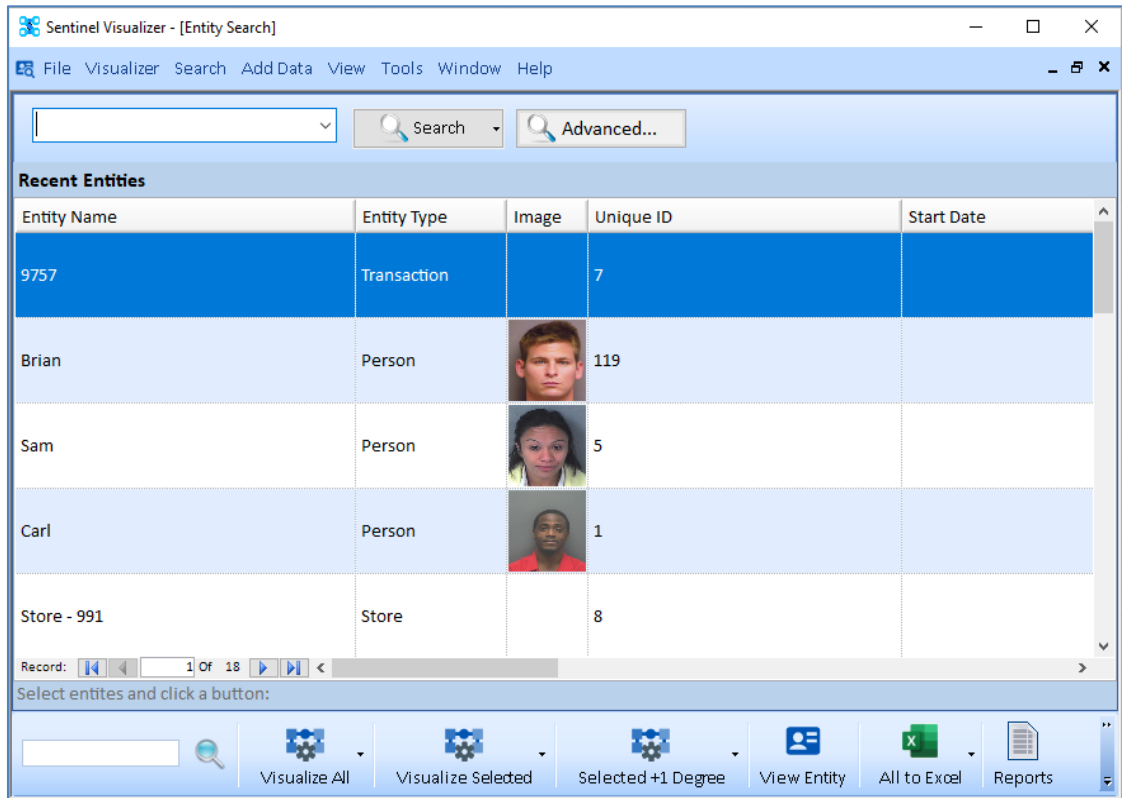
Searching for Entities

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



Entity Search Form

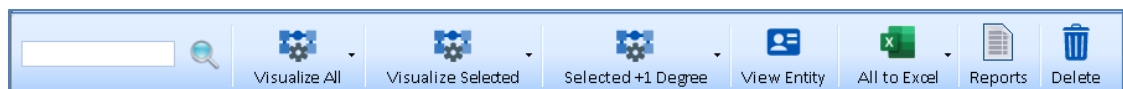
Entity Search displays the recently selected entities to easily pick them without searching.



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:



The toolbar is like the Home Page **Toolbar** described on page 43, plus these buttons:

- **Visualize All:** A new Visualizer is created with all the entities in the list.
- **All to Excel:** Export the entities to an Excel file with details on each entity. A dropdown lets you export just the selected entities.
- **Delete:** Delete the selected entities.

Two Search Modes

SentVi 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

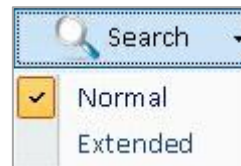
One of the problems of uniquely identifying entities is name ambiguity. Names can be ambiguous when entities have alternate name spellings or aliases. This problem is exacerbated when two or more entities share the same name. When you add translating names from one language to another, entity name accuracy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

SentVi supports 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:

- 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 depends on the size of the entity data and speed of the server. The results appear in the grid. Information in this area includes entity name, type, status, and other entity fields.

Accuracy	Found In	Entity Name	Entity Type	Image	Unique ID
70%	Name Contains	Kelly	Person		95
70%	Name Contains	Larry	Person		2
70%	Name Contains	Mary	Person		218
60%	Metadata Contains	Brian	Person		119
60%	Metadata Contains	Thomas	Person		1

Accuracy

The grid has an [Accuracy] column expressed as a percentage to indicate how close an entity matched. A higher Accuracy value indicates higher match accuracy.

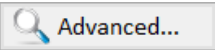
Accuracy	Description
100%	Exact match of search phrase in entity name field
90%	Exact match of search phrase in one or more metadata fields
70%	Partial match of search phrase in entity name field
60%	Partial match of search phrase in one or more metadata fields
50%	Phonetic match of search phrase in 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

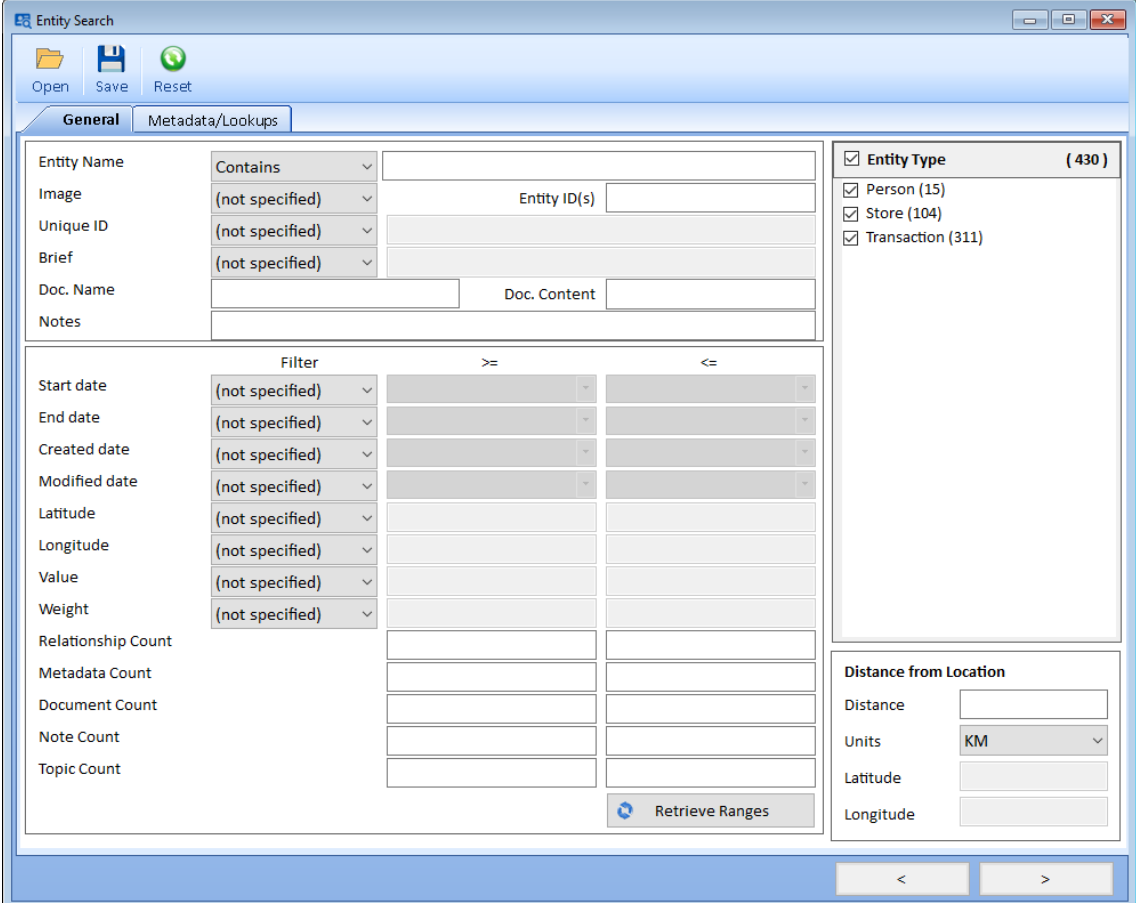
Sort the results by any field by clicking on the column's header area. The first click sorts the data in ascending order. Click the same column header again to sort in descending order.

Advanced Entity Search

To search more fields, press the Advanced button: 

This search screen is also in the Advanced Dataset Builder and the Visualizer's entity refinement. You can save your entries for future use in any of them, plus the Multiple Search Analysis.

There are two tabs at the top for General and Metadata/Lookups. Enter your search criteria, then press the [>] button at the bottom to execute it.



The screenshot shows the 'Entity Search' application window with the 'General' tab selected. The interface includes a toolbar with 'Open', 'Save', and 'Reset' buttons. The main area is divided into several sections:

- Search Criteria:** Fields for Entity Name, Image, Unique ID, Brief, Doc. Name, and Notes, each with a dropdown menu (e.g., 'Contains', '(not specified)') and a text input field.
- Entity ID(s):** A text input field.
- Doc. Content:** A text input field.
- Filter Section:** A table with columns for field names (Start date, End date, Created date, Modified date, Latitude, Longitude, Value, Weight, Relationship Count, Metadata Count, Document Count, Note Count, Topic Count), a 'Filter' dropdown, and comparison operators (>=, <=).
- Entity Type Summary:** A list of checked entity types with counts: Entity Type (430), Person (15), Store (104), and Transaction (311).
- Distance from Location:** Fields for Distance, Units (set to KM), Latitude, and Longitude.
- Buttons:** 'Retrieve Ranges' and navigation arrows (<, >).

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

There are dropdown options for many of the fields:

Entity Name Search

Entity Name

- Exact
- Contains
- Similar

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

Brief Search

Brief

- (not specified)
- Blank
- Not Blank
- Contains

This searches the text in the brief field which is a rich text field.

Document Name and Content Text Search

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.

Doc. Name Doc. Content

An entity can have multiple documents associated with it. The documents can be linked or embedded in the database. If the document is embedded (rather than linked), its text contents can be searched if the file format is supported.

The Doc. Content term (a word at least 4 characters) is searched in the embedded documents. Entities with one matching document pass the filter (does not have to be all its documents). The list of documents containing the search phrase is on the Entity Documents tab of the results.



Entity Documents Tab appears if Content Search finds Documents with Search Term

For more information on installing and configuring Document Content Search, see **Chapter 23: Configuring Your Database** on page 273.

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.

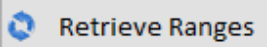
Entering the low value without a high value is a search for all values greater than or equal to the low value. Similarly, just entering the high value is a search for all values less than or equal to it. Entering both gets the entities with a value between the two.

Start date

- (not specified)
- (not specified)
- Blank
- Not Blank
- Range

- 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.

Distance Search

Select entities based on its distance from a location.

Distance from Location	
Distance	<input type="text" value="10"/>
Units	<input type="text" value="Miles"/>
Latitude	<input type="text" value="38.91648"/>
Longitude	<input type="text" value="-77.22663"/>

Entity Distance Search



Specify the distance in miles or kilometers, and the center point based on the latitude and longitude. All the entities with latitude and longitude in the circle are selected.

Metadata and Lookups Search

On the Metadata/Lookups tab, you can select entities with a specific Metadata Type and value, and other lookup values such as who created or last modified the entity, Classification, Dissemination, Status, and Topics.

General		Metadata/Lookups	
Metadata Type	Entity Type	Value	
<input type="text" value="Alias Name"/>	<input type="text" value="(not specified)"/>	<input type="text" value="Brian"/>	
<input type="text" value="(not specified)"/>	<input type="text" value="(not specified)"/>		
Created By	Modified By		
<input type="text" value="(not specified)"/>	<input type="text" value="(not specified)"/>		
<input checked="" type="checkbox"/> Classification (430)	<input checked="" type="checkbox"/> Dissemination (430)		
<input checked="" type="checkbox"/> (430)	<input checked="" type="checkbox"/> (430)		
<input checked="" type="checkbox"/> Entity Status (430)	<input checked="" type="checkbox"/> Topics (430)		
<input checked="" type="checkbox"/> Active (430)	<input checked="" type="checkbox"/> Default (430)		

Metadata Selections

An entity can have an unlimited number of metadata values. When you select a Metadata Type, you can optionally specify an Entity Type and value. Up to 3 metadata searches can be applied.

For example, if your database has people with Alias Name as a metadata type:

- Metadata Type, choose Alias Name.
- Entity Type, choose Person.
- Value field, enter the alias name.

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 value is included.

Limit by Entity Type

Specifying the Entity Type is helpful if you are only interested in searching for the metadata type and value for a specific entity type. For example, if Alias is used for many different entity types, you may only be interested in a person's alias. It's not necessary to specify the entity type if the metadata type or value is only used by one entity type.

All Entities with a Metadata Type

Leave the Value blank to select all the entities with the Metadata Type regardless of its value.

General	Metadata/Lookups	
Metadata Type	Entity Type	Value
Alias Name	(not specified)	

Find Entities with a Metadata Type

Metadata Wildcard Search

Wildcard searches support finding values that start with a letter(s), contain letters, and/or end with letters. The percent sign (%) is the wildcard character which symbolizes any characters. For instance, enter:

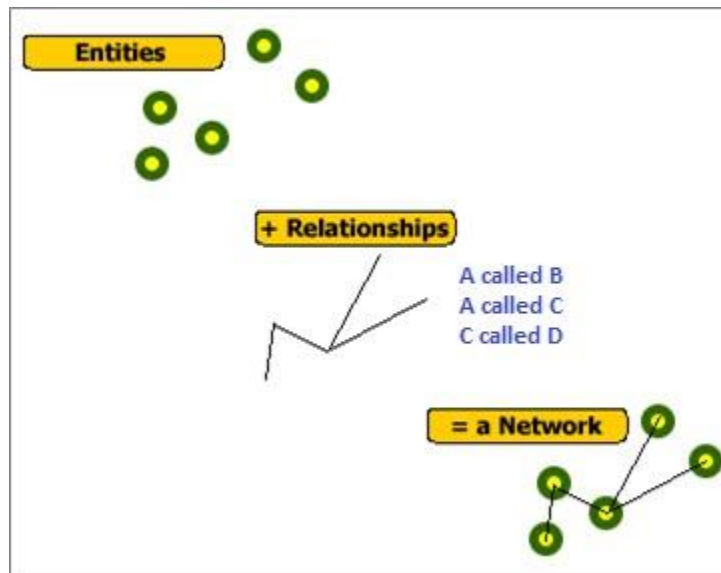
- A% for all values that start with the letter "A".
- US% for all values that start with "US".
- %a% for all values that contain the letter A (the search is case insensitive).
- %N for all values ending with the letter N.

Chapter 7: Relationships

While entities are the foundation of SentVi, they are not useful without relationships. SentVi 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 SentVi to perform sophisticated analysis and tracking.

Relationship Concepts

If entities are the core of the SentVi, 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. SentVi 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. SentVi 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, webpages, 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 SentVi 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 SentVi, such as:

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

For SentVi 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

SentVi 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 screenshot shows a web application window titled 'Thomas-3876'. At the top is a toolbar with icons for Edit, Save, Visualize, Report, and Delete. The main form is organized into several sections:

- Entity 1:** Thomas, Person, ID 1860
- Entity 2:** 3876, Transaction, ID 1698
- Relationship Type:** Makes Return
- Start date:** 6/24/2010 3:31:00 PM
- End date:** 6/24/2010 4:31:00 PM
- Classification:** None
- Value:** 210.72
- Weight (1-100):** 50
- Metadata:** ID (2329), Created (Admin, 10/13/2011 3:46 PM), Modified (Admin, 8/31/2020 2:24 PM), UUID (b0fad0b556f54cdaa2b9aa7d43f48f75)

Below the form is a 'Brief' tab with a text area containing the following text:

Thomas is a blue steam engine and has a number 1 painted on his side. All of the locomotives in The Railway Series were based on prototypical engines; Thomas has origins in a cast metal 0-6-0 Tank locomotive made by Stewart Reidpath (Essar, or S-R) in 1946. This locomotive was not based on the LBSCR London, Brighton and South Coast Railway E2 as once believed and portrayed by Hornby, but appears to be based on an LMS Fowler 0-6-0T (Inty). Thomas first appeared in 1946 in the 2nd book in the series, *Thomas the Tank Engine*, and was the focus of the 4 short stories contained within. Thomas's best friends are Percy and Toby.

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

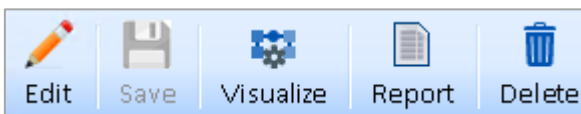
Relationship Tabs

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 Ultimate version to restrict who has access to this information.

Using the Toolbar

The View Relationship form toolbar has the following buttons:

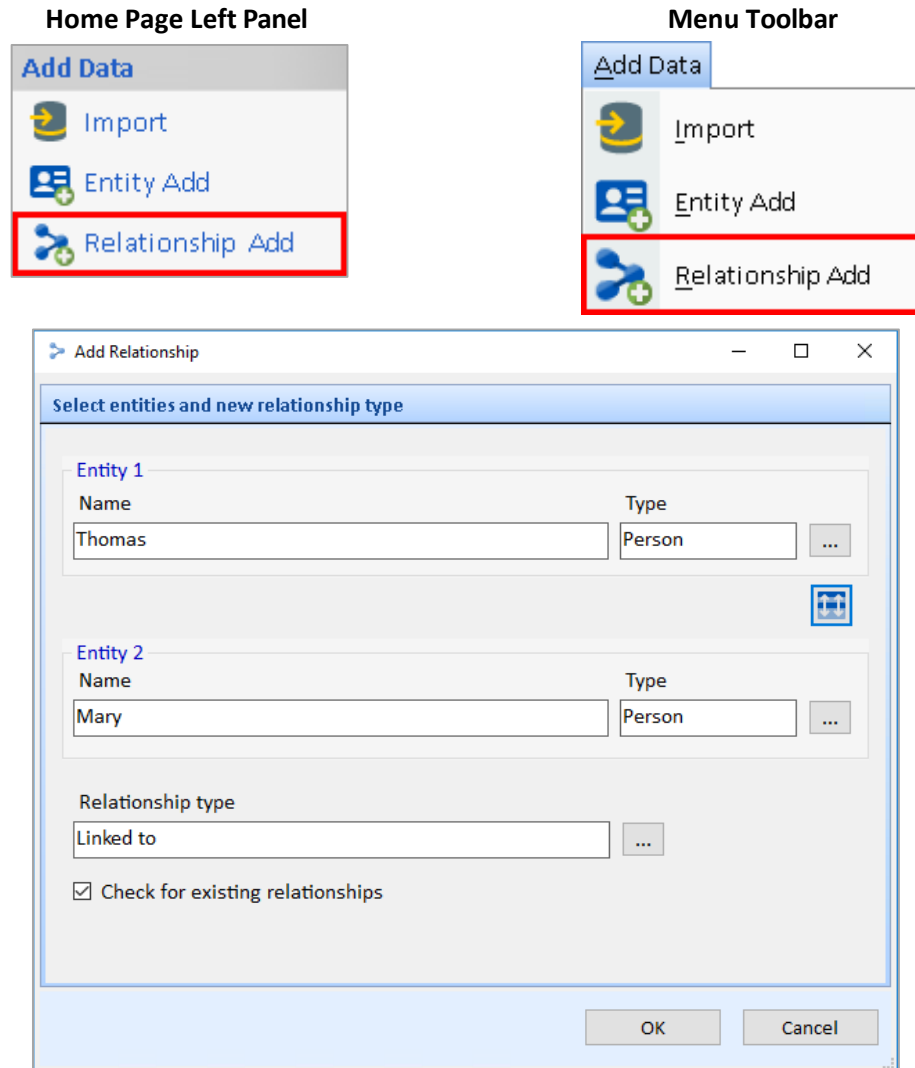


- **Edit:** Switch from view (read-only) mode to edit mode. You must have Edit permissions to edit the relationship. Contact your System Administrator for permissions.

- **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.




Select the Entities for the Relationship

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

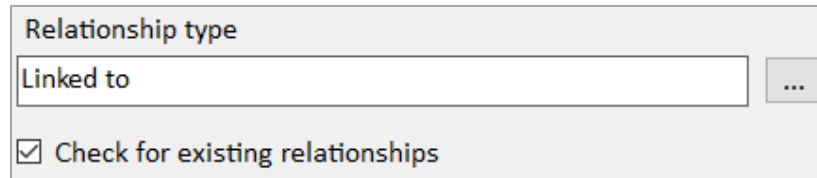
This is a close-up of the 'Entity 1' section from the dialog box. It shows a 'Name' field containing 'Thomas' and a 'Type' dropdown menu set to 'Person'. A small blue button with three dots [...] is located to the right of the 'Type' dropdown.

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.

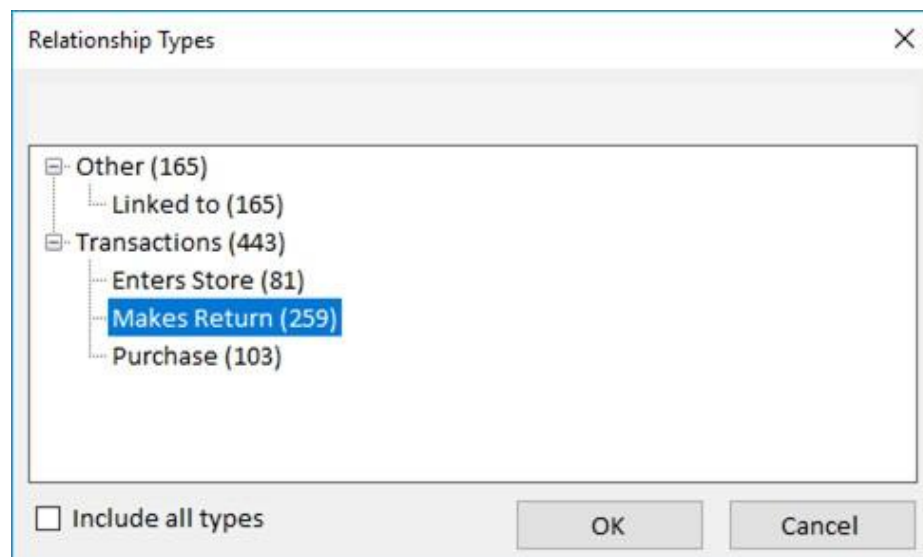
Select the Relationship Type

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



A dialog box titled "Relationship type" with a text field containing "Linked to" and a [...] button to its right. Below the text field is a checked checkbox labeled "Check for existing relationships".

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



A dialog box titled "Relationship Types" with a tree view showing a hierarchy of relationship types. The tree has two main categories: "Other (165)" and "Transactions (443)". Under "Other" is "Linked to (165)". Under "Transactions" are "Enters Store (81)", "Makes Return (259)", and "Purchase (103)". The "Makes Return (259)" item is highlighted with a blue selection bar. At the bottom, there is an unchecked checkbox labeled "Include all types" and two buttons: "OK" and "Cancel".

Overriding the Check for Similar Relationships

There may be cases where you want to skip the step of having SentVi 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.

Existing relationships

All the relationships of this type between the two entities.

Entity 1: Thomas Entity 2: 3876

Entity 1 Name	Relationship Type	Entity 2 Name	Start Date
Thomas	Makes Return	3876	6/24/2010 3:31:0
Thomas	Enters Store	3876	6/24/2010 3:31:0

Record: 1 Of 2

Edit existing
 Add new

< OK Cancel

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

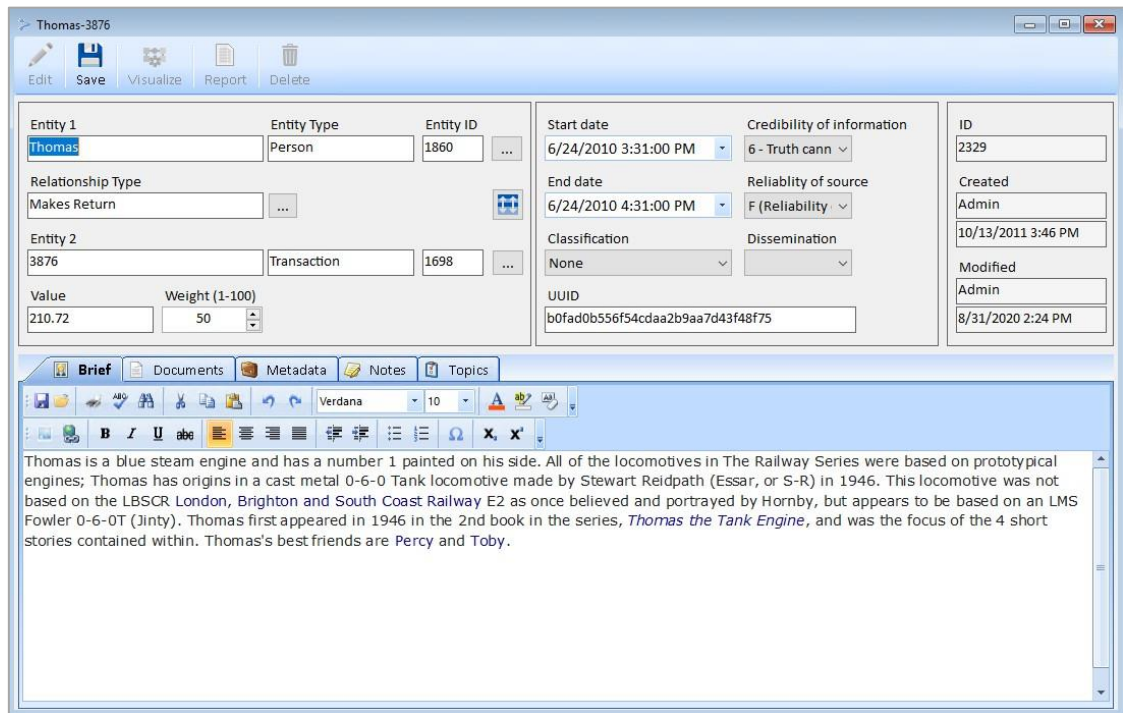
After the relationship is created, the relationship form is the same as editing it.

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 Type	Entity ID	
Thomas	Person	1860	...

Entity 1

Entity 2	Entity Type	Entity ID	
3876	Transaction	1698	...

Entity 2

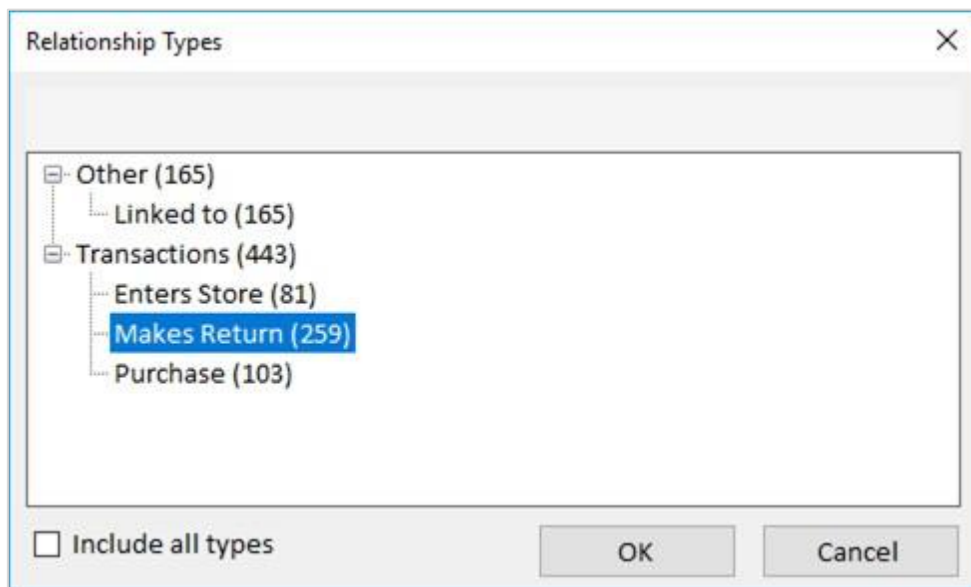
Use the swap button  to switch Entity 1 to 2 and vice versa.

Relationship Type

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

Relationship Type	
Makes Return	...

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.

Credibility of information	Reliability of source
6 - Truth cannot be judged	F (Reliability cannot be judged)
1 - Confirmed by other sources	A (Completely reliable)
2 - Probably true	B (Usually reliable)
3 - Possibly true	C (Fairly reliable)
4 - Doubtful	D (Not usually reliable)
5 - Improbable	E (Unreliable)
6 - Truth cannot be judged	F (Reliability cannot be judged)

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.

Classification	Dissemination
None	None

Unique ID

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

Unique ID
7f3ed3ae726a47fdb6d3d61b8bffe7

System Fields

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

ID	2329
Created	Admin
	10/13/2011 3:46 PM
Modified	Admin
	8/31/2020 2:24 PM

- **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 56 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.

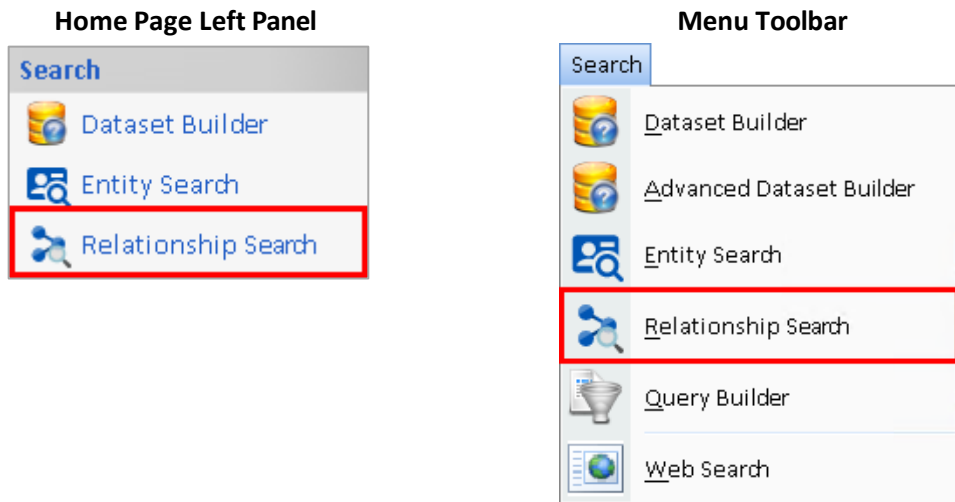
It is important to know that when you delete a relationship record, all data for that relationship, including its notes and documents, is permanently removed from the database. You cannot recover a deleted relationship except to revert to a previous checkpoint or backup.

Chapter 8: Relationship Search

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

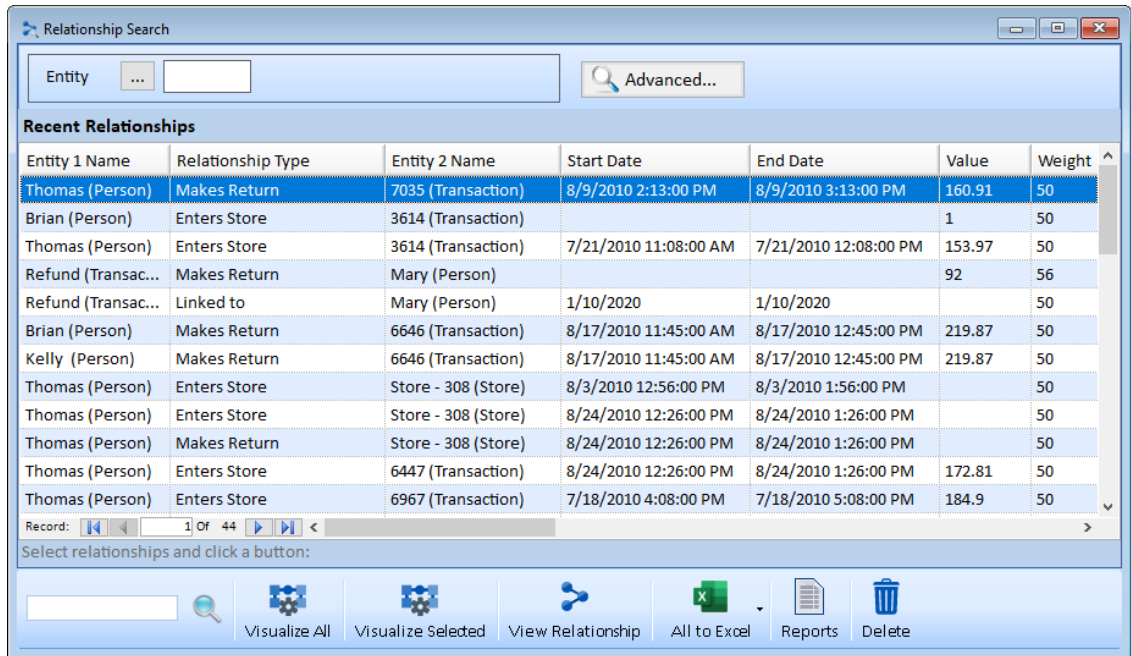
Search Relationships

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



Relationship Search

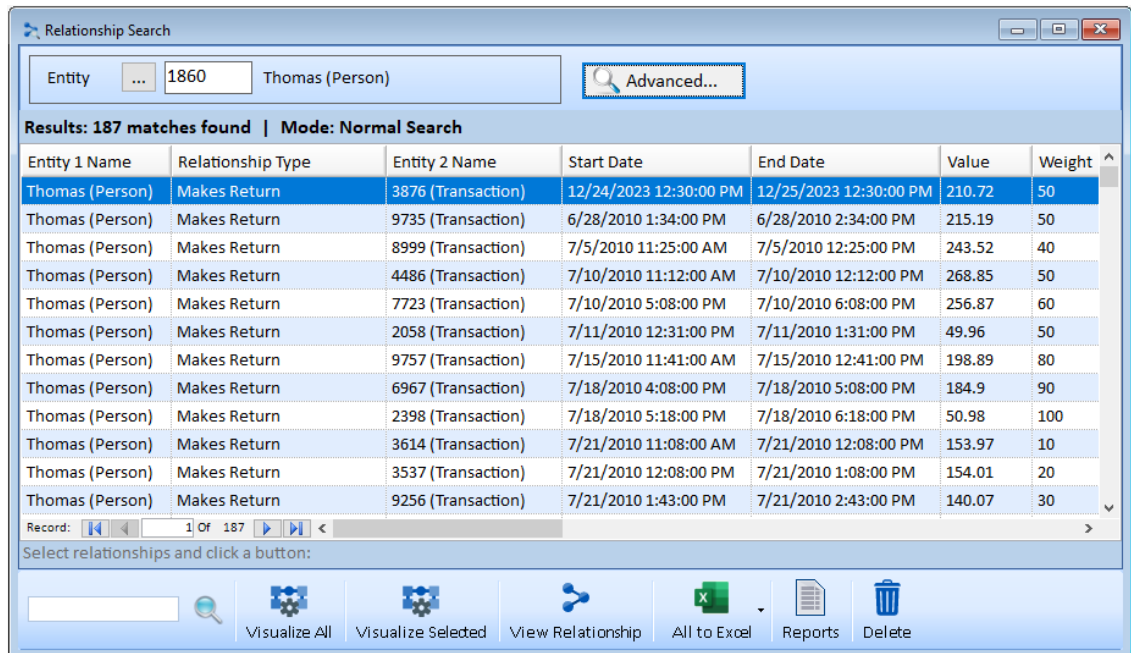
The Relationship Search form appears listing the recently opened relationships to select and perform actions on them:



Search Results

To search for all relationships associated with an entity, click the [...] button to select one or type in the entity ID. Any Relationships with it as Entity 1 or 2 is listed in the results. For more search options, click the [Advanced] button.

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



Sorting

Sort by clicking on the column's header. The first click sorts in ascending order. Clicking again resorts in descending order.

Toolbar

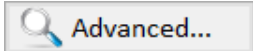
You can choose one or more relationships by clicking with the Shift or Ctrl key. Similar to Entity Search, you have these options below the search results.



The toolbar is like the Home Page **Toolbar** described on page 43, plus these buttons:

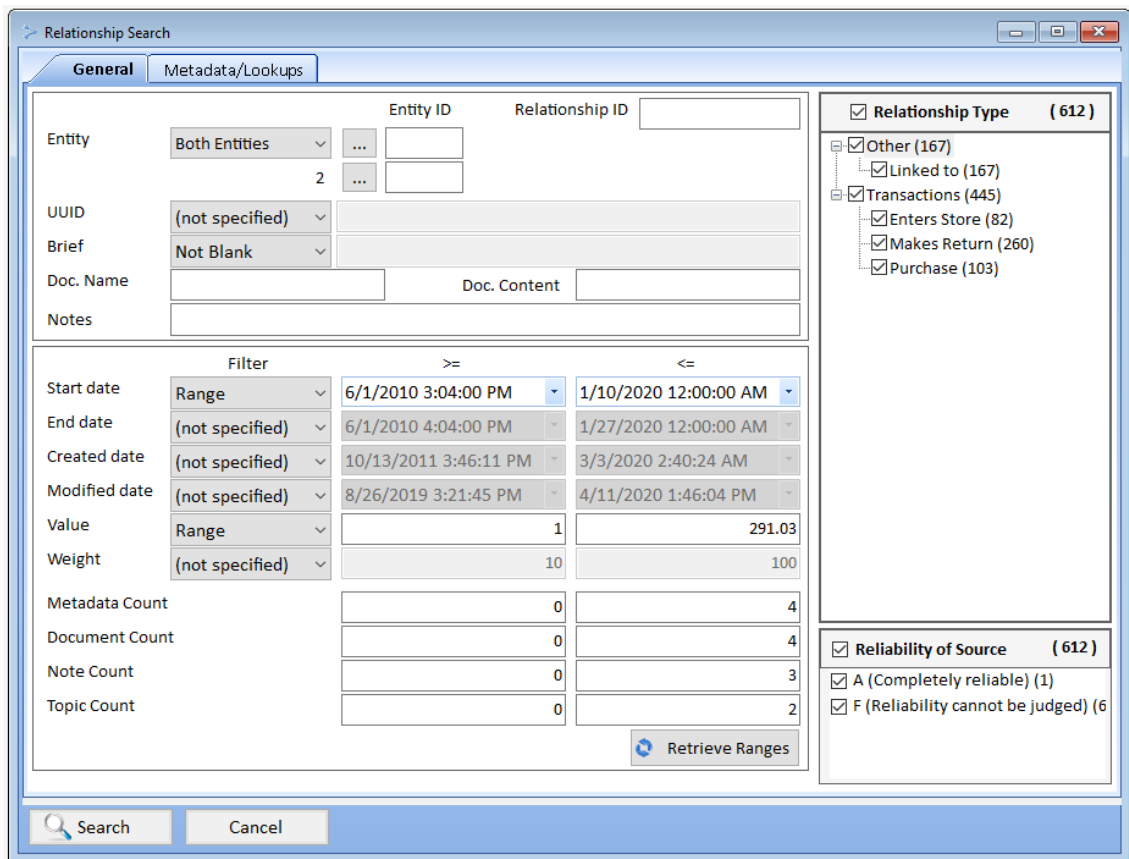
- **Visualize All:** All Relationships with their entities are displayed in a new Visualizer.
- **All to Excel:** Exports the list of selected relationships and its details to an Excel file. A dropdown lets you create the spreadsheet with just the selected rows.
- **Delete:** Delete the selected relationships. All data for the relationships, including their notes and documents, is permanently removed from the database. They can only be recovered by reverting to a previous database checkpoint or backup.

Advanced Relationship Search

To search for relationships beyond its entity, click the Advanced button: 

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

General Tab

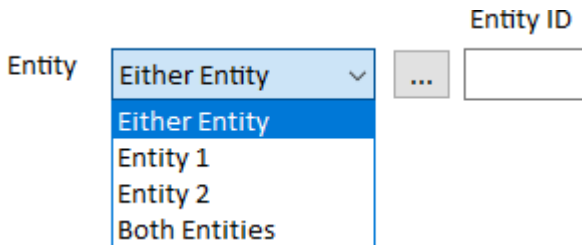
The screenshot shows the 'Relationship Search' window with the 'General' tab selected. It features a search criteria section with fields for Entity, UUID, Brief, Doc. Name, and Notes. Below this is a filter section with a table for date and value ranges. On the right, there are two tree views for 'Relationship Type' and 'Reliability of Source'.

Filter	>=	<=
Start date	6/1/2010 3:04:00 PM	1/10/2020 12:00:00 AM
End date	6/1/2010 4:04:00 PM	1/27/2020 12:00:00 AM
Created date	10/13/2011 3:46:11 PM	3/3/2020 2:40:24 AM
Modified date	8/26/2019 3:21:45 PM	4/11/2020 1:46:04 PM
Value	1	291.03
Weight	10	100

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 (the related entity), or both entities of a relationship. If you choose Both Entities, specify Entity 1 and 2.

A screenshot of a search interface. On the left, the word "Entity" is followed by a dropdown menu. The dropdown menu is open, showing five options: "Either Entity" (highlighted in blue), "Either Entity", "Entity 1", "Entity 2", and "Both Entities". To the right of the dropdown is a small grey button with three dots "...". Further right is a text input field labeled "Entity ID".

Document Name and Content Text Search

Like searching Entity Documents, the Doc. Name value searches the path, description, and notes fields for Relationship Documents.

A screenshot showing two search input fields. The first field is labeled "Doc. Name" and the second is labeled "Doc. Content". Both fields are empty text boxes.

A relationship can have multiple documents associated with it. The documents can be linked or embedded in the database. If the document is embedded (rather than linked), its text contents can be searched if the file format is supported.

The Doc. Content term (a word at least 4 characters) is searched in the embedded documents. Relationships with one matching document pass the filter (does not have to be in all its documents). The list of documents containing the search phrase is on the Relationship Documents tab of the results.

For more information on installing and configuring Document Content Search, see [Chapter 23: Configuring Your Database](#) on page 273.

Notes Search

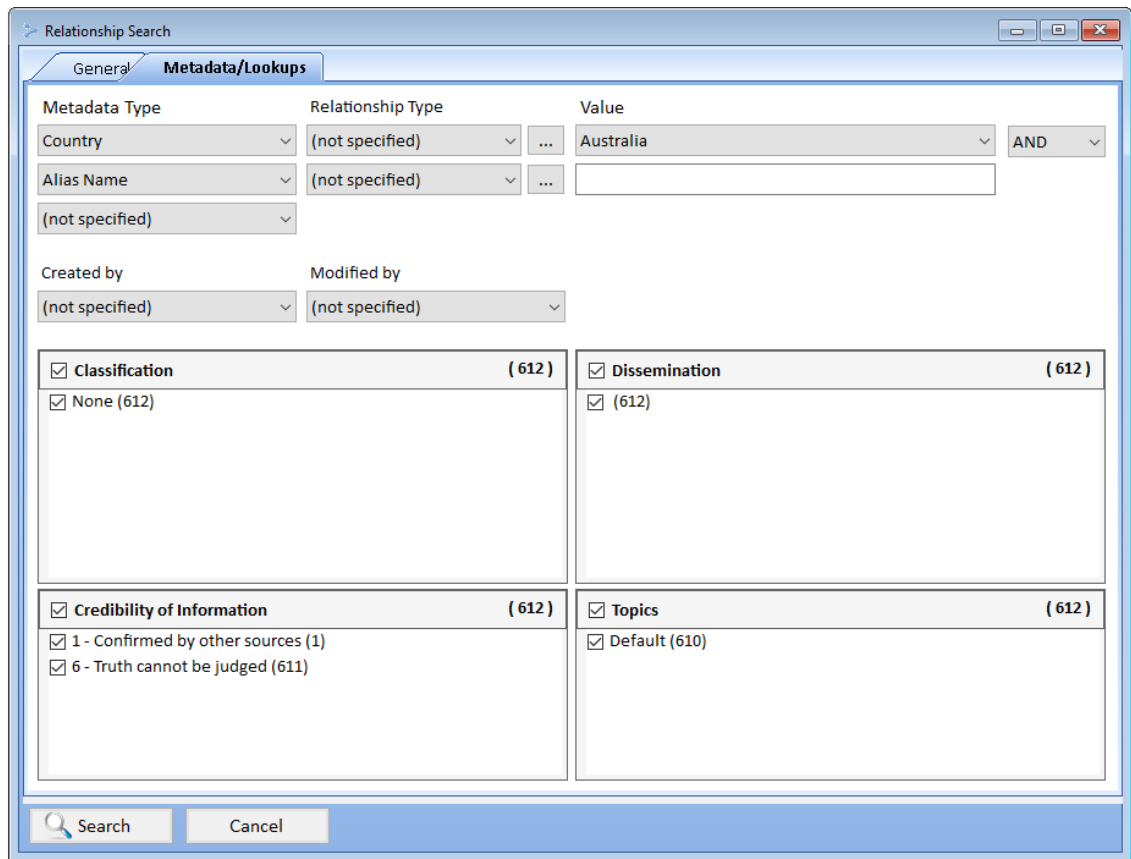
A note has a title and detail. Entering a search term finds notes where it exists in either field.

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

If no Value is specified, all Relationships with that metadata type (regardless of value) are selected. You can also perform wildcard search on the value field. For more information, visit [Metadata and Lookups Search](#) on page 69.

Chapter 9: Selecting Dates and Editing Rich Text

SentVi 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.

Select Dates and Times

The Start date and End date fields do not accept direct text input. Instead, SentVi 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.

The screenshot shows a 'Start date' selection dialog. At the top, the current date and time are displayed as '6/24/2010 3:31:00 PM' next to a drop-down arrow. Below this is a calendar for 'June 2010' with days of the week (S, M, T, W, T, F, S) and dates. The date '24' is highlighted. To the right of the calendar is a time selection interface for 'PM' with a grid of hours from 12:00 to 11:00. The time '3:00' is highlighted. Below the time grid is a 'Minutes' section with options from :00 to :55 in increments of 5. A 'Close' button is located at the bottom of the dialog.

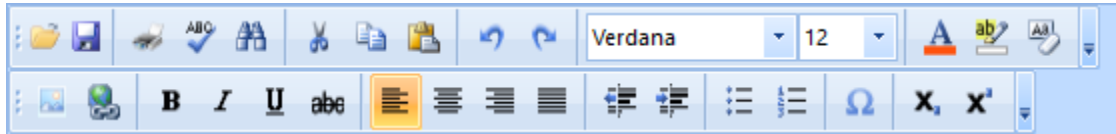
Rich Text Editor

Several areas in SentVi support rich text. Rich text lets you format text and paragraphs with images. Rich text is supported in:

- Entity and relationship Brief fields
- Entity and relationship Notes
- Entity and relationship Saved Filters
- Visualizer Diagrams

Rich Text Editor Toolbar

For example, when editing an entity record, the Brief tab shows text data with toolbar buttons to format it. The following toolbar buttons are available:



Rich Text Toolbar Options

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

First Row

- **Open:** Open a rich text or Word document to import its contents.
- **Save:** Save your information to file.
- **Print:** Print the text.
- **Spell Check:** Check for spelling mistakes.
- **Find & Replace:** Find a word or phrase and replace it with another.
- **Cut, Copy, and Paste:** Windows clipboard commands to cut, copy, or paste.
- **Undo:** Reverse previous change.
- **Redo:** Take previous undo and apply it back.
- **Font Selector:** Select a font from your system to apply to the selected text.
- **Character Size:** Select from all available point sizes for the selected font.
- **Text Color:** Set the text color from the standard Windows Color Selection dialog.
- **Highlight Text:** Set the background color to highlight text.
- **Erase Color:** Clear the text and highlight colors.

Second Row

- **Image:** Upload a graphic file.
- **Hyperlink:** Insert a hyperlink.
- **Bold, Italic, Underline, Strikethrough:** Text format for the selected text.
- **Align Left, Center, Right Justify:** Set the alignment for the selected paragraphs.
- **Bullets, Numbering:** Add bullet points or numbering to the selected paragraphs.
- **Increase/Decrease Indent:** Increase or decrease the paragraph indentation.
- **Symbol:** Insert a special character.
- **X₂(Subscript):** Type small text below the line of text.
- **X²(Superscript):** Type small text above the line of text.

Notes

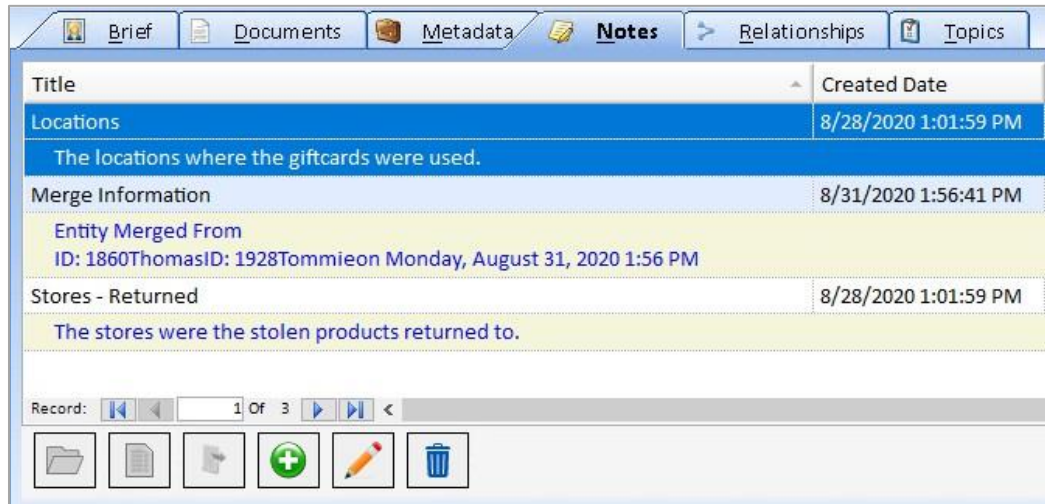
Notes are a useful way to attach textual information that you type directly into SentVi or copy and paste from other sources. You can use the Notes feature in various ways. For example, you could add a Note to keep your own list of information about an entity or relationship. Since SentVi tracks each 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 SentVi program:

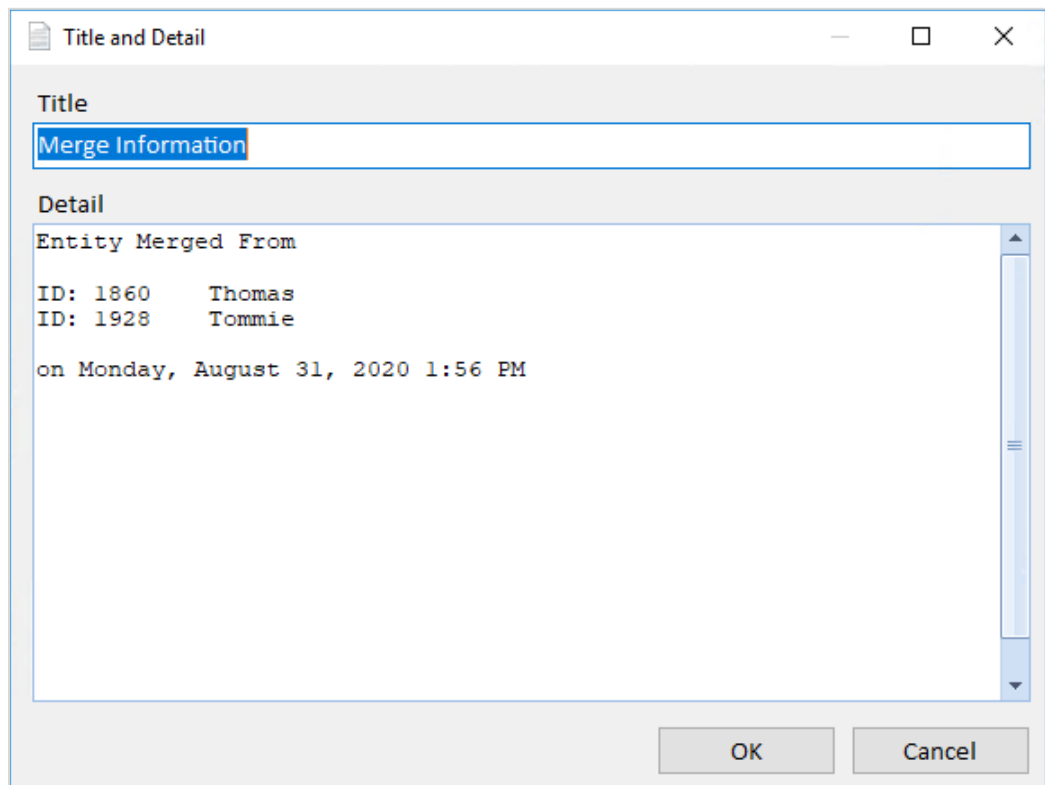
- View / Edit Entity form.
- View / Edit Relationship form.
- Various Entity and Relationship reports.

View 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.



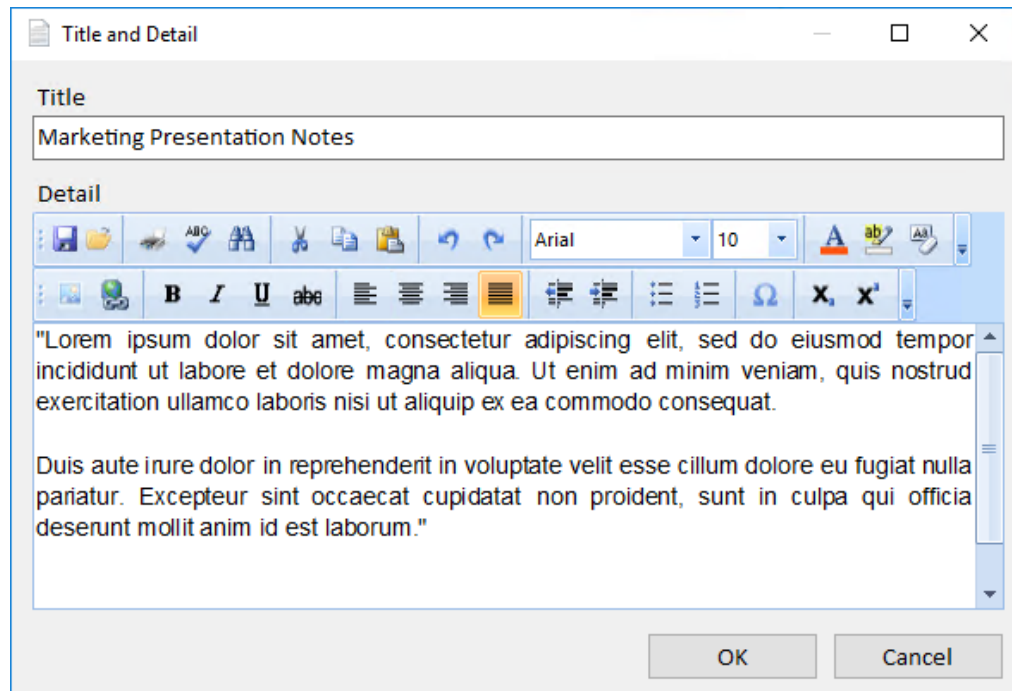
You can also select any Note and click the Open Folder button to see full information.



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.

Add and Edit 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.




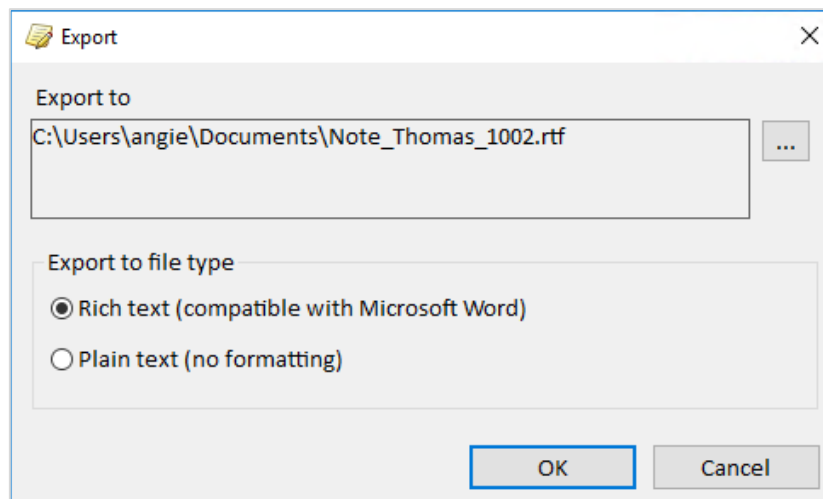
The screenshot shows a dialog box titled "Title and Detail". It has a "Title" field containing "Marketing Presentation Notes". Below the title is a "Detail" section with a rich text editor. The editor has a toolbar with various icons for text formatting (bold, italic, underline, text color, background color) and alignment. The text area contains two paragraphs of placeholder text: "Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat." and "Duis aute iure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum." At the bottom of the dialog are "OK" and "Cancel" buttons.

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 finished, click the [Save] button.

Export Notes

SentVi provides the ability to export any Note record to a file you specify. To export a Note, select it in the list and click the [Export] button. 



The screenshot shows an "Export" dialog box. It has a text field labeled "Export to" containing the path "C:\Users\angie\Documents\Note_Thomas_1002.rtf". To the right of the text field is a button with three dots "...". Below the text field is a section labeled "Export to file type" with two radio button options: "Rich text (compatible with Microsoft Word)" (which is selected) and "Plain text (no formatting)". At the bottom of the dialog are "OK" and "Cancel" buttons.

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

You can also choose the format for the exported file:

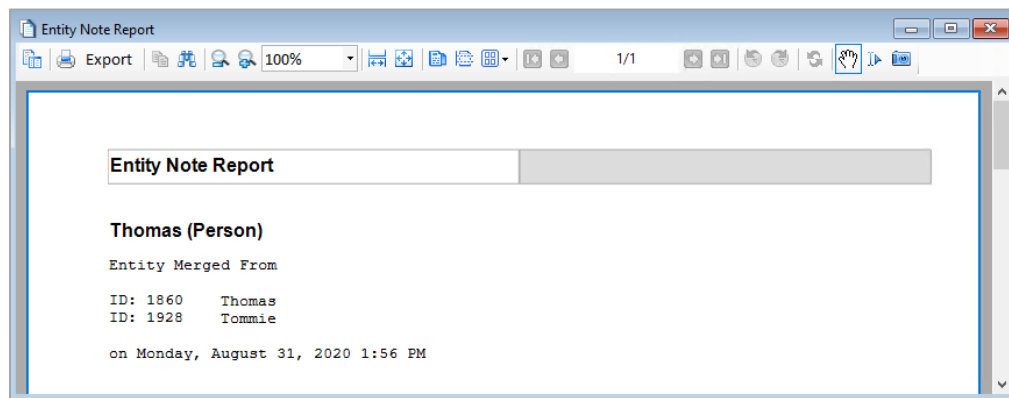
- **Rich Text (compatible with Microsoft Word):** Saves the note in Rich Text Format (RTF), which preserves note formatting, font selections, colors, etc. RTF documents can be opened with various Windows programs, such as Microsoft Write, WordPad, and Word. The RTF format is also recognized by a wide 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.

Print Note

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 106.

Search Notes

When you use the Entity Search form, you can choose the Extended Search mode. In this mode, SentVi considers the text in the Notes, making it easy to find matches in all Notes attached to all entities. For more information, see [Chapter 5: 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 PDFs, Word documents, spreadsheets, images, audio files, videos, etc. that relate to an entity or relationship and store them as Documents.

Documents are available in the following parts of the SentVi program:

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

Linked vs. Embedded Documents

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

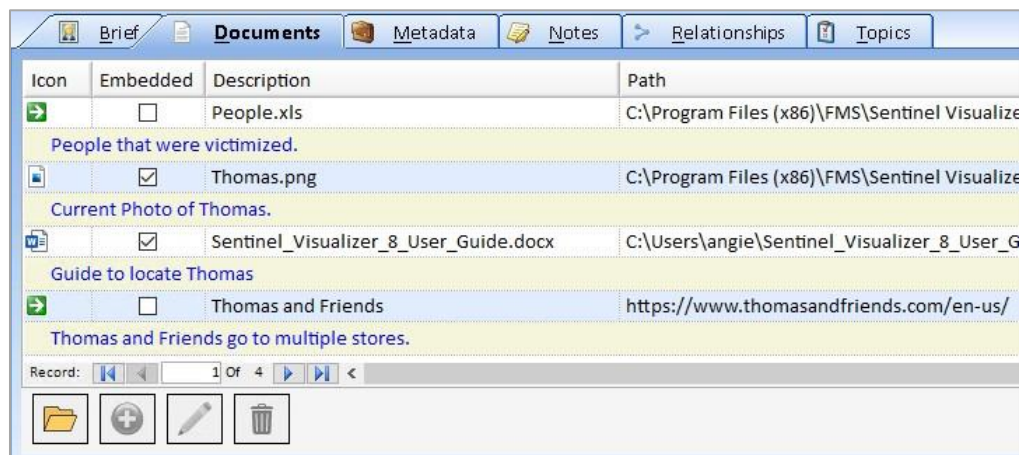
Embedded

The file is copied into the SentVi 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.

SentVi can search the text contents of documents stored in the database.

View 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.



Icon	Embedded	Description	Path
	<input type="checkbox"/>	People.xls	C:\Program Files (x86)\FMS\Sentinel Visualize
People that were victimized.			
	<input checked="" type="checkbox"/>	Thomas.png	C:\Program Files (x86)\FMS\Sentinel Visualize
Current Photo of Thomas.			
	<input checked="" type="checkbox"/>	Sentinel_Visualizer_8_User_Guide.docx	C:\Users\angie\Sentinel_Visualizer_8_User_G
Guide to locate Thomas			
	<input type="checkbox"/>	Thomas and Friends	https://www.thomasandfriends.com/en-us/
Thomas and Friends go to multiple stores.			

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 SentVi 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 SentVi 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.

Open Documents

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



SentVi 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**, SentVi 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 SentVi 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, SentVi 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 SentVi, 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, SentVi 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.

Add and Edit Documents

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


The screenshot shows a 'Document Form' dialog box with the following fields and options:

- Document Location:**
 - Linked** Specify the path to a file or URL
 - Embedded** Import into the database. Contents can be searched if supported.
- Path:** A text box containing 'C:\Users\Desktop\us_highway_97.png' with a file selection button (three dots and a folder icon) to its right.
- Optional information:**
 - Description:** A text box containing 'us_highway_97.png'.
 - Notes:** A text area containing two paragraphs: 'U.S. Route 97 (US 97) in the U.S. state of Oregon is a major north–south United States highway which runs from the California border, south of Klamath Falls, to the Washington border on the Columbia River, between Biggs Junction, Oregon and Maryhill, Washington.' and 'This is the major highway that Thomas used during the giftcard fraud.'

At the bottom right, there are 'OK' and 'Cancel' buttons.

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, SentVi 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.

Save Changes

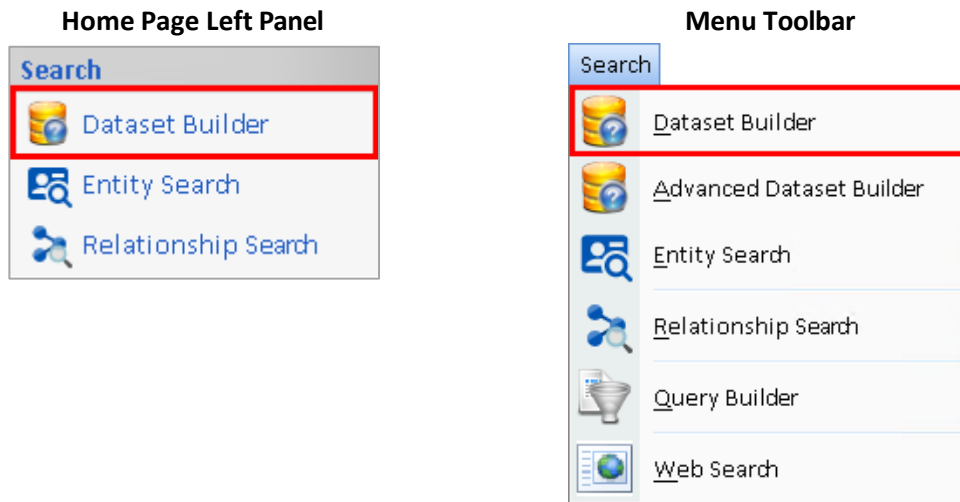
When you finish adding or editing a document, click the [OK] button to save the information back to the entity or relationship. To discard your changes, click the [Cancel] button.

Chapter 10: Dataset Builder

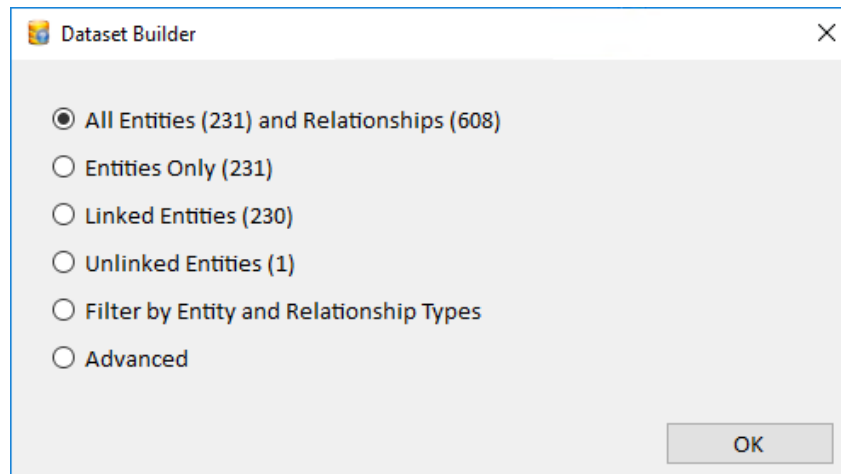
The Dataset Builder is a wizard that steps you through the process of selecting entities and relationships with a variety of criteria and exporting the resulting data to files or processes.

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.

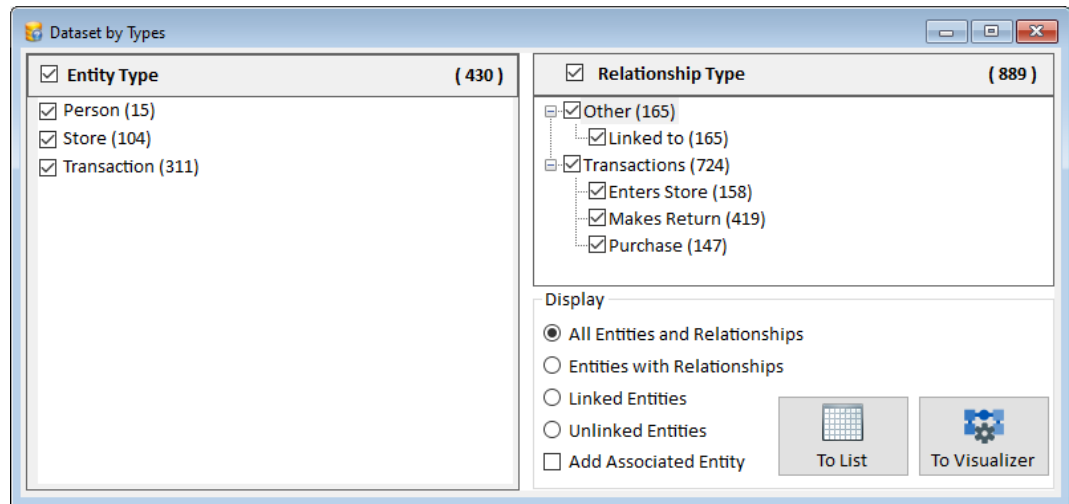


Easily send All Entities and Relationships, Entities Only, Linked Entities, and Unlinked Entities to the Visualizer with a single click. Additional options let you select more specific data.



Filter by Entity and Relationship Types

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



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

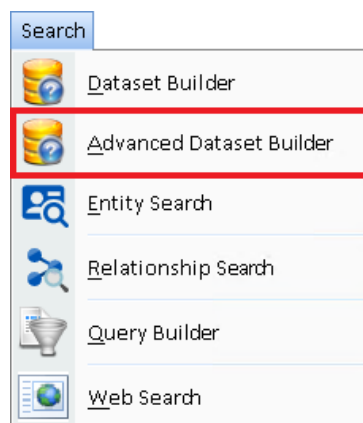
Filter Related Entities

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

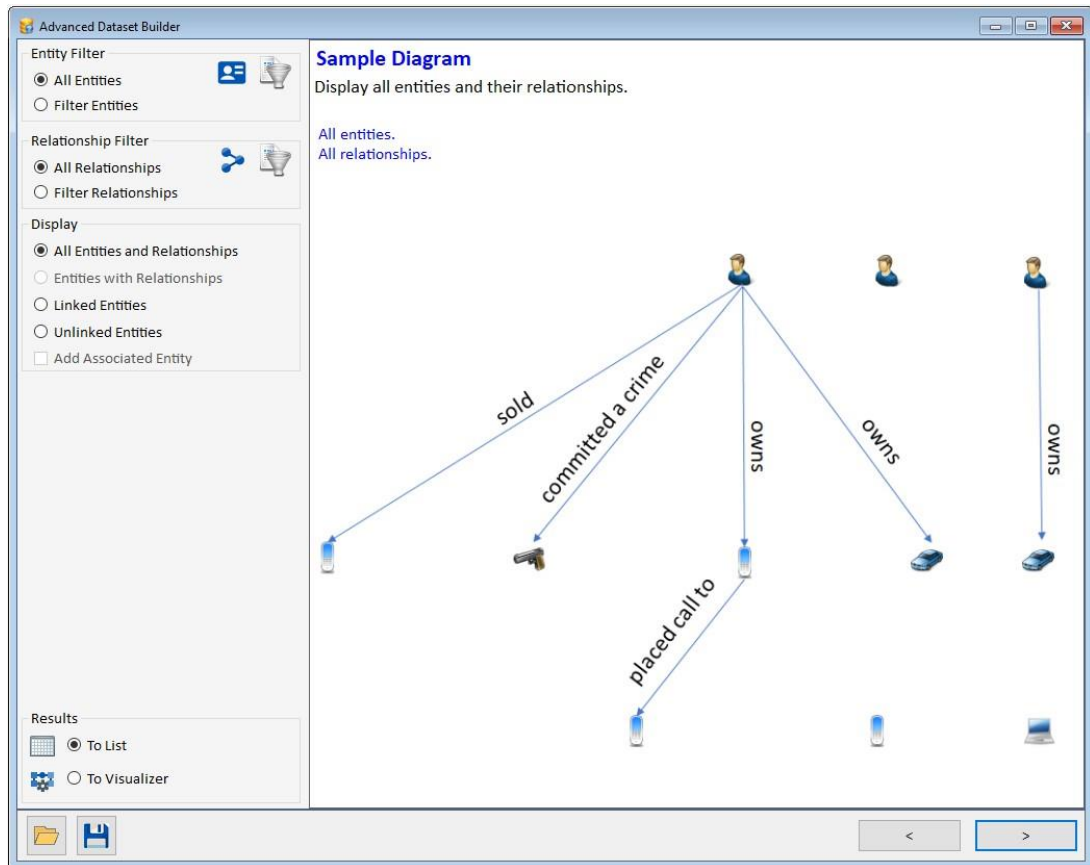
From the Search menu, choose Advanced Dataset Builder:



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.

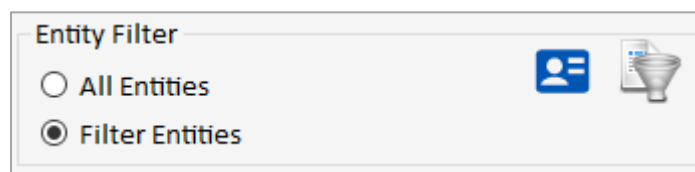
The first page of the Advanced Dataset Builder offers options to determine how to select the entities and relationships you want. As you change the options on the left, the Sample Diagram on the right shows how it impacts the selected entities and relationships.



Advanced Dataset Builder with Filter and Display Options

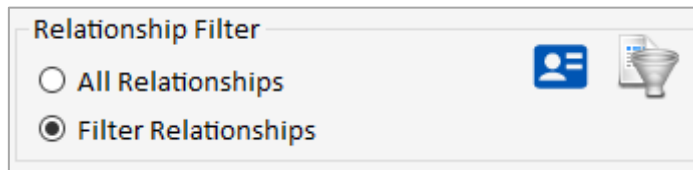
Filter Entities

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 67 for details.



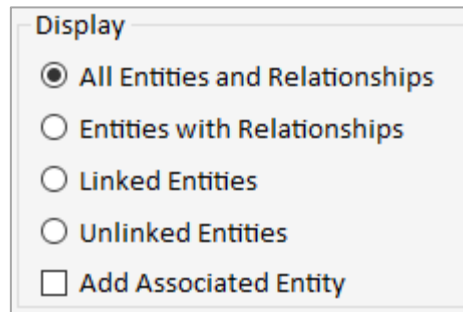
Filter Relationships

If Filter Relationships is selected, the wizard displays the relationship search identical to the **Advanced Relationship Search** in Relationship Search. See page 83 for details.

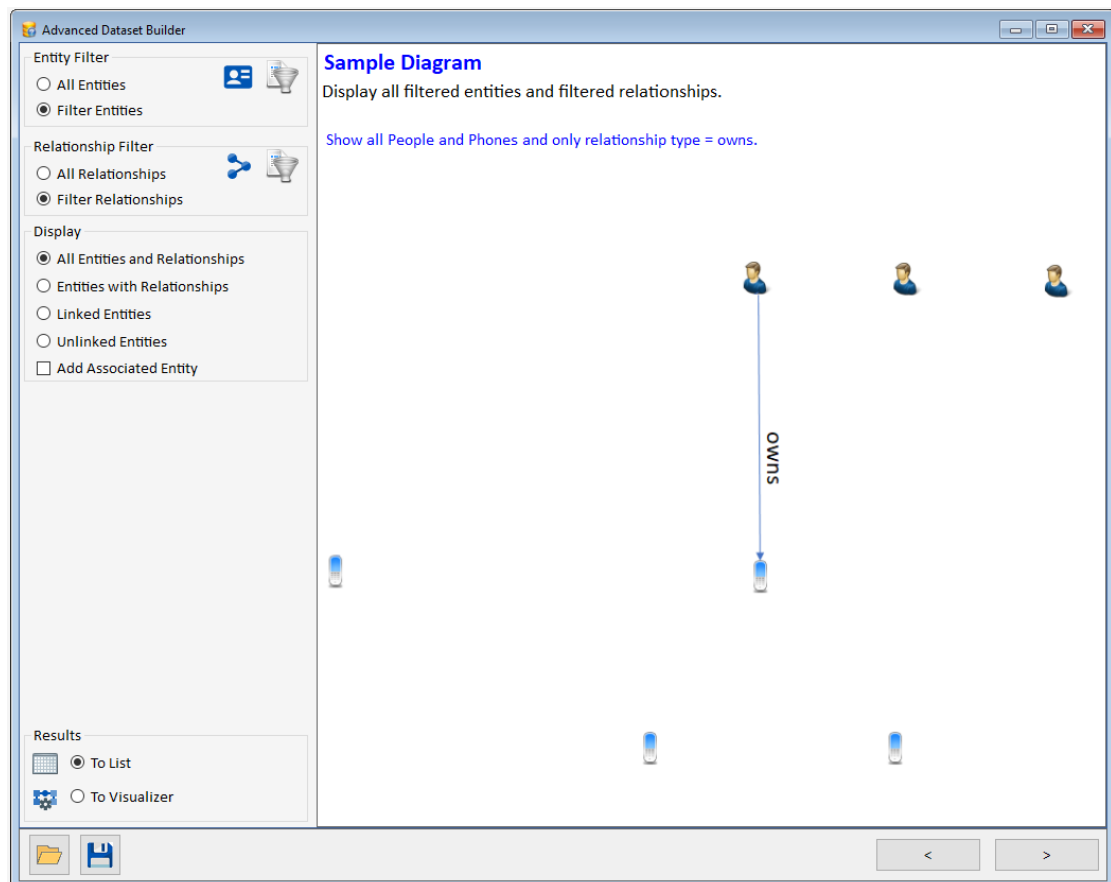


Display Options

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

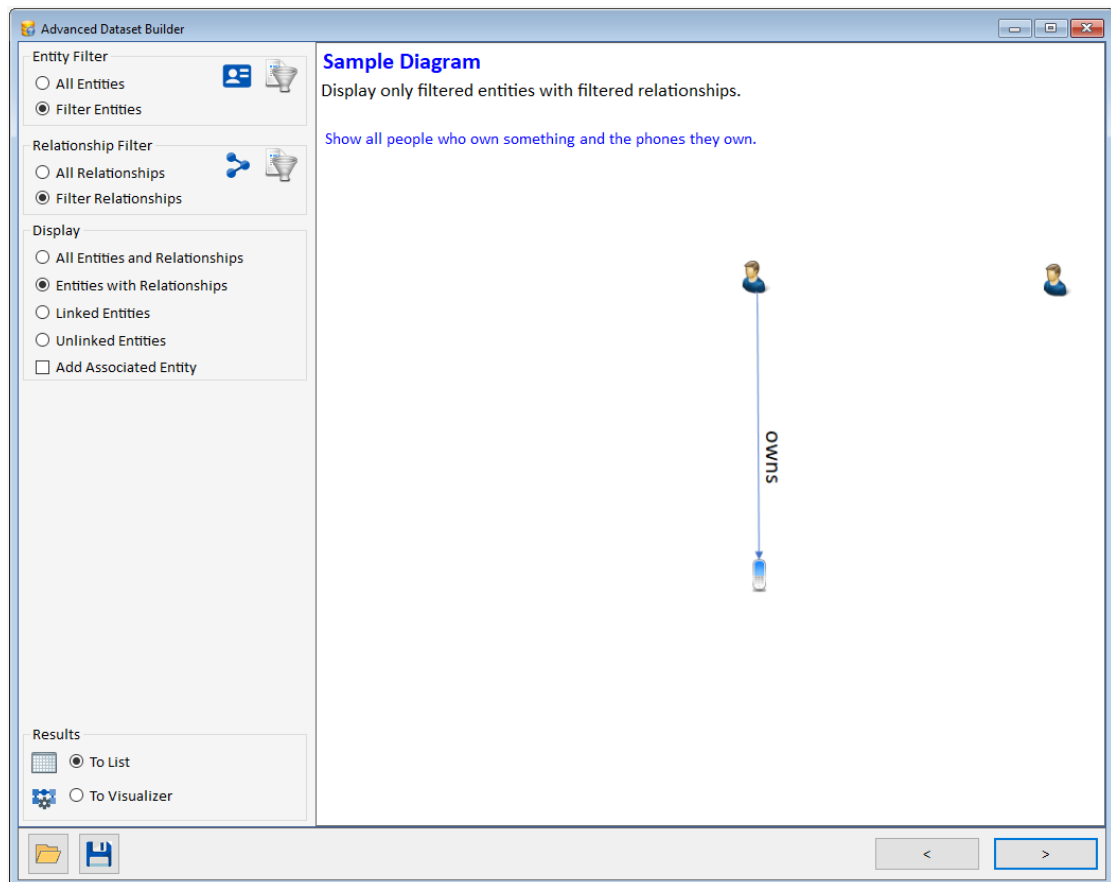
This option retrieves “All Entities” that pass the filter and generates these results:

- 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 for Persons and Phone, and Relationship filter for Owns.

- Only Persons and Phones that have an Owns relationship type are included.
- Excludes Persons and Phones that do not have an Owns relationship.
- Includes Persons who own entities that are not Phones.

Once entities are in the results, only relationships with both entities 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.

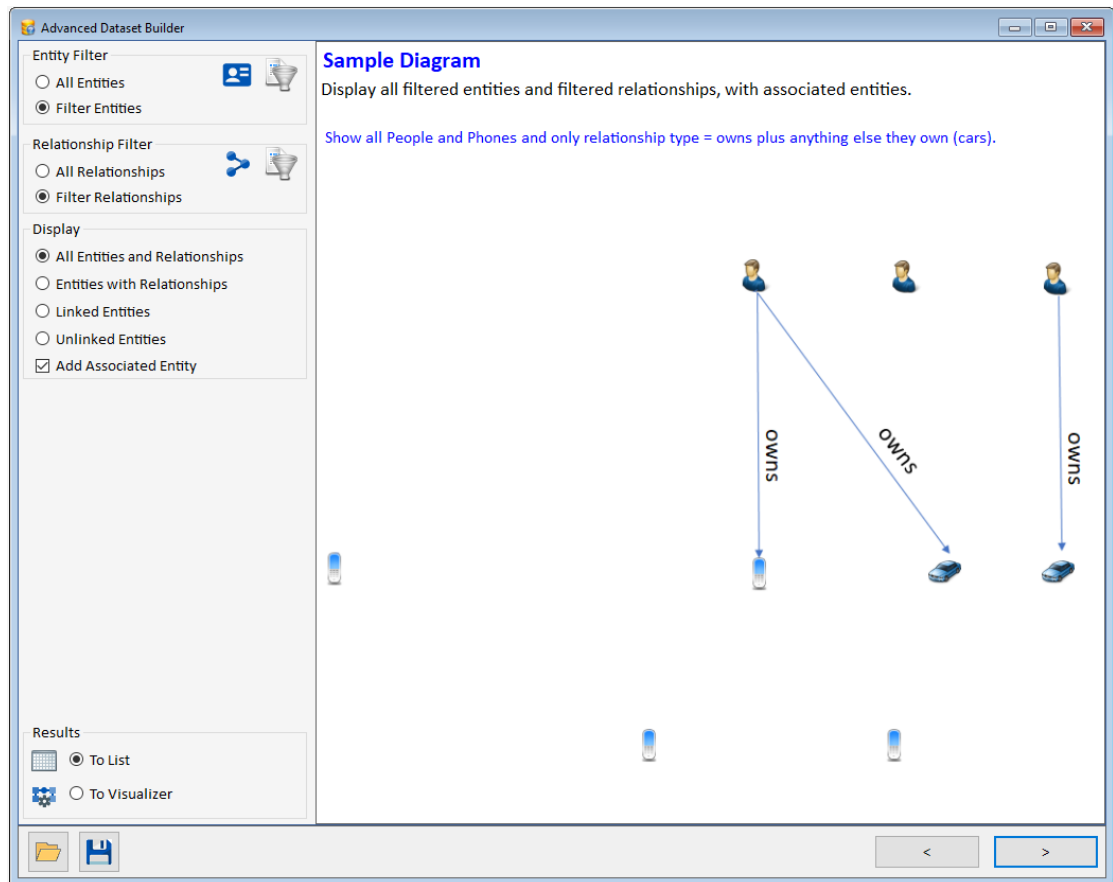
Add Associated Entity

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.

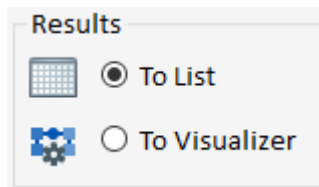
The example shows car ownership since the cars are the associated entity to the people's Own relationship, but cars were not included in the entity filter.



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.



Results List

After entering the entity and relationship criteria, if you selected to send the results to a list, a form with the data passing the filter is displayed.



Advanced Dataset Builder Results Tab

If the results are not what you expected or you want to change the criteria, go back to the Advanced Dataset Builder tab. Easily generate multiple results for comparison.

Entity Name	Entity Type	Image	Unique ID	Start Date	End Date
3972	Transaction		242		
8047	Transaction		246		
Thomas	Person		1		
Kelly	Person		95		
Mark	Person		102		
Brian	Person		119		
Mary	Person		218		

Dataset Builder List Results

Document Search Results

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



Click the [Open Documents] button to create a local copy of the file and open it.

Bottom Toolbar

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, export the data to Excel or XML, and delete the data.



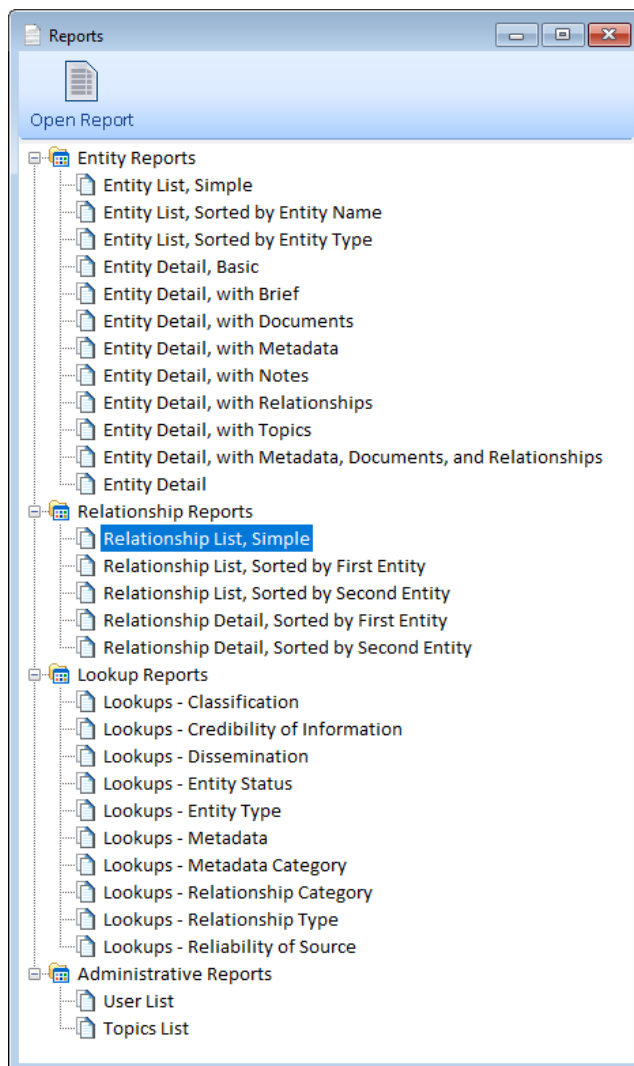
The toolbar is like the Home Page **Toolbar** described on page 43, plus these buttons:

- **All to Visualizer:** Sends all the data to the Visualizer diagram.
- **All to Excel:** Sends all the records to an Excel spreadsheet. A dropdown sends just the selected records to Excel.
- **All to XML:** Saves all the records to an XML file.
- **Delete:** Permanently deletes the selected Entities or Relationships from your database.

Chapter 11: Reports

SentVi 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. This category does not appear for users who are not Administrators.

Report Viewer

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

The screenshot shows a window titled "Entity List, Sorted by Entity Name". The window contains a toolbar with various icons for navigation and actions. Below the toolbar is a table with the following data:

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			1825
1465	Transaction	Active			1832
1466	Transaction	Active			1833
1548	Transaction	Active			1798
1555	Transaction	Active			1818

Report Viewer

Using the Report Viewer Toolbar

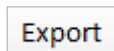
A variety of buttons along the top of the Report Viewer comprise the toolbar:



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



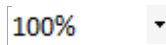
Open the Find dialog to search for specific text within the report.



Zoom out.



Zoom in.



Set the Zoom level.



Contents are scaled to fit within width of the page.








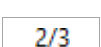





Fit content to one page.



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

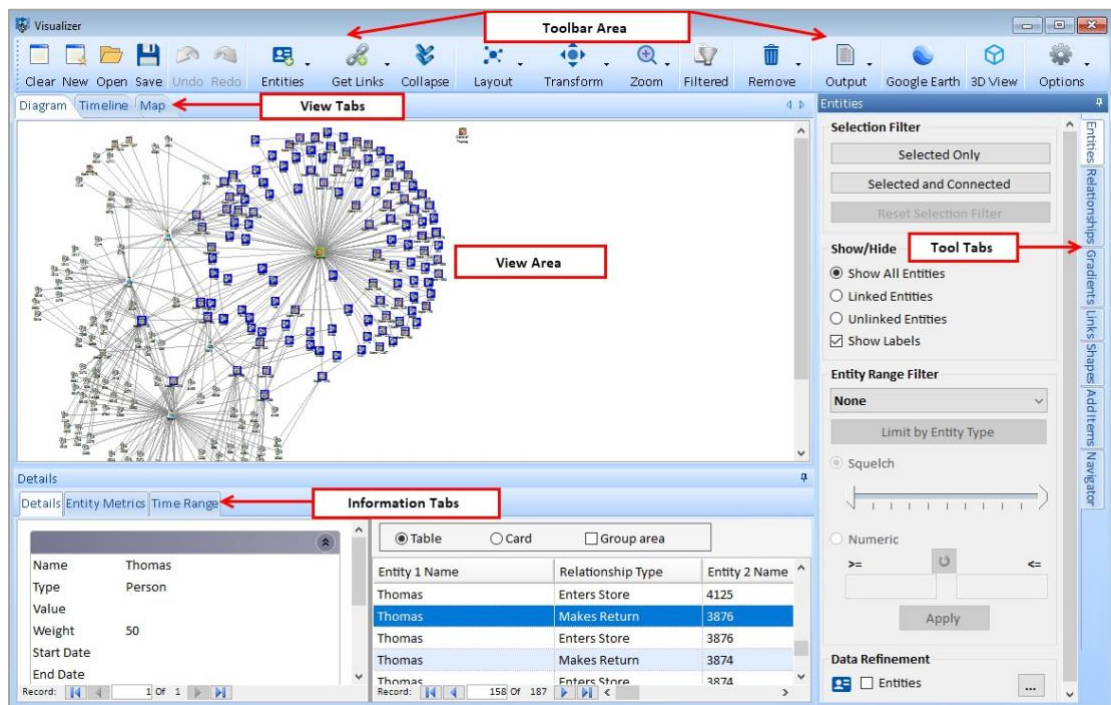
- **AutoRowHeight:** Sets the height of the row based on the contents of that row.
- **DisplayGridLines:** Indicates whether grid lines in a workbook are displayed.
- **FileFormat:** Sets the file format version that the output file supports.
- **MinColumnWidth:** Sets the minimum width (in inches) of 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 where applicable.

Chapter 12: Visualizer

SentVi 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.



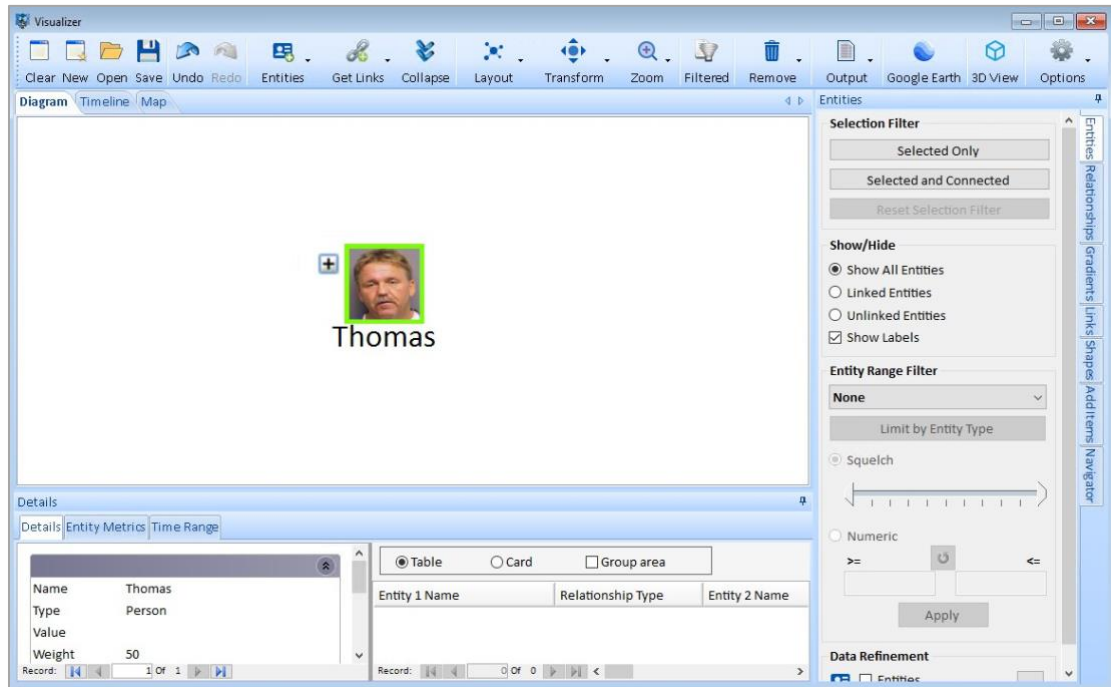
- **The Toolbar:** Provides command buttons and other controls for commonly used tasks.
- **View Tabs:** Show your data in various formats including Diagram, Timeline, and Map.
- **View Area:** Provides a visual representation of entities and relationships according to the View Tab that is currently 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 [New Visualizer] on the Home Page.

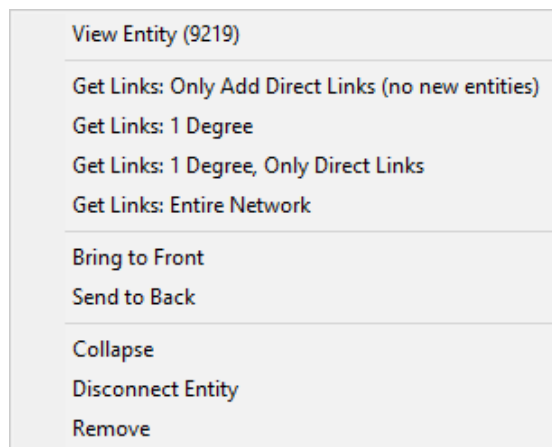
Pick an Entity

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]. A form like the Entity Search form appears to let you find and select the entities to add to the diagram.



Context Right Click Menu

Right click on an entity or line to bring up a context sensitive menu to simplify selecting similar options from the toolbar.



Depending if the diagram, entity, or relationship is selected, a different menu appears.

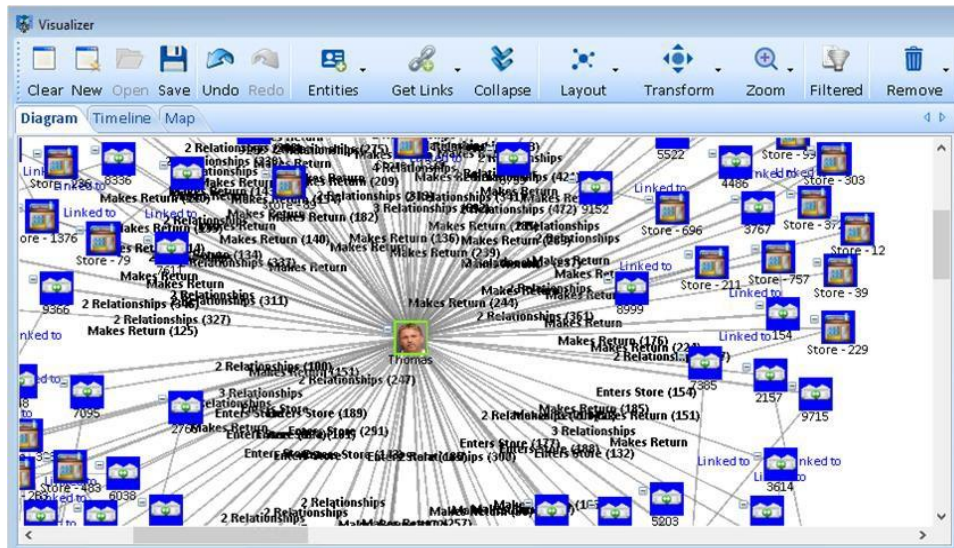
Get Links from the Entity

To see the relationships for the entity that you added, click on the entity to select it. A green box appears around it to indicate it is selected. Right click and choose Get Links from the context menu. You can also click the [Get Links] button on the toolbar to choose an option.



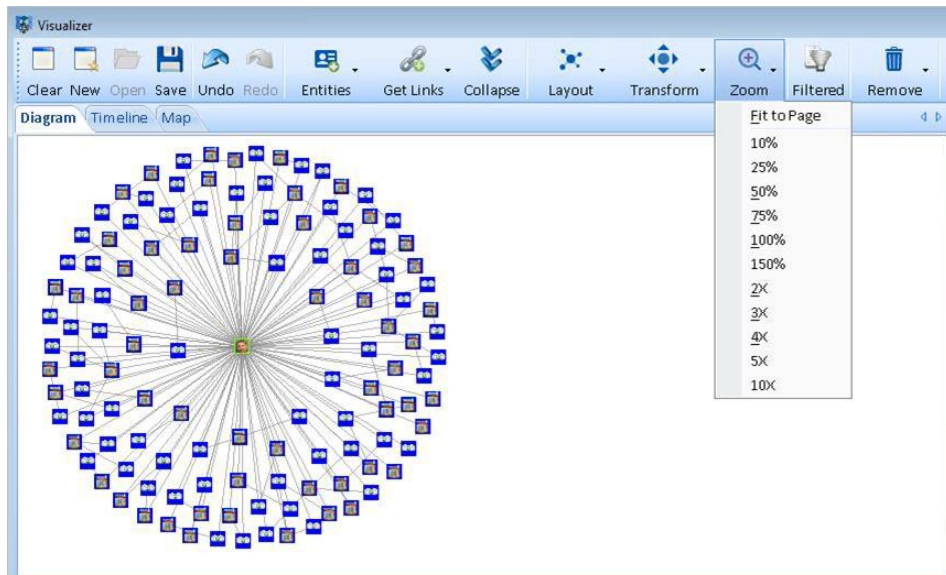
If the entity has links, the [+] appears next to it. Click it to perform Get Links, 1 Degree, All.

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




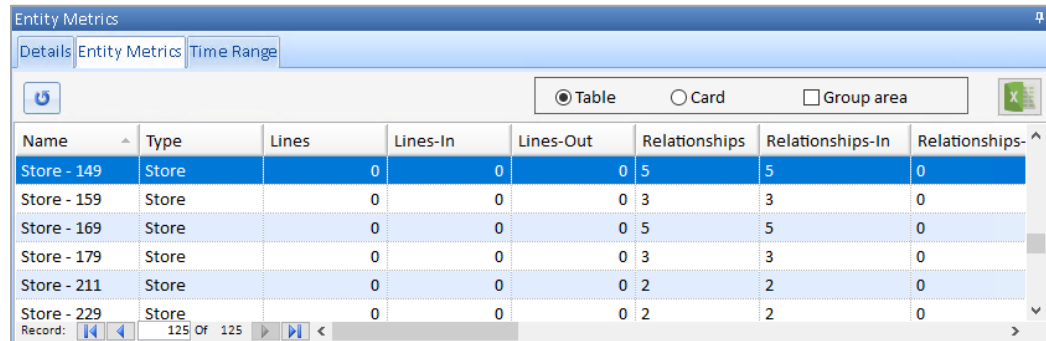
Click on any entity in the diagram to get its links. This lets you explore the diagram and add more data. You can automatically change the location of the entities under Layout.

If you can't see all the entities, set the view to by using the Zoom button on the toolbar and selecting "Fit to Page".



Entity Metrics

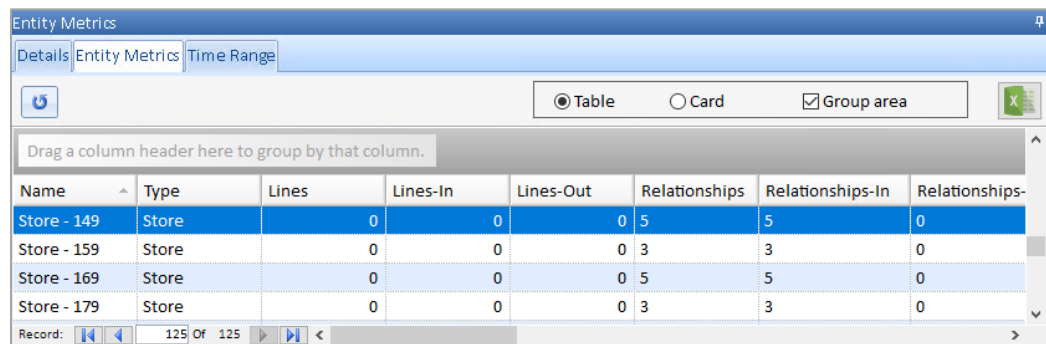
As your diagram gets more complex, you may want to use Entity Metrics to apply automated analysis to the data. This makes it easier to rank entities by a variety of criteria. Select the Entity Metrics tab at the bottom of the screen and click the  [Calculate] button. Visualizer calculates all values for the entities in the diagram.



The Entity Metrics window displays a table with the following data:

Name	Type	Lines	Lines-In	Lines-Out	Relationships	Relationships-In	Relationships-Out
Store - 149	Store	0	0	0	5	5	0
Store - 159	Store	0	0	0	3	3	0
Store - 169	Store	0	0	0	5	5	0
Store - 179	Store	0	0	0	3	3	0
Store - 211	Store	0	0	0	2	2	0
Store - 229	Store	0	0	0	2	2	0

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.

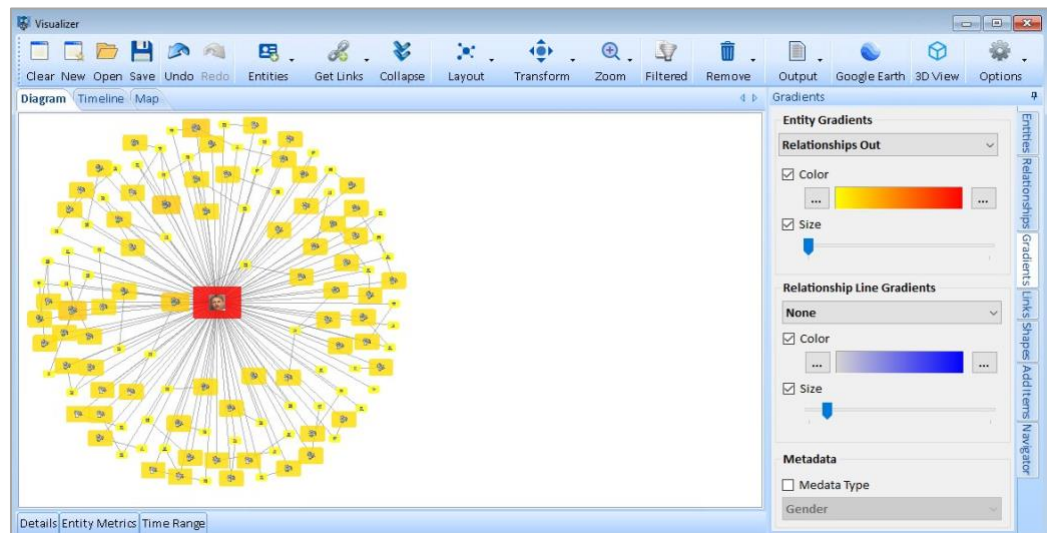


The Entity Metrics window shows the 'Group area' checkbox checked. A message above the table reads: "Drag a column header here to group by that column."

Name	Type	Lines	Lines-In	Lines-Out	Relationships	Relationships-In	Relationships-Out
Store - 149	Store	0	0	0	5	5	0
Store - 159	Store	0	0	0	3	3	0
Store - 169	Store	0	0	0	5	5	0
Store - 179	Store	0	0	0	3	3	0

Gradient Metrics

Now that your diagram is displayed, and Visualizer calculated a variety of metrics, use the Gradient Metrics feature to visualize Entity Metrics on your diagram.

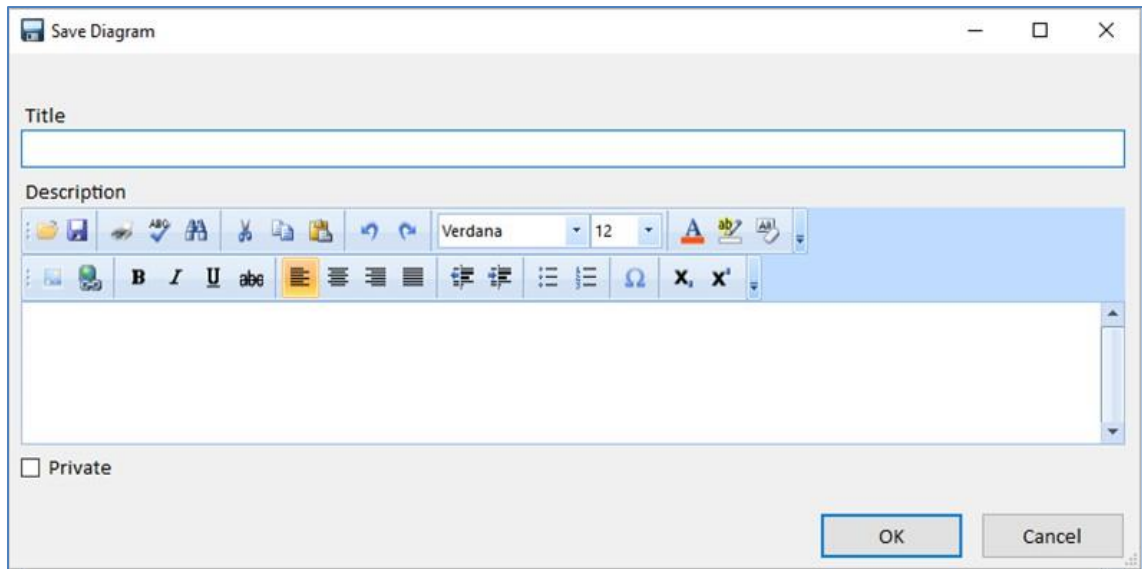


Select the Gradient tab to the right of the Visualizer window to color your entities and relationships based on the metric you select. See [Gradient Metrics](#) on page 177 for more information.

A Metadata Type with lookup values can have colors assigned to each. Select it for display here.

Save 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 SentVi database. This can be opened by you or (if not private) any SentVi 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 SentVi 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

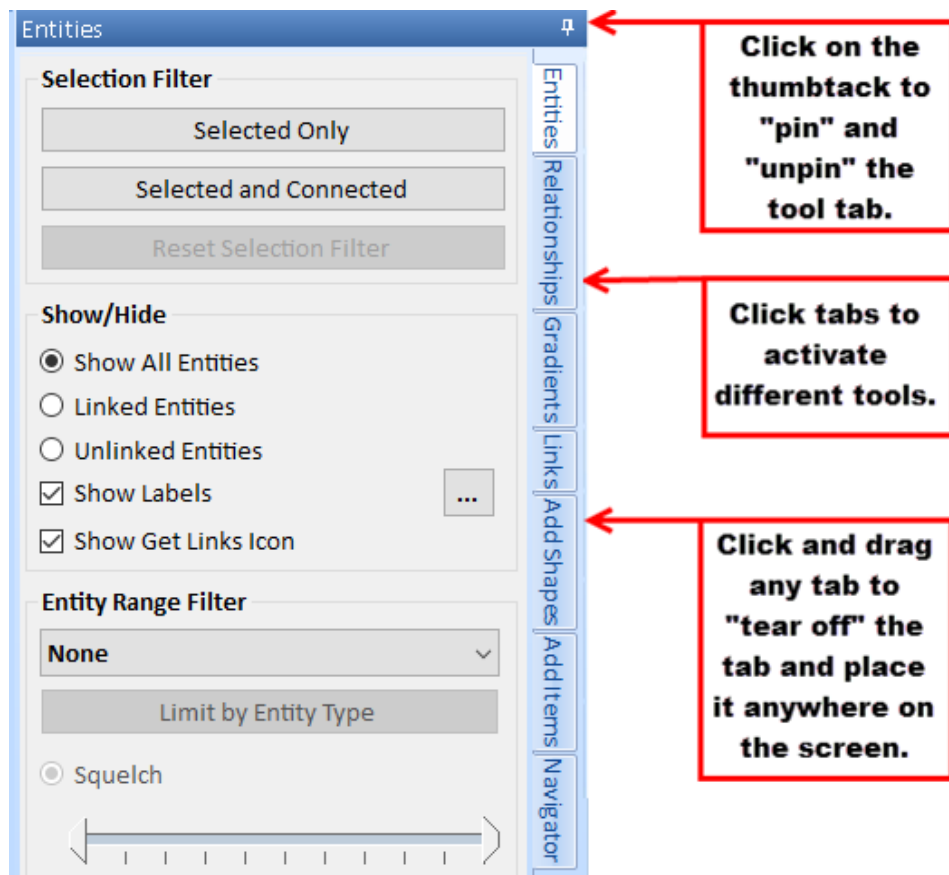
As you work through your analysis process, you may find that some informal items turn out to be real data—that is one of the central values of SentVi. For example, an entity that you added to your Visualizer diagram last week turns out, through new intelligence, to be an actual person with a known name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

Panels

To maximize the amount of space within the Visualizer interface, the right panel has tabs designed to be sized, moved, and 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.

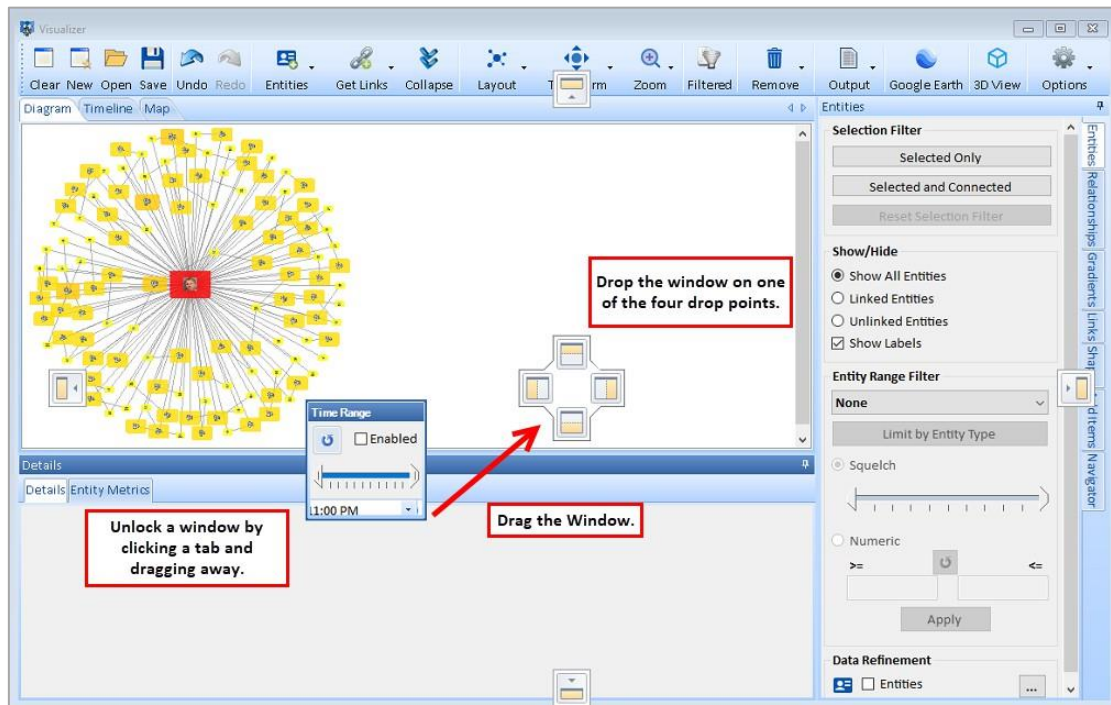
For convenience, SentVi remembers your tool area positions and settings when you close the Visualizer. The next time you open the Visualizer, your tool areas are restored to the saved positions and settings.

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.

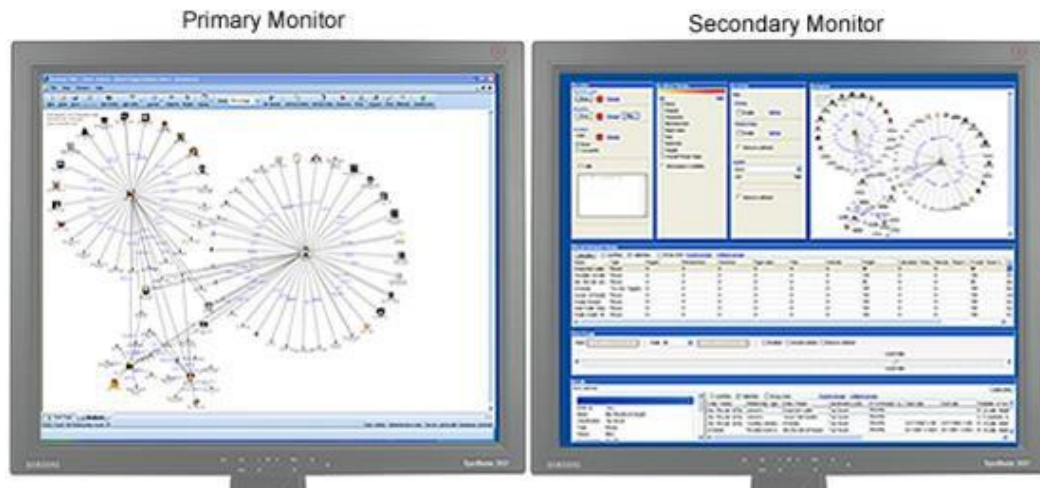
Multi-Monitor Support

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 SentVi.

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 SentVi by clicking on the “Restore Down” button  in the top right corner of the main SentVi window. You can then drag the overall SentVi 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

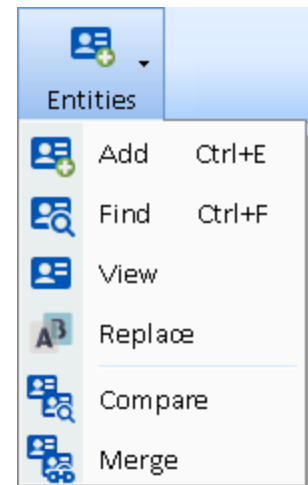
- **Clear:** removes everything from the screen. If you made changes, a prompt to save appears.
- **New:** creates a new Visualizer form without modifying the current one.
- **Open:** opens a previously saved diagram to replace or merge into the current diagram.
- **Save:** saves your diagram in the database which can be shared with others.
- **Undo/Redo:** Reset the last addition or removal of entities, relationships, shapes, layouts, and other significant changes.



Entities

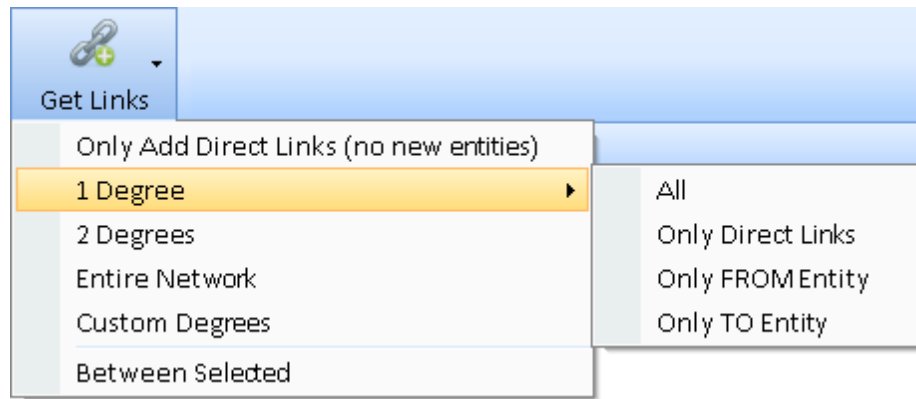
Entities include the entity related tasks on the Visualizer.

- 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 links.
- Find an entity on the diagram by its name.
- View Entity details for the selected entity.
- Replace (Keep and Hide) entities based on entity and relationship types.
- Compare selected entities for data differences. See [Compare](#) on page 297.
- Merge selected entities into one entity. See [Merge](#) on page 299 for details.



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.



Get Links Menu

- Add any missing relationships among the entities on your diagram (does not add entities).
- Add entities one degree from your selected entities with options for All, Only Direct Links (not links between the entities added), and only links TO or FROM them.
- 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.

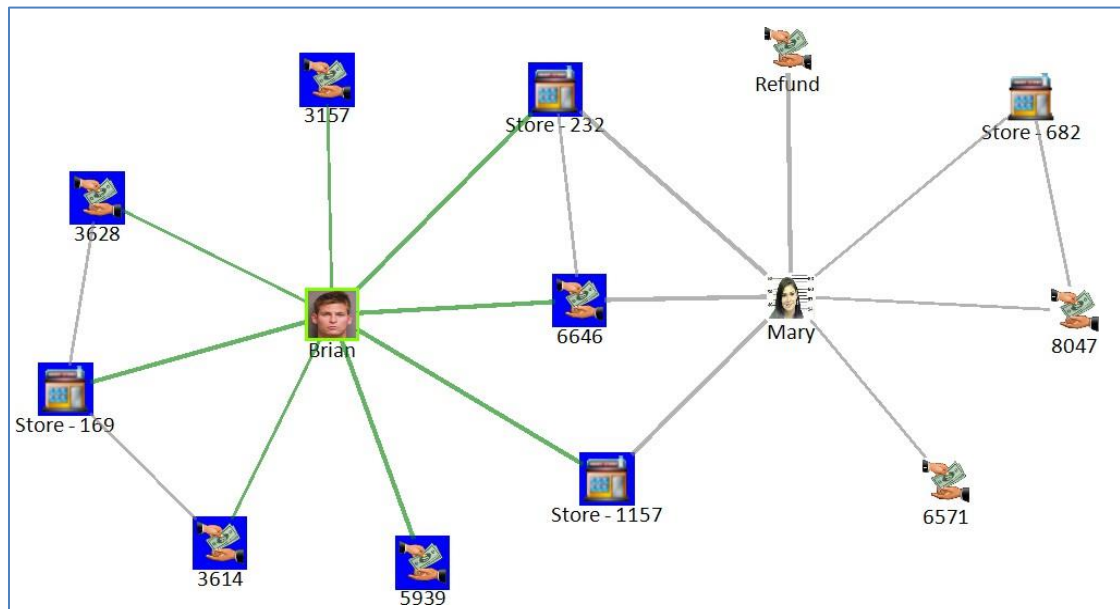
For more information, visit [Get Links](#) on page 129.

Collapse



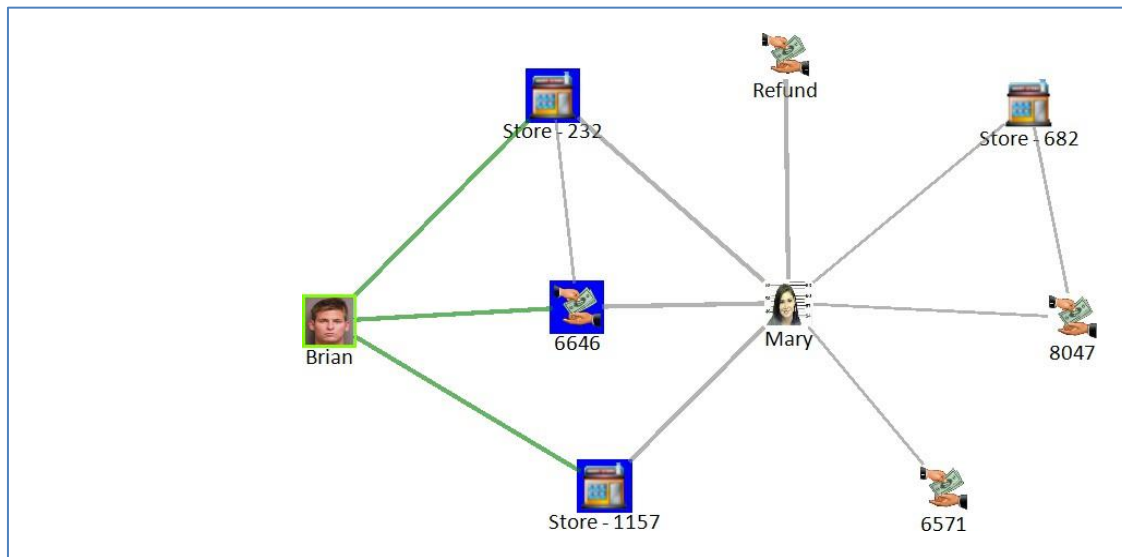
Collapse removes entities that are only linked to the selected entity to clean up your diagram.

For example, start with this diagram and select the central entity (Brian) on the left:



Original Diagram

After clicking Collapse, many entities linked to the selected entity are gone:



After Collapse

1. Entities that are only linked to the selected entity are removed.
2. Entities that are only linked to the selected entity and other entities that are only linked to the selected entity are also removed. For example, the store on the left.

The entities linked to the entities on the right are not removed.

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.

Layout	Transform	Zoom
<ul style="list-style-type: none"> Incremental Circular Elliptical Rectangular Square Triangular Hierarchical Additional Layout Options Set Last as Default 	<ul style="list-style-type: none"> Bring to Front Send to Back Rotate Right 90° Rotate Left 90° Rotate 180° Rotate Any Angle Flip Vertical Flip Horizontal Resize Stretch to Fit 	<ul style="list-style-type: none"> Fit to Page 10% 25% 50% 75% 100% 150% 2X 3X 4X 5X 10X

The Transform button lets you modify your objects and diagram, the zoom to move in and out. For more information, see **Chapter 13: Visualizer Layouts, Transform and Zoom** on page 147.

Filtered Status

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 items on the diagram and click the [Remove] button for options to remove them.

Remove from Diagram

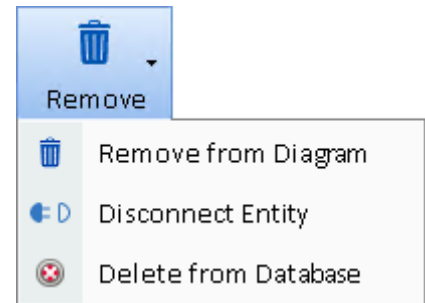
Removes items from the diagram but not the database.

Disconnect Entity

Removes all the lines from the selected entity.

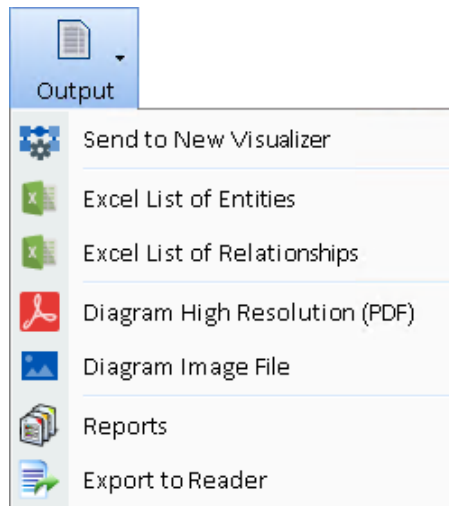
Delete from Database

Deletes the items from the diagram and database.



Output

Output your Visualizer diagram's data and appearance.



Create a new Visualizer with your currently visible 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 others.

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 216 for more information.
- The 3D View lets you explore and animate your diagram in three dimensions. See [Chapter 18: Three-Dimensional Viewer](#) for more information.

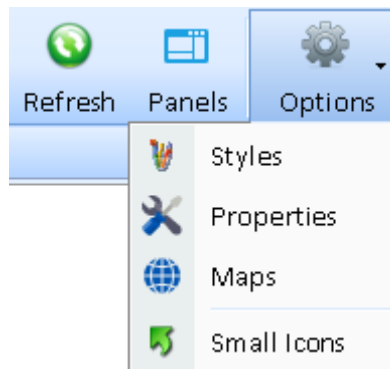
Right Side Buttons

Three buttons are on the right side of the toolbar:



Right Side of the Visualizer Toolbar

- **Refresh** updates the data of the Entities and Relationships on the diagram which is useful if the data changed for entity name, images, metrics, relationship type, etc. Filters, gradients and replace features are applied on the refreshed data. Note that entity type icons are not updated if they changed.
- **Panels** toggles the opening and minimizing of the right and bottom panels.
- **Options** offers additional customizations:



Styles

Set style options such as colors, fonts, transparency, borders, link thickness, etc. for the diagram, entities, and relationships. Settings can be saved under a name and retrieved later. This is covered in the [Visual Styles](#) section on page 134.

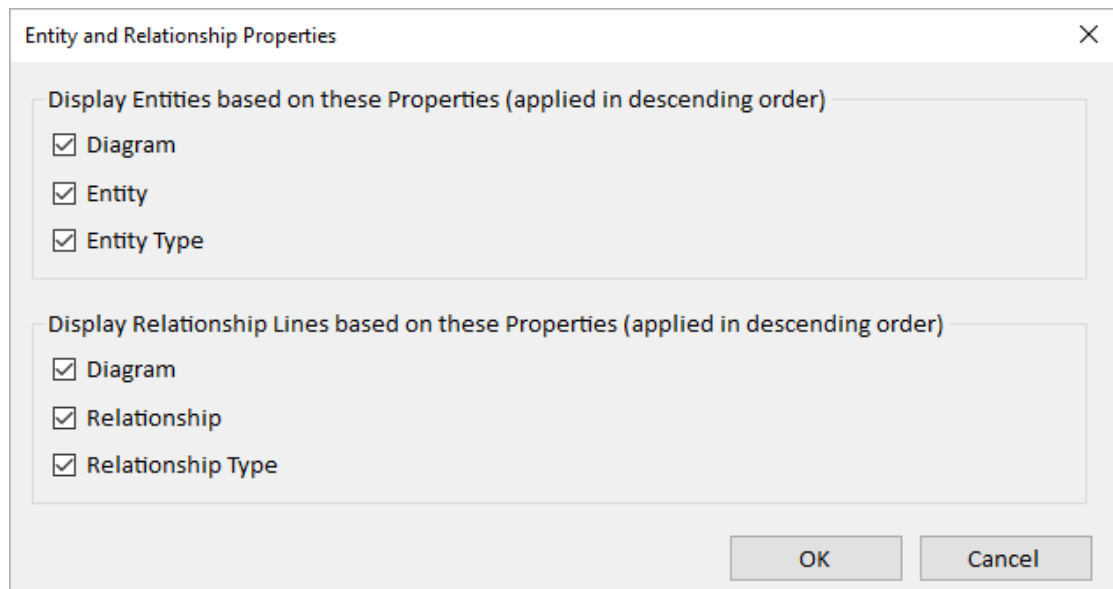
Maps

If you have an internet connection, SentVi offers online maps with Microsoft Bing. It also offers offline maps that support shape files such as ESRI. By default, if an Internet connection is detected, online maps are used to offer high resolution maps across the world.

The options are described in the Maps chapter under [Map Options](#) on page 202.

Properties

Custom properties can be set for individual entities and relationship lines on your diagram. They can also be saved to the underlying entity or relationship to become their default appearance every time they are put on the Visualizer. The properties can also be saved to the item's type so all entities or relationships of that type use those properties.



The dialog box titled "Entity and Relationship Properties" contains two sections. The first section, "Display Entities based on these Properties (applied in descending order)", has three checked checkboxes: "Diagram", "Entity", and "Entity Type". The second section, "Display Relationship Lines based on these Properties (applied in descending order)", has three checked checkboxes: "Diagram", "Relationship", and "Relationship Type". At the bottom right are "OK" and "Cancel" buttons.

Property Options

This form controls whether they are displayed on the diagram. Even if you set custom properties for entities in your diagram, you can turn that on and off from this form.

Small Icons

Toggle the toolbar buttons between standard graphics with text and small icons without labels.

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.

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.

Details	
Name	Thomas
Type	Person
Value	
Weight	50
Start Date	
End Date	
Status	Active
Entity ID	1860
Created Date	10/13/2011 3:46:10 PM
Created By	Admin
Modified Date	9/3/2020 12:00:00 PM
Modified By	Admin

Record: 1 Of 2

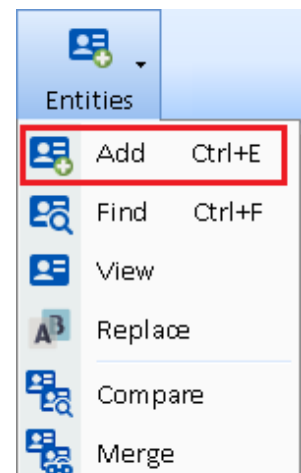
Add and Find Entities

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

The Entity Picker form is essentially the same form as the Entity Search form in **Chapter 6: Entity Search** on page 63.

Pick one or more entities from the search results using the [Shift] or [Ctrl] keys with mouse click, then choose a button on the bottom toolbar to add them to the diagram.

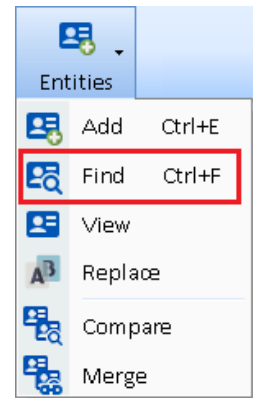
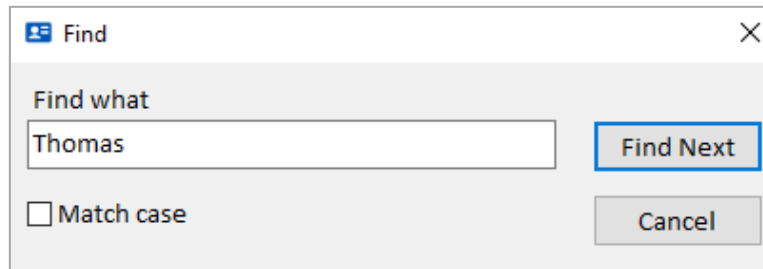
You can specify what else is added:



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

Find Entities

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



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.

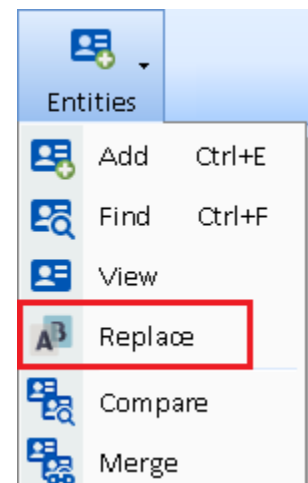
Replace Entities

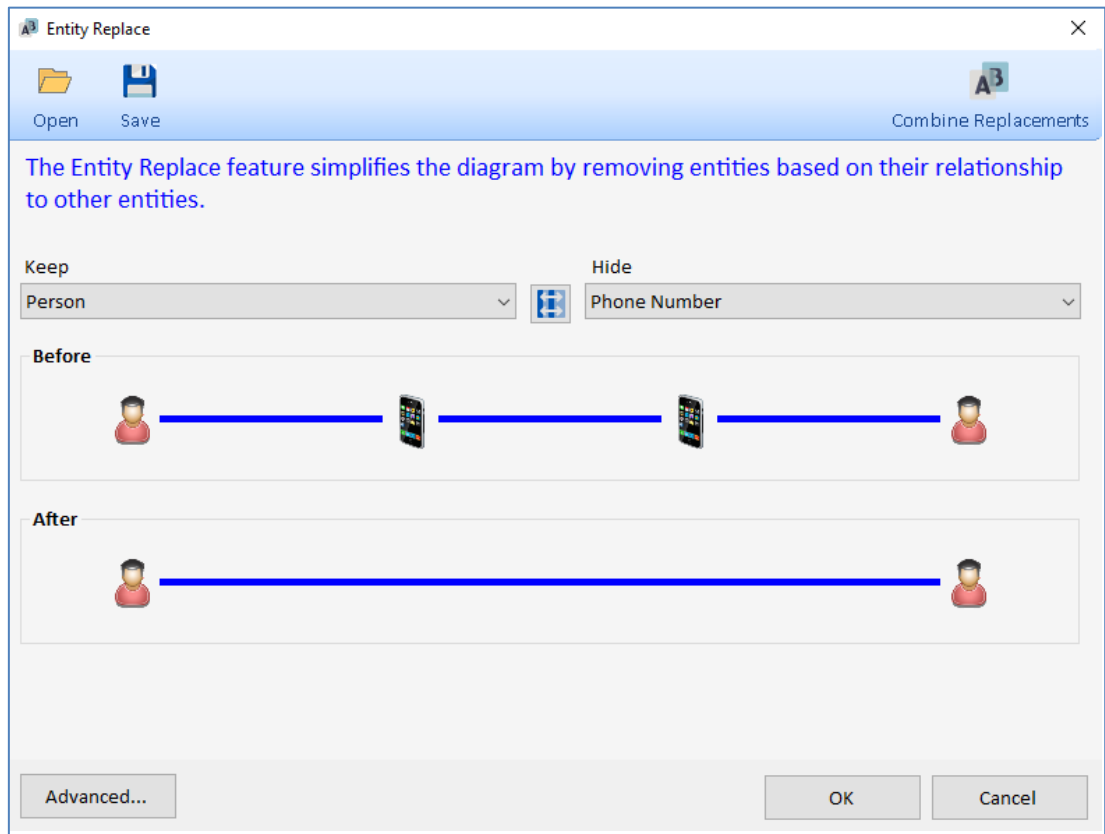
Entity Replace lets you keep and hide entities based on their types and relationships. This is powerful way to create higher-level views of your network and eliminate clutter.

For instance, you may have telephone call data showing calls between phone numbers and the owner of each phone. Entity Replace lets you replace the phones with their owners to show the connection between the people rather than phones.

Entity Replace acts like a filter. Once it is set, if you add new entities to your diagram, like Get Links, the replacement is applied to the new entities. Turn off the Entity Replace to see to all your entities again.

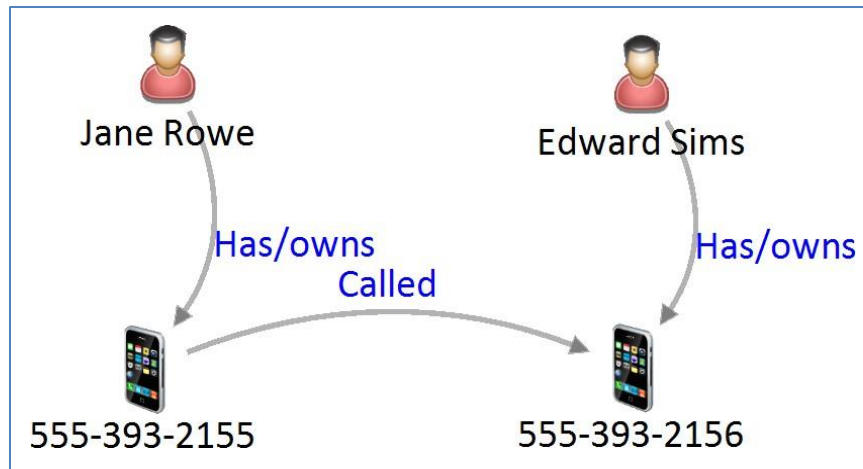
From the Visualizer diagram's toolbar Entities button, choose Replace then select the entity types to keep and replace.





Replace Entity Type Phone Number with Person

Click [OK] to apply the selection. Click the [Save] button to keep your selection for future use.



Original Diagram Before Replace

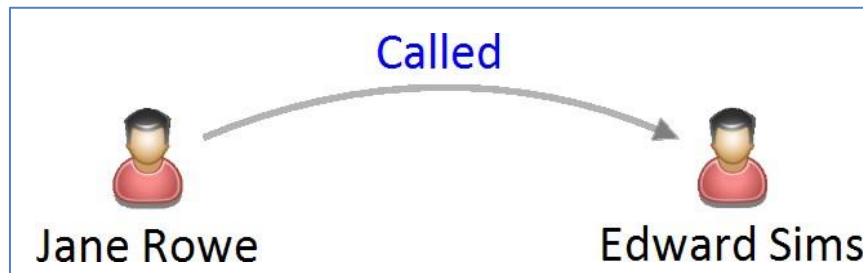
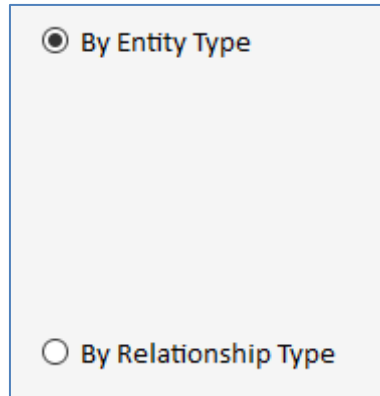


Diagram After Replacing Phones with Owners

Advanced Wizard

Click [Advanced...] for more options such as selecting multiple entity and relationship types to keep and hide. Start by selecting by Entity Type or Relationship Type.

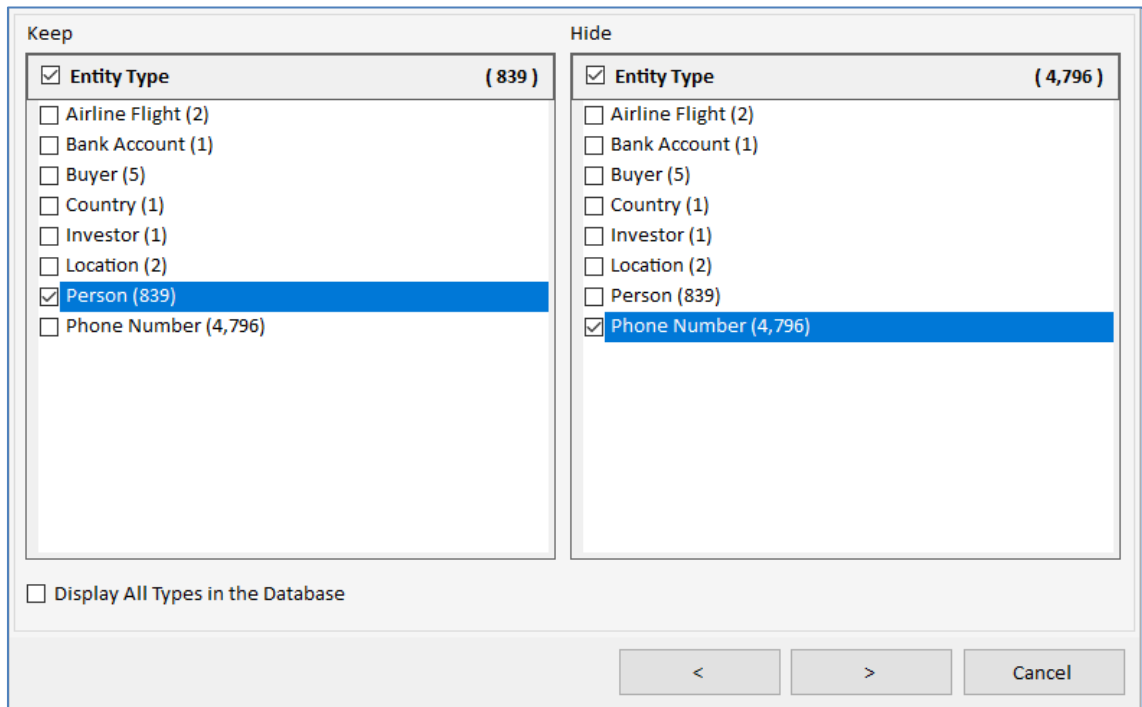


The image shows a dialog box with two radio button options. The top option is 'By Entity Type', which is selected with a filled radio button. The bottom option is 'By Relationship Type', which is unselected with an empty radio button.

Choose by Entity or Relationship Type

Replace by Entity Type

Choosing Entity Type lets you select one or more entity types to Keep and Hide. Each entity type with the number of them in your diagram are shown.



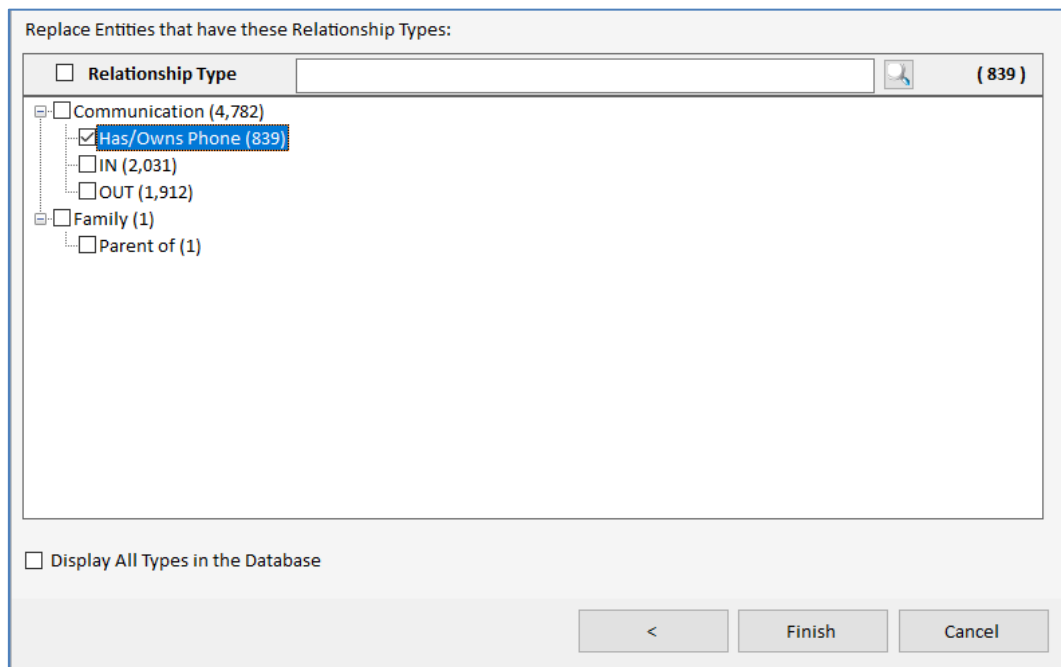
The image shows a dialog box titled 'Replace by Entity Type'. It has two columns: 'Keep' and 'Hide'. Each column contains a list of entity types with checkboxes and counts. In the 'Keep' column, 'Person (839)' is checked and highlighted. In the 'Hide' column, 'Phone Number (4,796)' is checked and highlighted. At the bottom, there is a checkbox for 'Display All Types in the Database' which is unchecked. There are also navigation buttons '<' and '>' and a 'Cancel' button.

Keep	Hide
<input checked="" type="checkbox"/> Entity Type (839)	<input checked="" type="checkbox"/> Entity Type (4,796)
<input type="checkbox"/> Airline Flight (2)	<input type="checkbox"/> Airline Flight (2)
<input type="checkbox"/> Bank Account (1)	<input type="checkbox"/> Bank Account (1)
<input type="checkbox"/> Buyer (5)	<input type="checkbox"/> Buyer (5)
<input type="checkbox"/> Country (1)	<input type="checkbox"/> Country (1)
<input type="checkbox"/> Investor (1)	<input type="checkbox"/> Investor (1)
<input type="checkbox"/> Location (2)	<input type="checkbox"/> Location (2)
<input checked="" type="checkbox"/> Person (839)	<input type="checkbox"/> Person (839)
<input type="checkbox"/> Phone Number (4,796)	<input checked="" type="checkbox"/> Phone Number (4,796)

Choose the Entity Types to Keep and Replace

Check [Display All Types in the Database] to see all the entity types in its lookup table. This is useful to save settings for reuse with entity types that aren't currently used by any entity in the database.

Click [>] to select the Relationship Types to include in the replacement. By default, all are selected, but you can limit the replacements to just specific types like ownership.

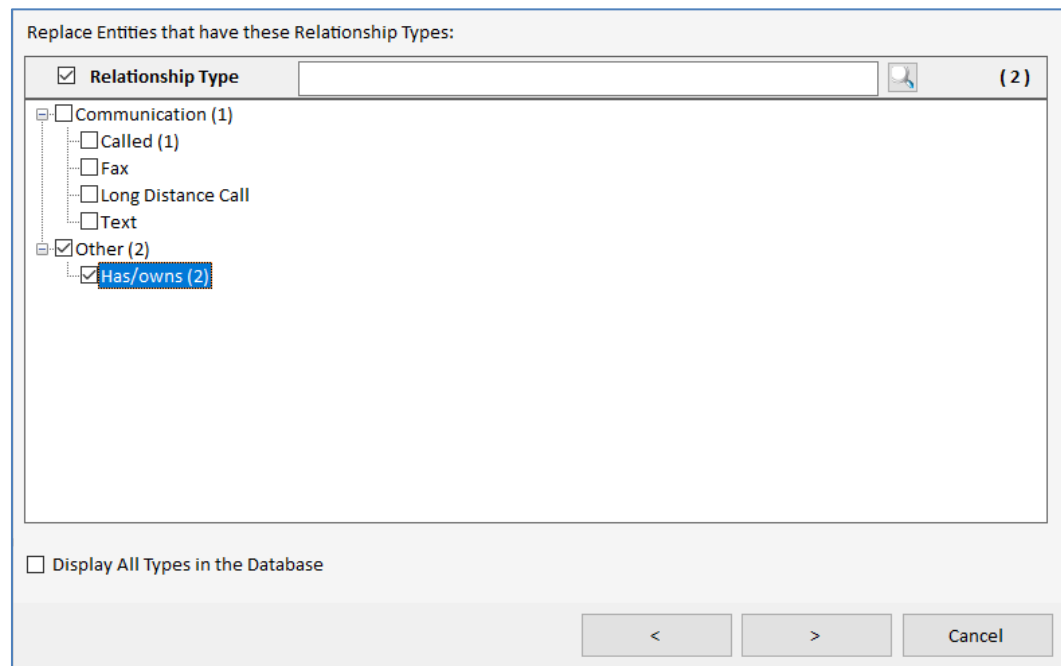


Select the Relationship Types to Include in the Replacements

Click [Save] to preserve the selections for reuse. Click [Finish] to see the results. Click [Finish] to apply the replacement on your diagram.

Replace by Relationship Type

If you choose Relationship Type in the Wizard's first screen, the same Relationship Type selection form appears showing the count of relationship types in the diagram.



Select Relationship Type First based on the Types in the Current Diagram

Check [Display All Types in the Database] to see all the relationship types in its lookup table. This is useful to save settings for reuse with relationship types that aren't currently used by any relationship in the database.

Click [>] to see the relationships passing the filter.

Entity 1	Relationship Type	Entity 2
Edward Sims (Person)	Has/owns	240-555-2156 (Phone Numb...
Jane Rowe (Person)	Has/owns	240-555-2155 (Phone Numb...

Record: 1 Of 2

Keep Entity 1, Hide Entity 2
 Keep Entity 2, Hide Entity 1

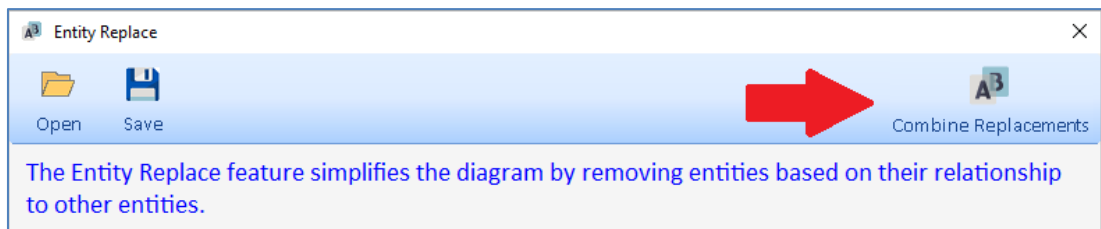
< Finish Cancel

Relationships and their Entities to Replace

The list shows the relationships to be replaced with the Entity 1 and Entity 2 values. Choose whether you want to Keep Entity 1 or 2. Press [Save] to save your selections for reuse. Click [Finish] to see the replacements on the diagram.

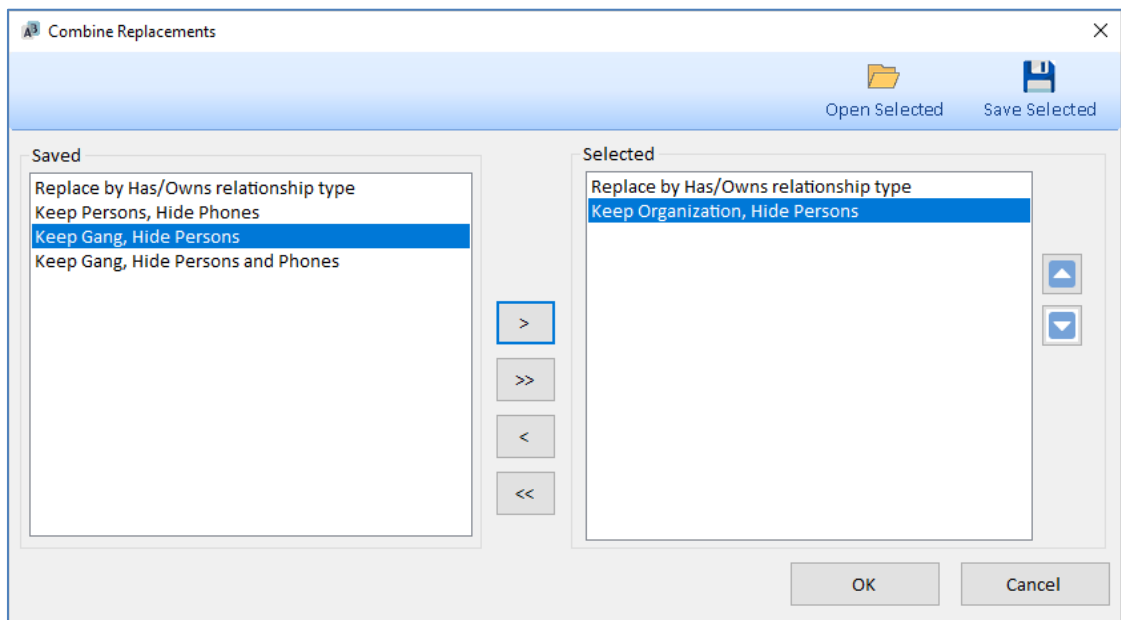
Combine Replacements

If saved replacement settings exist, they can be combined with [Combine Replacements]:



The Entity Replace dialog box has a toolbar with 'Open', 'Save', and 'Combine Replacements' buttons. A red arrow points to the 'Combine Replacements' button. Below the toolbar is a text box: 'The Entity Replace feature simplifies the diagram by removing entities based on their relationship to other entities.'

Select the saved replacement settings and their order. A saved replacement can be applied multiple times depending on how you want to layer the replacements. The order matters as the replacements are based on the entities that exist when each is applied.



The Combine Replacements dialog box has a toolbar with 'Open Selected' and 'Save Selected' buttons. It contains two list boxes: 'Saved' and 'Selected'. The 'Saved' list contains: 'Replace by Has/Owns relationship type', 'Keep Persons, Hide Phones', 'Keep Gang, Hide Persons', and 'Keep Gang, Hide Persons and Phones'. The 'Selected' list contains: 'Replace by Has/Owns relationship type' and 'Keep Organization, Hide Persons'. Between the lists are navigation buttons: '>', '>>', '<', and '<<'. At the bottom are 'OK' and 'Cancel' buttons.

The entire set can be saved for reuse.

Clear Replace

After applying an Entity Replace, the Filtered button is highlighted on the toolbar. Click that to turn off all filters, but that includes other filters. If you just want to remove the Entity Replace filter, open the Entity Replace form again.

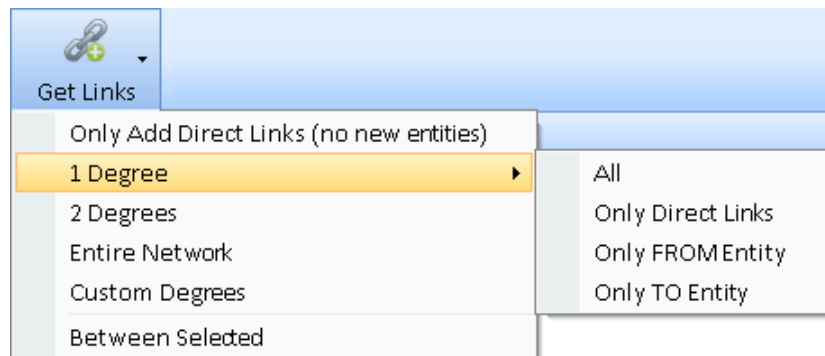
If an Entity Replace is applied, the bottom has a [Clear] button. Click it to remove the Entity Replace.



Entity Replace with Clear Button

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.



Get Links Menu

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

“One Degree” adds all entities and relationships linked to the entity. If an entity on the diagram has links available, a [+] button appears next to it (if the Entities panel has “Show Get Links Icon” checked). Add one degree by clicking on the [+] or selecting 1 Degree from the top or right click menu.

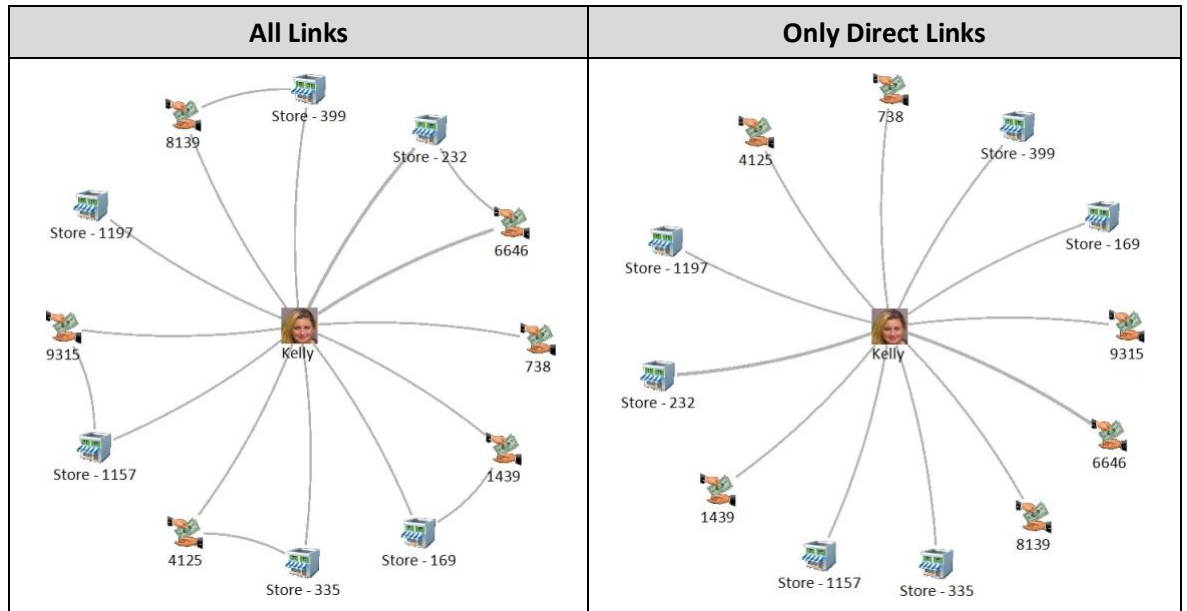
1 Degree has four options: All, Only Direct, Only FROM or Only TO. Notice the difference between [All] and [Only Direct Links] where All adds the links between the linked entities.

- [All] includes linked entities, plus relationships among those entities.
- [Only Direct Links] is a hub and spoke linked to the selected entity in the middle.

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



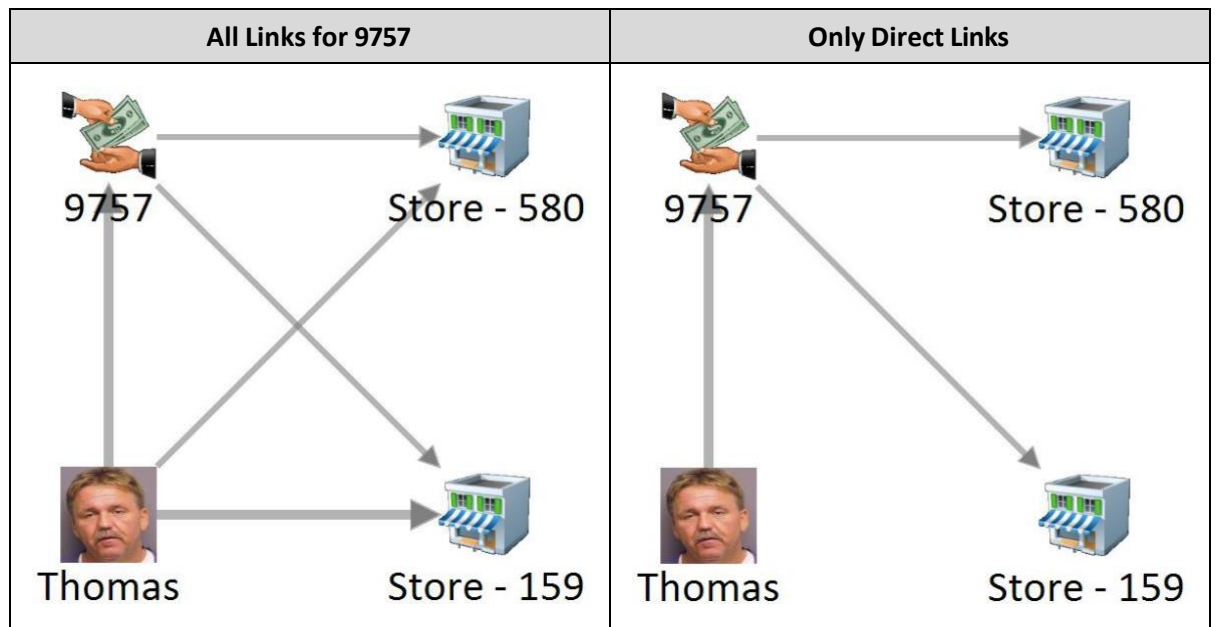
If you choose the Only Direct Links option, you can add the missing relationships later by using the Only Add Direct Links menu item.

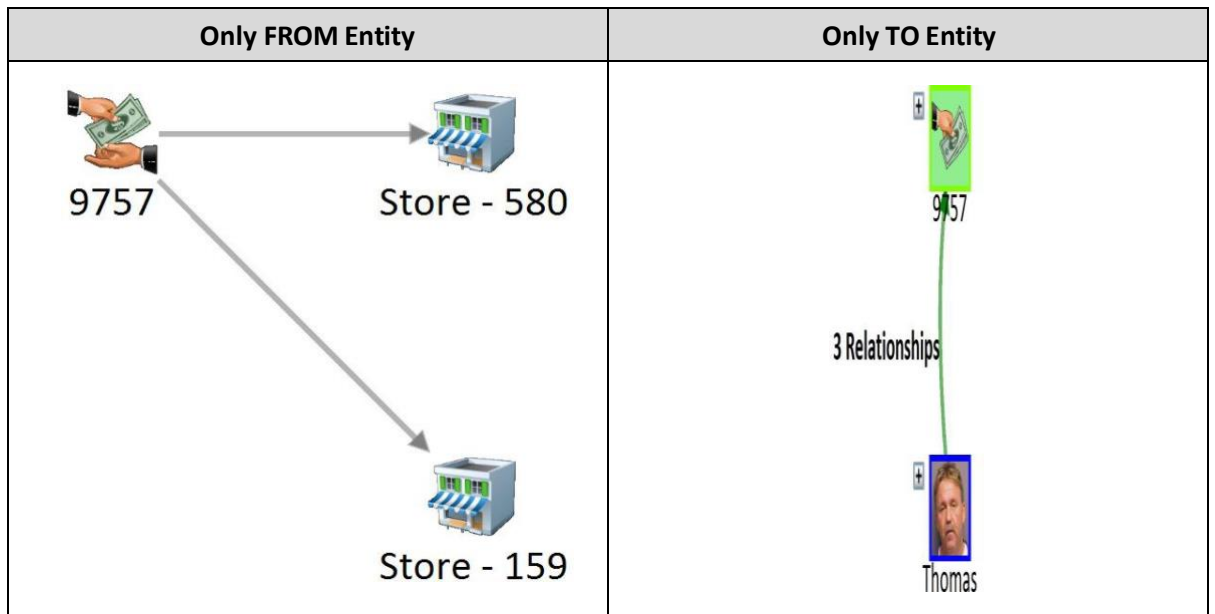


Directional Links

You can also choose to include relationships either TO or FROM an entity. Every relationship has two entities. A relationship goes FROM Entity 1 TO Entity 2 (related entity).

For example, Transaction 9757 has relationships FROM one person and TO two stores. These are the four Get Links options for entity 9757 in the top left corner:





2+ Degrees

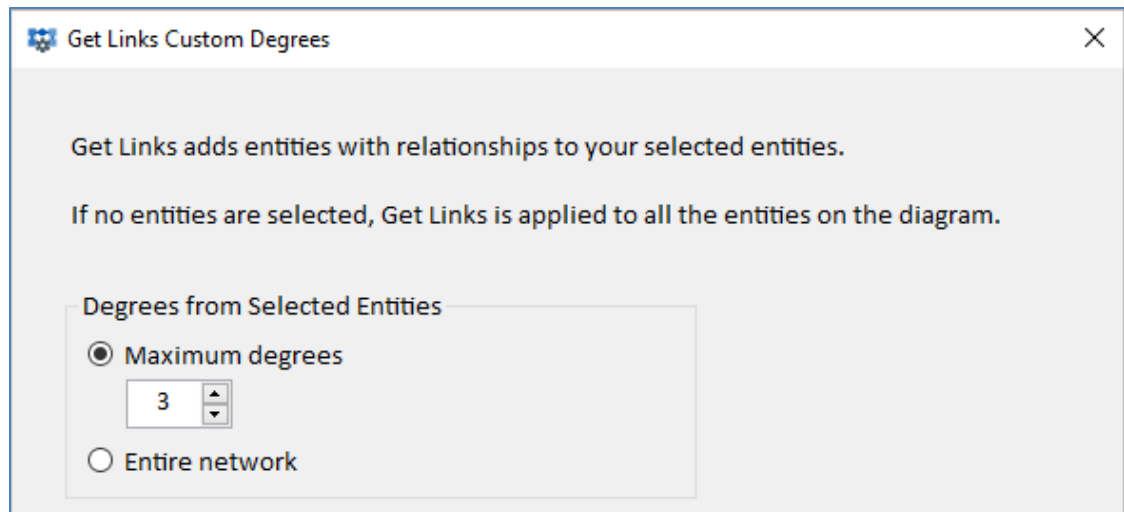
You can also use Get Links for 2 or more degrees (up to 99 under Custom Degrees). Higher degrees may bring back so many entities that your diagram becomes too cluttered to use.

Entire Network

[Entire Network] gets all the entities linked to your selected entity or entities. This adds all the entities in its network of connected entities without guessing how many degrees there are.

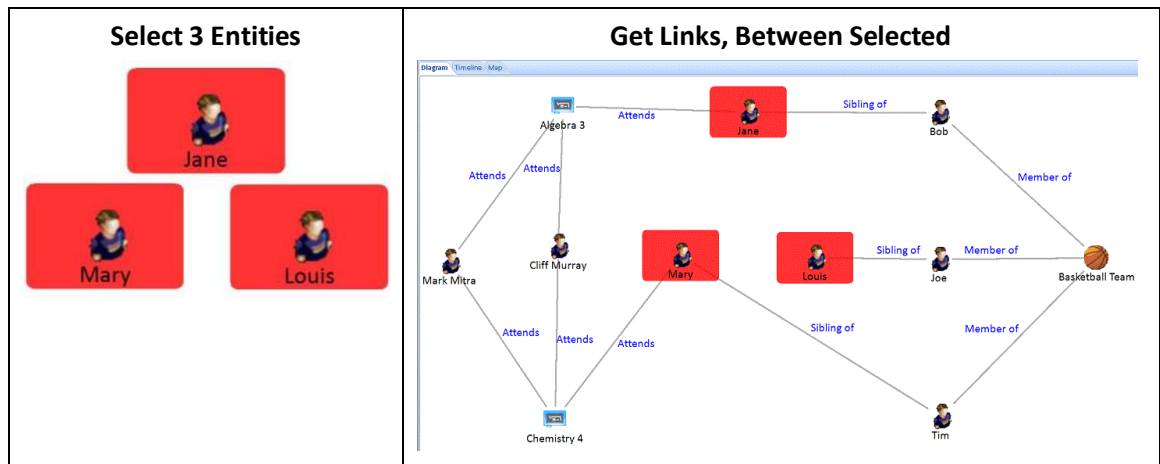
Custom Degrees

Custom Degrees lets you specify more than two degrees.



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

Get Links Between Entities
✕

Add the fewest entities to connect your selected entities.

Number of degrees between your entities

Minimum degrees for each pair

Do not add entities if pairs are more than this many degrees apart:

▲
▼

When new entities are added:

Add links to all entities on the diagram

Only add links to the selected entities

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.

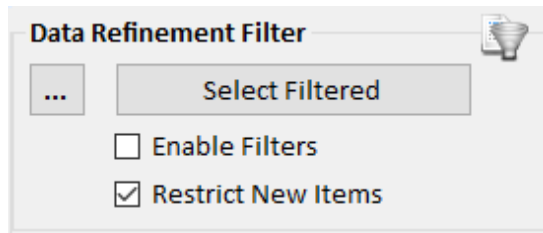
When new entities are added

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.

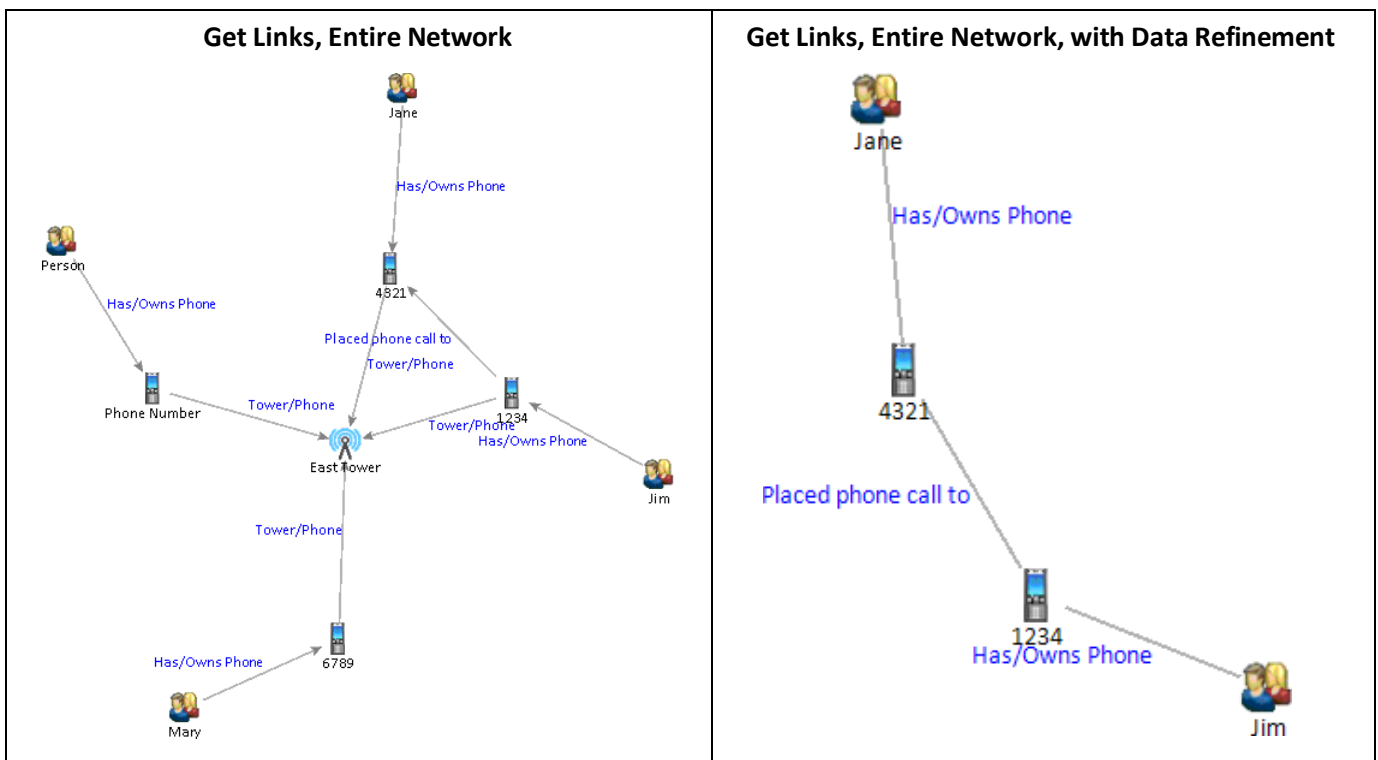
Get Links and Data Refinement

Get Links respects the Data Refinement Filter if "Restrict New Items" is checked:

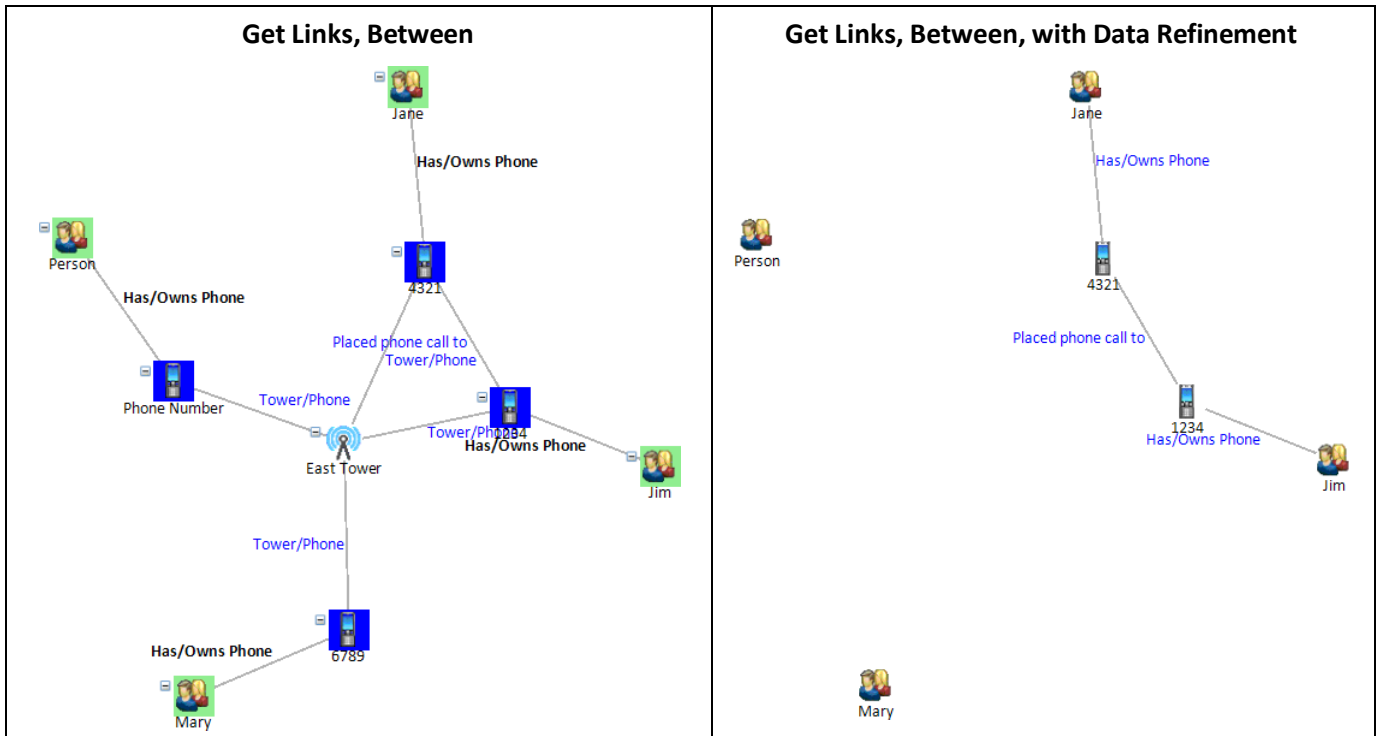


In the following example, start with Jane at top and select Get Links, Entire Network. The left diagram is without data refinement and shows the entire network connected to Jane.

The right diagram shows the results with cell tower entity types excluded and "Restrict New Items" checked. Because the Cell Tower is excluded that part of the network is not added.



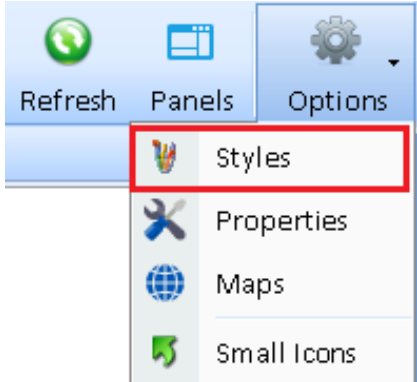
The next example starts with 4 selected people (green) followed by a Get Links, Between.

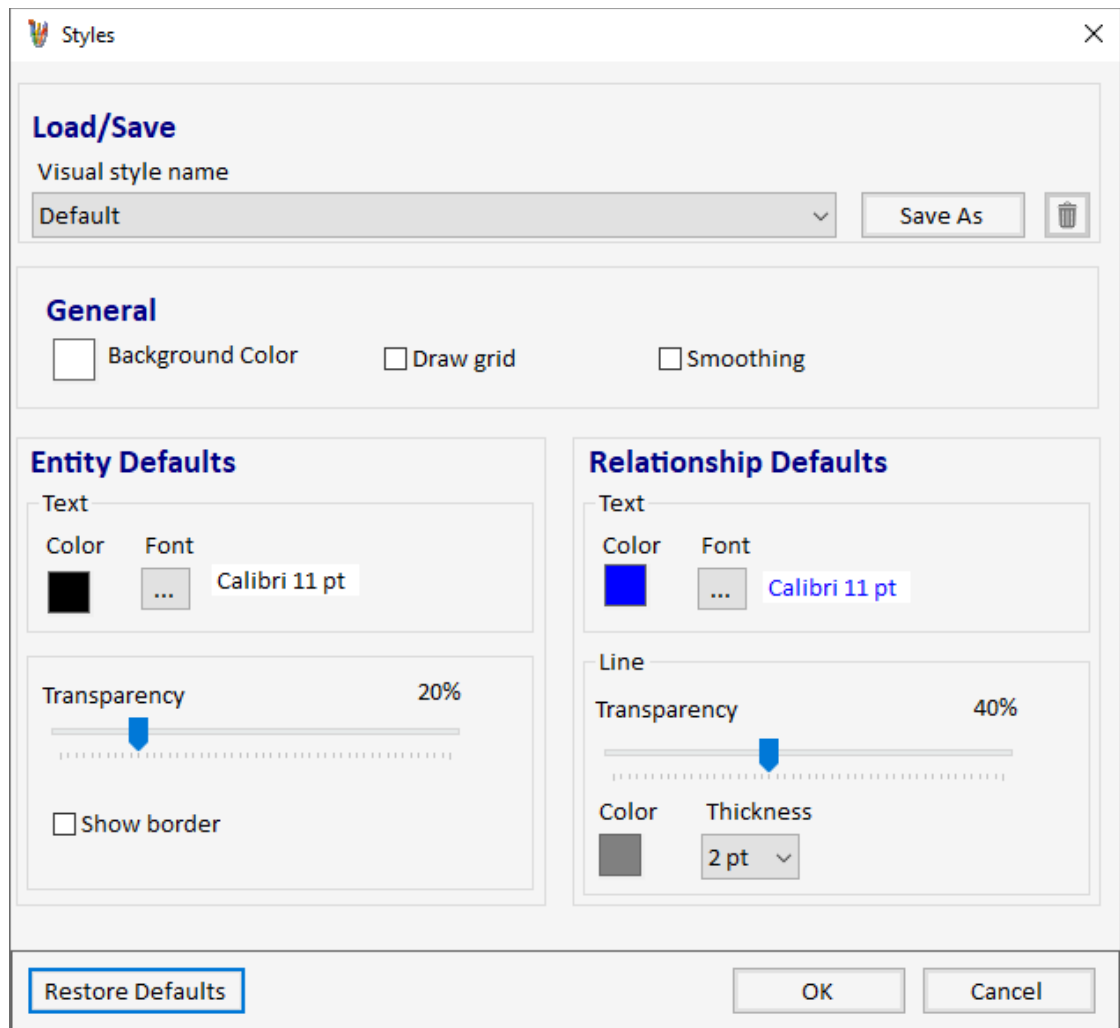


The left diagram shows the results with no data refinement and how they are connected. The right diagram shows the results of Get Links, Between when Data Refinement excludes cell tower entity types which is the middle entity in the left diagram. Without the Cell Tower, the two people on the left are not connected to the two on the right.

Visual Styles

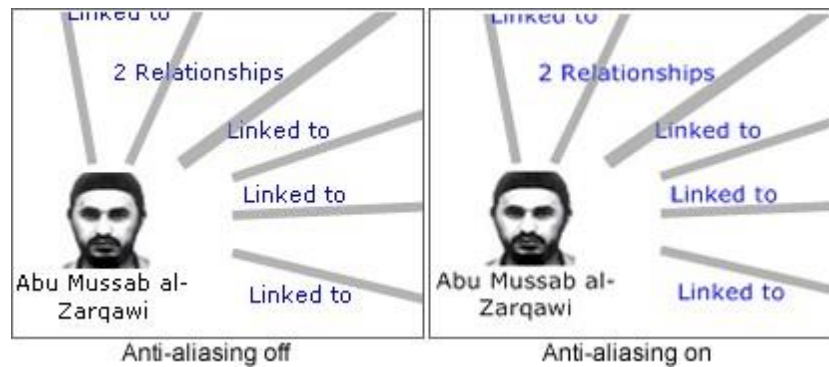
The [Styles] button under Options launches the Visual Styles form.



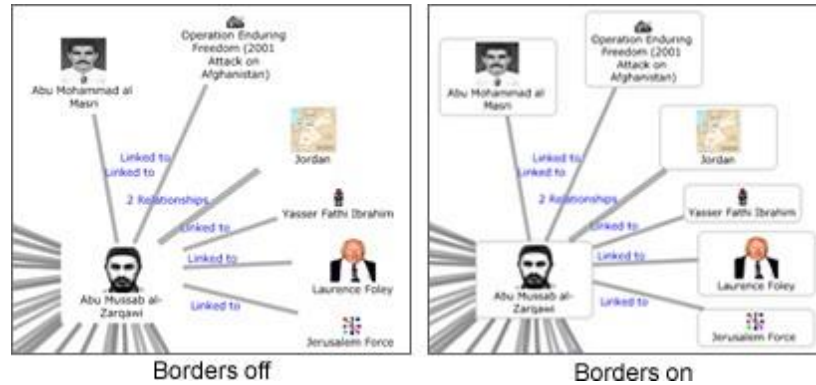


General Settings

- **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:



Entity Defaults



- **Text Color:** Set the color for entity text by clicking the color box.
- **Text Font:** Set the font for the entity text by clicking the [...] button.
- **Transparency:** Set the transparency of the images. A higher value is more transparent.
- **Show Border:** Toggle whether an entity icon has a border.

Relationship Defaults

- **Text Color:** Set the color for relationship label by clicking the color box.
- **Text Font:** Set the font for the relationship text by clicking the [...] button.
- **Transparency:** Set the transparency of lines. A higher value is more transparent.
- **Line Color:** Set the color of relationship lines.
- **Line Thickness:** Set the thickness of relationship lines, from 1 to 14 points.

Saving and Loading Visual Styles

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

You can save and name the Visual Style settings by clicking the [Save As] button. To return to the default SentVi settings, click the [Restore Defaults] button to reset all the current visual style settings to their default values.

Save the Diagram and New Data

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:

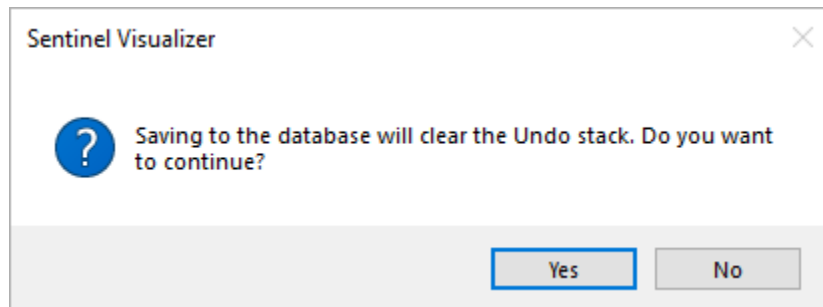
- **Diagram** is the pictorial link chart of entities and relationships. Diagram data consists of pointers to entities and relationships, and their position on the diagram.
- **Database Items** are entities and relationships that are retrieved from the database via the Get Entity operation and the Get 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 (see page 183 for details). These items are not saved in the database yet and only

exist in the diagram. They cannot be accessed by the SentVi functions such as View, Search, Reports, Export, etc.

When you save your diagram, the layout is saved with the items but not their details. Details are retrieved from your database when the saved diagram is opened. The added items can be saved to the database, or merely kept as part of the saved diagram data.

To save the diagram to your database, click the [Save] button on the toolbar.

A prompt appears to confirm that saving the diagram also clears the Undo stack. After saving, you cannot undo previous changes.

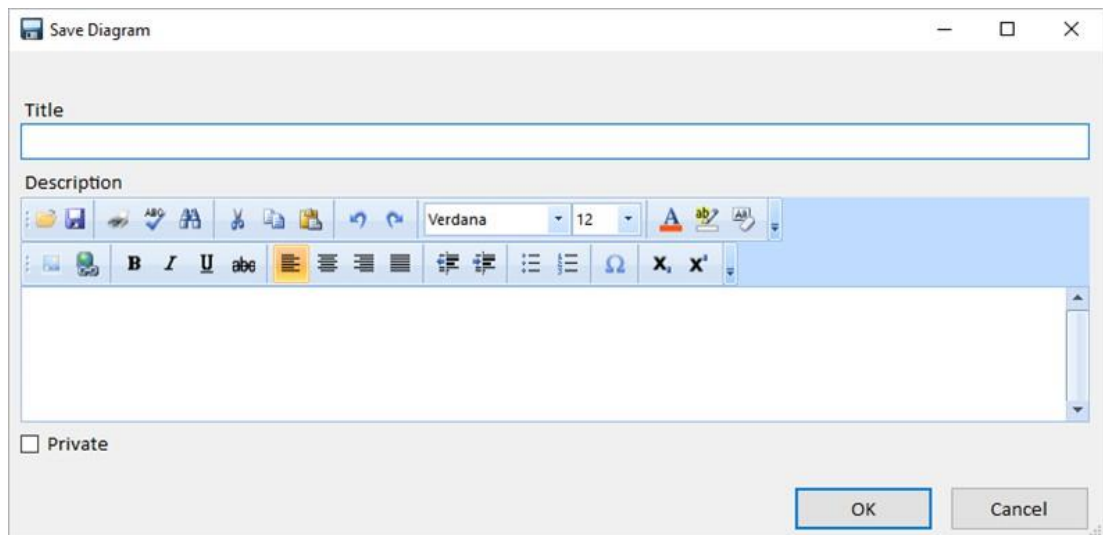


Click [Yes] to continue. The Save Diagram form appears.

If your diagram has no added entities or relationships, the standard Save form appears to type a title and description. 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.

Enter a title and optionally add notes in the Description box which can be rich text. 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.

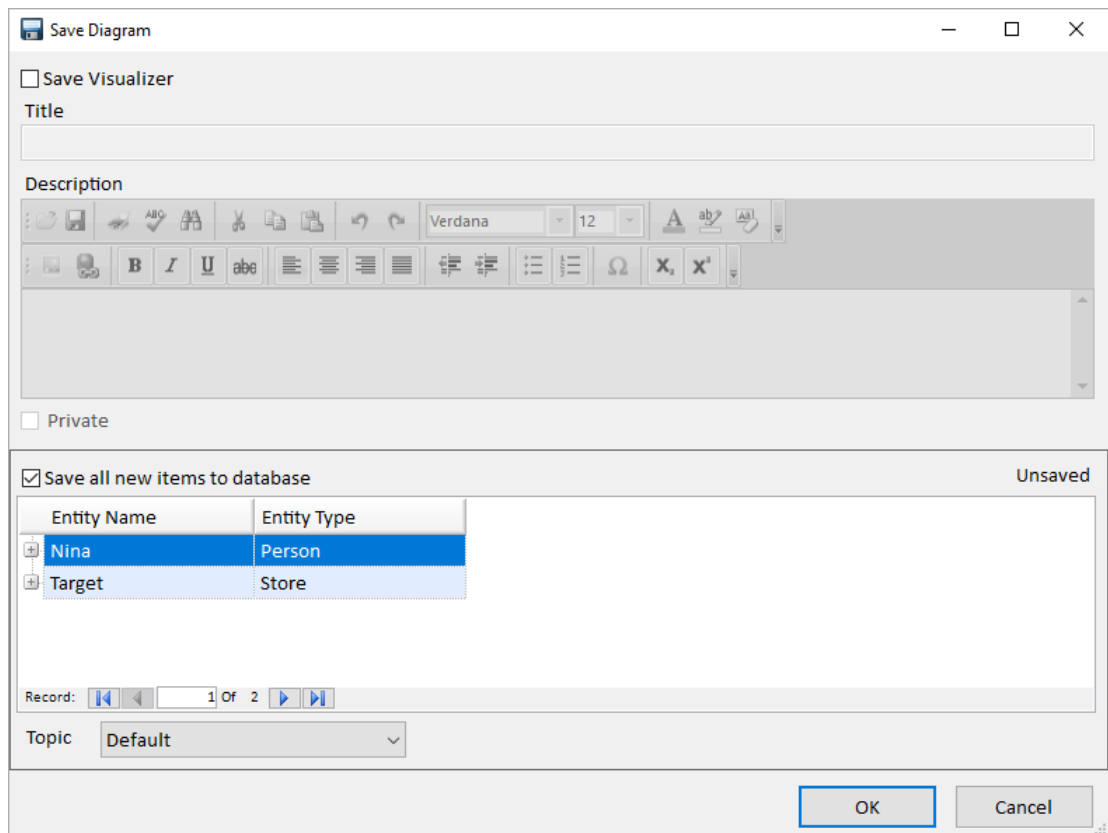
Click the [OK] button save or click [Cancel] to return to Visualizer without saving.



Save Visualizer Diagram when No Items are Added

Saving a Diagram with Added Items

If you added entities or relationships to your diagram, the Save button opens the Save form with an additional section for the items.



Save Diagram Dialog to Save the Visualizer and/or save the new items

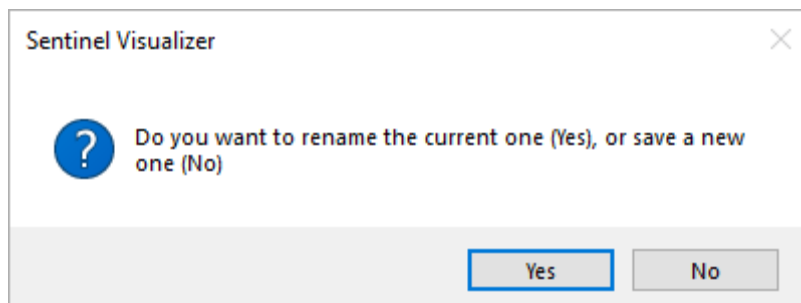
This form can save your diagram like the standard version. It can also save your added entities and relationships to the database as formal entity and relationship records with these options:

- **Save Visualizer:** Check this to save the diagram, which is the collection of entity and relationship locations and styles.
- **Save All New Items to Database:** Your added entity and relationship items are listed. Click this option to add them to the database. Once 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. You can leave this option unchecked and just save the visualizer which would include the new items in their unsaved state.

Save As a New Diagram

If the current diagram was opened from a saved diagram, pressing [Save] shows the current name and text. If you don’t change the name, it replaces the existing saved copy.

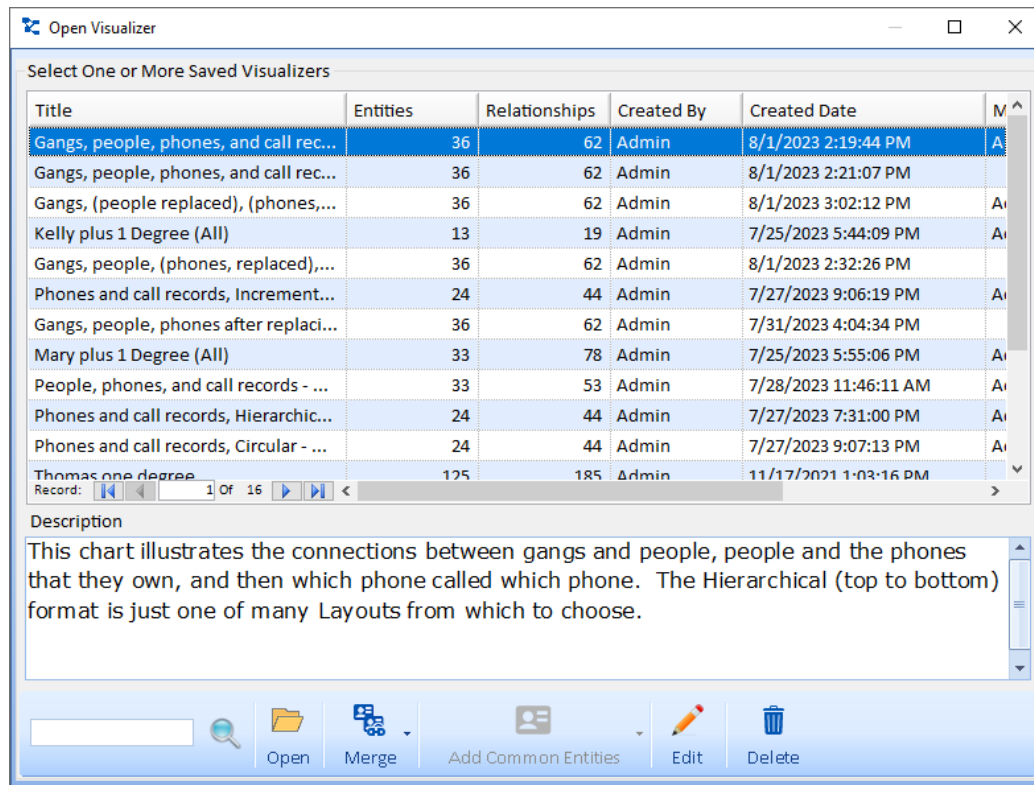
If you change the name, a prompt asks if you want to replace the current diagram (renaming it) by clicking Yes, or saving it under the new name by clicking No.



Rename the Saved Diagram or Save As a New Diagram

Open a Saved Visualizer Diagram

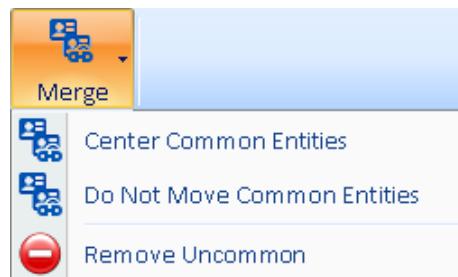
Load a previously saved diagram by clicking the [Open] button on the toolbar. If you have unsaved work in the Visualizer, you are prompted to save your work.



- **Open:** Select an item and click the [Open] button to replace the current diagram.
- **Merge:** Add the selected diagram to the current one, or just keep the common entities.
- **Add Common Entities:** If two or more are selected, add their common entities.
- **Edit:** Edit the title and notes of the selected diagram.
- **Delete:** Delete the selected diagram. You can delete your items—only Administrative users can delete items belonging to others.

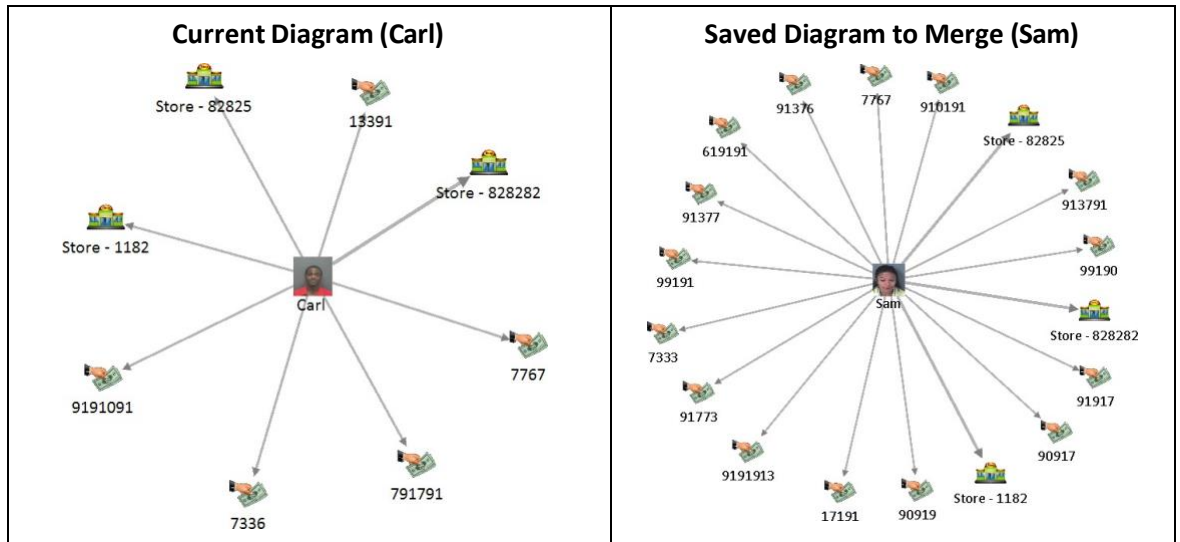
Merge Diagrams

The Merge button offers three options to combine the saved diagram to the current one:



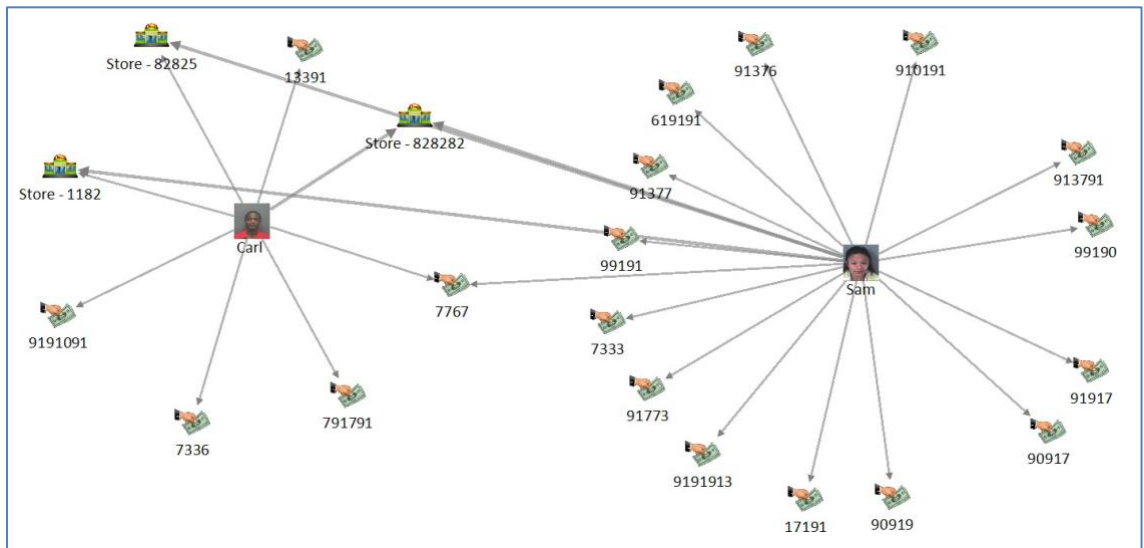
Merge Submenu Options

We can use these examples for the merge options. The current diagram on the left is Carl's network. Sam's Diagram is saved and being merged into Carl's:



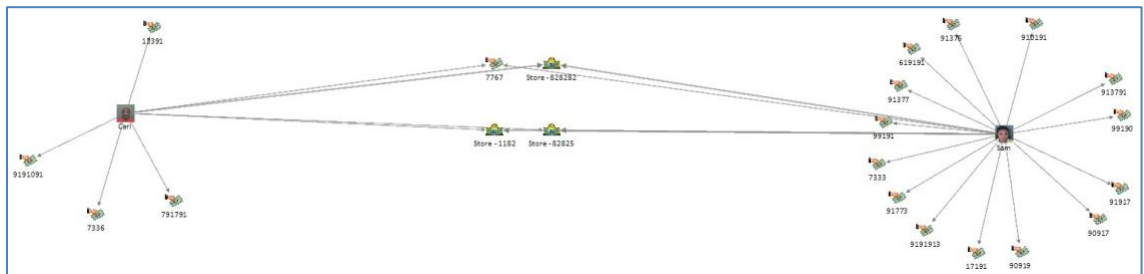
Do not Move Common Entities

The second option is easiest to explain. The selected diagram is added to the right of the original. If there are common entities, the new diagram connects to them without adding them:



Center Common Entities

Usually, one wants to know which entities are in both diagrams. The “Center Common Entities” option highlights this by moving the common entities so they are in the middle:

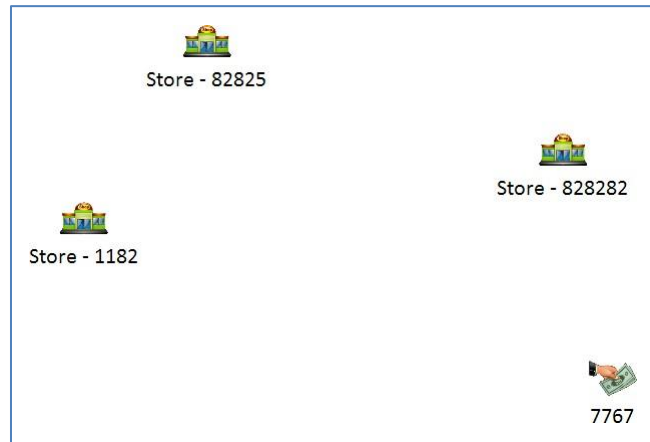


The Four Common Entities are Moved into the Middle

Note that shapes (arrows, circles, labels, etc.) from the saved diagram are not merged into the current diagram.

Remove Uncommon

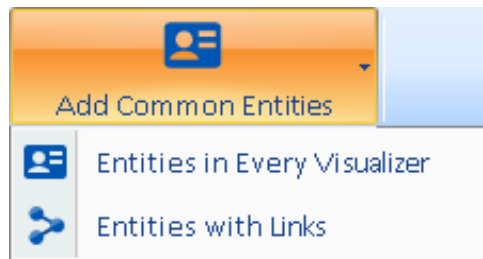
If you are only interested in the entities in common, “Remove Uncommon” deletes all the existing entities not in the selected diagram. You are left with just the common ones.



Just the Four Common Entities Remain

Add Common Entities

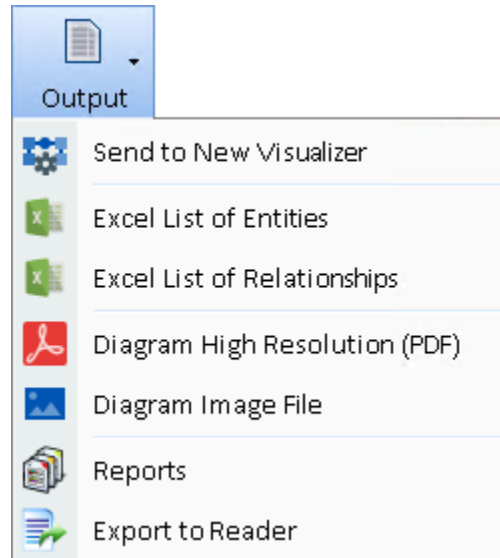
If two or more saved Visualizers are selected, the Add Common Entities button is enabled.



- “Entities in Every Visualizer” finds the common entities and adds them to your diagram.
- “Entities with Links” adds those common entities plus any relationships among them.

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.



Send to New Visualizer

The Send to New Visualizer feature creates a new Visualizer window with the items in the current view that are not filtered out. This opens a new Visualizer window while leaving your current Visualizer window 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

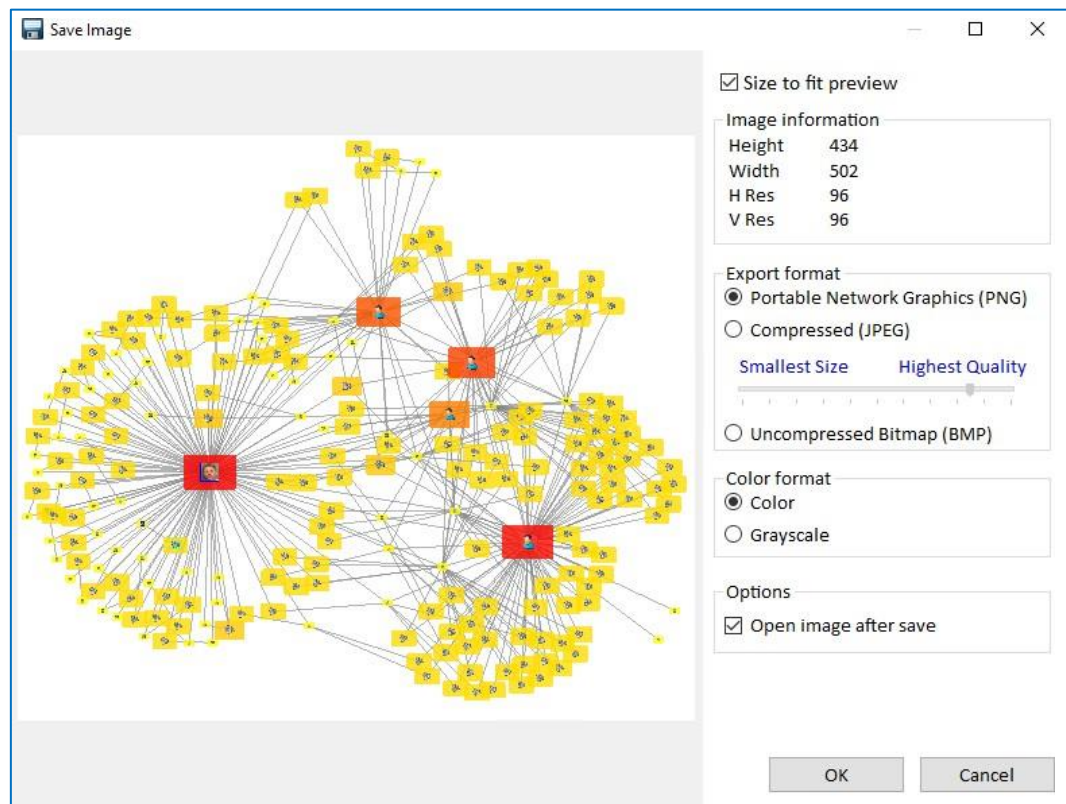
Create an Excel file with the list of relationships in the diagram. The list includes the pair of entities, the relationship type, and many other details of each relationship.

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, SentVi 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 11: Reports** on page 105.

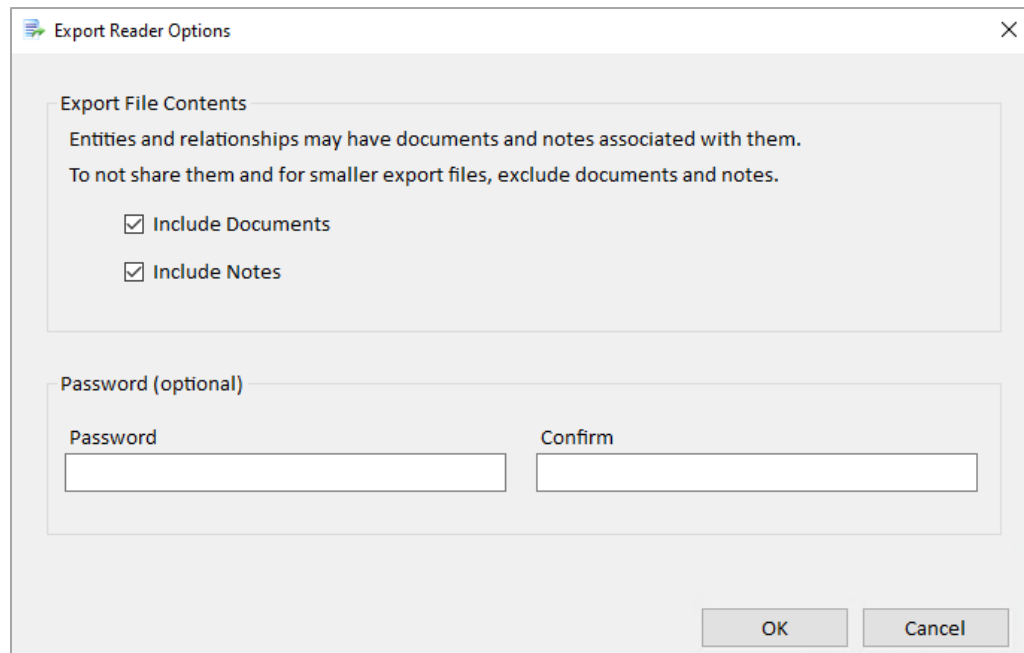
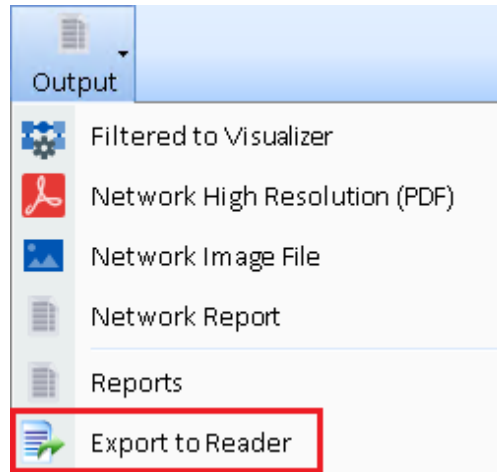
Export to Reader

Save the diagram to an external SVX file to share your link analysis chart with non-licensed users running the free SentVi Reader. Users with a SentVi license can also view the Reader diagrams. See next section for details.

Export to Reader

SentVi licensed users can share diagrams with non-licensed users running the free SentVi Reader. This is done by creating and distributing an SVX file that contains your link analysis charts, timeline and map.

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



Export Reader Options

Choose what content the SVX file should or should not contain.

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

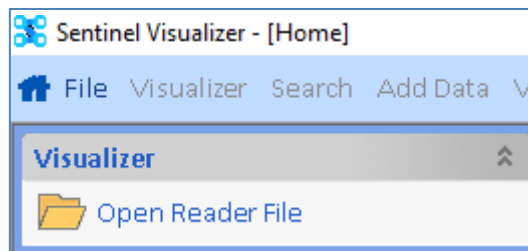
A password can be added to the SVX file for added security. Click [OK] and name the SVX file (make note of the path/folder).

Open a Reader SVX File

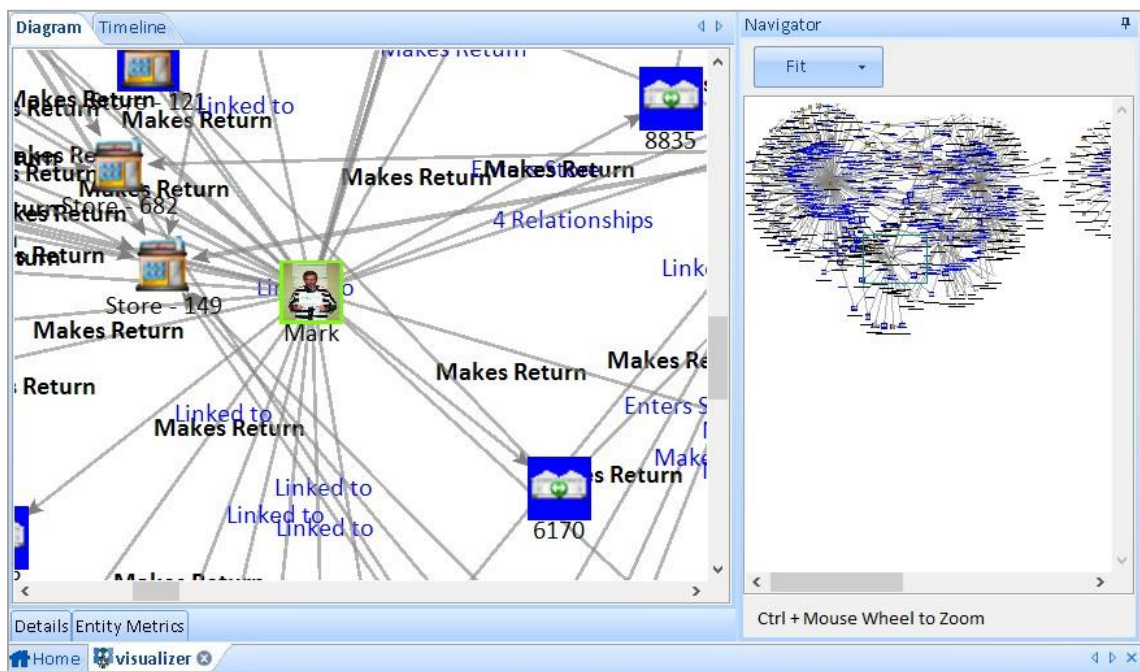
Download and install the free SentVi Reader to view the diagram and the data behind the diagram including metadata, notes, topics, documents, and information on the Brief tab, but they cannot modify the data.

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

Once SentVi Reader is installed the user can open an SVX file. Launch SentVi Reader and click [Open Reader File].



Select the SVX file to open the Visualizer window displaying the diagram. The Reader user can move objects, navigate, and open details for any of the items.



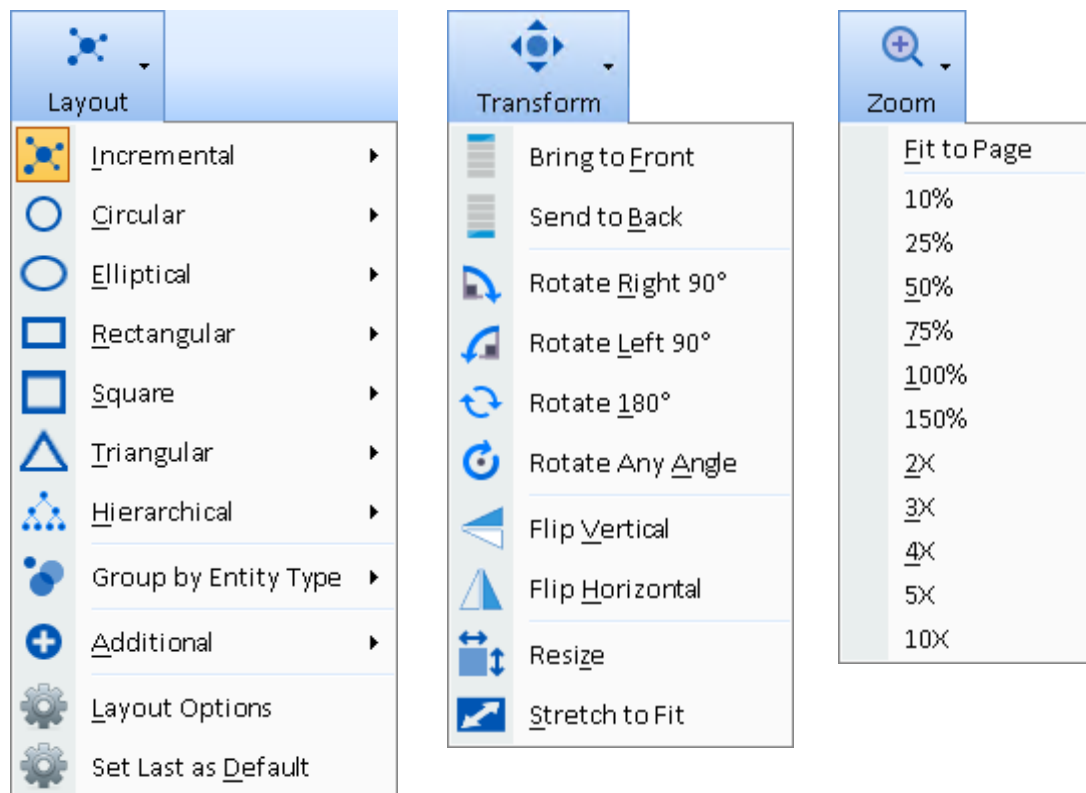
Visualizer in Reader with Limited Options

Chapter 13: Visualizer Layouts, Transform and Zoom

SentVi'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, Transform and Zoom Toolbar Buttons

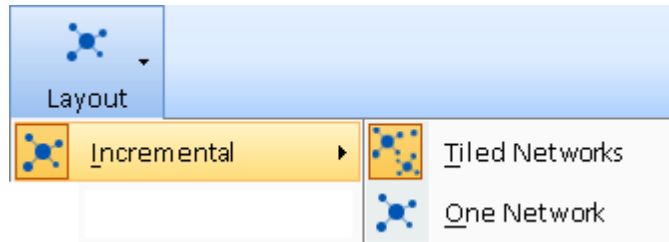
This chapter covers these three toolbar buttons that adjust the position of the entities:



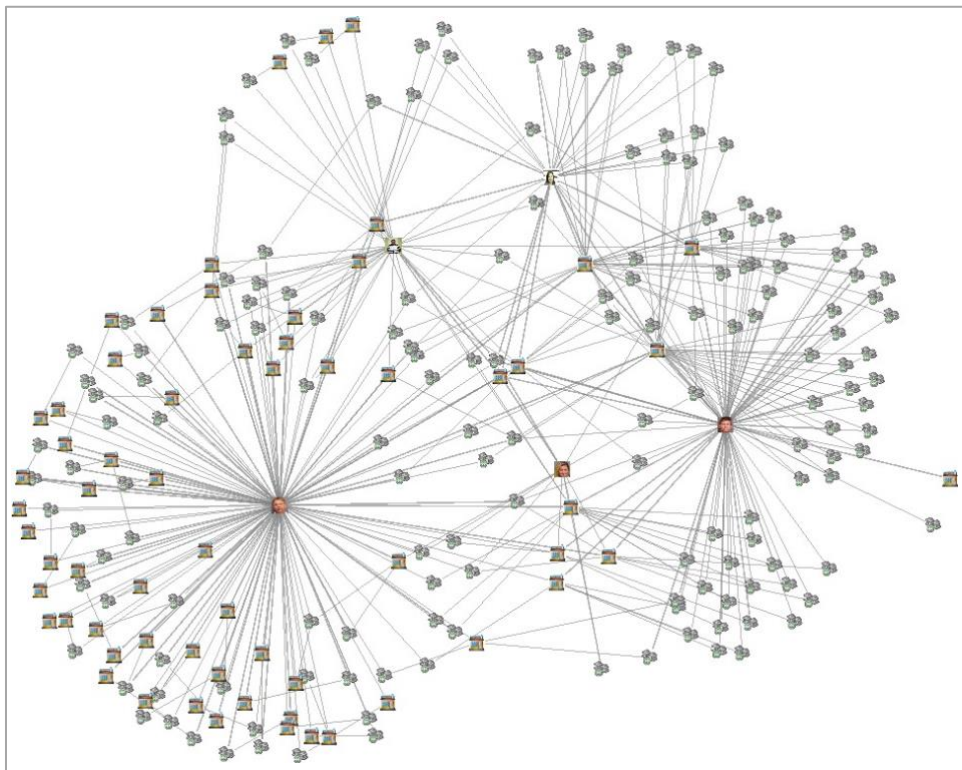
- **Layout** automatically repositions the entities into different shapes.
- **Transform** adjusts the Z-Order of individual entities, and changes the entire diagram by rotating, flipping, resizing, and stretching.
- **Zoom** changes the zoom level which can also be performed with the Ctrl Scroll button.

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.



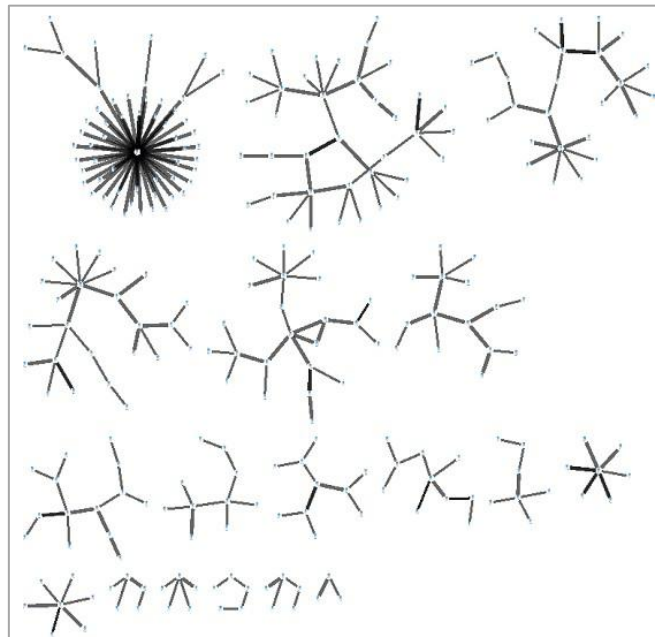
The Incremental layout uses a random initialization, so the results vary each time. Run it multiple times and use Undo/Redo to switch between them. If you like the results, but not the rotation, use the Transform feature to adjust it.

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.

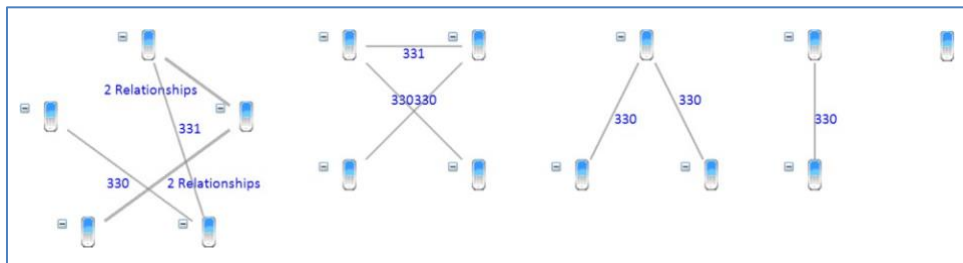
Incremental layouts can tile each network separately or put them all in one block.

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.

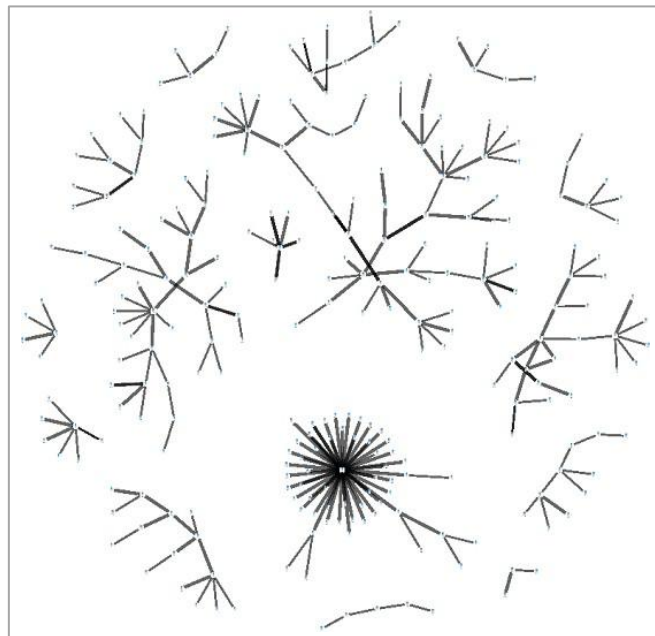


For small networks of 5 or fewer entities, standard layouts are used for consistency:



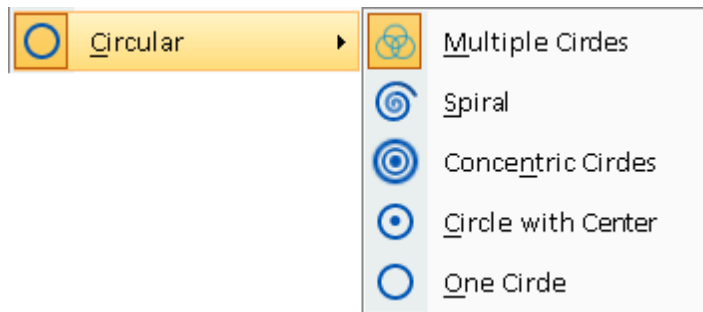
One Network

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



Circular Layout

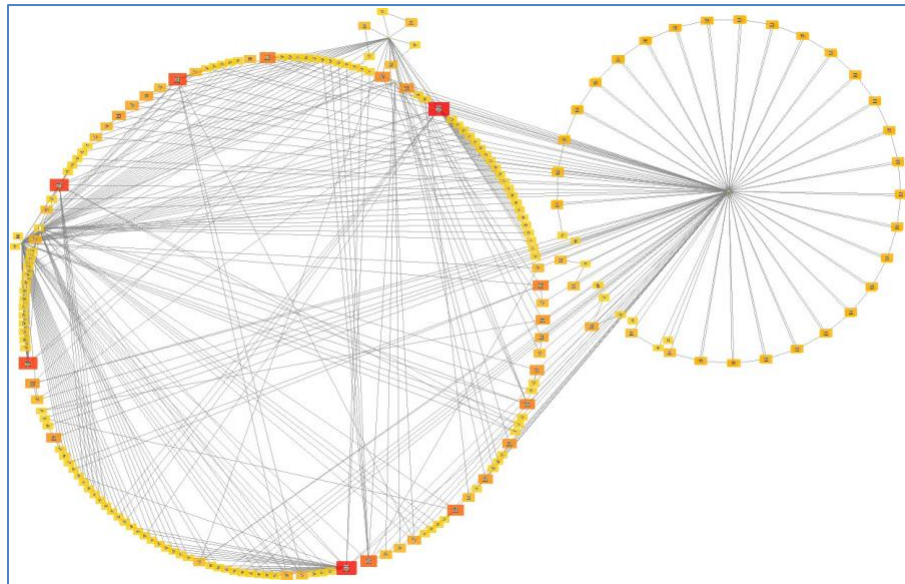
The circular layout option organizes entities and relationships in a circular pattern.



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.

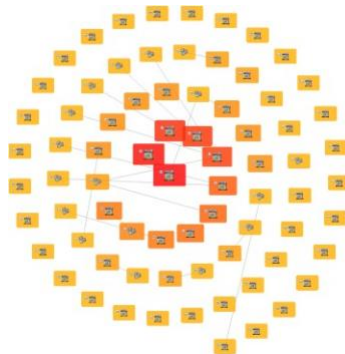
Multiple Circles

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



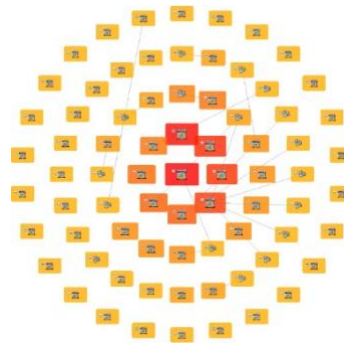
Circular Spiral

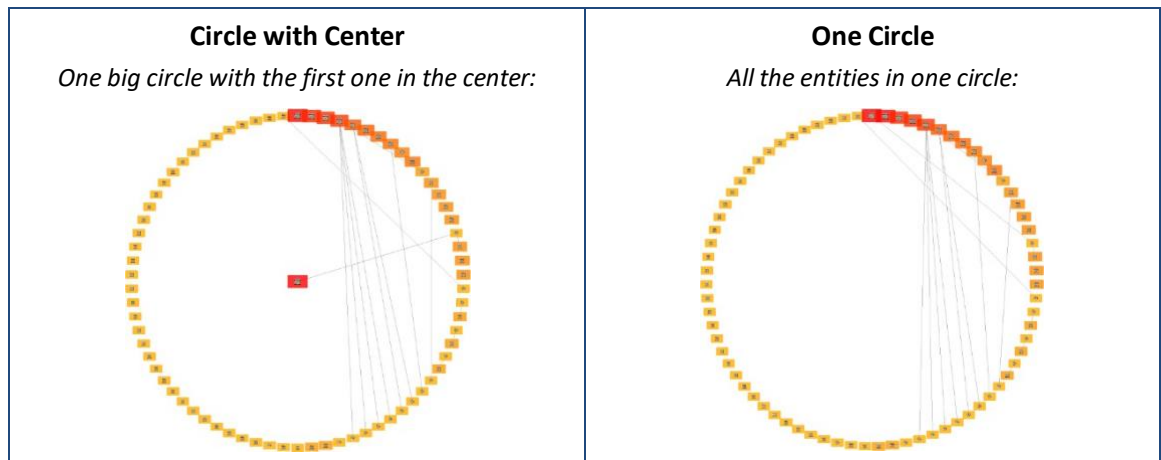
Entities are sorted from the center and grow out in a spiral (with gradient on Lines Out):



Circular Concentric

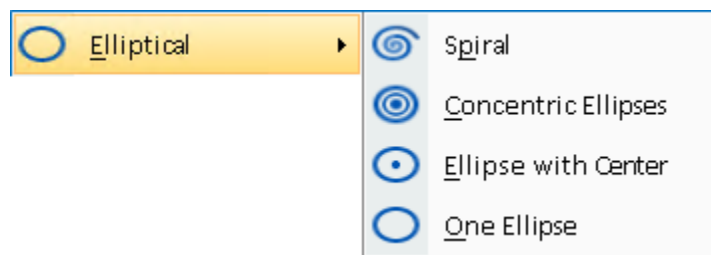
Entities are placed in larger circles from the center out:



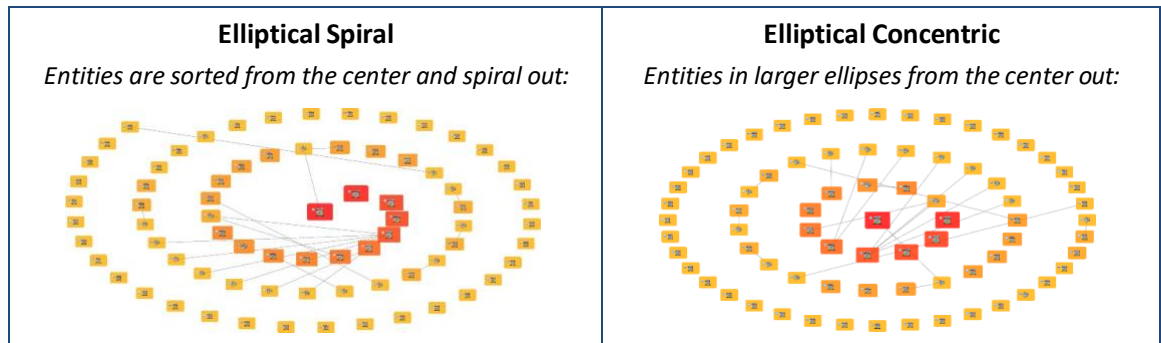


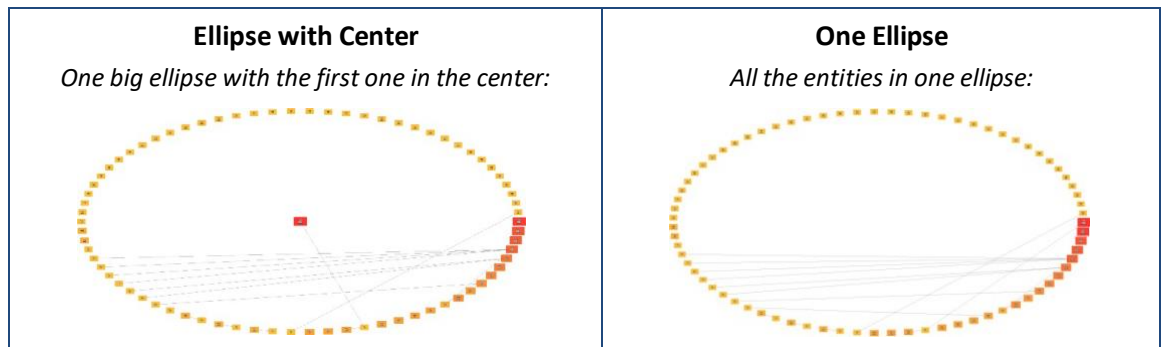
Elliptical Layout

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 uses more space, so it has more entities in one orbit than a circular layout.



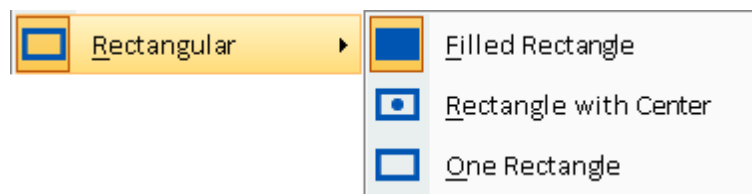
Shown with angle starting at 90 degrees (far right) as defined under Layout Options.



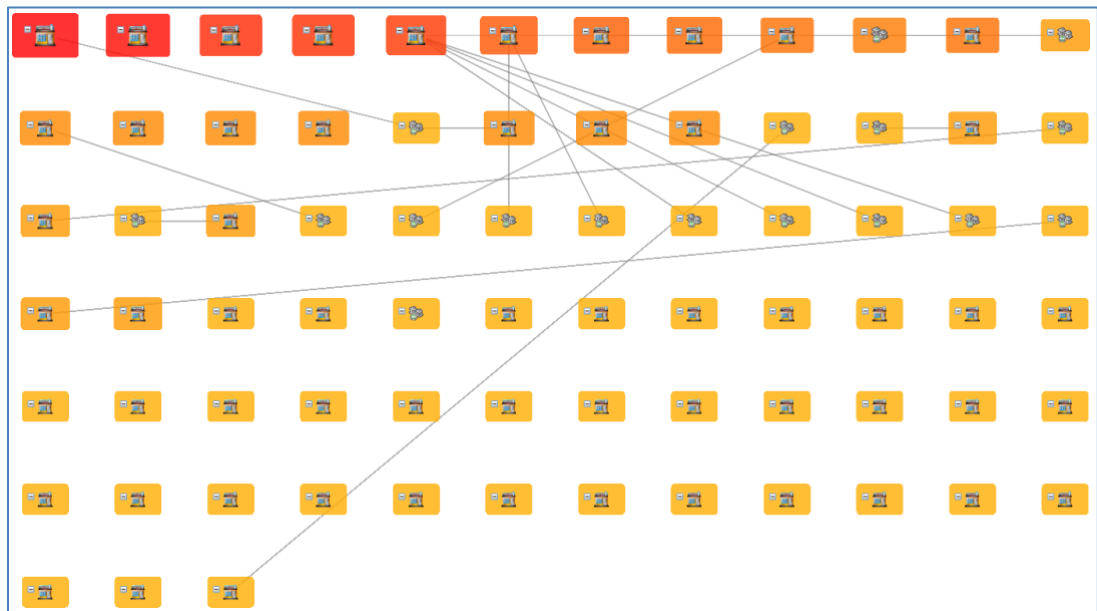


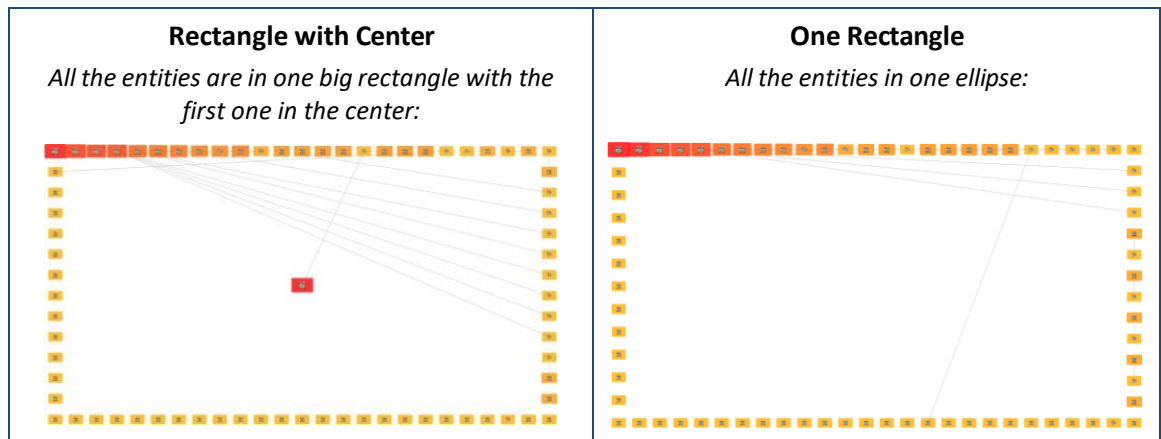
Rectangular Layout

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



Filled Rectangle





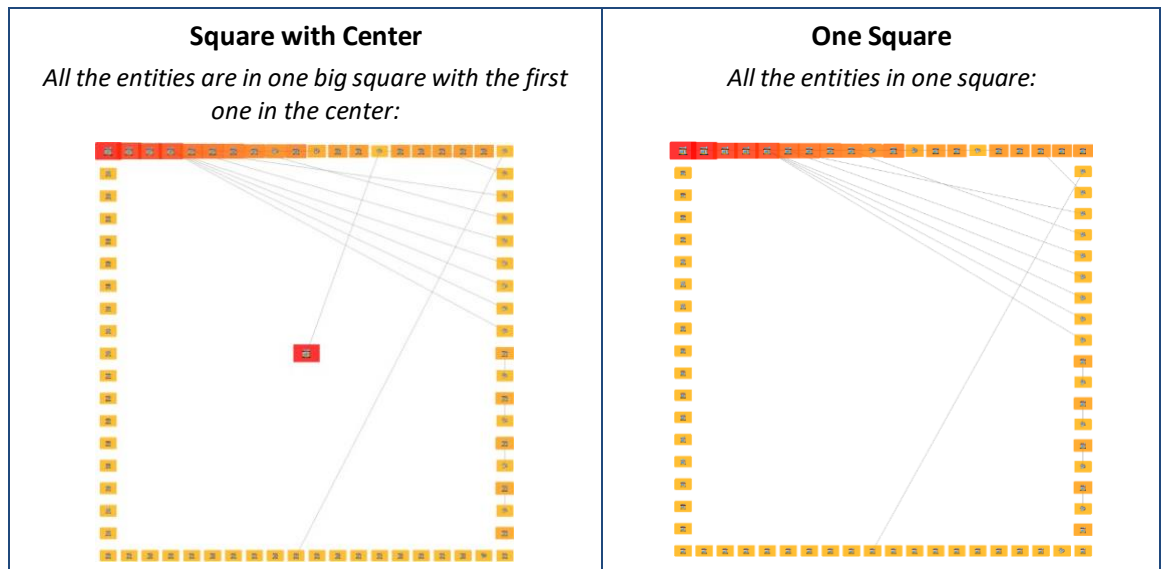
Square Layout

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.



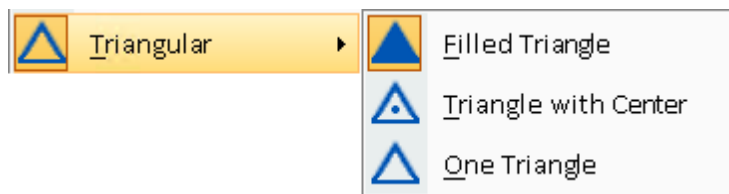
Filled Square





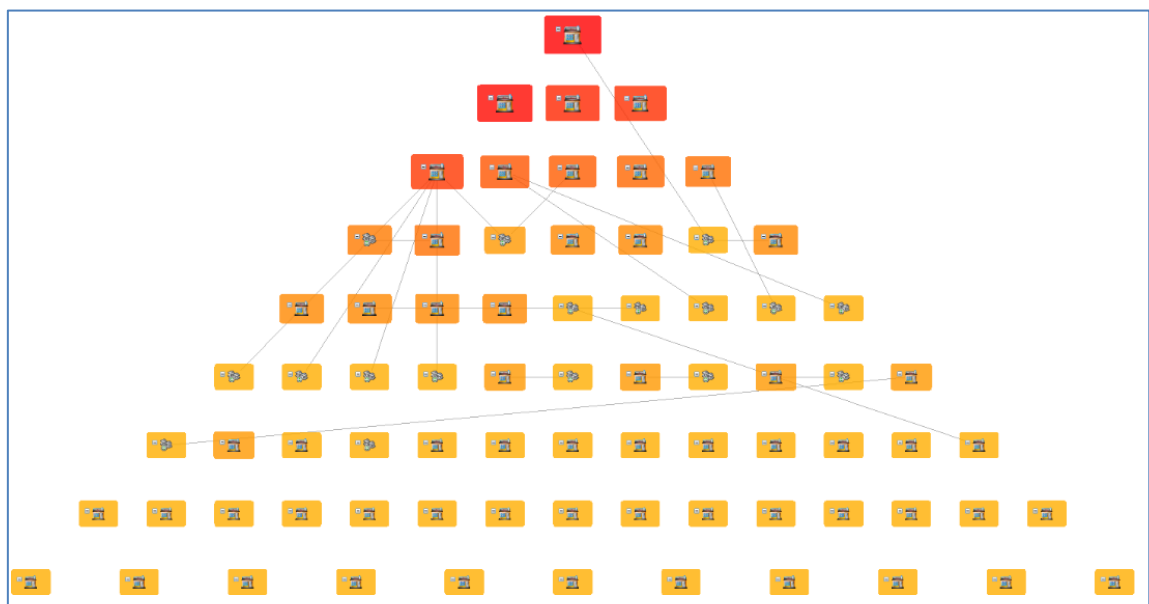
Triangular Layout

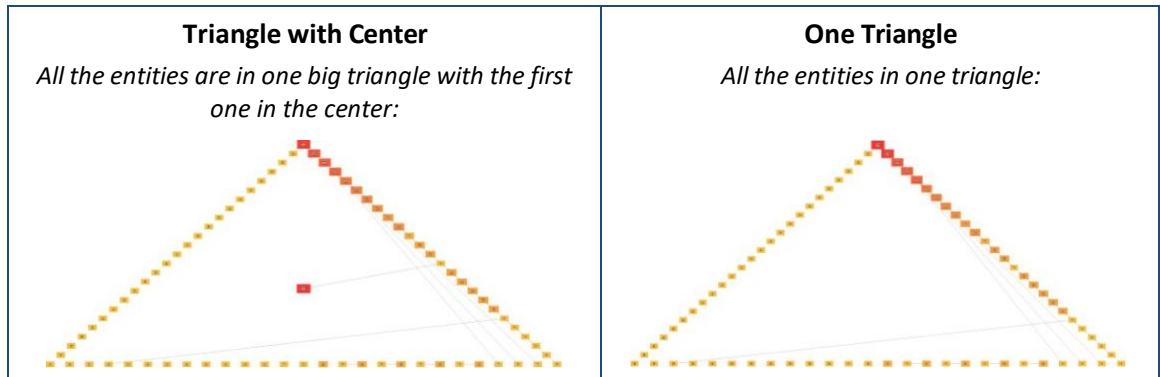
The Triangular layout organizes the entities in a triangle that fills the Visualizer window.



Filled Triangle

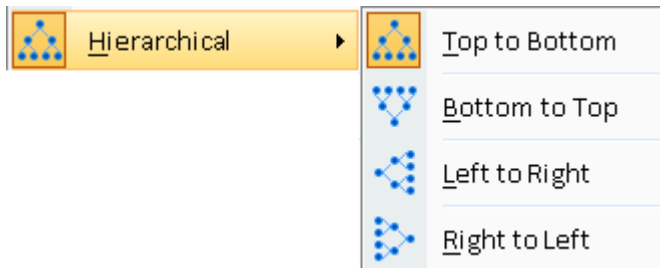
Each row has more entities. The bottom row distributes the remaining entities evenly:



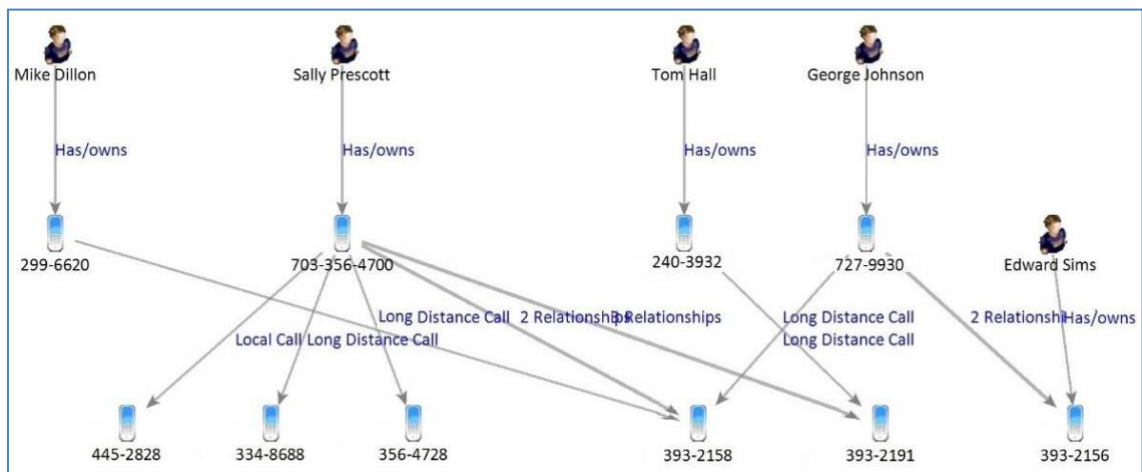


Hierarchical Layout

The Hierarchical layout option arranges entities in a hierarchy. As explained in **Chapter 7: Relationships** on page 71, all SentVi 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.

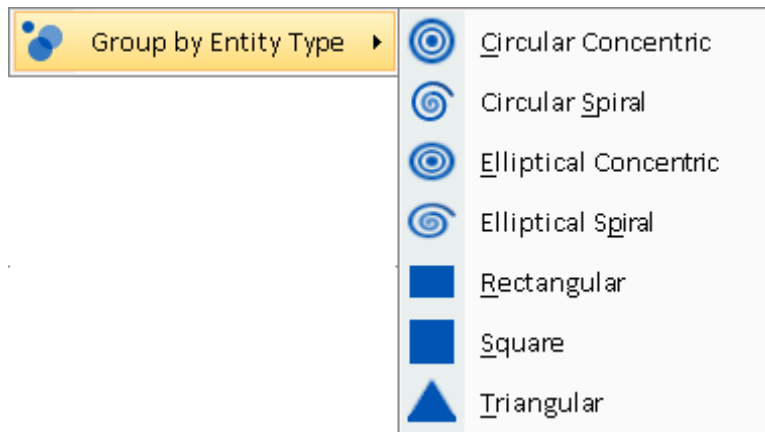


For example, if you select only organizational type relationships, you can see the hierarchy layout of the entities.

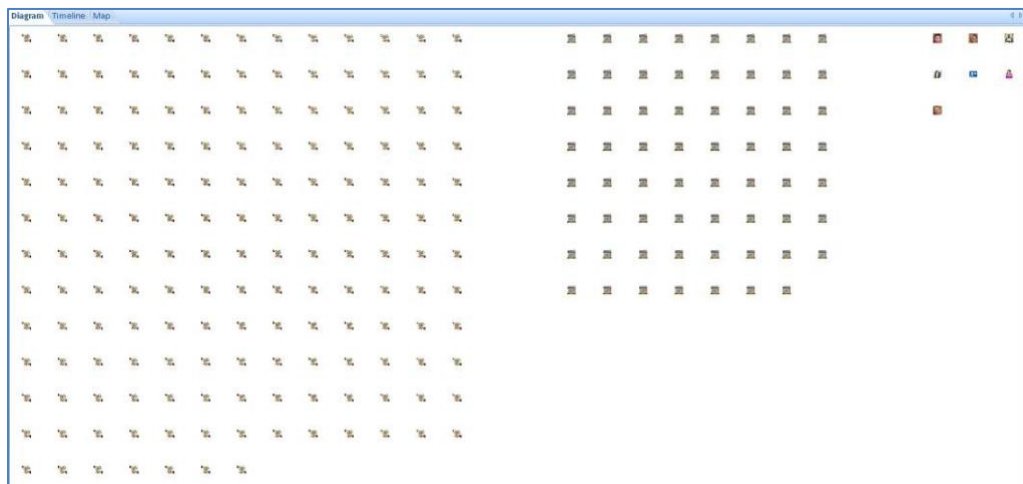


Group by Entity Type

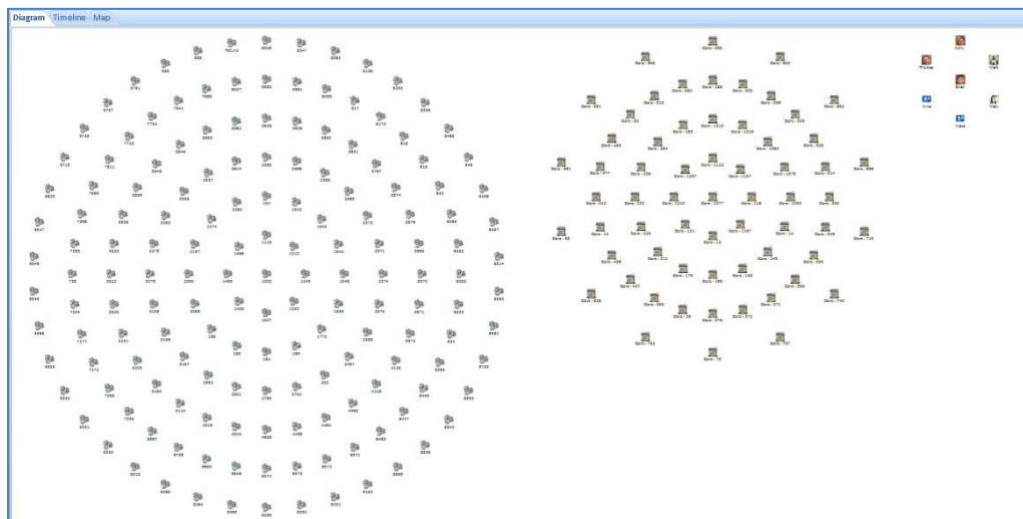
Easily organize and see all the entities by entity type using the Group by Entity Type layout.



Each entity type is treated as a separate network arranged from largest to smallest number of entities. Within each entity type, they are sorted by name.



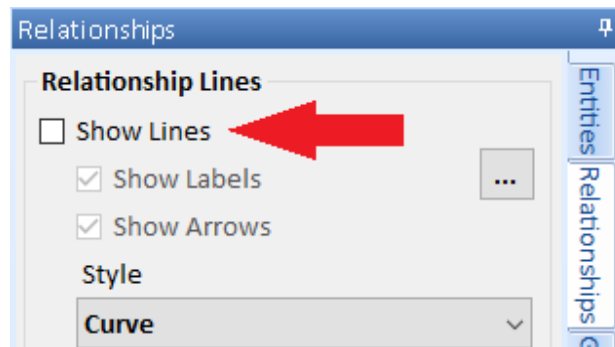
Layout by Entity Type in Squares



Layout by Entity Type in Concentric Circles

Hide Relationship Lines

If your diagram has relationships, there may be lots of lines between your entities obscuring the layouts. From the right Relationship panel, turn off relationship lines.



Turn off Show Lines from the Relationships panel

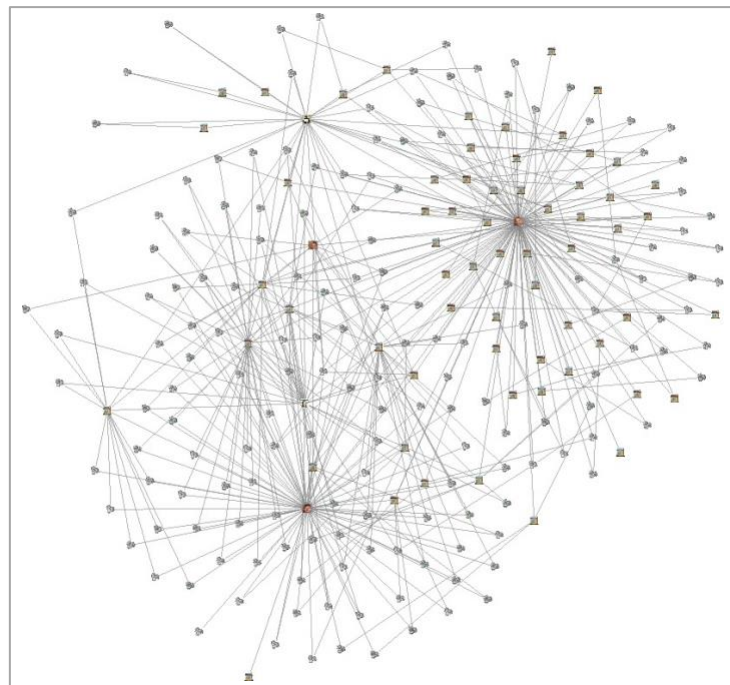
Grouping by entity type makes it easy to see all your entities by type. You can easily select the ones you don't want and remove them or select the ones you want and send them to a New Visualizer under Output.

Additional Layouts



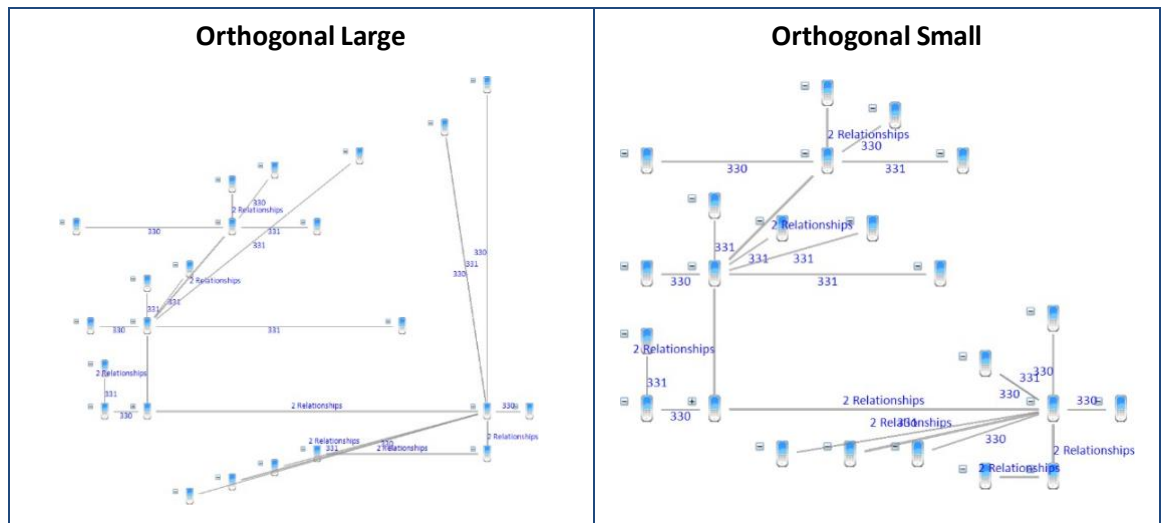
Force Directed

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



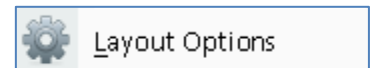
Orthogonal Layout

The Orthogonal layout uses 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.



Layout Options

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



⚙️ Layout Options
✕

Multiple Network Displays

A network is a set of connected entities. For the shape layout options, if there is more than one network:

Tile Each Network Separately

All Networks in One Layout

Sort Entities

For Shape layouts

Descending

Distributed

Ascending

Circular Sort Start

For circular and elliptical shapes

Start at: degrees

0° 90°
 180°

Performance

	Speed	Quality	Maximum processing time	
Incremental	<input type="range"/>	<input type="range"/>	<input type="text" value="10"/> seconds	Seconds <input checked="" type="radio"/> Per 1000 Entities <input type="radio"/> Fixed
Force Directed	<input type="range"/>	<input type="range"/>	<input type="text" value="10"/> seconds	

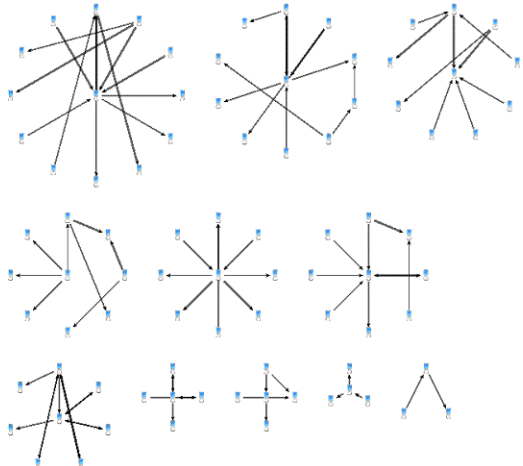
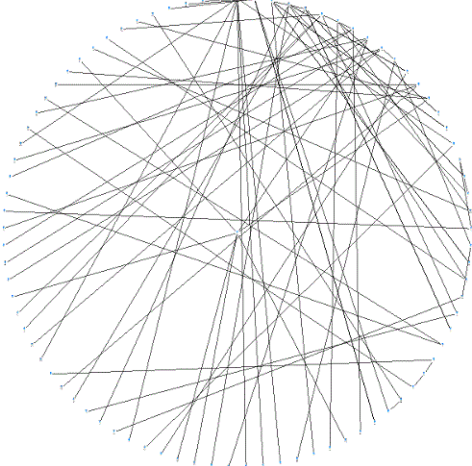
Zoom After Get Links

Fit to Page

No Zoom

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 <i>Each of the networks is displayed in its own Circle with Center</i>	All Networks in One Circle Layout <i>All the entities from all the networks are arranged in one Circle with Center</i>
	

Geometric Shape Options

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

Sort Entities

Entities are sorted in 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.

Maximum Processing Time

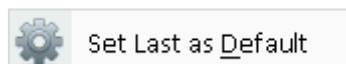
Limit the maximum time the Incremental layout algorithm uses. Note this is just the layout processing time and does not include the time to load the data.

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

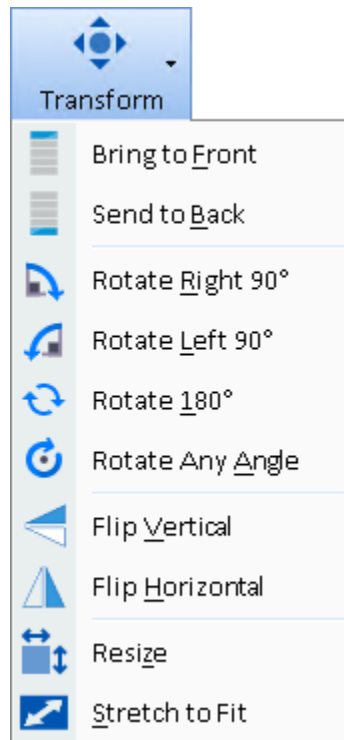


By default, when you launch All to Visualizer from the menu, it displays the entities with the Incremental, Tiled Networks layout. You can change this by selecting the layout you prefer and selecting Set Last as Default.

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.



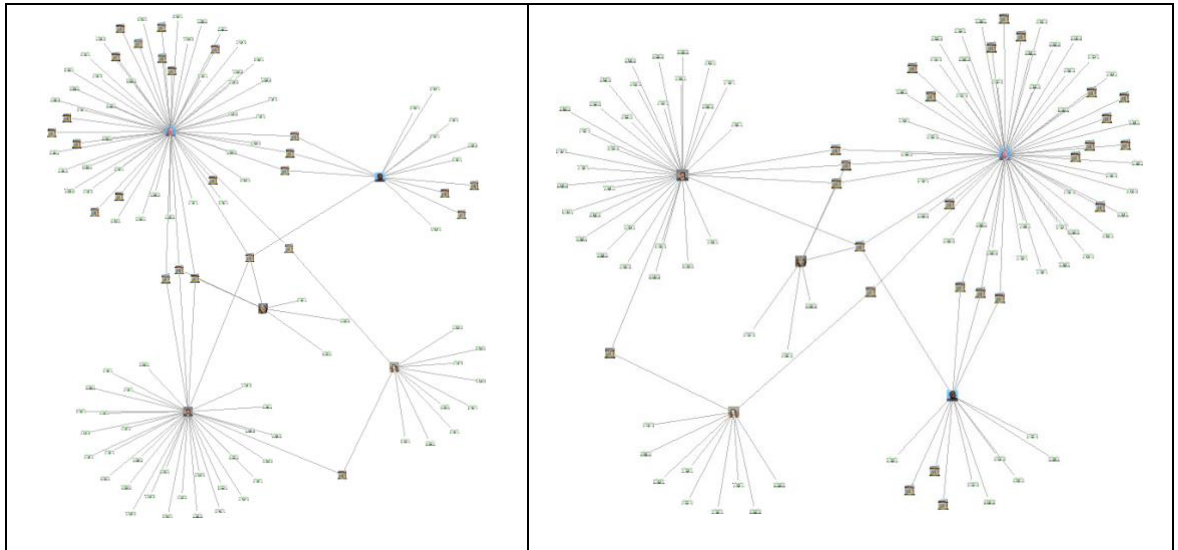
Z-Order

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.

Original Diagram	Diagram rotated 90°
------------------	---------------------

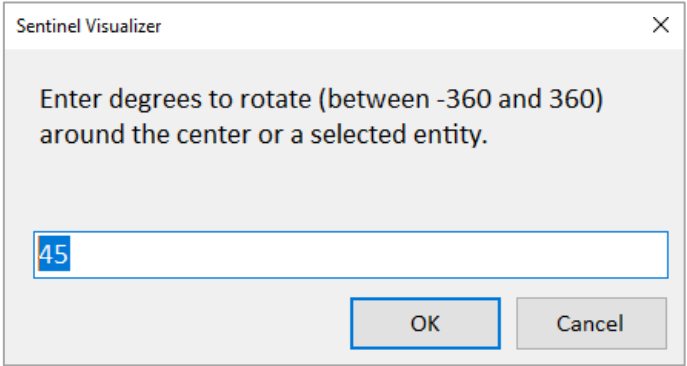


When entities are moved, their image and labels remain horizontal in the new location. Similarly, if a text shape is rotated, the center is relocated, and the text remains horizontal.

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

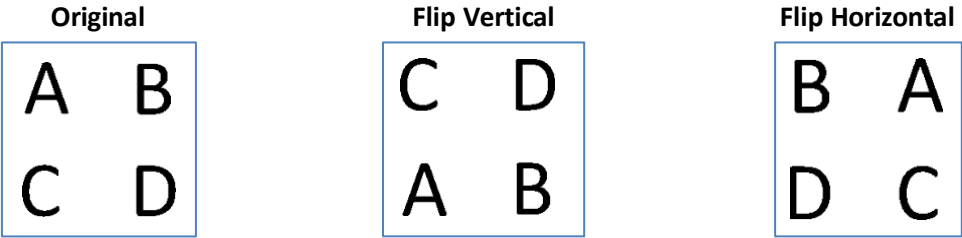
Rotate Any Angle

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.



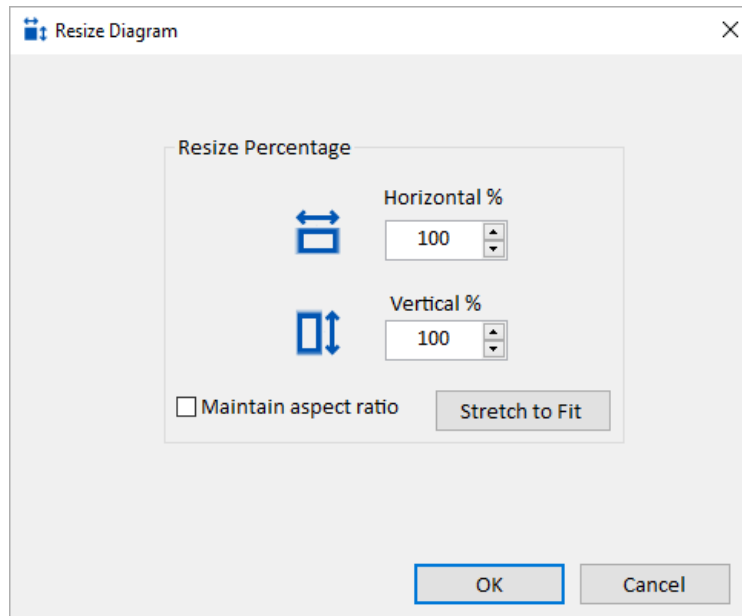
Flip Vertical and Horizontal

You can also flip the diagram vertically and horizontally. Flip Vertical swaps the top and bottom. Flip Horizontal swaps left and right.



Resize

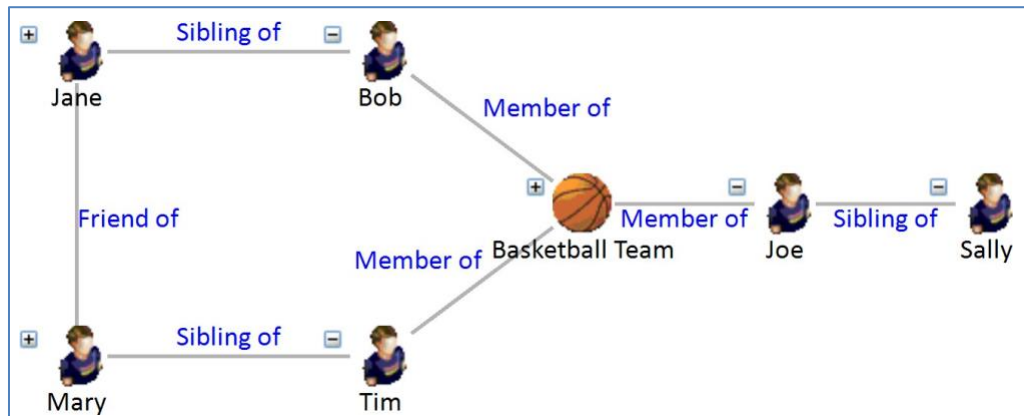
For Resize, set the % to increase the horizontal and vertical dimensions of your diagram. A value more than 100 stretches the dimension while a value before 100 shrinks it.



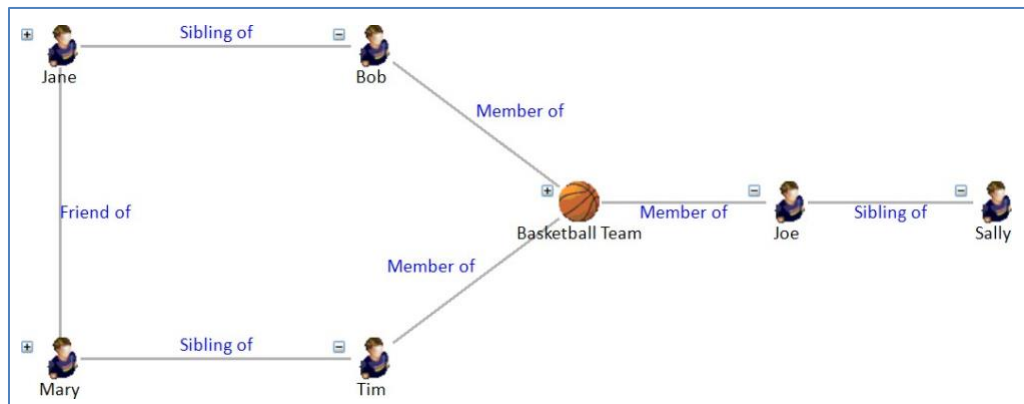
Click the [Maintain aspect ratio] checkbox to keep horizontal and vertical the same.

Stretch to Fit

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.

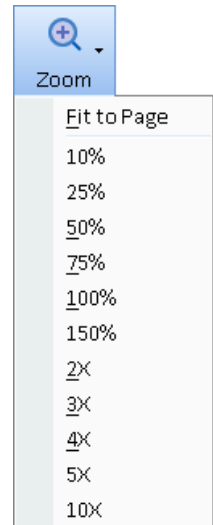


The resized diagram gives a better layout.

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 [Ctrl] key, and using the mouse scroll wheel to zoom in and out.

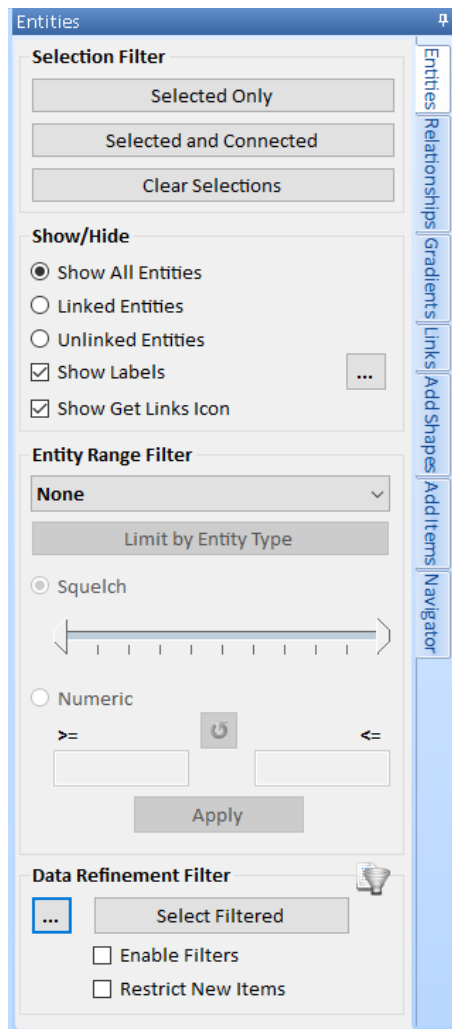


Chapter 14: Visualizer Tool Panels

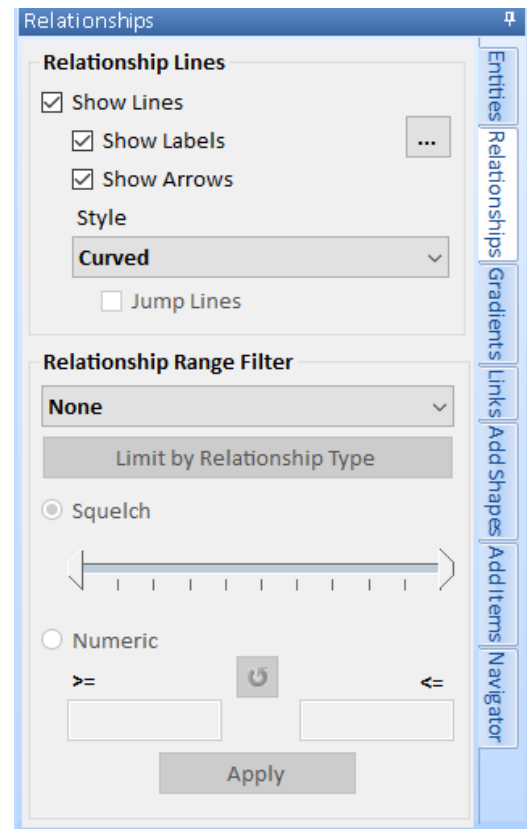
The panels on the right side of the Visualizer let you customize your diagram. Filter entities, relationships, color and resize them, show paths, select individual networks and cliques, add new items, add shapes, and navigate your diagram mover efficiently.

Tool Panels

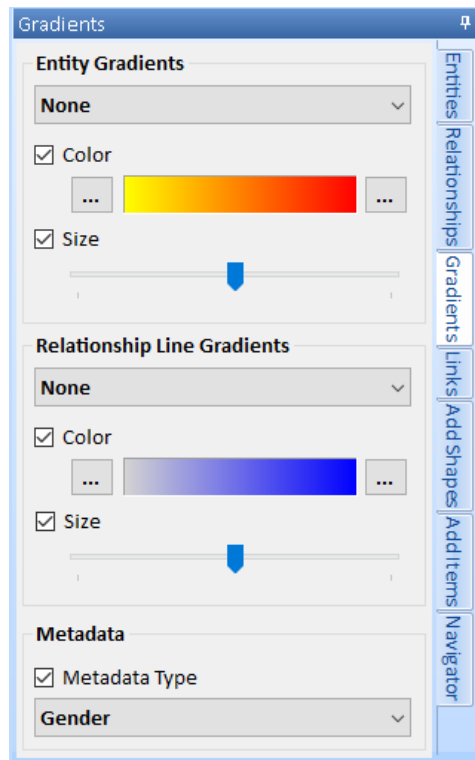
There are seven panels on the right side of the Visualizer. The whole section can be minimized to provide more room for the Diagram. They can also be dragged to another monitor.



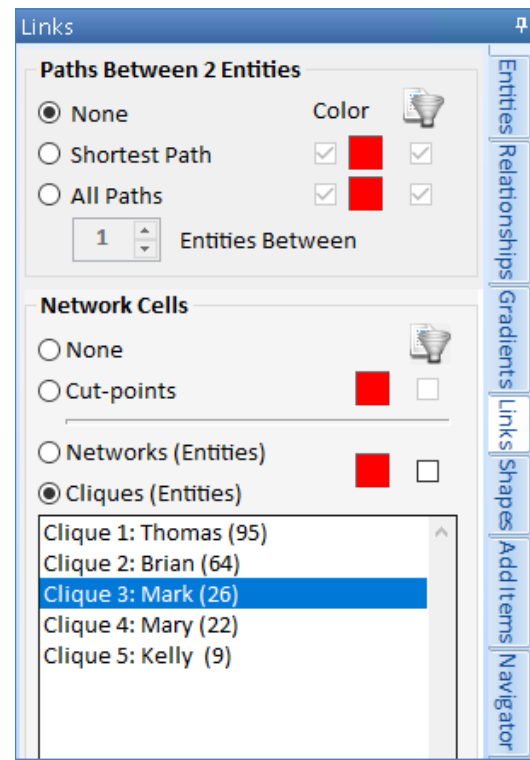
Entities Panel



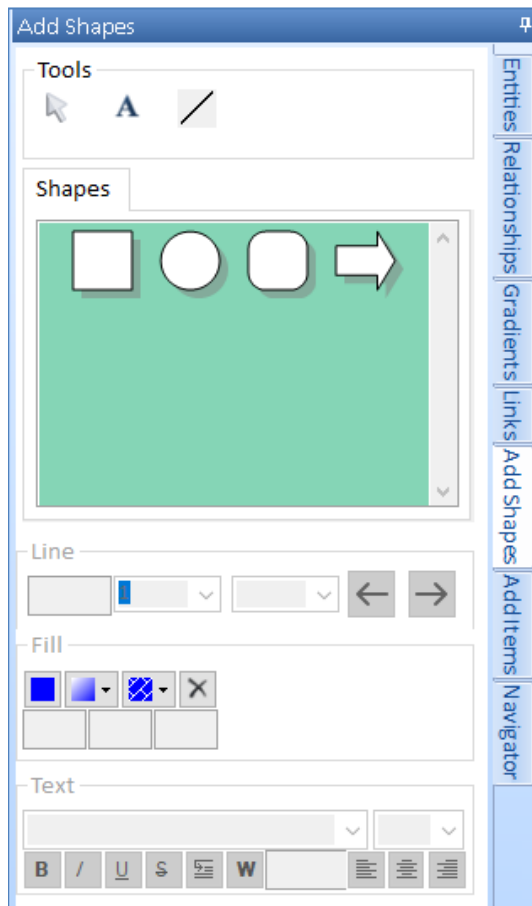
Relationships Panel



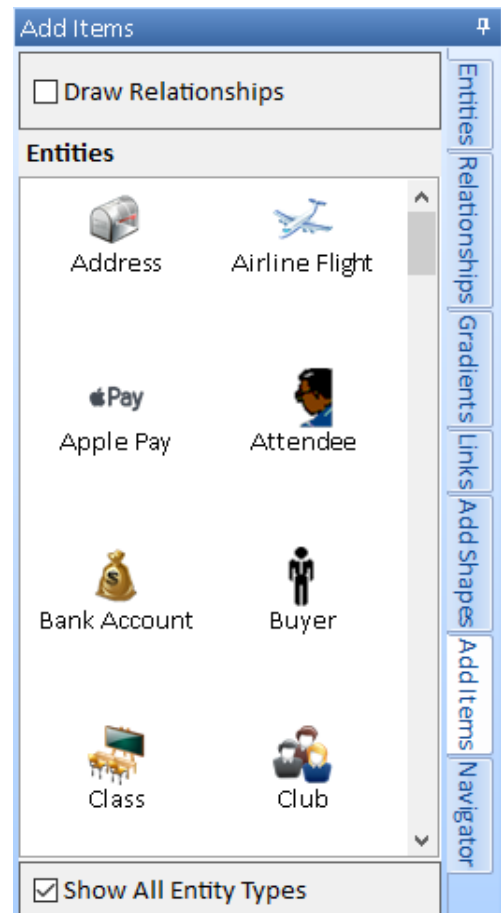
Gradients Panel



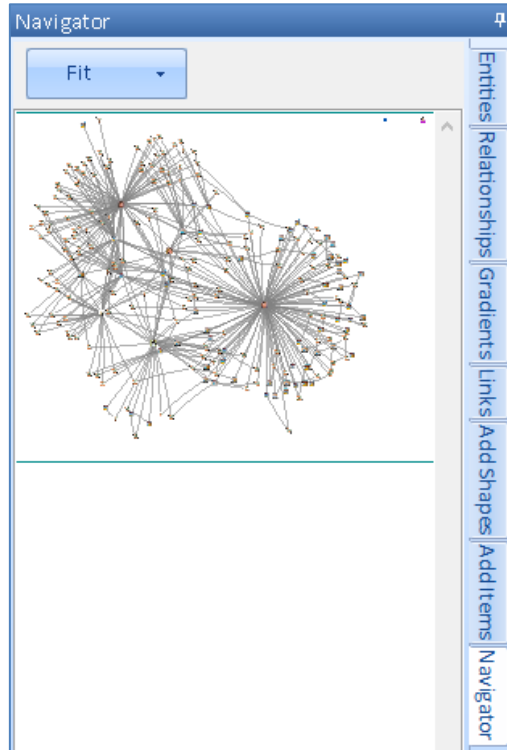
Links Panel



Add Shapes Panel



Add Items Panel



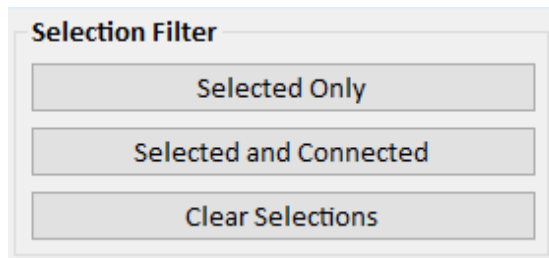
Navigator Panel

Entities Panel

As you add more entities and relationships to your diagram, visual clutter makes it difficult to see patterns or important items and clusters. Visualizer offers declutter features to address this problem. Select the Entities tab to see the 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. If a relationship is selected, the two entities in the relationship are considered selected.

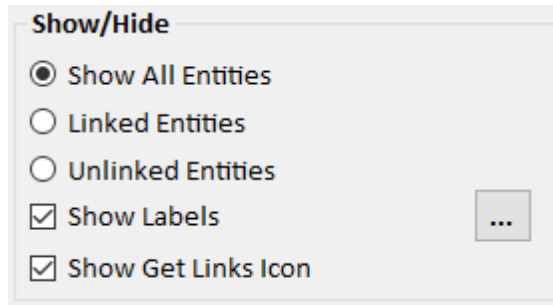


Selection Filter Buttons

- Click [Selected Only] to reduce your diagram to just the selected items.
- Click [Selected and Connected] to filter to the selected and their connected entities.
- If a Selected button was clicked, [Clear Selections] is enabled to unselect them.

Show/Hide

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



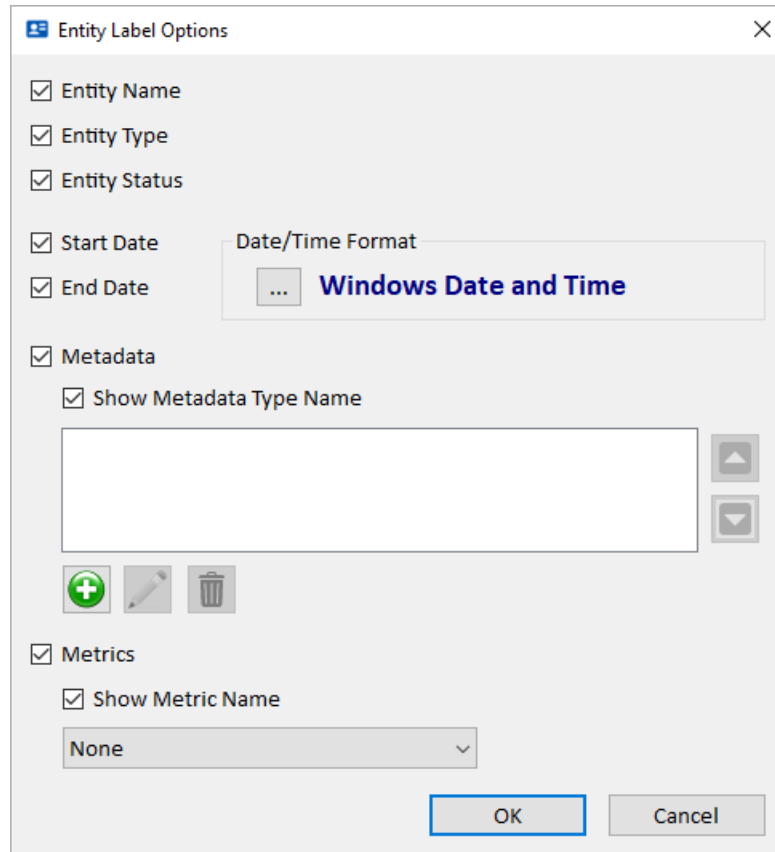
Show/Hide Options

- [Show Labels] toggles the text under each entity on and off. The default is entity name, with other options under [...].
- You can toggle the Get Links icon which indicates whether the entity has additional related entities.

If the diagram is large with lots of entities, the labels and get links icons are automatically hidden at smaller zoom levels.

Entity Label Options

Click the [...] next to the Show Labels checkbox to set the entity labels.



Entity Label Options

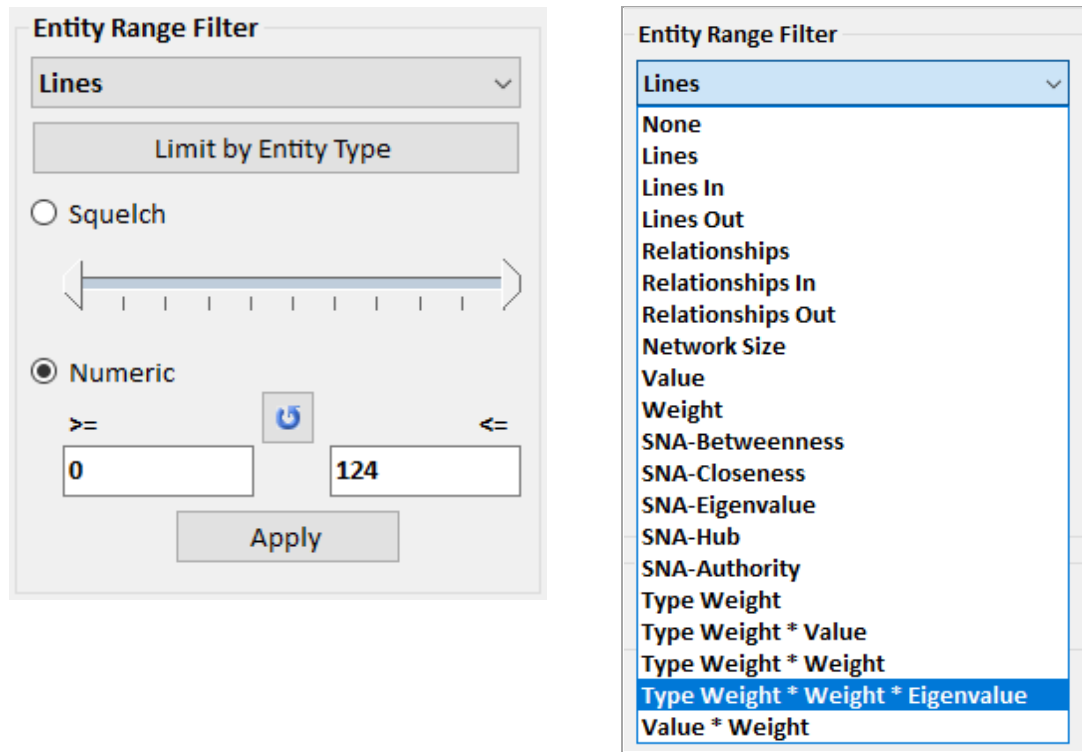
By default, only the Entity Name is selected. Choose the other values such as Entity Type and Status. For the Start and End Dates, you can set the Date/Time format.

Metadata values are selected by choosing the metadata type(s) to display with the option to show its name. Similarly, network metrics are shown with or without the metric name.

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.

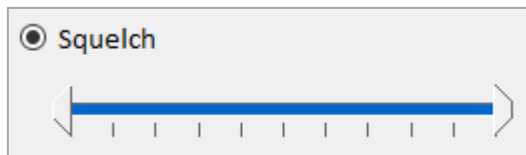
Select the data type, then specify the numeric range either with the squelch range or specific numbers. You can limit the criteria to specific entity types, so they do not apply to other entity types under [Limit by Entity Type].



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 15: Entity Metrics with Social Network Analysis \(SNA\)](#) on page 189.

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.

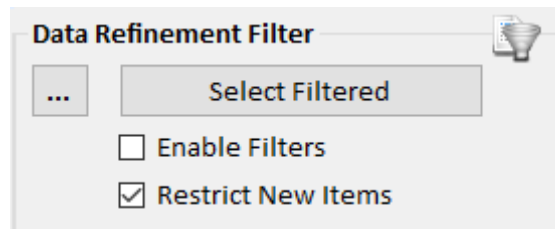


If you do not know the values, press the  refresh button to fill the boxes with your current entities' lowest and highest values.

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.



Click [...] to open the filter form and make your choices. Afterwards, these options are available:

- **Select Filtered:** Select the items on the diagram that pass the filter. By default, selected items have a green outline, and their linked entities have a blue background.
- **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

The Relationships Panel customizes if and how relationship lines appear.

Relationship Lines

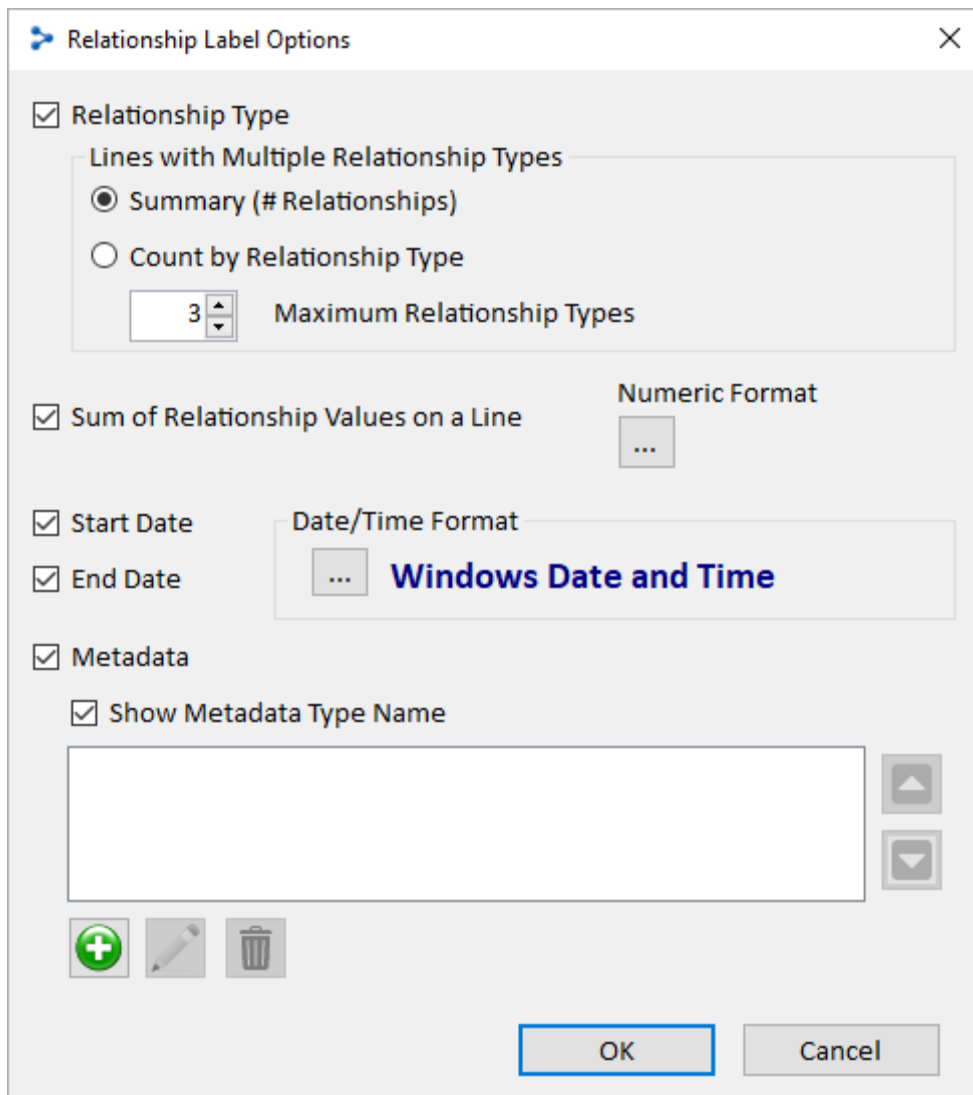
Customize the relationship lines and labels. The [Show Lines] checkbox controls whether relationship lines are visible. If it is checked, you can customize the lines further.



Relationship Line Options

Show Labels Options

Control whether line labels are visible. Click the [...] button to open the Relationship Label Options form to specify what appears:



Relationship Label Options

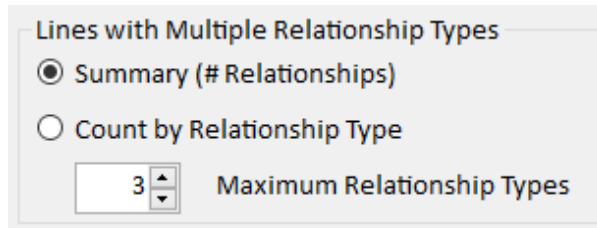
Lines with Multiple Relationship Types

The label shows the line's relationship type and the number if there's more than one.



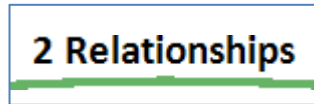
Line Represents Three Relationships of Type Makes Return

For lines representing more than one relationship type, there are two options for the label:

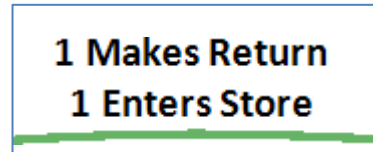


If there are different relationship types, the count of relationships is shown with the option as a summary or by relationship type.

Summary (# Relationship)



Count by Relationship Type

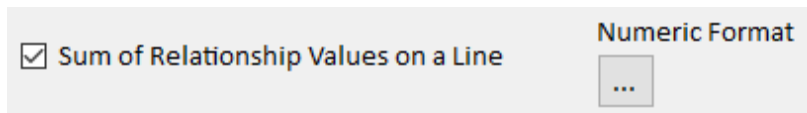


Sum of Relationship Values on a Line

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

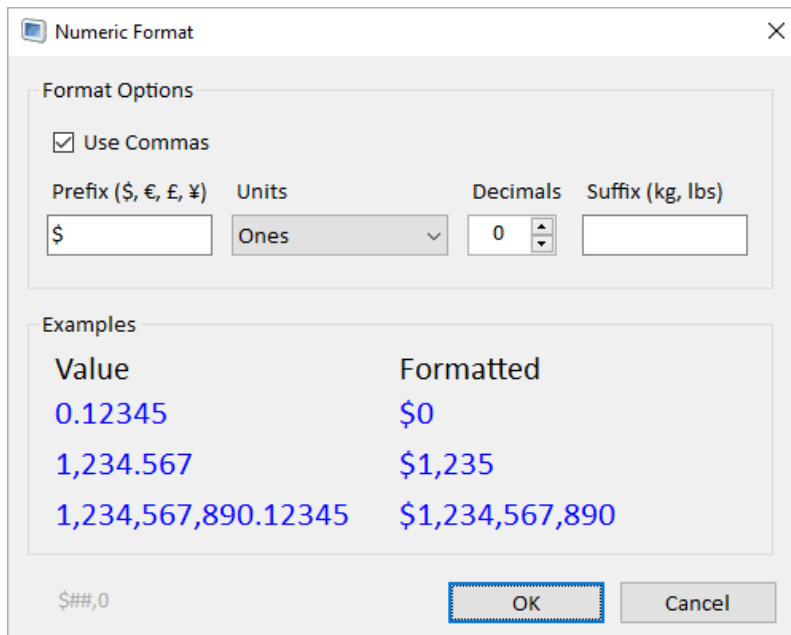


The values can be formatted:



If there are relationships in different directions, the sum of each direction is shown.

Use the Numeric Format [...] button to customize the numeric format of the sum.

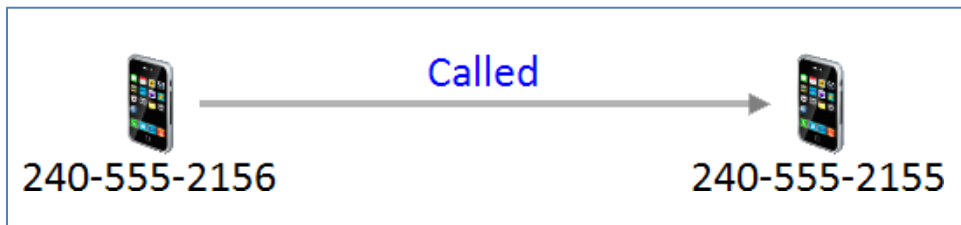


Numeric Format with \$ Dollar Sign

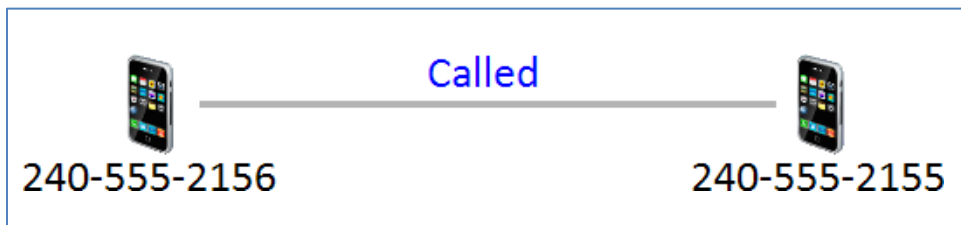
You can use commas, add a prefix like a \$ sign, specify the units in ones, thousands, millions, and billions, and set the number of decimals. You can also specify a suffix. Examples of the selected format are shown in the bottom section as you change the options.

Show Arrows

Relationships represent a link from Entity 1 to 2. An arrow at the end of the line points to Entity 2 and indicates the direction. You can toggle the arrow on and off:



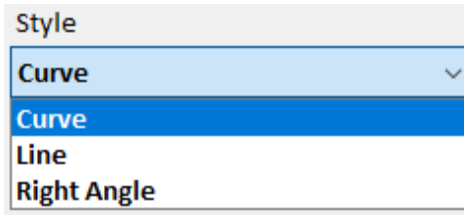
Relationship Line with Arrow



Relationship Line without Arrow

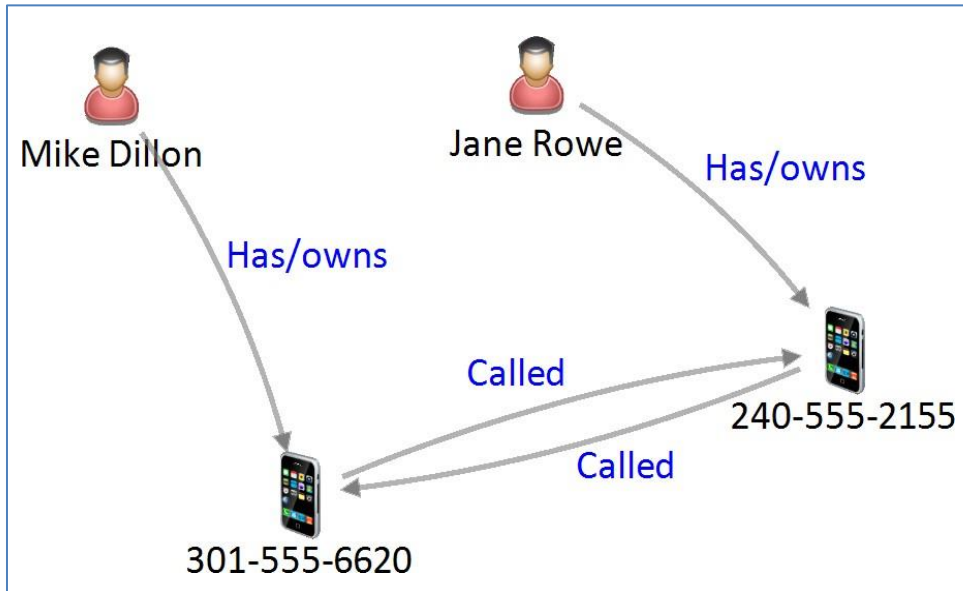
Style

Customize the shape of the lines which can be curved, straight, or right angles.



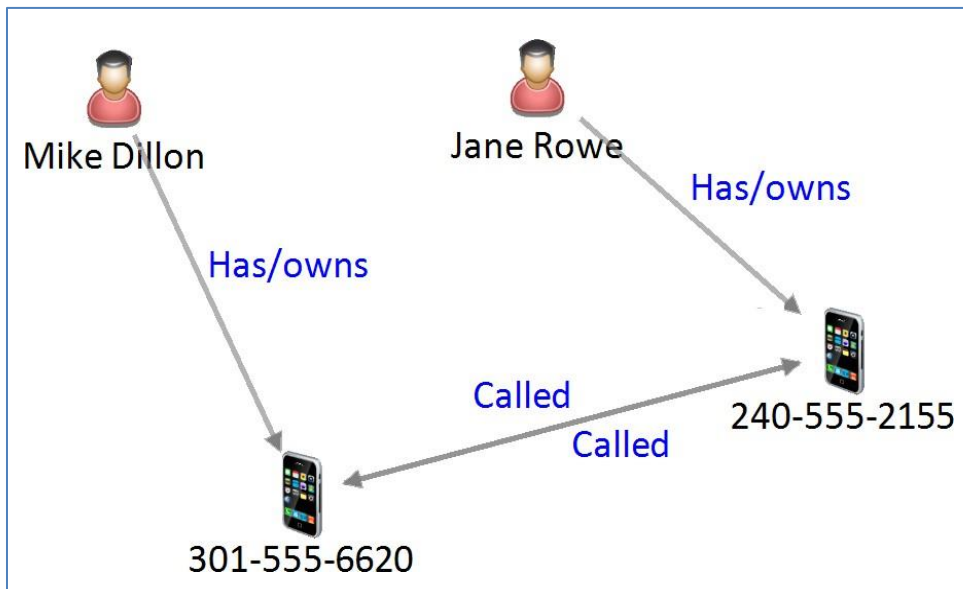
Relationship Line Styles

For Curved, relationships in each direction are shown as a separate curve, so a pair of entities may have two lines for relationships in opposite directions.



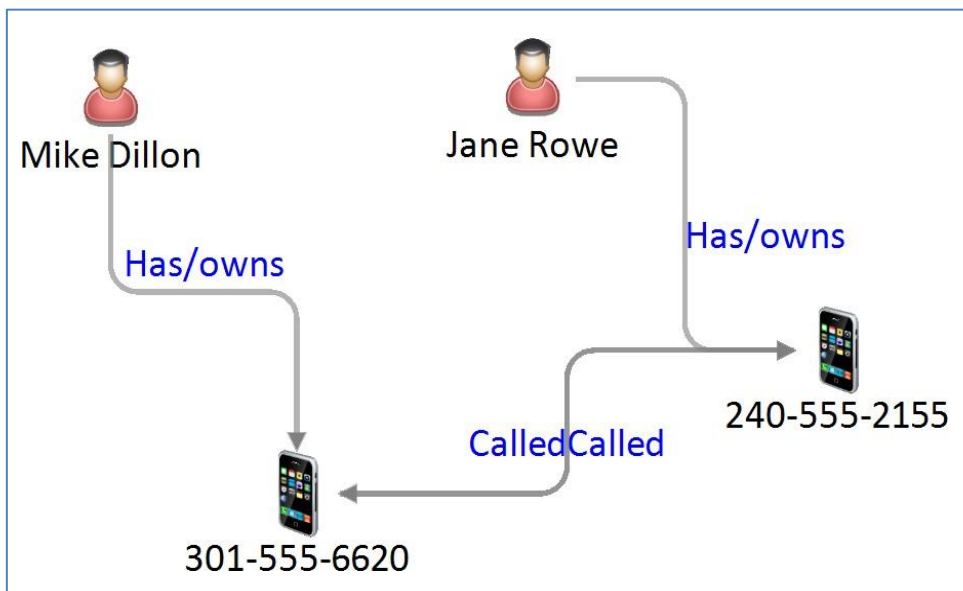
Relationships as Curves

For Lines, all the relationships between two entities are in a single line:



Relationships as Straight Lines

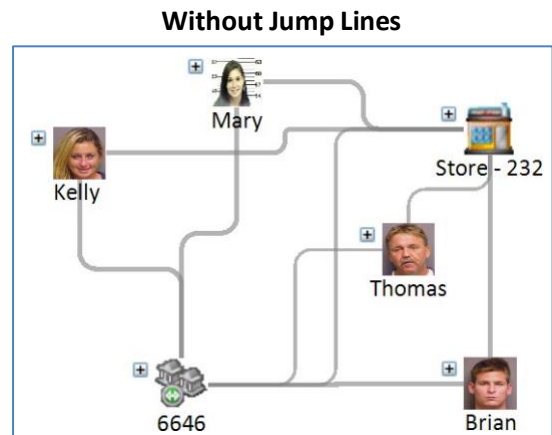
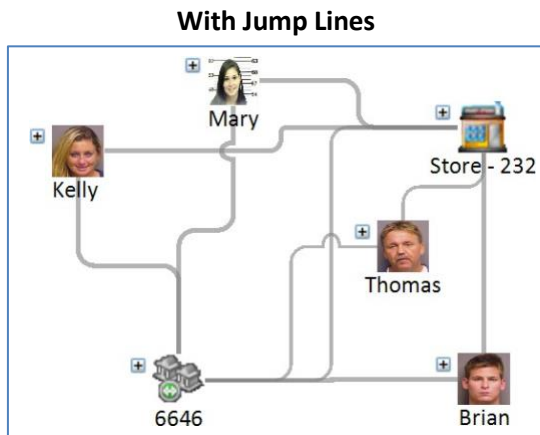
For Right Angle, lines have right angle corners.



Relationship Lines as Right Angle

Jump Lines

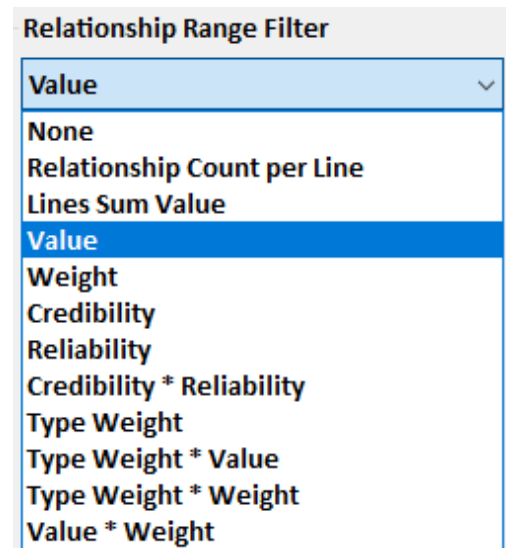
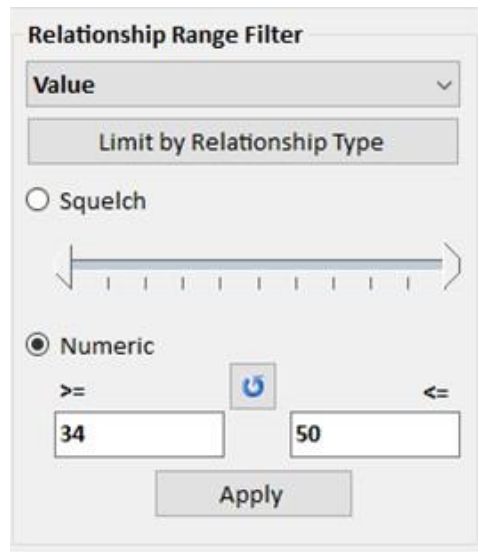
If Right Angle is selected, there is an additional option to show intersecting lines as jumps, so they don't look connected.



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.

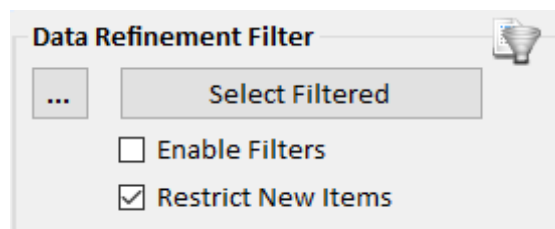
- Relationship Count per Line is the number of relationships on a line.
- Lines Sum Value is the sum of values on the relationship line.
- Value is the value field for the relationship. If a relationship does not have a value, it is not included and becomes invisible if it is the only relationship.
- 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 the 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 169 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

Data Refinement performs more advanced relationships filtering.



Click the [...] button to open the Relationship Filter form. This is identical to the **Advanced Relationship Search** on page 83.

- **Select Filtered:** Select the items on the diagram that pass the filter. By default, selected items have a green outline and their linked entities have a blue background.
- **Enable Filters:** Hide items that do not pass the Data Refinement Filter. The filter merely shows and hides relationships—it does not delete them from the diagram, nor does it have any impact on the relationships 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.

The image shows the 'Gradients' panel on the left and a network diagram on the right. The panel has three sections: 'Entity Gradients', 'Relationship Line Gradients', and 'Metadata'. 'Entity Gradients' includes 'Lines' (Color and Size), 'Relationship Line Gradients' (Lines Sum Value, Color, Size), and 'Metadata' (Metadata Type, Gender). The network diagram shows a central node 'Mary' connected to many other nodes, with relationship lines of varying thicknesses and colors. The nodes are colored based on their gradient settings, and the relationship lines are colored and sized based on their 'Lines Sum Value'.

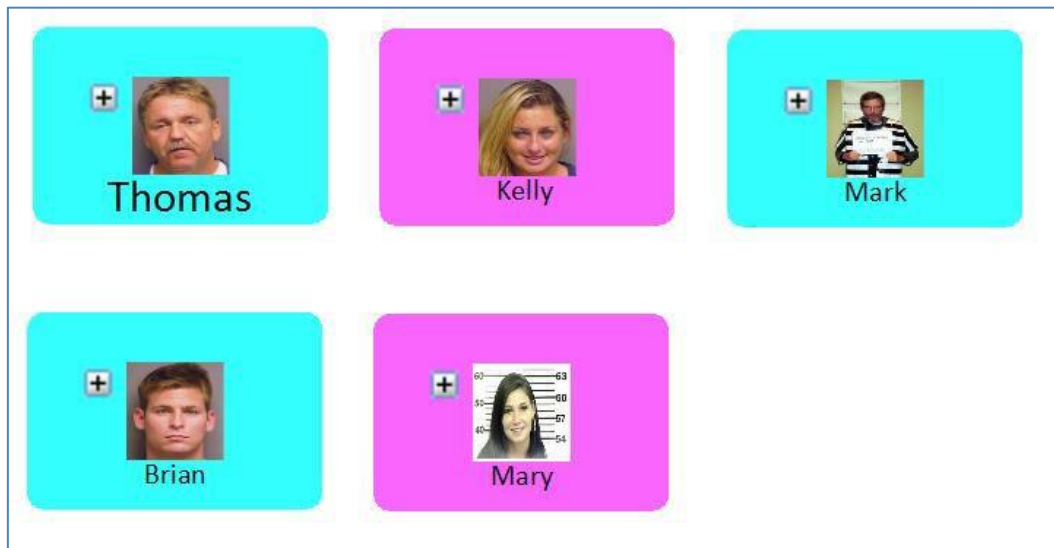
You can set the Entity and Relationship colors and size separately.

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

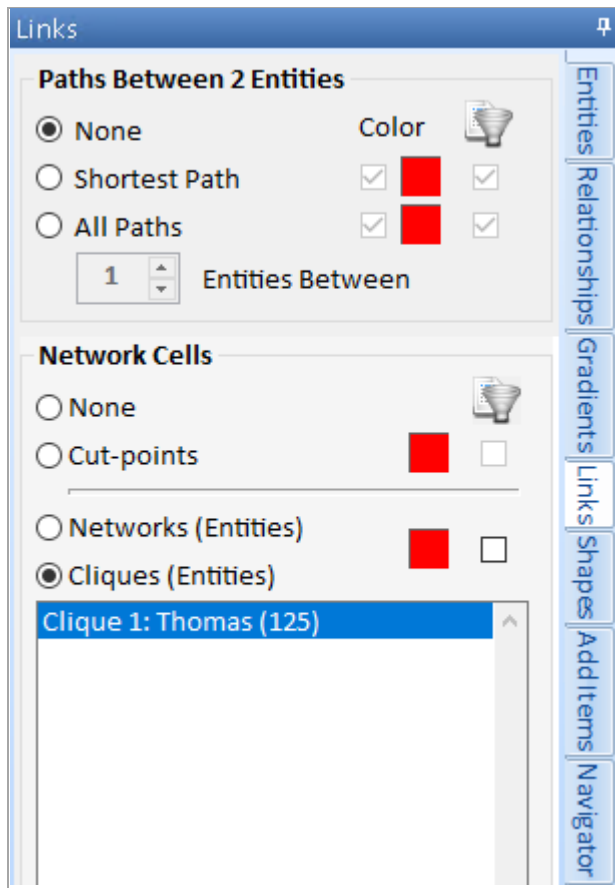
Metadata Type allows you to color Entities based on a metadata value. The metadata must be defined as a lookup type, such as Gender.



The colors are specified for metadata type lookups in Manage Database, Metadata Types. See **Manage Lookup List Values** on page 286 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. SentVi optionally highlights and filters the shortest path between the two entities.

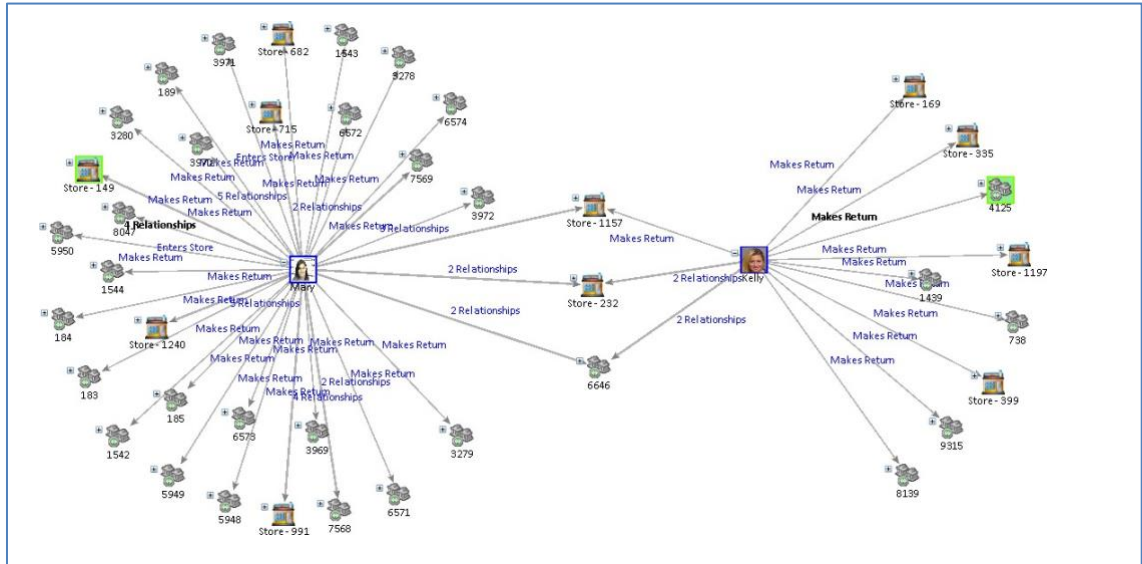


Diagram of all Entities and Relationships

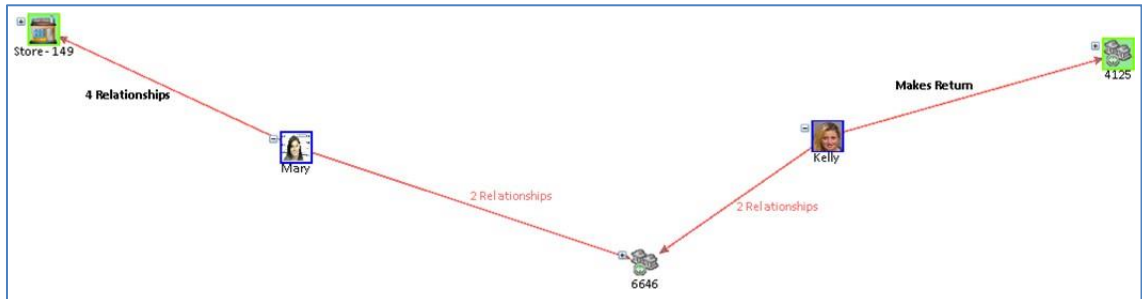


Diagram of Shortest Path between two Entities

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. SentVi 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.

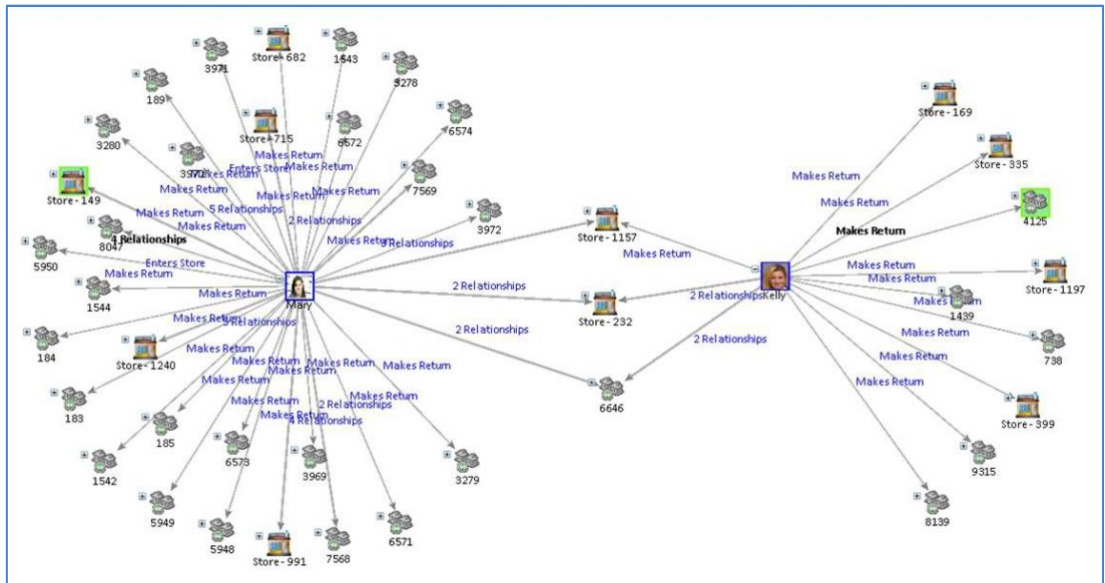


Diagram of all Entities and Relationships

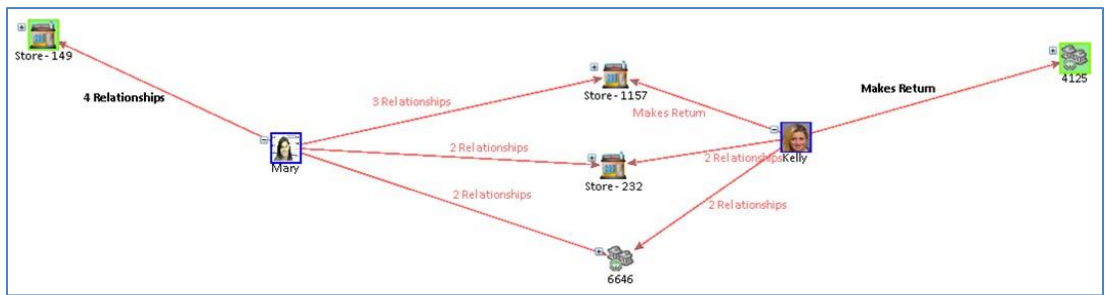
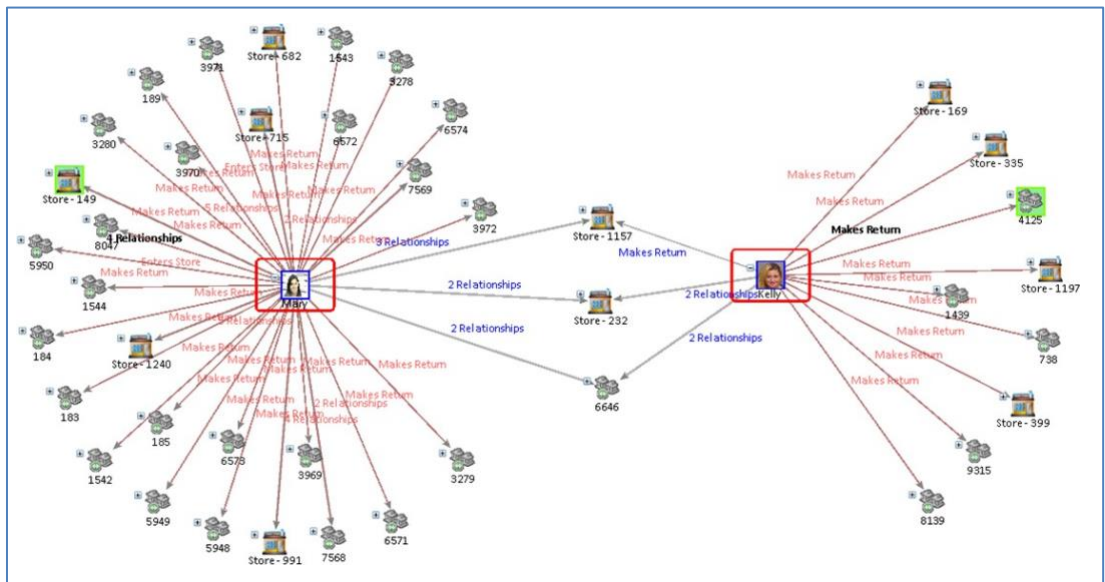


Diagram of All Paths to the two Entities

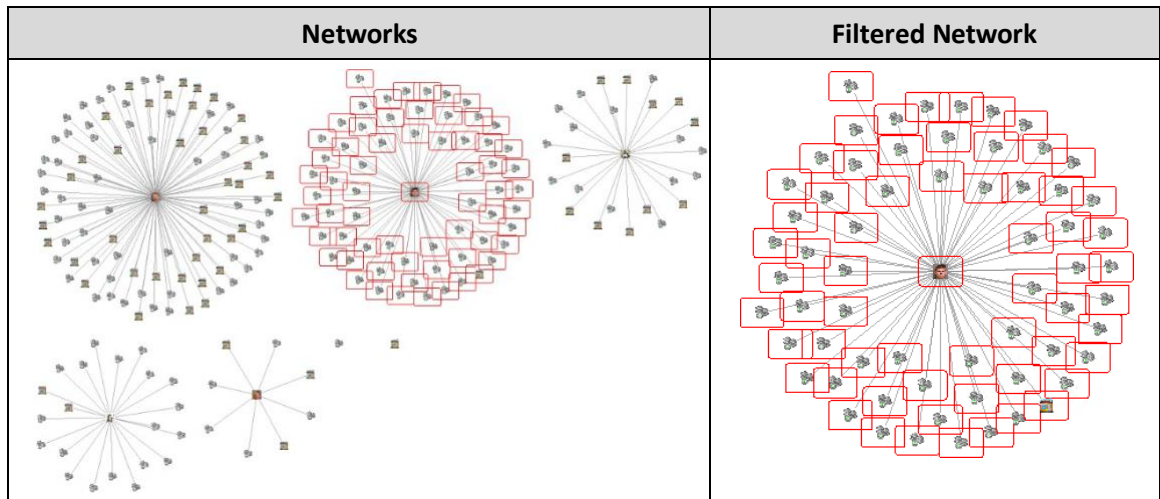
Cut Points

SentVi 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.



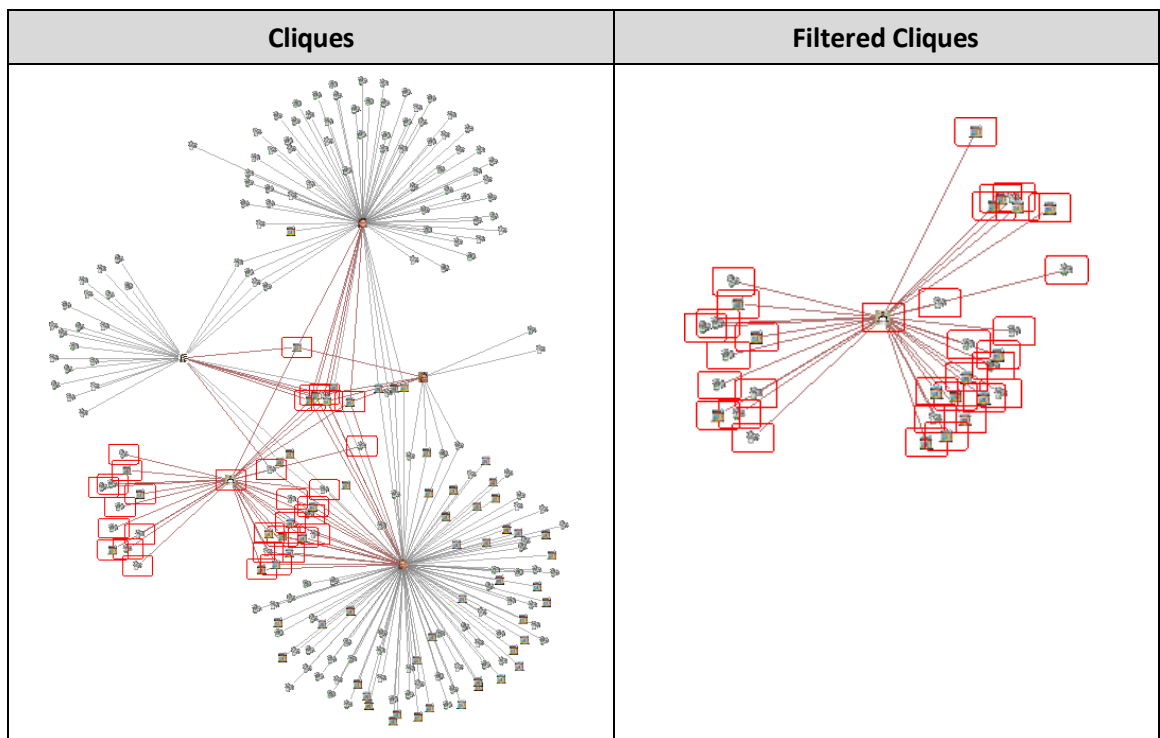
Networks

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.



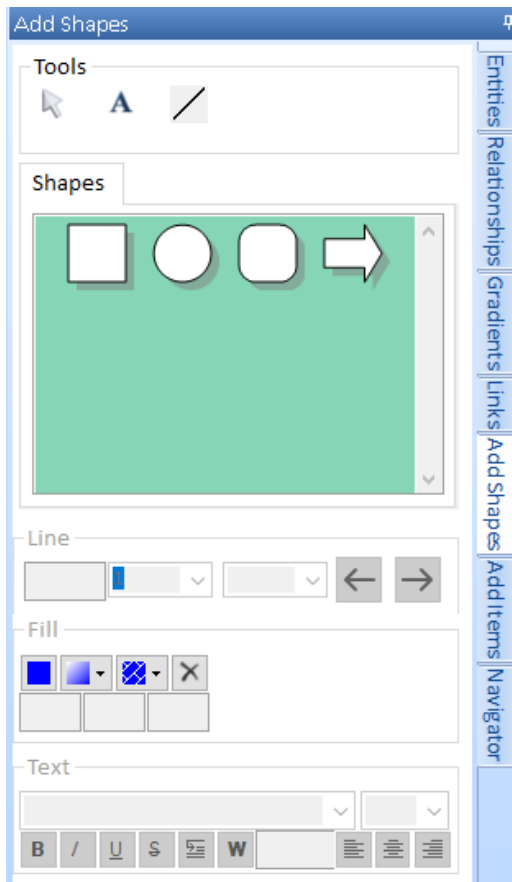
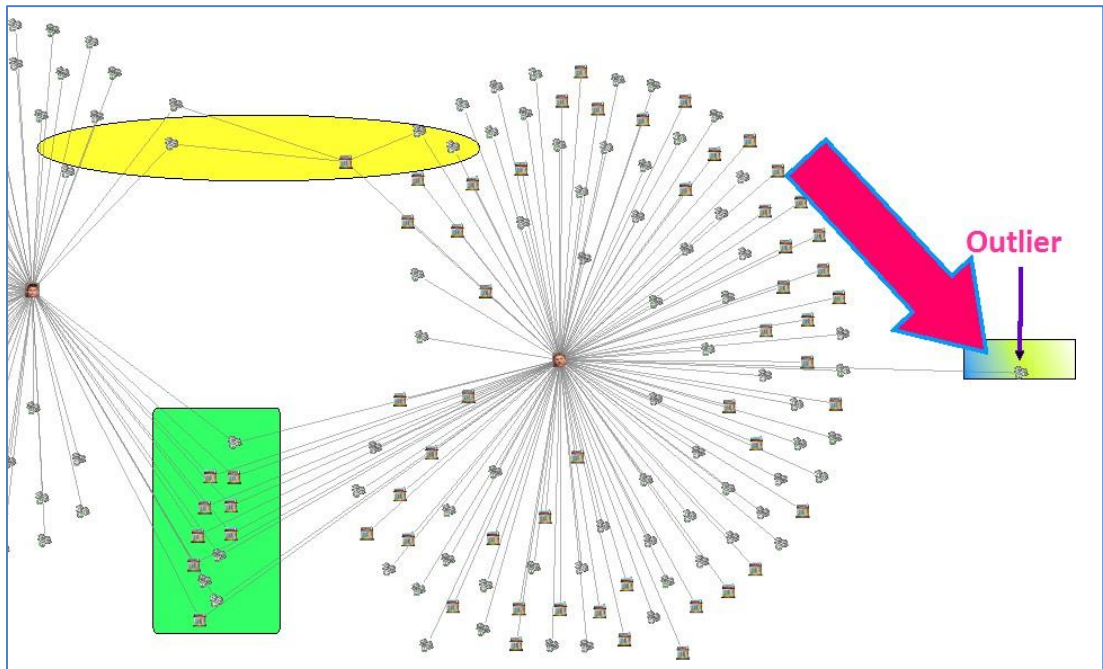
Cliques

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.



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 Line – Draw a straight line.

Shapes

Variety of shapes to use in the diagram.

Line Tools

Change the thickness of line and shape outline.

Fill Tools

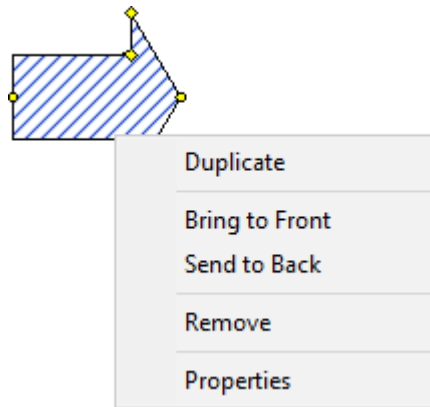
Change the color, pattern, texture to the interior of a shape.

Text Tools

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

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

To copy an existing object on your Diagram, right-click and select Duplicate. Additionally, you can show the Shape Panel by selecting a shape in the Diagram, right-click, and select Properties.

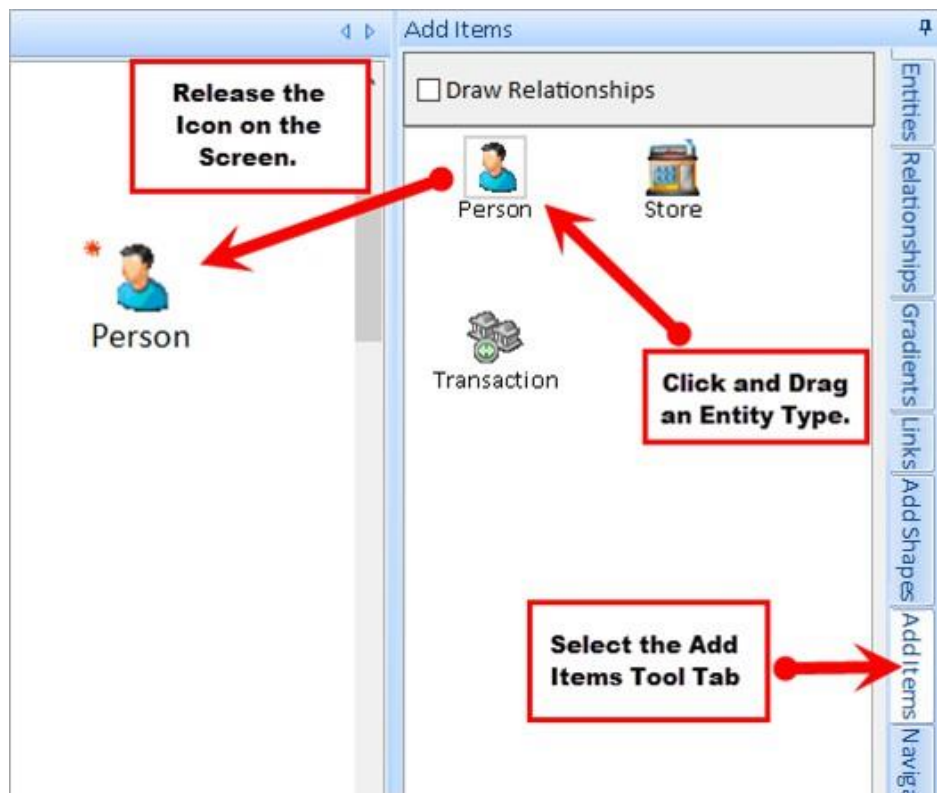


Add Items

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.

Add Entities

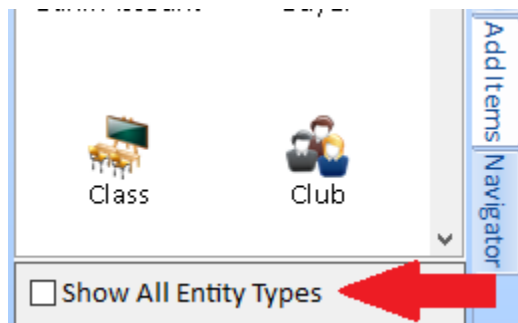
To add an entity, click the [Add Items] tab in the Visualizer. A list of entity types appears.



Click on the icon you want and drag it to the Diagram.

Show All Entity Types

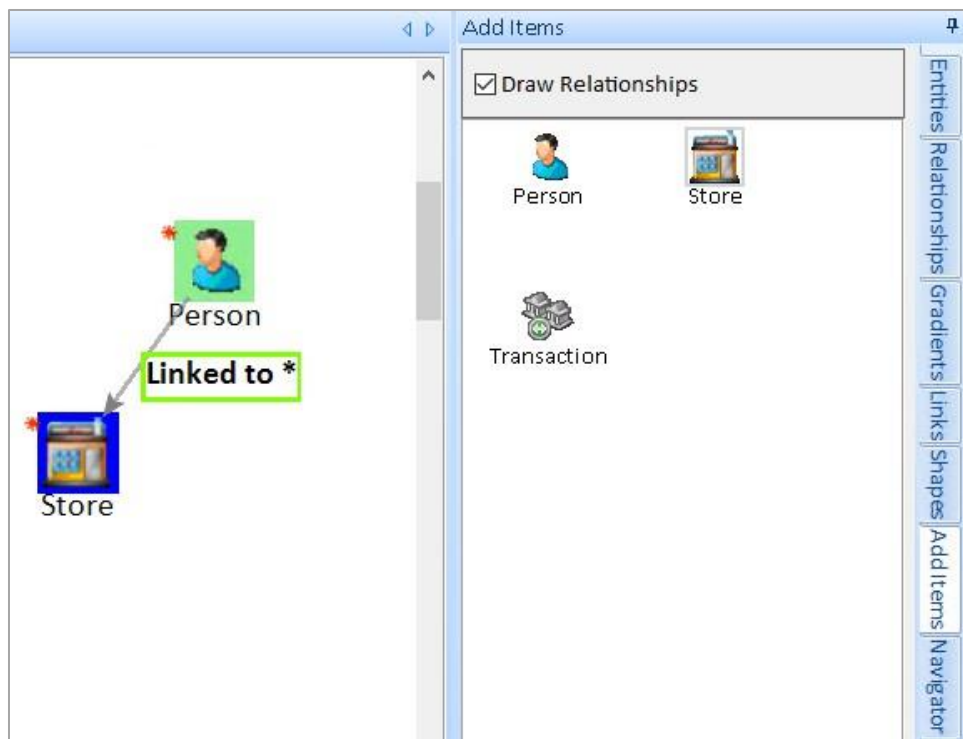
By default, the checkbox [Show All Entity Types] is not selected so that only entity types used by entities in your database appear. Check the box to see all the entity types defined in the entity type lookup, so you can add the first of that type.



Option to Show All Entity Types

Draw 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.

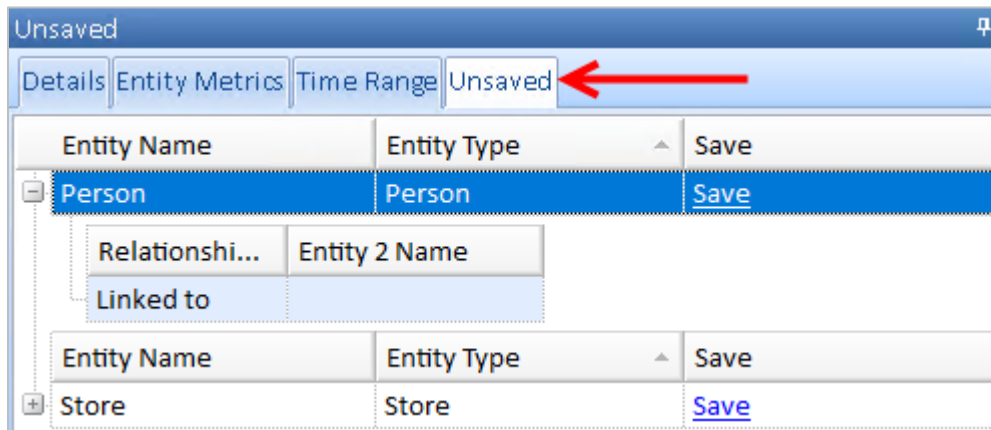


As with adding entities, right-click on the relationship to specify its type. When finished drawing the relationships, un-check [Draw Relationships] to turn off Add Relationship mode.

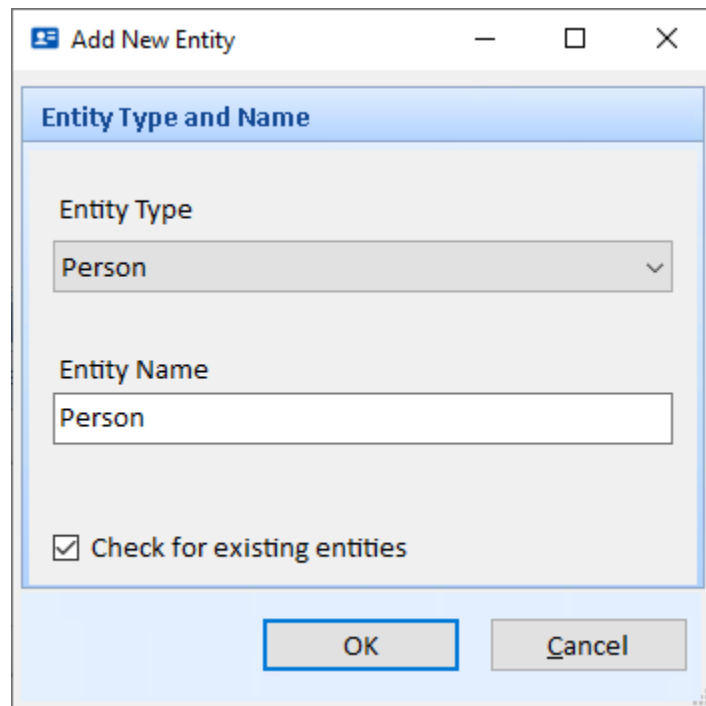
Unsaved Items

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 [Save the Diagram and New Data](#) on page 136.

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



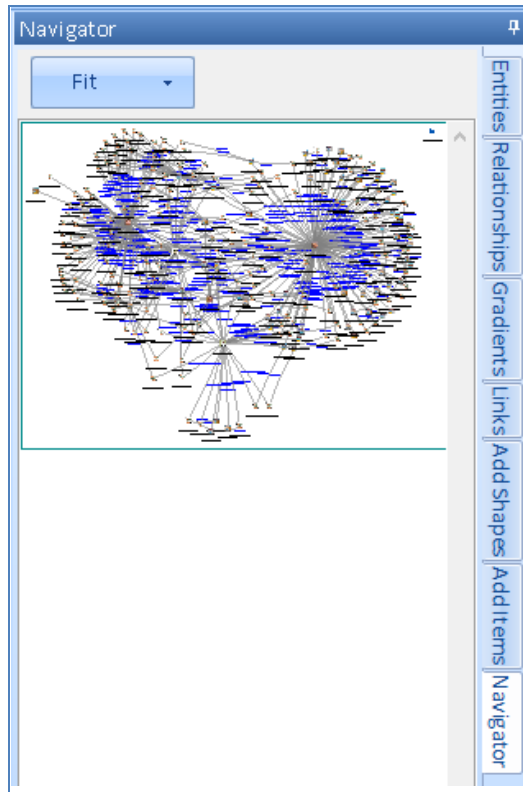
You can save individual items by clicking [Save] in the right column and add the new item.



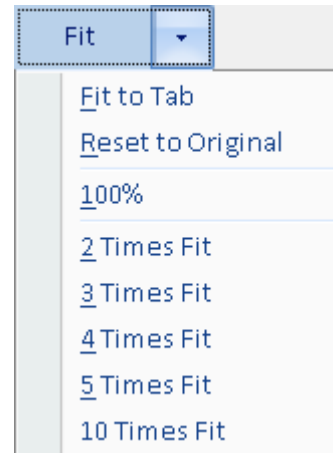
To save all the added items, click the [Save] button on the toolbar. See [Save the Diagram and New Data](#) on page 136.

Navigator

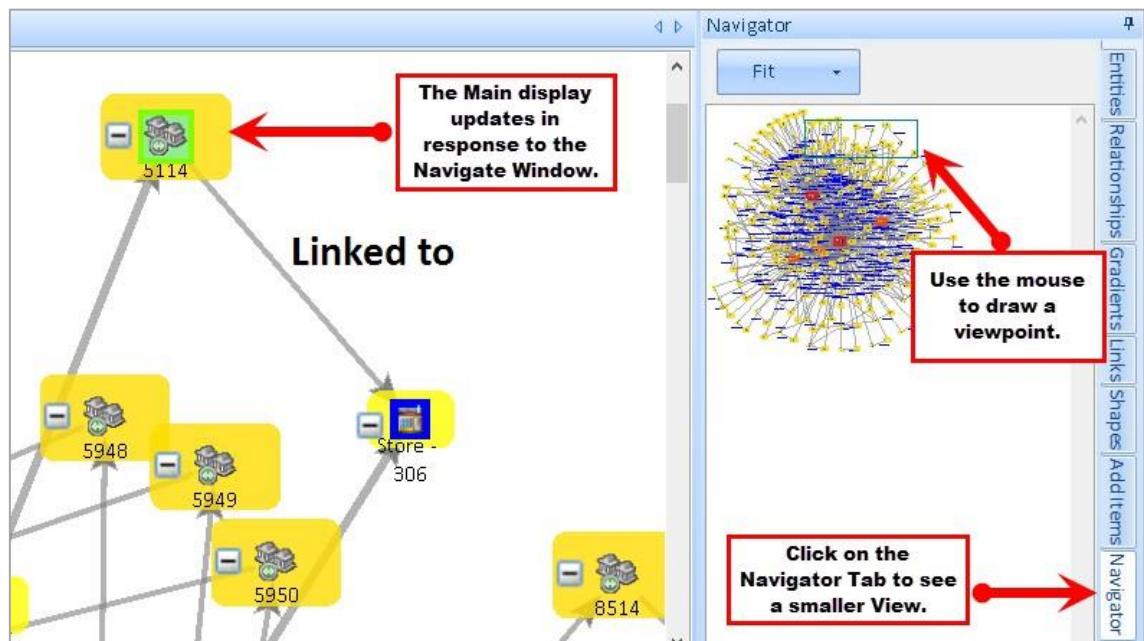
As you add entities and relationships to the diagram, the complexity can make it difficult to navigate. You may want to zoom in to see detail and zoom out to see patterns. The Navigator panel provides a thumbnail view that allows you both zoomed and un-zoomed windows.



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 15: Entity Metrics with Social Network Analysis (SNA)

Entity Metrics based on Social Network Analysis (SNA) are a key aspect of SentVi's automated analysis capabilities. Entity SNA Metrics 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?

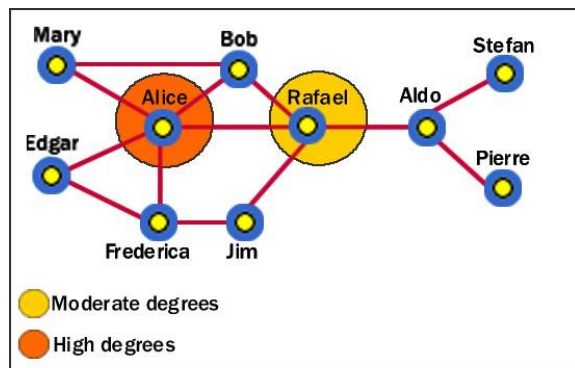
SNA provides a rich set of metrics, many of which are used in the SentVi Network Metrics functionality.

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.

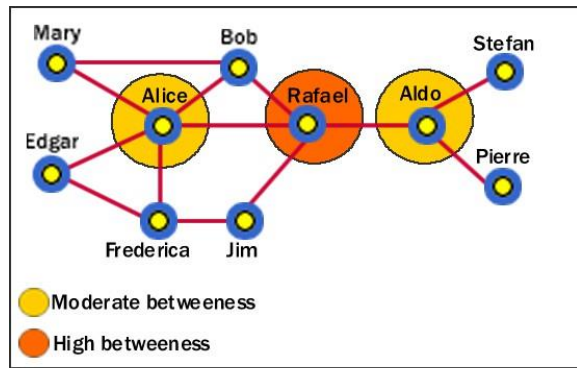
Weight

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.

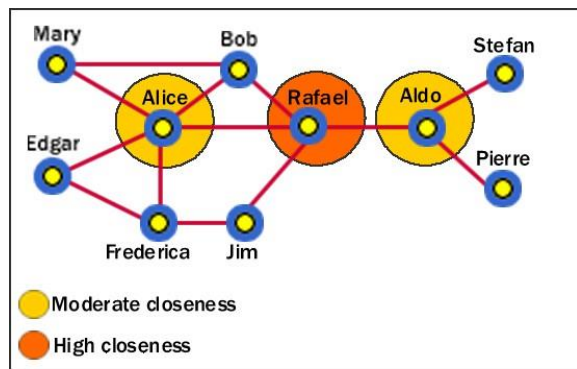


In this example, Rafael has the highest betweenness because he is between Alice and Aldo, who are between other entities. Alice and Aldo have a slightly lower betweenness because they are essentially only between their own cliques. Although Alice has a higher degree centrality, Rafael has more importance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



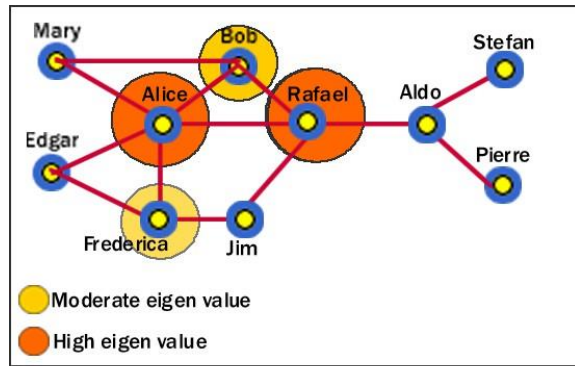
As with the betweenness example, Rafael has the highest closeness centrality because he can reach more entities through shorter paths. As such, Rafael's placement allows him to connect to entities in his own clique, and to entities that span cliques.

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.

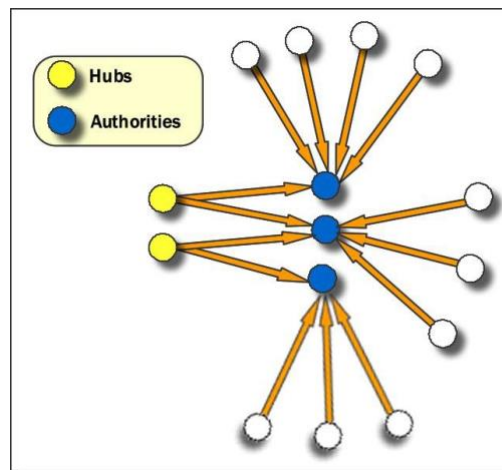


In this example, we can see that Alice and Rafael are closer to other highly close entities in the network. Bob and Frederica are also highly close, but to a lesser value.

Hub and Authority

Entities that many other entities point to are called Authorities. In SentVi, 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

SentVi calculates the previously mentioned Social Network Analysis numbers, which are useful for identifying key entities in a network. Network Metrics extends this model by providing additional weighting and calculations.

Each Entity Type can be assigned a Weight which is a number between 1 and 100 to prioritize them. For instance, a Person may be assigned a higher Weight than a phone or a car. Each Entity can also be assigned a Weight and Value. These numbers are applied for additional metrics:

- **Type Weight:** The weight value defined for each entity type to consider the significance of entity types.
- **Type Weight * Value:** The product of an entity type's weight and the entity's 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.

Name	Type	Lines	Lines-In	Lines-Out	Relationships	Relationships-In	Relationships-Out
Store - 149	Store	0	0	0	5	5	0
Store - 159	Store	0	0	0	3	3	0
Store - 169	Store	0	0	0	5	5	0
Store - 179	Store	0	0	0	3	3	0
Store - 211	Store	0	0	0	2	2	0
Store - 229	Store	0	0	0	2	2	0

Entity Metrics tab

There is a row for each entity in the diagram. Click the Excel icon to send the data to a spreadsheet. Like other grids in SentVi, 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.

If there are more than 1000 entities, you have the option to calculate the SNA values.

Include SNA

If this is not checked, the non-SNA values are calculated. The SNA values are required for some filters and gradients based on them, but you may not want to wait for the calculations if you don't use them.

Changes to the Database

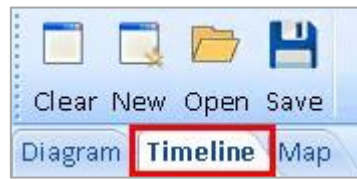
When you or other users make changes that affect Entity Metrics (e.g. Weight or Status), the numbers that appear in the Entity Metrics tab are not updated. Press the [Refresh] button on the toolbar to get the latest values and recalculate the metrics.

Chapter 16: Timeline and Time Range Filter

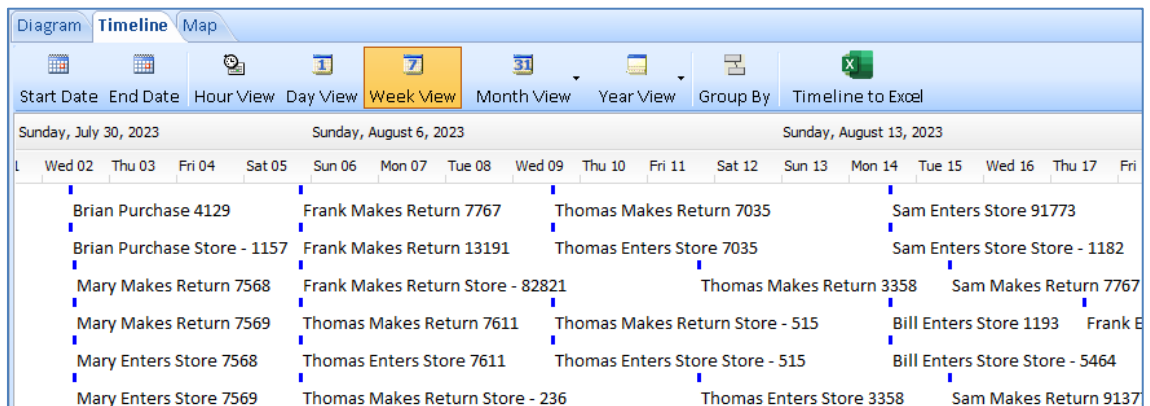
SentVi supports storing start dates/times and end dates/times for entities and relationships and provides functionality that allows you to visualize and analyze the temporal nature of your data. The Visualizer form includes a Timeline tab to see the timeline of events for entities and relationships that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

Timeline View

With the Visualizer open, click on the Timeline tab:

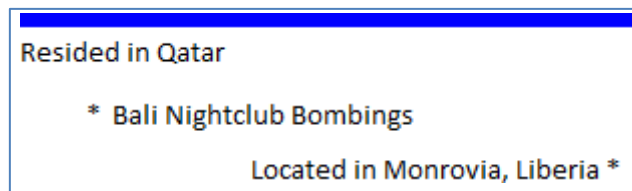


The Timeline becomes active:



Timeline for Entities and Relationships on the Diagram

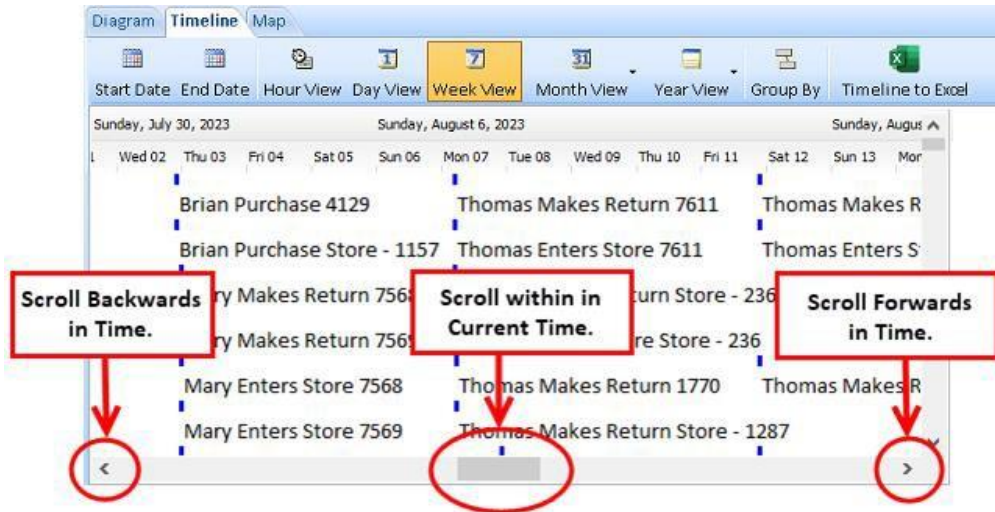
The Timeline shows bars for each entity and relationship on the diagram with a Start or End Date. If the Start or End Date is missing, it is treated as a point in time. The label starts with a * if the Start Date is missing or ends with a * if the End Date is missing.



Example of Labels for Items with Start and End Dates, Missing Start Date, and Missing End Date

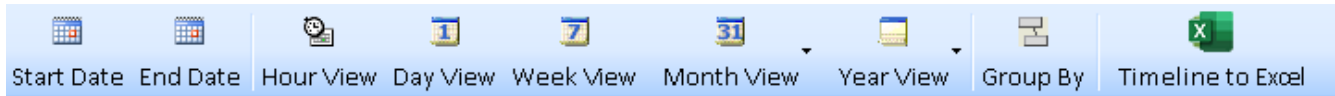
Scroll through Dates

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 moves 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.

Timeline Toolbar



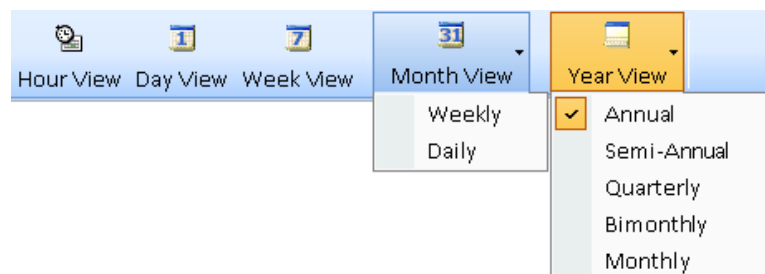
Start and End Dates

By default, the Start Date and End Date are set to the earliest and latest dates among your entities and relationships.

If your Date View selection and screen width exceed those dates, it displays a wider range of dates than your start and end dates. You can choose a different Date View to show more data.

Date View

The middle of the toolbar has the Date View options.



Date View Time Spans, Expanded

Set the time span to Hour, Day, Week, Month or Year. The Month and Year Views have dropdown options. Select the view to see the best time span for your data.

Date View Examples

Your selection determines the horizontal space for time. Here are examples of the screen width zooming into smaller and smaller periods of time from years to days.

Year Views

Year 2010					Year 2015					Year 2020				
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024

Year View, Annual with the Top Summary Label Every 5 Years (example 15 years)

Year 2022				Year 2024				Year 2026			
2021-12	2022-06	2022-12	2023-06	2023-12	2024-06	2024-12	2025-06	2025-12	2026-06	2026-12	2027-06

Year View, Semi-Annual with Summary Label Every 2 Years (example 6 years)

Year 2022				Year 2023				Year 2024			
2021-12	2022-03	2022-06	2022-09	2022-12	2023-03	2023-06	2023-09	2023-12	2024-03	2024-06	2024-09

Year View, Quarterly with Summary Label for each Year (example 3 years)

Year 2022						Year 2023					
12	2022-02	2022-04	2022-06	2022-08	2022-10	2022-12	2023-02	2023-04	2023-06	2023-08	

Year View, Bimonthly with summary Label for each Year (example 20 months)

Year 2023											
2023-01	2023-02	2023-03	2023-04	2023-05	2023-06	2023-07	2023-08	2023-09	2023-10	2023-11	2023-12

Year View, Monthly with the Summary Label for each Year (example 1 year)

Month Views

January 2023				February 2023				March 2023				April 2023			
01-01	01-08	01-15	01-22	01-29	02-05	02-12	02-19	02-26	03-05	03-12	03-19	03-26	04-02	04-09	04-16

Month View, Weekly with the Summary Label for each Month (example 4 months)

February 2023																											
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Month View, Daily (example 1 month)

Week View

Sunday, January 1, 2023							Sunday, January 8, 2023						
Sun 01	Mon 02	Tue 03	Wed 04	Thu 05	Fri 06	Sat 07	Sun 08	Mon 09	Tue 10	Wed 11	Thu 12	Fri 13	

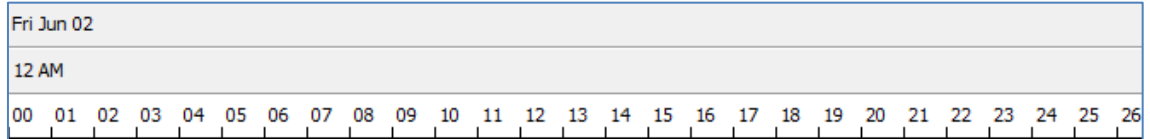
Week View (example 2 weeks)

Day View

Friday, June 2, 2023														
12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM

Day View (example half day)

Hour View



Hour View (example 26 minutes)

Group by Entity

Grouping combines timelines for each entity into an expandable region by selecting the first or second entity of relationships.

Click the [Group By] button to select the field to group on, set the sort order and the initial expanded or collapsed state.

When grouped, collapsible regions are created for each entity so you can see all their events.

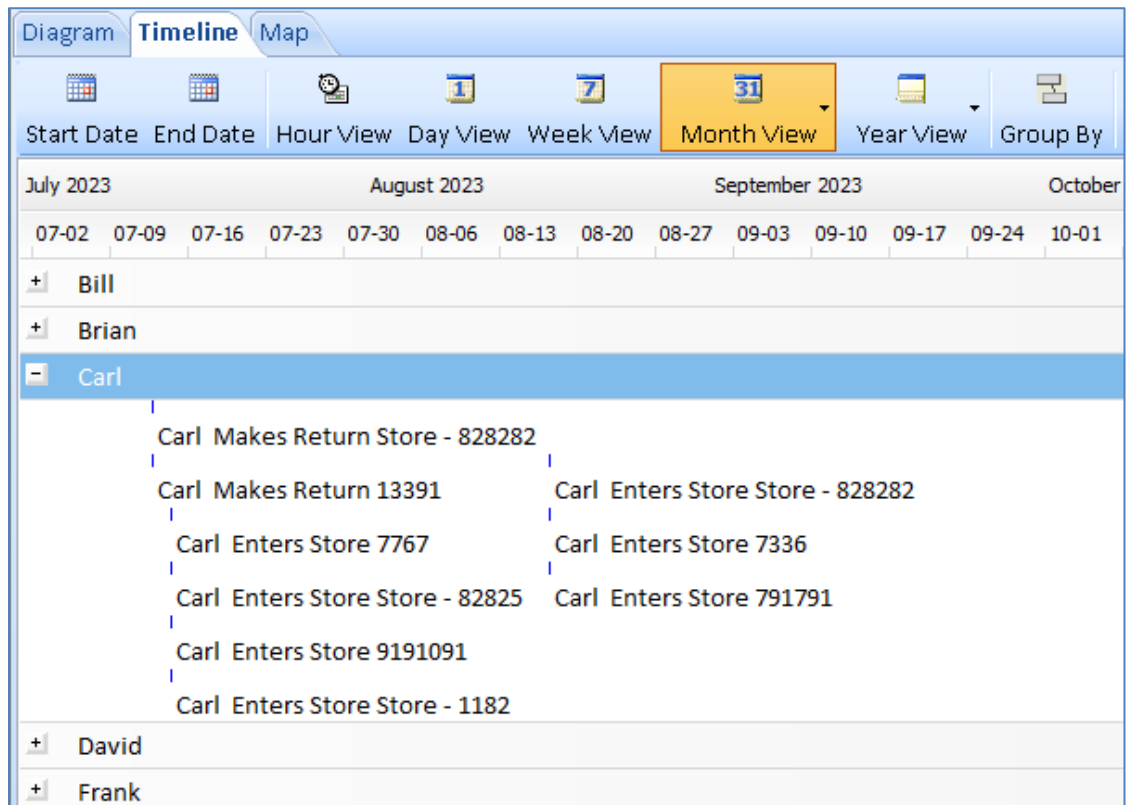
Define Groups

Group Items By: Entity 1 (Ascending selected)

Then By: Entity 2 (Ascending selected)

Initial State: Collapsed selected

Buttons: Clear, OK, Cancel

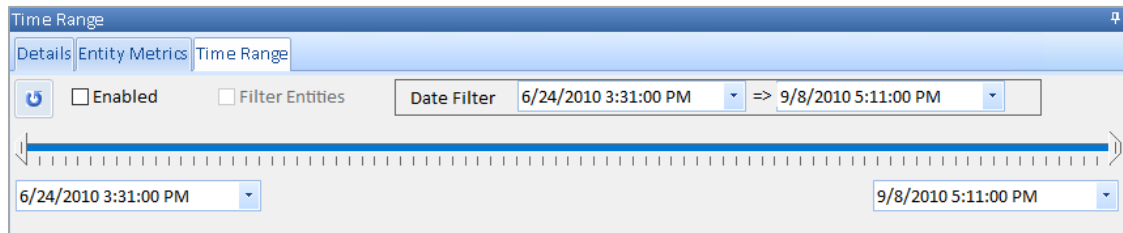


Timeline Grouped by Entity with Carl Expanded


Time Range Panel for Temporal Analysis

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

On the bottom panel's Time Range tab, define a slider control for a time period. As you move the slider, entities and relationships appear or disappear on the diagram.

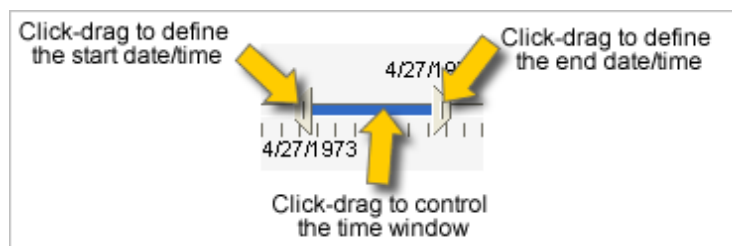


Time Range Tab on the bottom panel of the Diagram

- **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.

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.

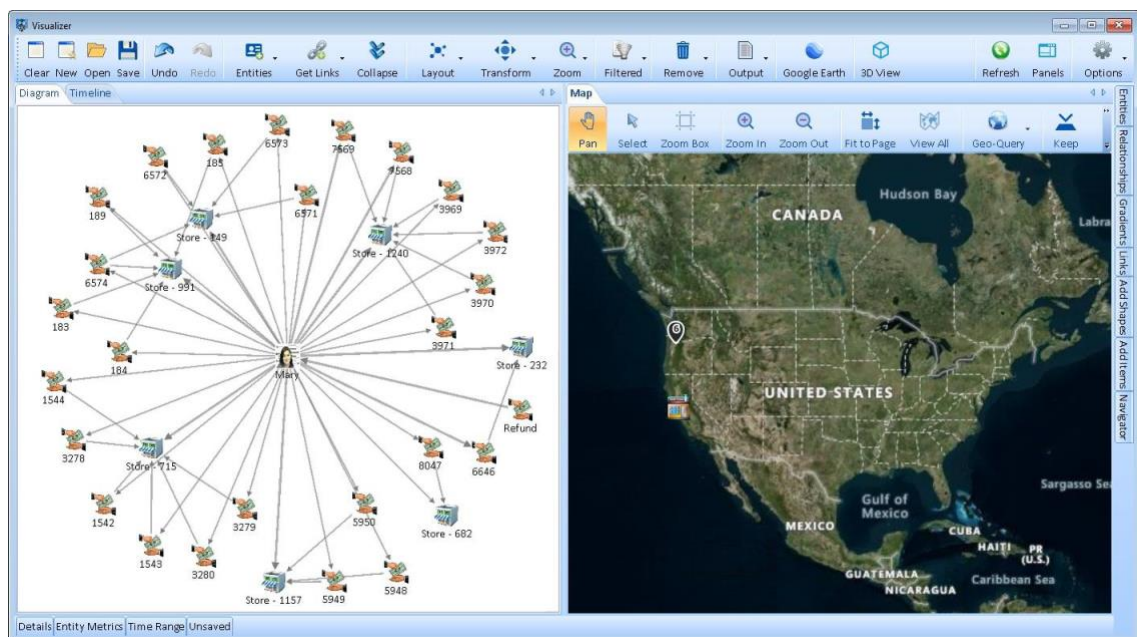


Chapter 17: Geospatial Mapping Tools

SentVi 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.

Introduction to Maps in SentVi

Entities on the diagram are also added to the Map pane if they have latitude and longitude. For example, this screenshot shows both the diagram and geospatial views of the same data:



Visualizer with Map Tab Dragged to Right to Show it Side-by-Side with the Diagram Tab

Geospatial Features in SentVi Versions

Geospatial tools are included in the following editions of SentVi:

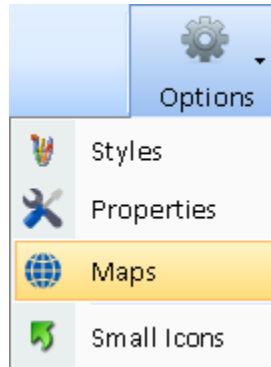
- Professional Edition
- Premium Edition
- Ultimate Edition

SentVi incorporates these geospatial tools:

- A geospatial viewer and tools directly integrated into the SentVi interface for online and offline maps.
- Google Earth integration to export data to the Google Earth program.

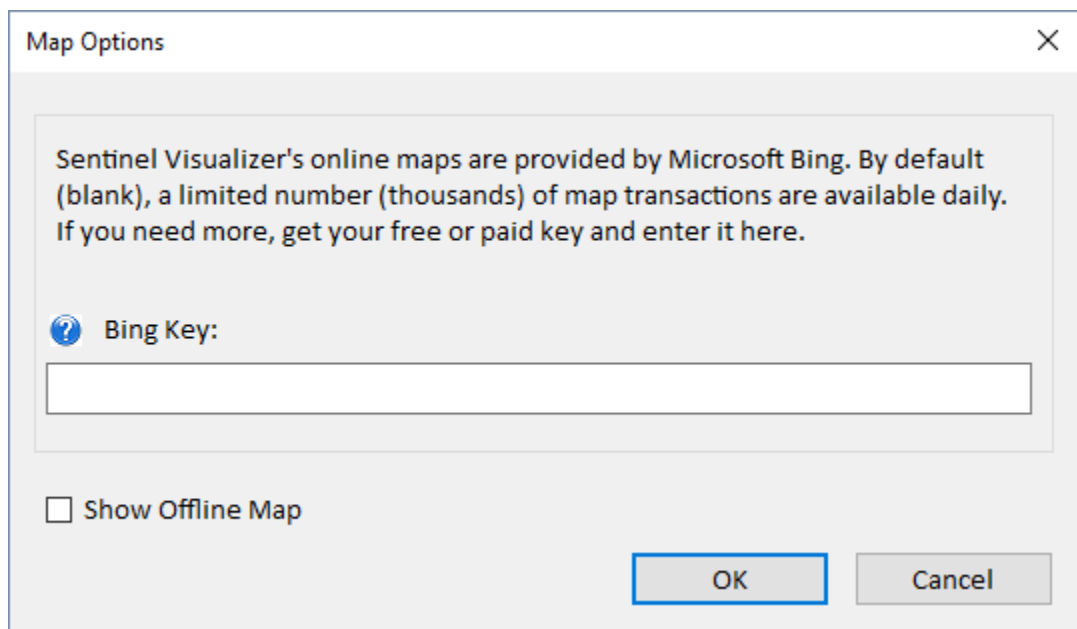
Online and Offline Maps

SentVi offers online maps with Microsoft Bing if you have an internet connection or offline maps that support shape files such as ESRI. By default, if an Internet connection is detected, online maps are used to offer high resolution maps across the world.



Map Options

Map settings are selected under the Visualizer, Options, Maps item:



Map Options to Enter Your Own Bing Key

The [Show Offline Map] checkbox lets you use offline maps even with an internet connection. The offline maps are more limited but support shape files from ESRI and other sources.

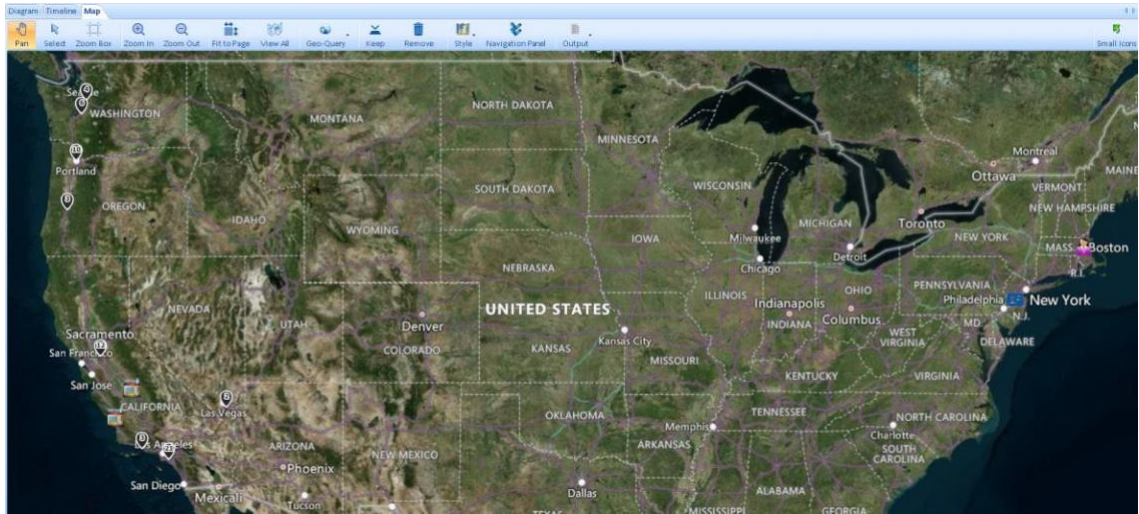
Get a Bing Map Key

If you want to generate lots of online maps, get a Bing Key from Microsoft and enter it here.

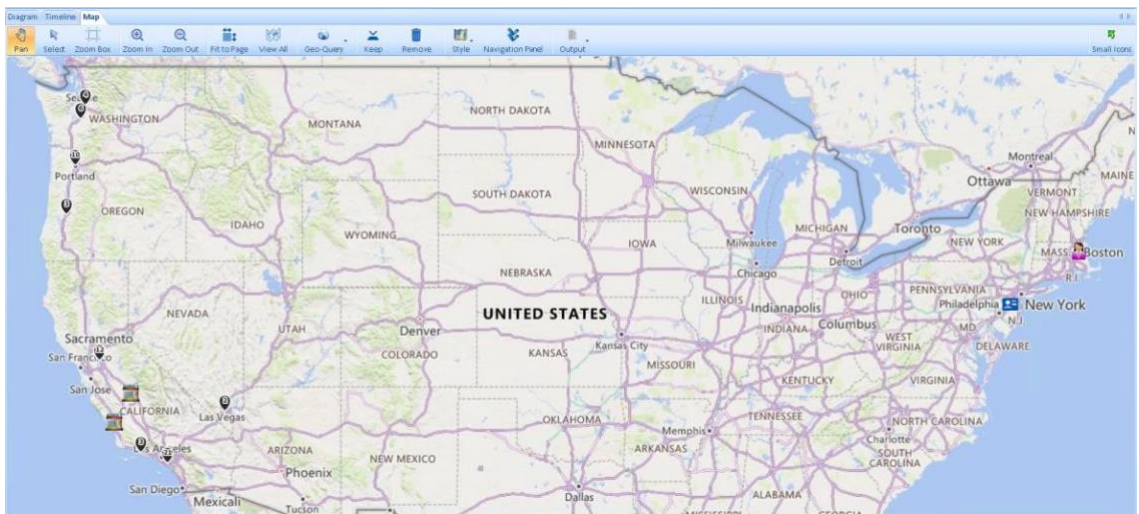
Microsoft currently offers up to 25,000 transactions per day for the free key with options to buy more. For more information, visit <https://learn.microsoft.com/en-us/bingmaps/getting-started/bing-maps-dev-center-help/getting-a-bing-maps-key>.

Map Tabs

On the Visualizer, the Map tab at the top shows the online map locating diagram entities with latitude and longitude values.



Visualizer Online Maps: Hybrid Style



Visualizer Online Maps: Road Style

Icons appear for each entity. If multiple entities are close together, a pin with number shows how many are in that location:



Individual Icon and Pins showing Multiple Entities

As you zoom into the map, the pins separate into their individual locations.

The mouse scroll wheel zooms in and out from the current mouse pointer location.

Toolbar Buttons



Mouse Click Modes

Clicking one of these sets the mode for how the mouse works afterwards.

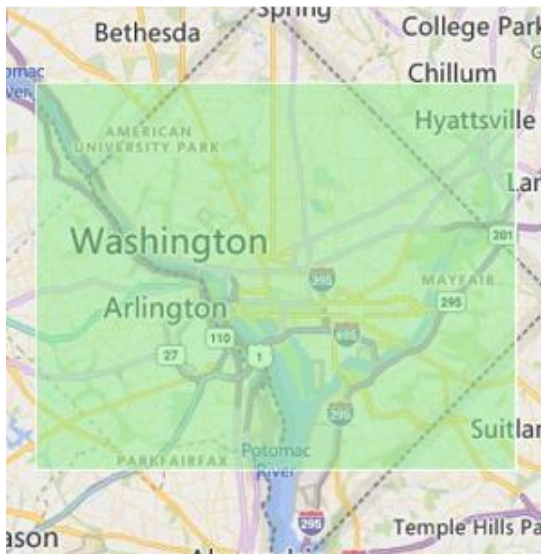
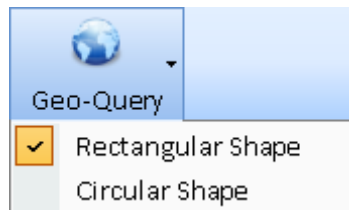
- **Pan:** With the cursor in Pan mode, clicking and dragging moves the map surface. Click the mouse on an entity to open an entity form.
- **Select:** In Select mode, clicking and dragging selects all the entities in the rectangle which is used for the Keep and Remove features. Click on one entity to its information form.
- **Zoom Box:** In Zoom Box mode, clicking and dragging a rectangle on the map adjusts the map to fit in the rectangle.

Additional Buttons

- **Zoom In** to magnify the map.
- **Zoom Out** to see a larger area.
- **Fit to Page:** Reset the map to show all the entities. For instance, if all the data is across the US, and the current view is of the whole world or a small area, this sets the map to the US.
- **View All:** Resets the zoom to show the entire world map.

Geo-Query

Add entities from your database located inside a shape on the map.



Rectangle Geo-Query

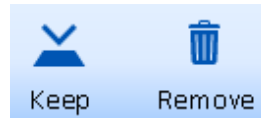


Circular Geo-Query

Select the option to add entities by drawing a rectangle or circle. All entities in your database located inside the shape are added to the map (and Visualizer Diagram and Timeline tabs).

Keep and Remove

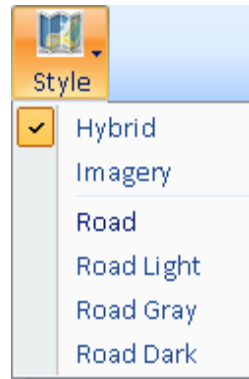
Based on the selected entities, you can keep or remove them.



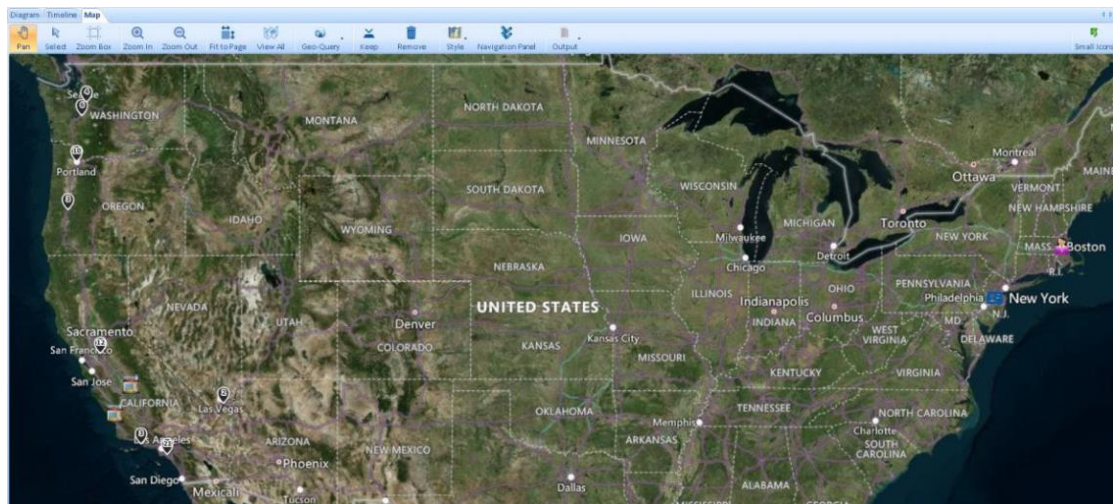
- [Keep] removes all the unselected entities (keeps the selected ones).
- [Remove] removes the selected entities.

Online Styles

Many visual types are available with the online Bing Maps under Style:

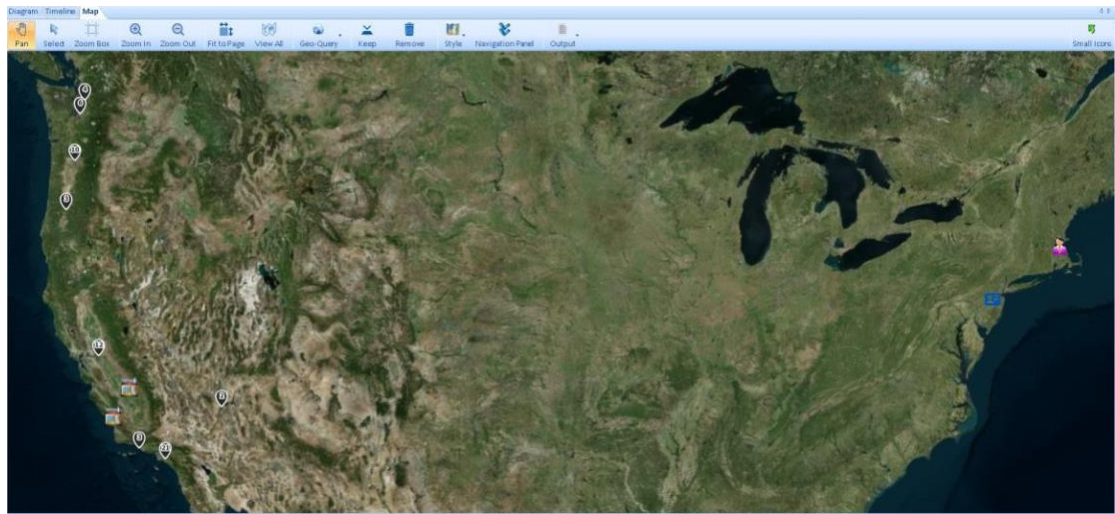


Hybrid shows a map with satellite imagery of topography, borders, and labels:



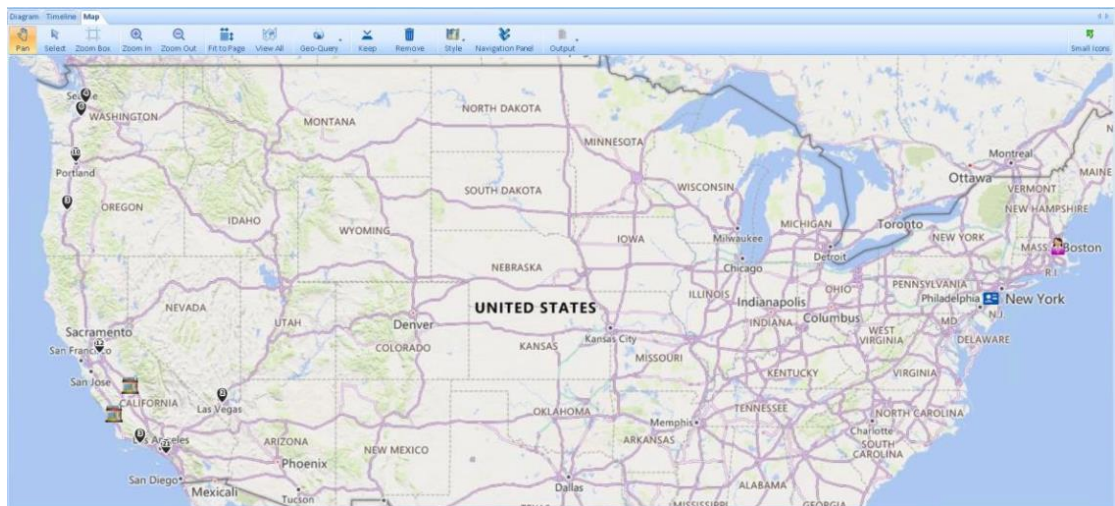
Visualizer Online Maps: Hybrid Style

Imagery shows the map with satellite pictures, but no borders or geographic labels:

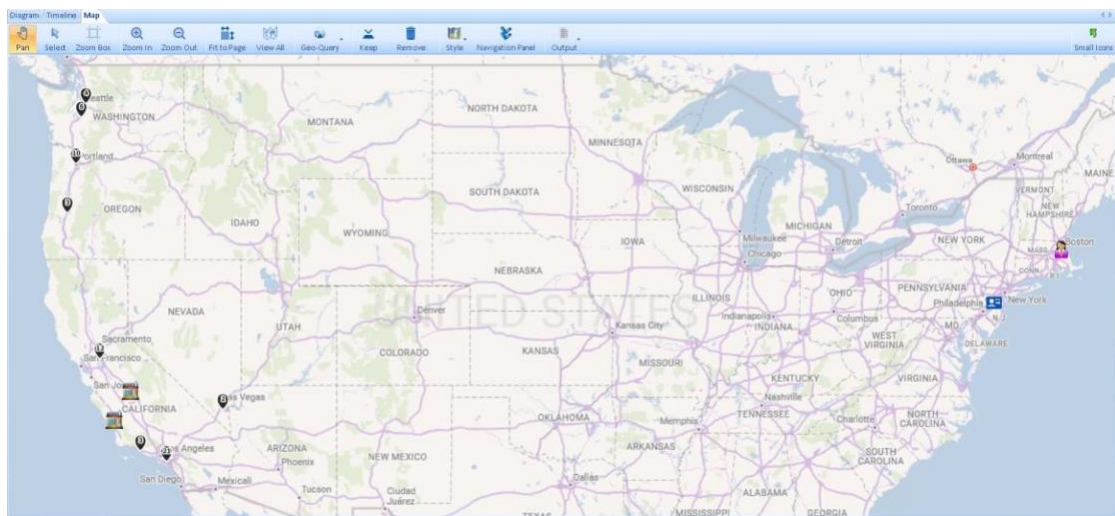


Visualizer Online Maps: Imagery Style

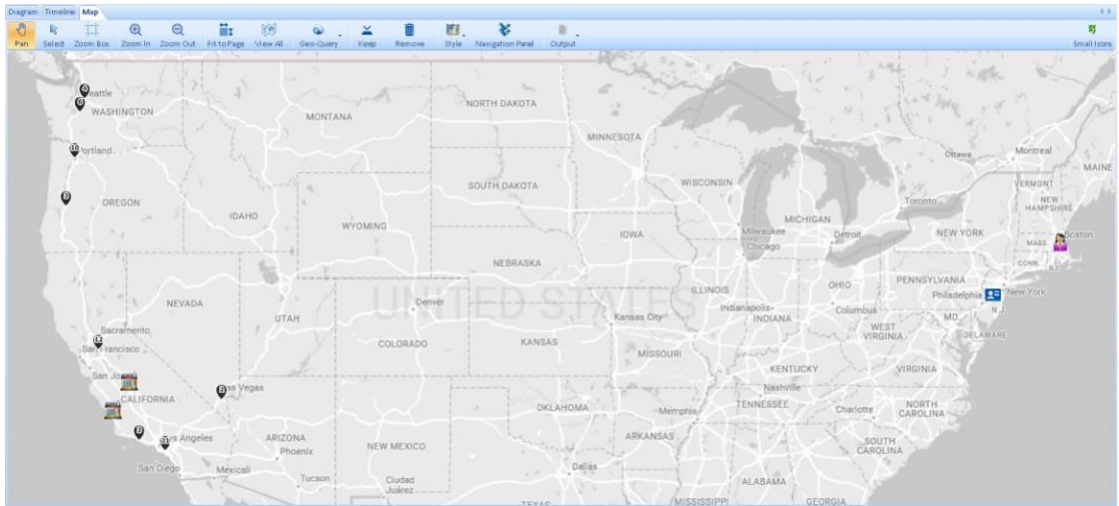
The Road style shows roads, borders, and geographic labels on a plain background.



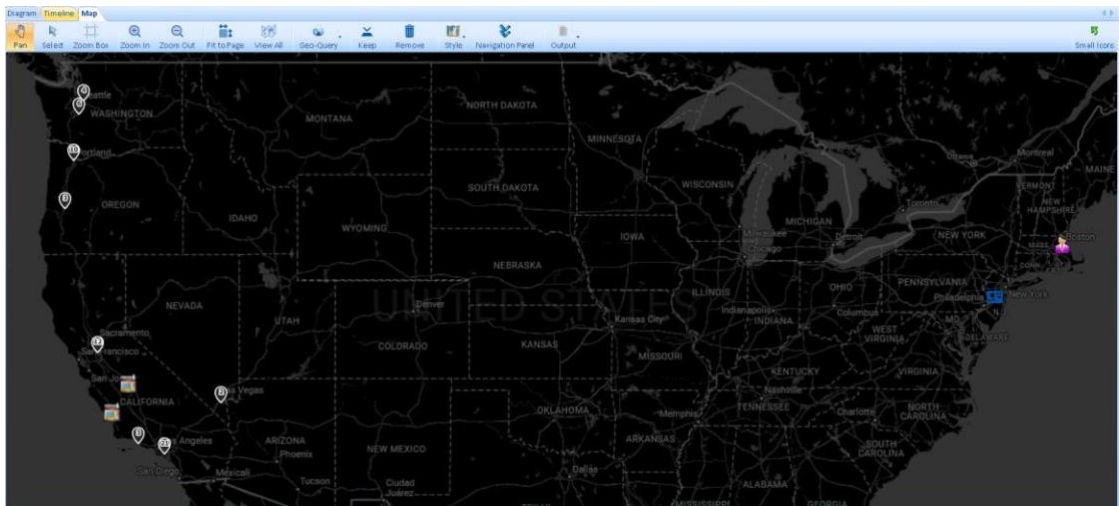
Visualizer Online Maps: Road Style



Visualizer Online Maps: Road Light Style

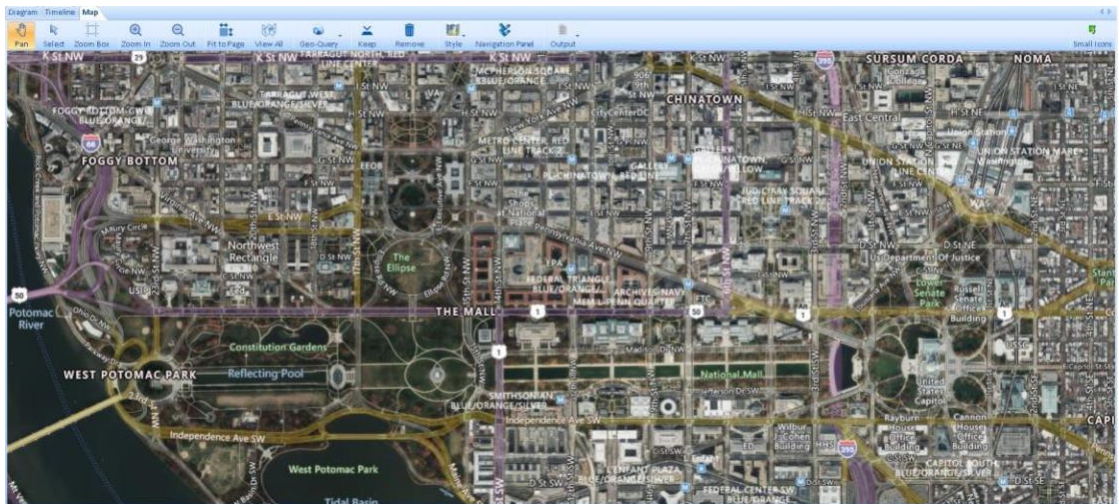


Visualizer Online Maps: Road Gray Style

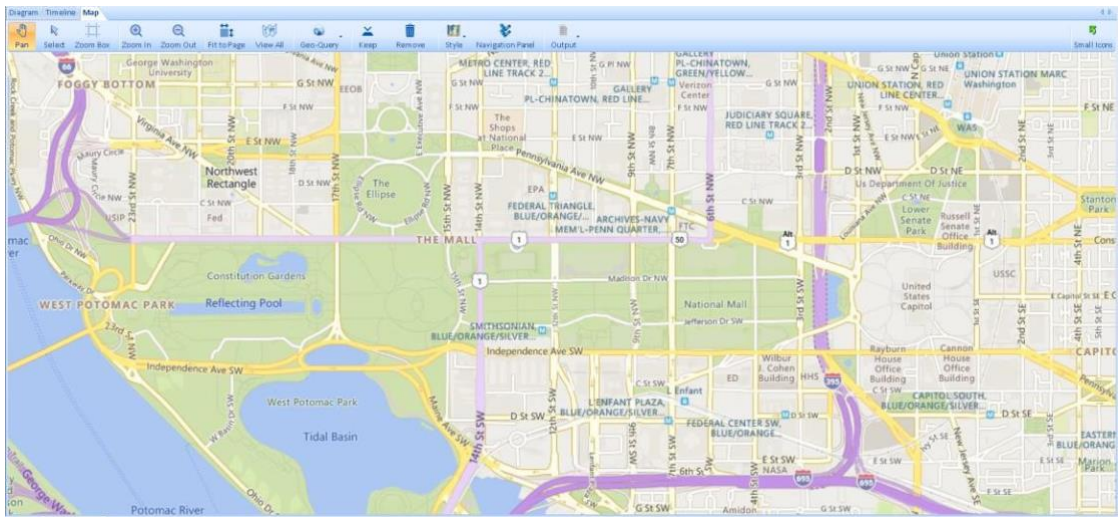


Visualizer Online Maps: Road Dark Style

The online maps support zooming to street level:



Visualizer Online Maps: Hybrid Style Zoomed to Street Level

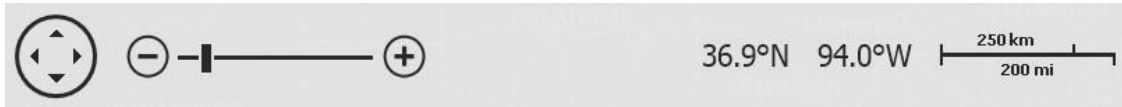


Visualizer Online Maps: Road Style Zoomed to Street Level

Navigation Panel



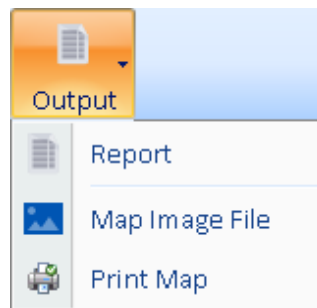
The Navigation Panel button toggles an area at the bottom of the map to help you move around the map and zoom on the left side. The right side shows the location and distance scale.



Navigation Panel

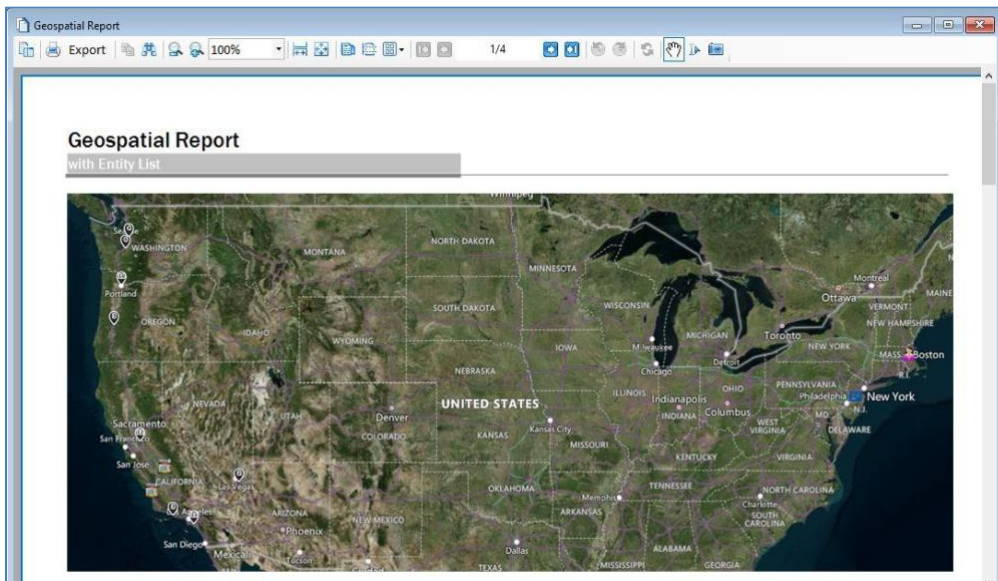
Output

The [Output] button sends your map to a report, file or printer.



Report

Create a report with the map image and list of entities sorted by latitude and longitude.

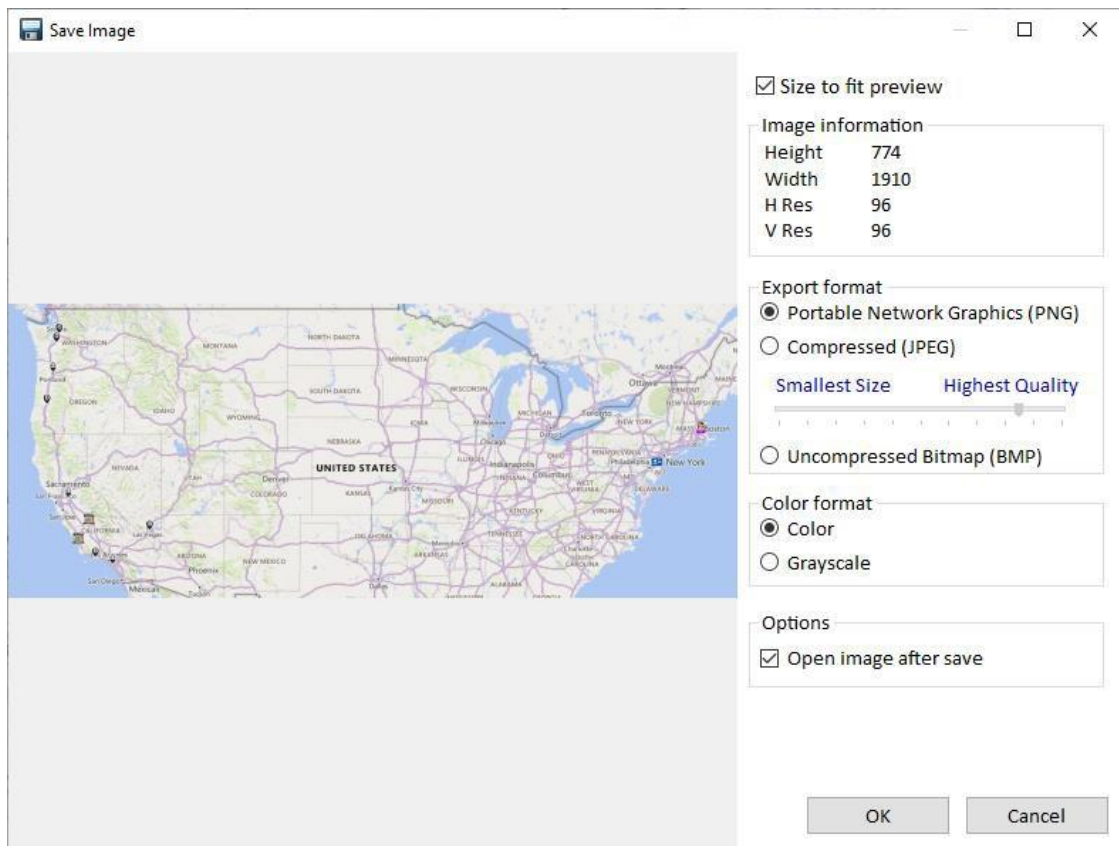


Map Report, List of Entities not Shown

See **Report Viewer** on page 106 for more information about using the Report Viewer form.

Map Image File

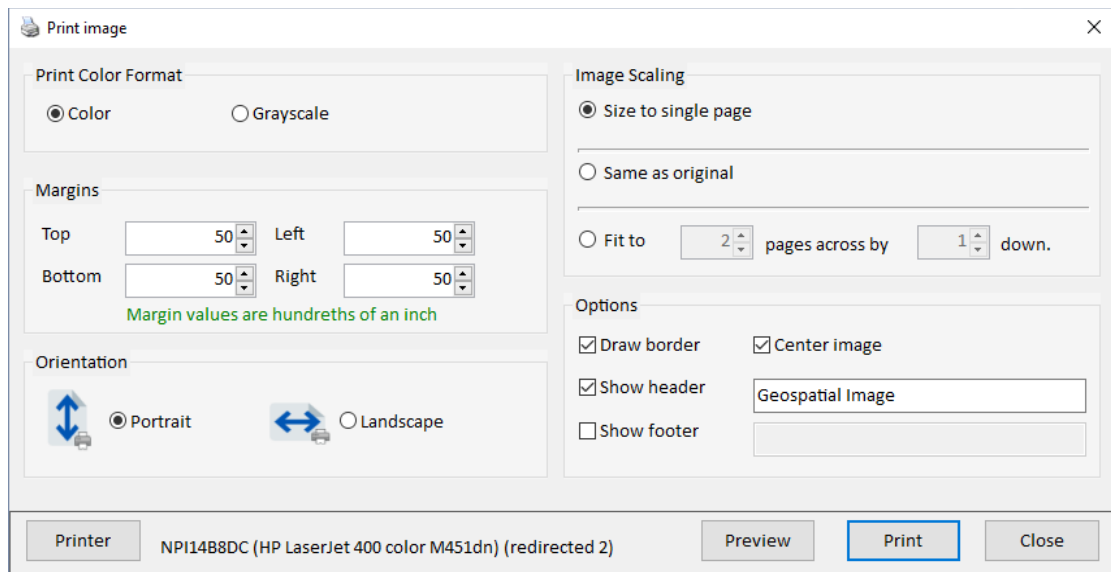
Save the map to an image file.



The form is similar to the Visualizer Export tool in the **Diagram Image File** on page 142.

Print Map

The printed image is an exact copy of the map sent to your specified printer.



General Settings

- **Print Color Format:** Select color or grayscale.
- **Margins:** Set the margins in hundredths of an inch.
- **Orientation:** Select Portrait or Landscape layout.

Image Scaling

- **Size to a single page:** Resize the map to fit within the printable margins on a single page.
- **Same as original:** Do not scale the image—the number of pages depends on your map size.
- **Fit to:** Scale the image to fit within the number of specified pages.

Print Options

- **Draw Border:** Draw a one-pixel border around the diagram image.
- **Center Image:** Center the image within the printed page.
- **Show Header:** Add customized text to the top of each printed page.
- **Show Footer:** Print the page position at the bottom of each page and optionally add customized text.

Set Printer Options

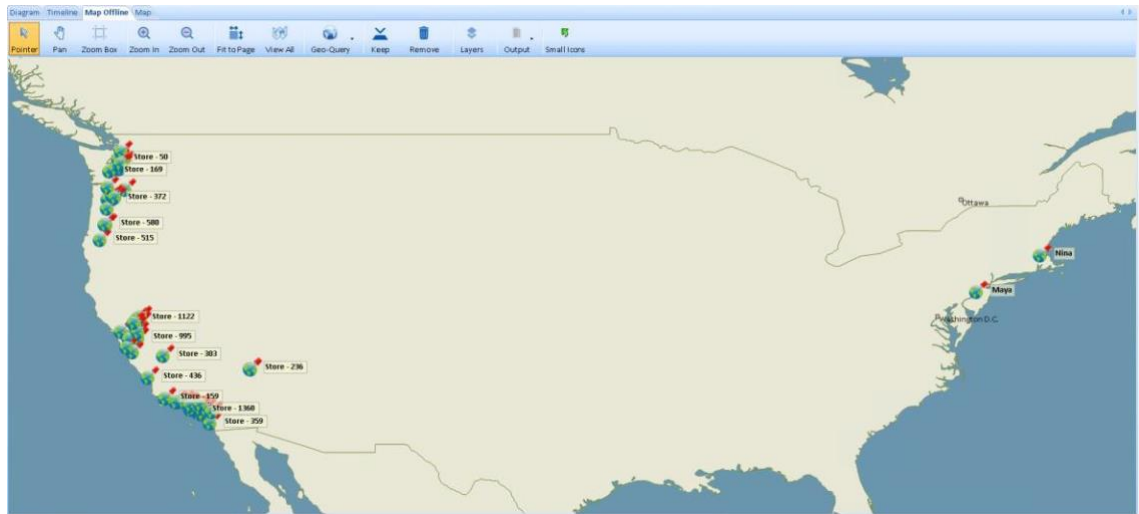
Click the [Printer] button to set printer-specific options.

Preview and Print

To preview, especially for large diagrams that may require many pages, 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 map, return to the Print form and click the [Print] button.

Offline Maps

If internet connectivity is not available or offline maps are activated, the Map Offline tab appears:

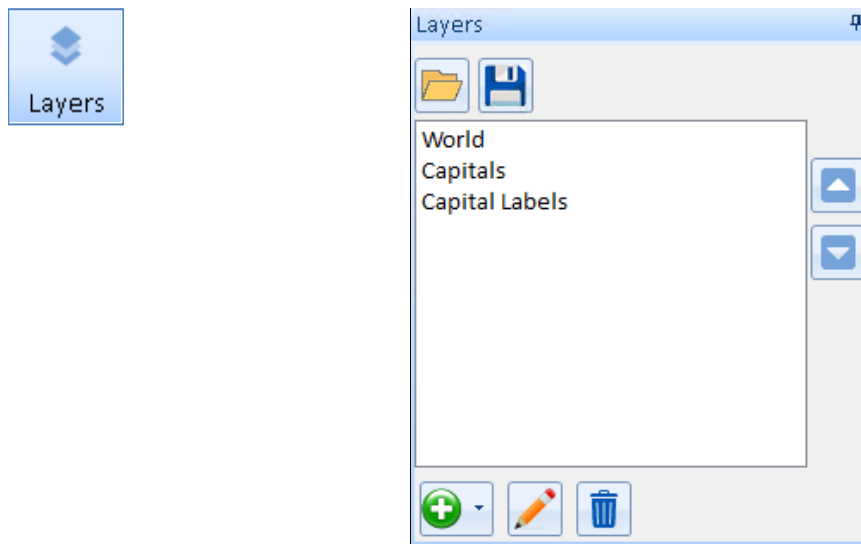


Visualizer Offline Map




The toolbar for Map Offline is similar to the Map tab with a Layers button to use shape files.




Layers

The offline map supports Shapefiles, ArcGIS server, and GeoTIFF. Shapefiles, links to an ArcGIS server, and GeoTIFF's are managed through layers. Click the [Layers] button on the toolbar to open the Layers panel on the left side of the map.



The Layers panel includes these buttons:

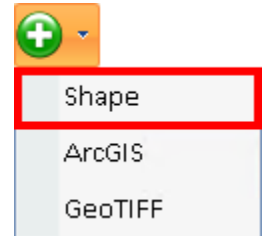
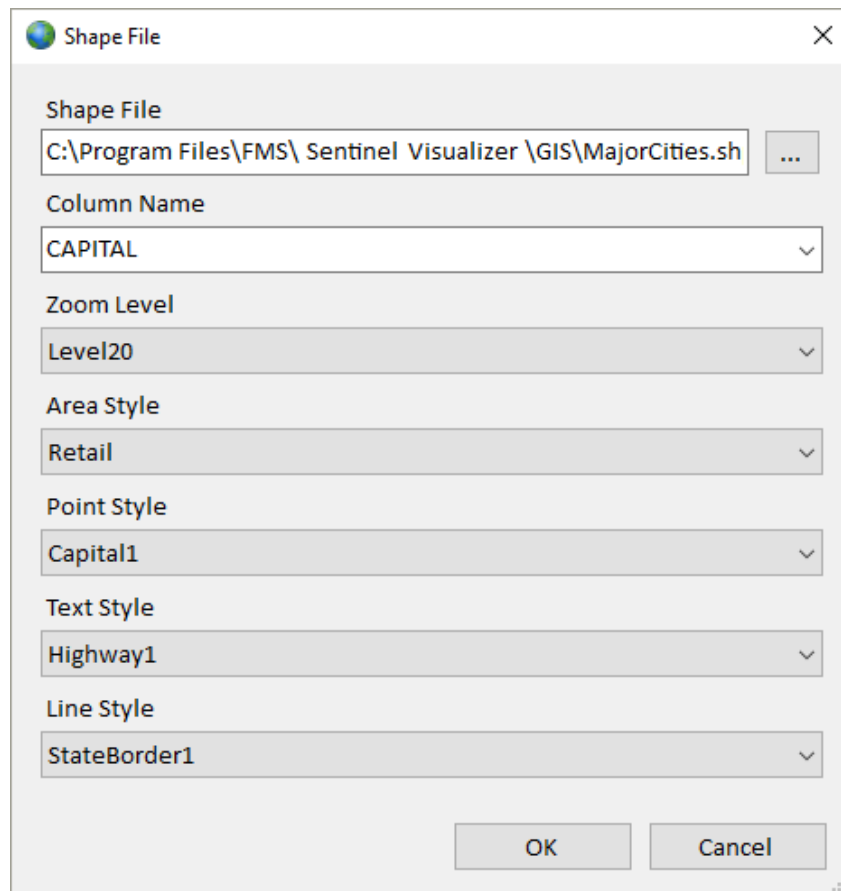
	<p>Add a Layer: Use the drop down to add a Shape or ArcGIS file.</p>
	<p>Edit a Layer: Edit the existing layer.</p>
	<p>Remove a Layer: Use the trash icon to remove an existing layer.</p>

	<p>Change the Order of Layers: Layers are applied from the top of the list to the bottom. Reorder the list to your needs.</p>
	<p>Save Layers: Save the set of Layers to reload them on another map.</p>
	<p>Open Layer: Open (load) a saved set of layers into the Map.</p>

Add a Shape File Layer

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

To add a shape file, select the plus dropdown and select Shape to open the Shape File editor:

The dialog box titled "Shape File" contains the following fields and options:

- Shape File:** C:\Program Files\FMS\ Sentinel Visualizer \GIS\MajorCities.sh
- Column Name:** CAPITAL
- Zoom Level:** Level20
- Area Style:** Retail
- Point Style:** Capital1
- Text Style:** Highway1
- Line Style:** StateBorder1

Buttons: OK, Cancel

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.

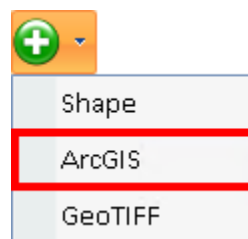
Select [OK] and the shape file is added to the map.



Add 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:

ArcGIS Layer

Name
New ArcGIS Layer

ArcGIS Server
http://sampleserver1.arcgisonline.com/ArcGIS/rest/services/Specialty/ESRI_StateCityHighway_USA/MapServer

Image Format
Png

Parameters

Parameter	Value
transparent	true

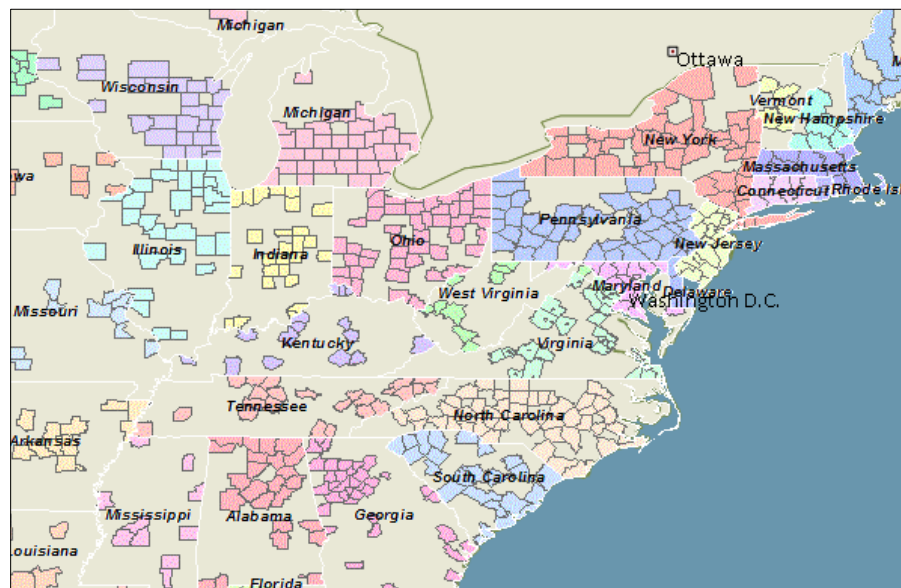
OK Cancel

ArcGIS Layer Options

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.

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



Example of ArcGIS Layers

Parameters

ArcGIS accepts many 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**.

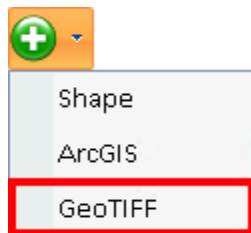
Filter

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**.

Add 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 which opens a File Open dialog.



Google Earth Integration

SentVi 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.

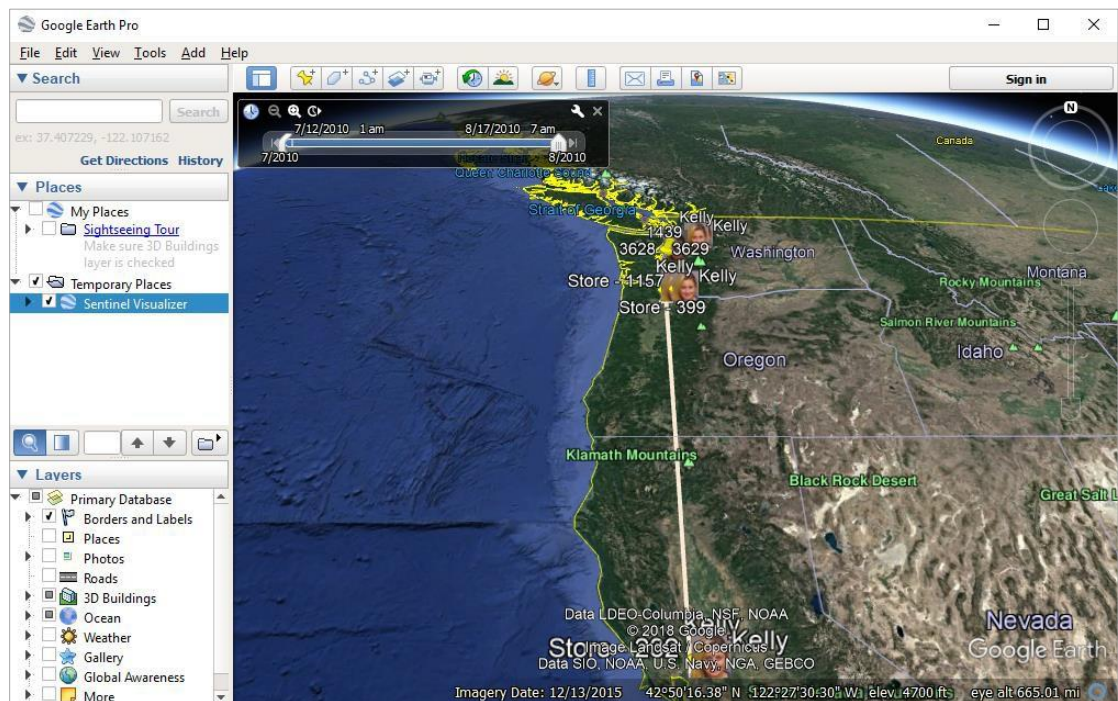
Google Earth must already be installed on your machine to use this feature. Google Earth can be installed from <https://google.com/earth/>

Launching Google Earth Integration

This feature is available from the SentVi toolbar. To launch Google Earth integration, click the Google Earth button.



After a moment, Google Earth opens:



Data Plotted on Google Earth

Google Earth and Place Names

Unlike SentVi'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:

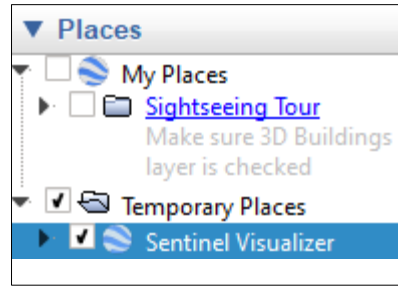
1. The latitude and longitude fields within the Entity record must carry a value, or
2. The Entity Type must be marked as a Location, and the Entity Name field must have enough address information for Google Earth to translate it correctly.

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.

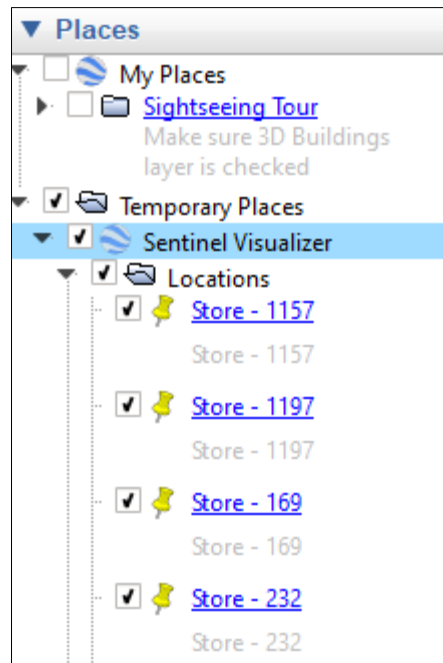
The address information must be placed in Entity Name.

Google Earth Places

Using the Google Earth tabs on the left of the screen, see all items added by SentVi.



Under the Temporary Places folder, there is an item named “SentVi”. Click on the triangle to the right of the text to expand the list:



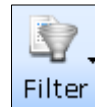
How SentVi Exports Data

When you click the [Google Earth] button, SentVi gathers the following data from entities and relationships currently displayed on the SentVi 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 SentVi. For example, if you have filtered out entities of a specific type, those entities are not exported to Google Earth.

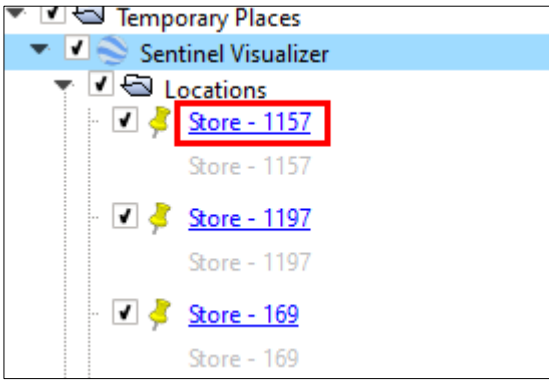
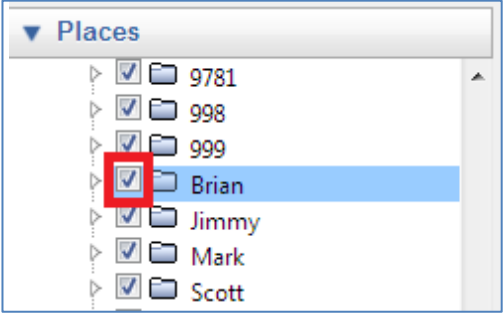
If you want to see all items, return to SentVi and remove all filters. You can quickly remove filters by using the [Filtered] button on the Visualizer toolbar:



Non-location entities that are connected to locations are placed at the same location as the location Entity.

Google Earth Tools

These SentVi-specific features are available in Google Earth.

Navigating to an Item	Hiding and Showing Items
<p>You can quickly navigate to any item in the Sentinel Visualizer list by clicking on the hyperlink for the location or the entity.</p>  <p>The screenshot shows a tree view in Google Earth. Under "Temporary Places", there is a folder named "Sentinel Visualizer". Inside it is a folder named "Locations". Under "Locations", there are three items: "Store - 1157", "Store - 1197", and "Store - 169". Each item has a checkmark icon to its left. The "Store - 1157" item is highlighted with a red box.</p>	<p>You can hide or show any item on the map by clicking on the check box next to the item.</p>  <p>The screenshot shows a "Places" list in Google Earth. It contains several folders: "9781", "998", "999", "Brian", "Jimmy", "Mark", and "Scott". Each folder has a checkmark icon to its left. The "Brian" folder is highlighted with a red box.</p>

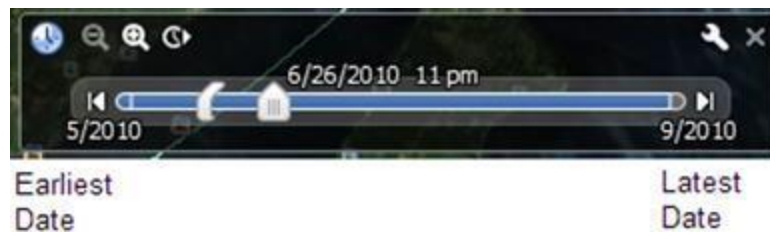
Google Earth Timeline Tools

When SentVi 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.



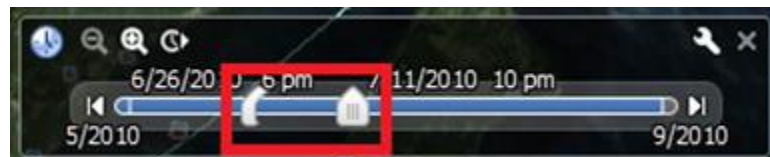
Using the Play Feature

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.



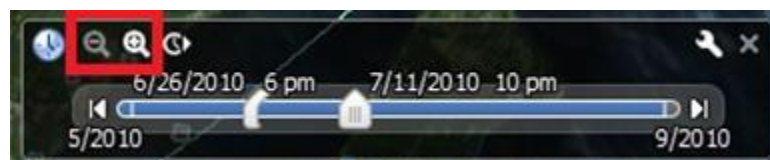
The visible relationships are those that occur within the time window. The time window is defined by the start date object on the timeline and the current position indicator. All relationships whose start/end dates exist between those positions are shown on the map.



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.

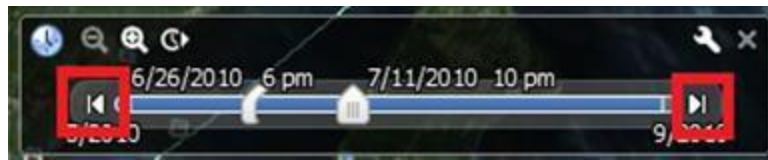
Using the Zoom Feature

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.



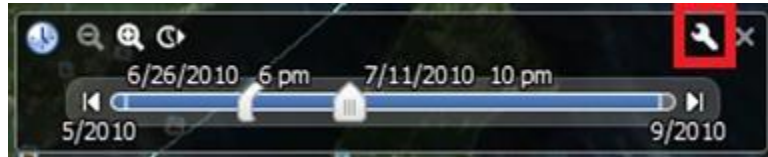
Moving to the Earliest and Latest Dates

You can quickly move to the earliest and latest dates within the time range by clicking on the beginning and end buttons.

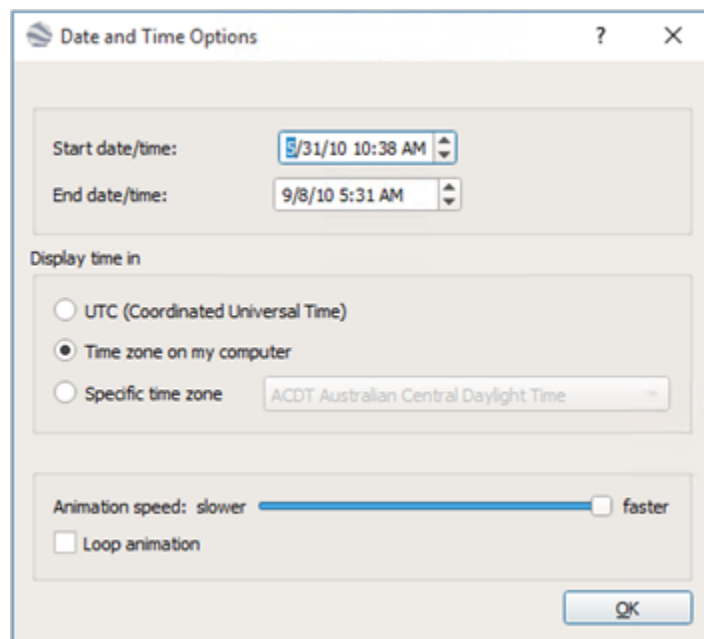


Setting Options

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:

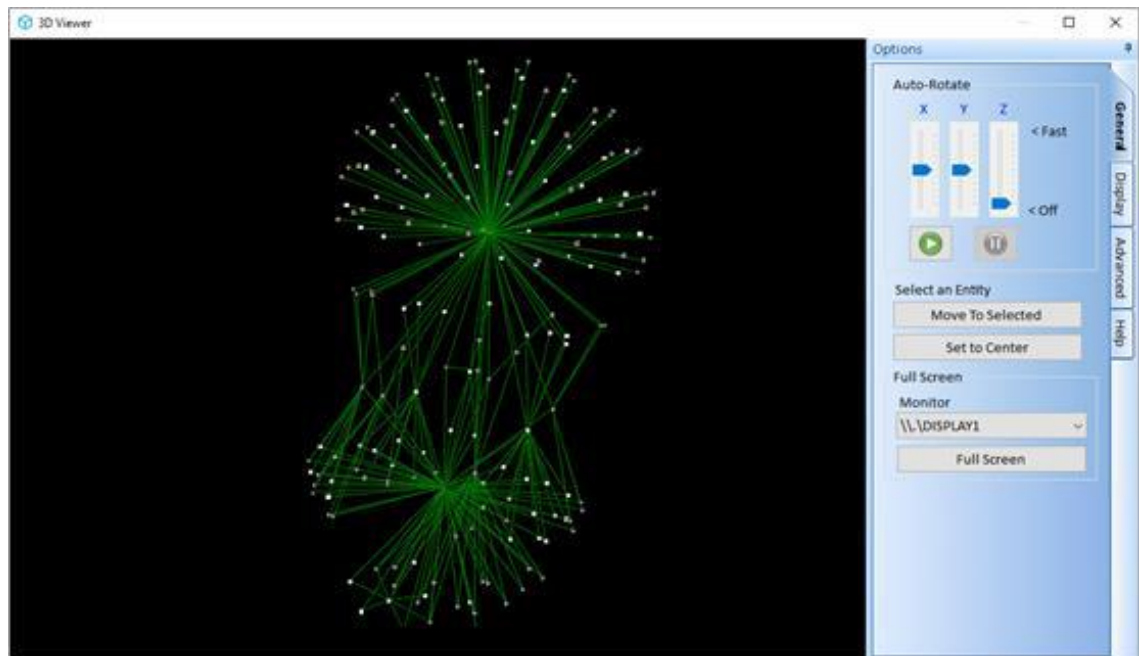
- **Start date/time:** View or set the earliest visible date/time.
- **End date/time:** View or set the latest visible date/time.
- **Display time in:** Set the time format to use. You can choose UTC, the time zone setting currently active on your computer, or a specific time zone from the drop-down 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 18: Three-Dimensional Viewer

SentVi allows you to visualize diagrams beyond the traditional two-dimensional link analysis view. With the three-dimensional (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

Click the [3D Viewer] button on the toolbar to display your diagram in three dimensions.

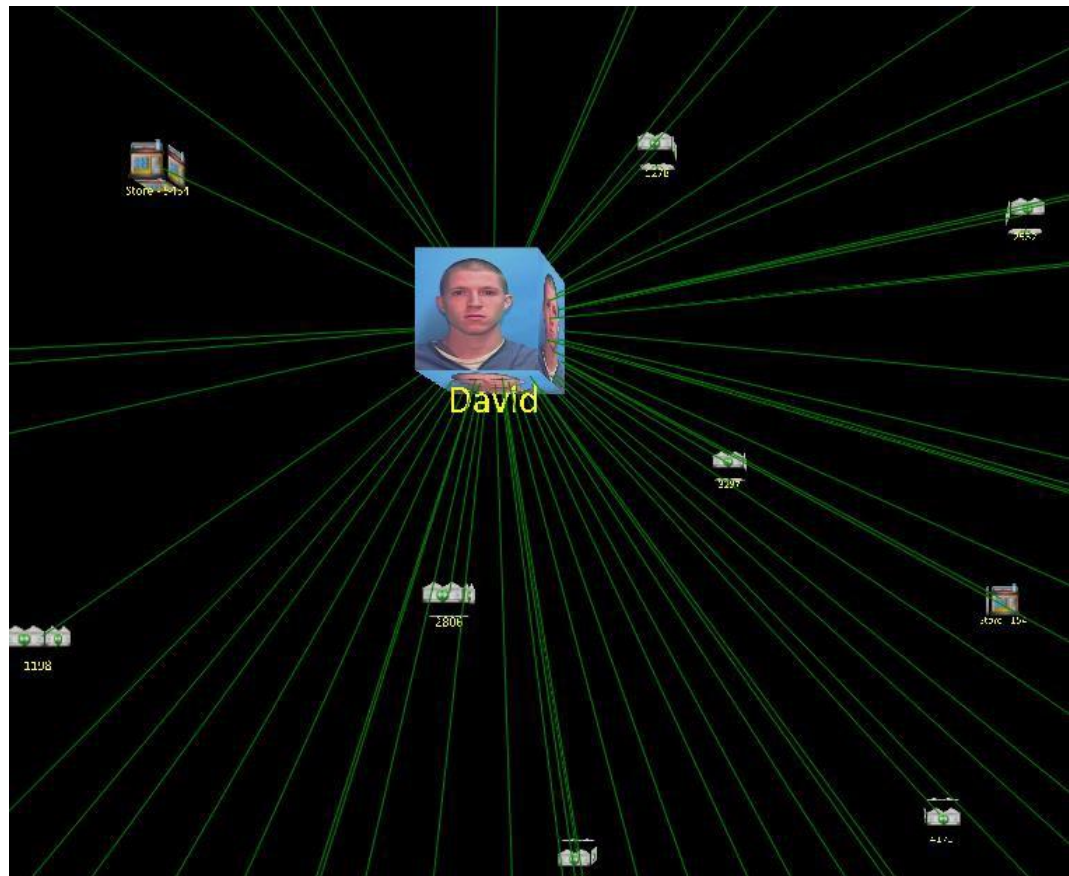


Navigate through Three Dimensions

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.

Rotation can be animated from the Display tab's auto-rotate feature.



3D Viewer Zoomed into an Entity with an Image

You can also select an entity that you want to act as the center point for rotation by double-clicking on it.

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.

Panels

The right panel has several tabs to customize your 3D View.

General Tab

The General Tab contains the following controls:

- Auto-Rotate:** Three sliders for X, Y, and Z axes. The Z slider is set to '< Off'. A speed indicator shows '< Fast'. There are play and pause buttons.
- Select an Entity:** Two buttons: 'Move To Selected' and 'Set to Center'.
- Full Screen:** A dropdown menu for the monitor (currently showing '\\.\DISPLAY1') and a 'Full Screen' button.

Display Tab

The Display Tab contains the following controls:

- Color Selection:** Three color swatches: Green for 'Line color', Yellow for 'Label color', and Red for 'Selected color'.
- Stereo Options:** Radio buttons for 'Normal', 'Side by Side', 'Over / Under', and 'Anaglyph' (which is selected). Under 'Anaglyph', there are radio buttons for 'Red/Cyan' (selected) and 'Red/Blue'.
- Inter-Pupillary Distance:** A numeric input field set to '5' with up/down arrows.
- Swap Eyes:** A checkbox that is currently unchecked.

Advanced Tab

The Advanced Tab contains the following controls:

- Projection:** Five numeric input fields: 'Near clip' (10), 'Far clip' (10000), 'ScreenZ' (10), 'Depth' (0), and 'FOV' (60).
- Perspective Correction:** Radio buttons for 'None', 'Speed' (selected), and 'Quality'.
- Line Smoothing:** Radio buttons for 'None', 'Speed' (selected), and 'Quality'.
- Polygon Smoothing:** Radio buttons for 'None' (selected), 'Speed', and 'Quality'.
- Renderer:** A dropdown menu currently set to 'OpenGL'.

Help Tab

The Help Tab contains the following information:

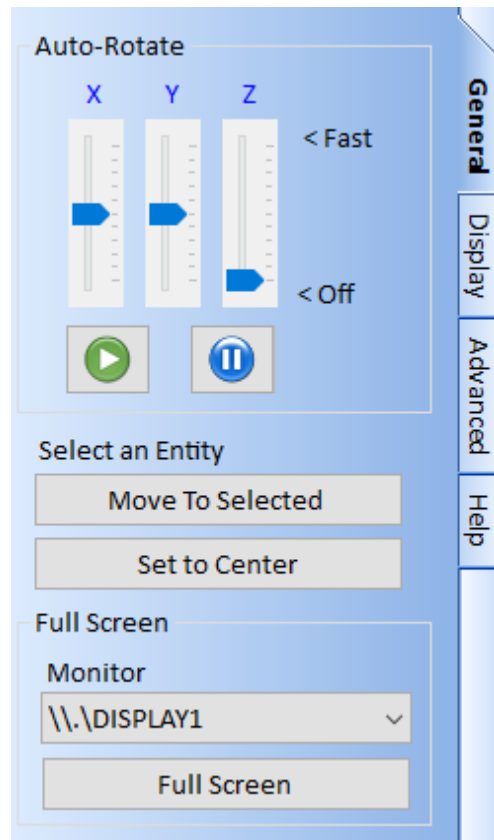
- Navigation Keys:**

Arrow keys	Pan
[S]	Zoom in
[X]	Zoom out
[Alt]+[S]	Grid Forward
[Alt] + [X]	Grid Backward
- Mouse:**

Double-click	Select Z point
Left-drag	Pan
Right-drag	Rotate
Wheel	Zoom

General Tab

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.



Play to begin rotating



Pause to stop animation

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.

Display Tab

The Display tab lets you set colors and stereo buttons to support anaglyph glasses.



Color Settings

There are three color settings:

- **Line Color:** Color for the relationship connector lines.
- **Label Color:** Color for Entity labels.
- **Selected Color:** Color to display the selected (highlighted) entities.

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.

Advanced Tab

The Advanced tab manages additional options for projection, performance, and renderer:

Projection

- Near clip
- Far clip
- ScreenZ
- Depth
- FOV

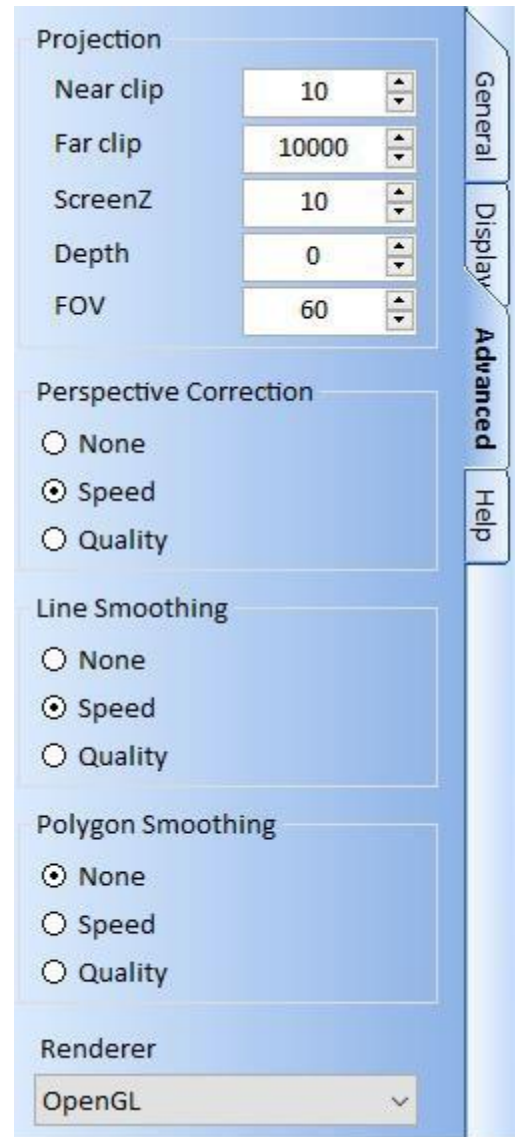
Speed and Quality Adjustments

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.

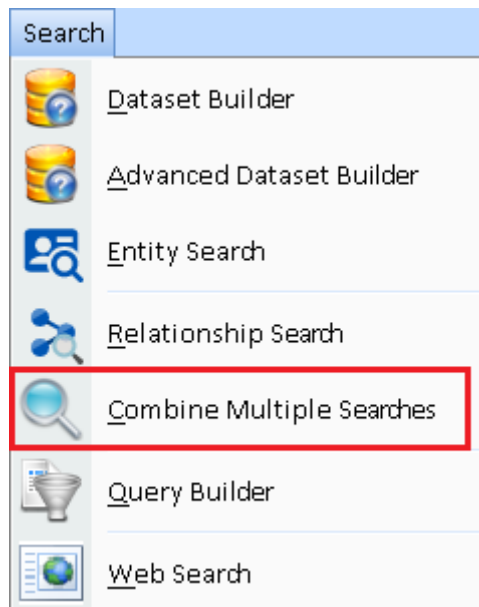


Chapter 19: Additional Searches

Perform advanced search analysis by combining your saved entity and relationship searches. You can also combine and compare saved Visualizer diagrams and perform web searches.

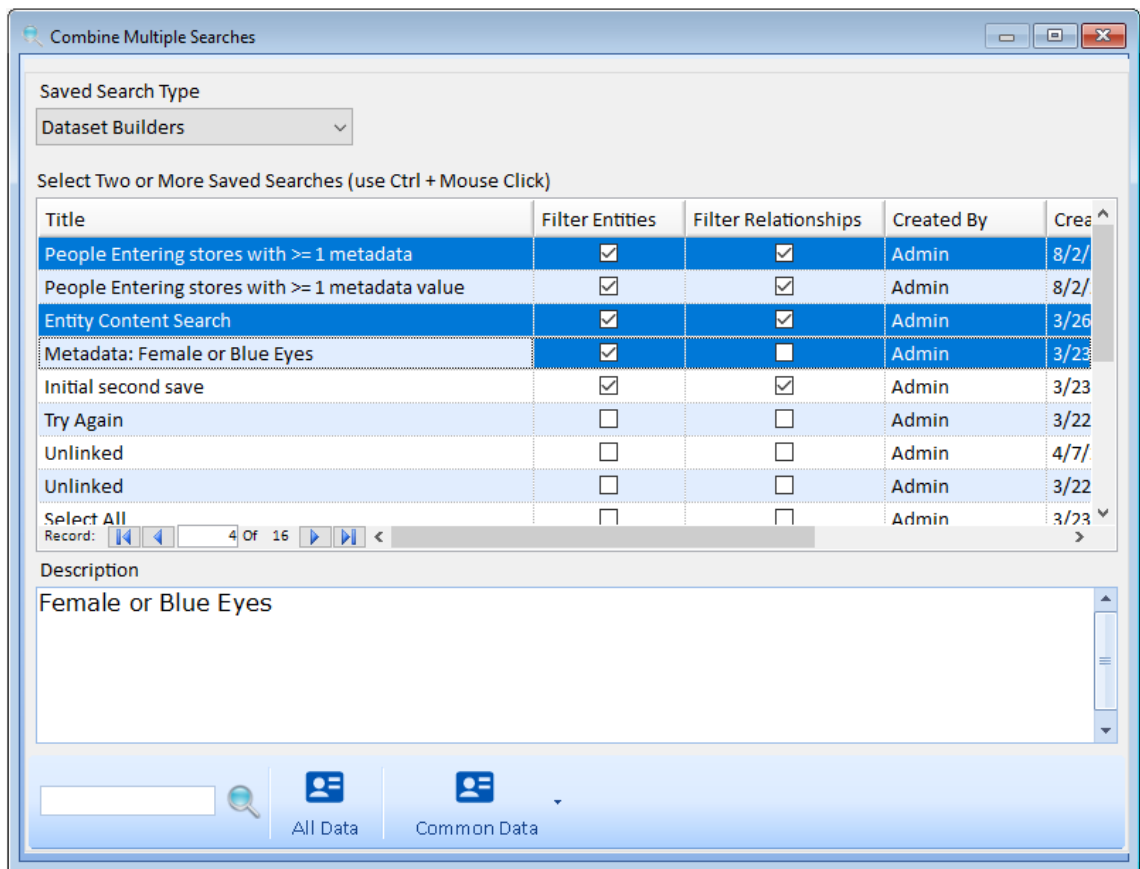
Combine Multiple Searches

Searches for entities and relationships can be saved. Under Search, [Combine Multiple Searches], you can select and perform analysis among them.



Unlike saved Visualizer Diagrams which save specific items, saved searches are applied against your current database, so its results change with your data. Combine multiple filters to show their Entities and Relationships.

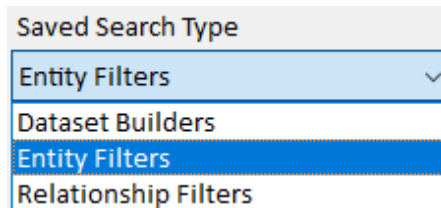
For instance, you saved a search for each crime scene with entities around a particular location and time. As your database is updated, each search retrieves new results. Wouldn't it be interesting to find entities that appeared in all or most of the crime scenes?



Select the Saved Searches to Combine

Saved Search Type

In the top left, choose the Saved Search Type based on where you saved the search:



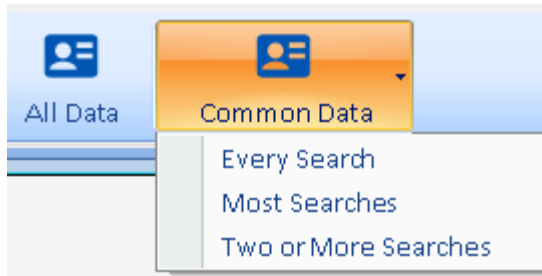
- **Dataset Builders** are saved in the Advanced Dataset Builder with columns showing if they include Entity and/or Relationship Filters.
- **Entity Filters** includes saved Entity Searches plus Dataset Builders with entity filters.
- **Relationship Filters** includes saved Relationship Searches plus Dataset Builders with relationship filters.

Selecting Saved Searches

Click on the rows to select them. Use Ctrl Click to select each row.

Click the [All Data] button to generate the list of all entities and relationships among the selected rows.

When more than two rows are selected, the [Common Data] button is enabled to find common items among them:



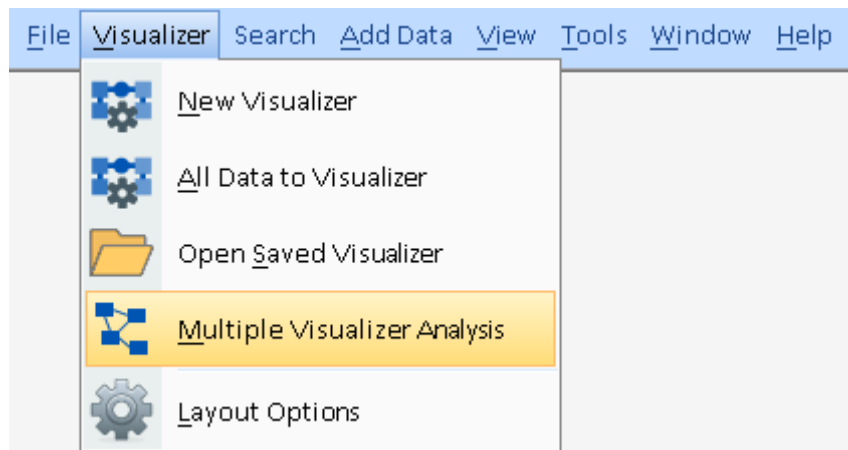
- **Every Search:** Find Entities and Relationships that are in every selected search. These are the highest value targets.
- **Two or More Searches:** Entities that are in at least two of the searches.
- **Most Searches:** Determine the maximum number of selected filters that an entity is found and show those. For instance, 10 filters are selected, but no Entities are in all 10. SentVi finds that the most filters an entity is in is 7, so it shows the entities (and relationships) that are in 7.

Results are displayed in a form identical to displaying the results from the Advanced Dataset Builder, Entity Search, and Relationship Search, with options to send it to Visualizer, Excel, etc.

Multiple Visualizer Analysis

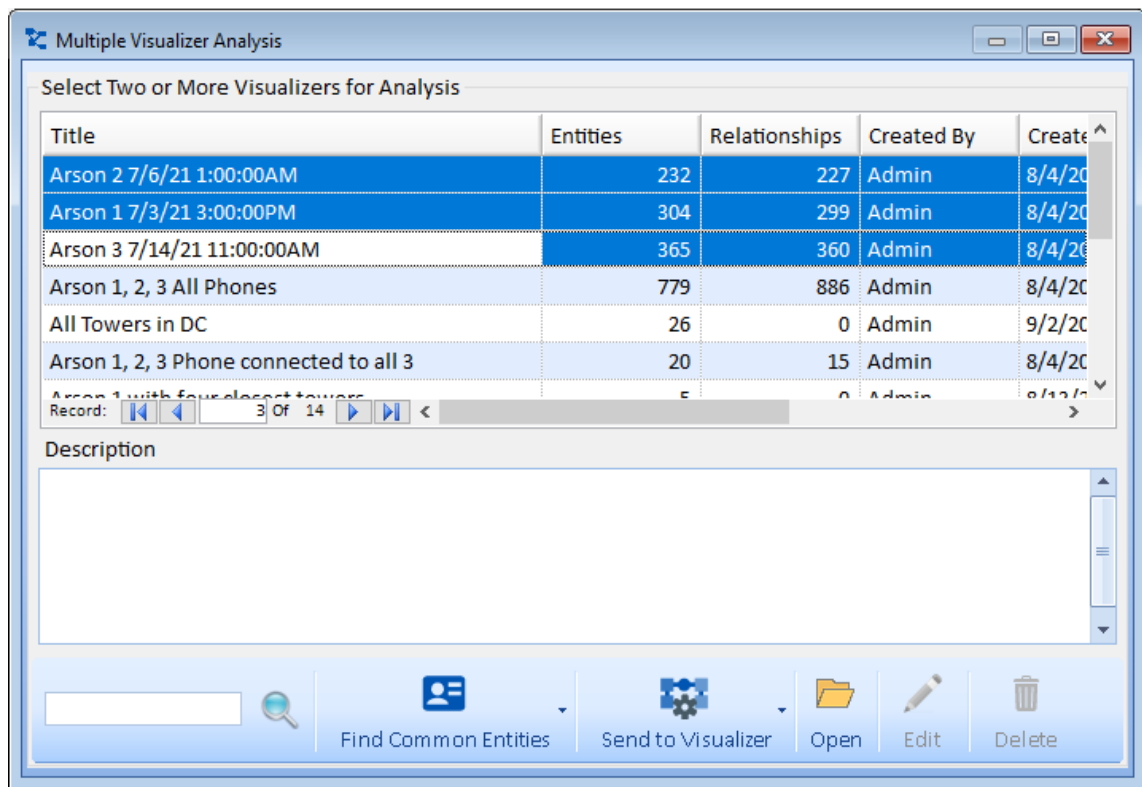
The Visualizer lets you save your diagrams with its list of entities and relationships. The Multiple Visualizer Analysis feature lets you see if they have entities in common.

This can be particularly helpful if your saved visualizers represent data from specific places and times like crime scenes, to see if any entities are the same among several of them. The analysis finds entities that are in all the selected visualizers, the most, or at least two.



Multiple Visualizer Analysis under Visualizer

When you select [Multiple Visualizer Analysis] from the Visualizer menu or Home Page, the list of Saved Visualizers appears:

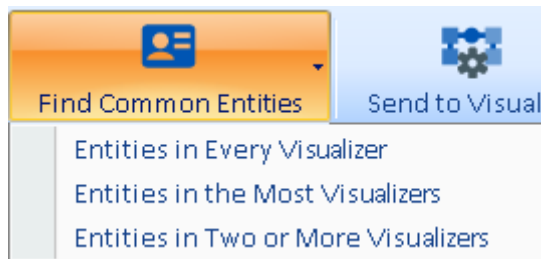


Select from the List of Saved Visualizers

Select one or more of them to analyze by using Ctrl and Mouse Click, then press one of the buttons in the toolbar.

Find Common Entities

If two or more saved Visualizers are selected, the [Find Common Entities] button is enabled with three options. The last two are enabled if 3 or more are selected.



Find Common Entities Options

Get a list of Entities among the selected saved Visualizers based on the three options:

Entities in Every Visualizer

Retrieve the list of entities in all the selected visualizers.

Entities in the Most Visualizer

With 3 or more selected, entities, there may not be an entity in all of them. This finds the entities in the most of them. For instance, if 4 saved visualizers are selected, there may not be any entities in all 4, but some in 3 of them.

Entities in Two or More Visualizers

Retrieve the list of entities in two or more of the selected visualizers. The results show the number of visualizers it's found in, and the list of them below:

The screenshot shows a software window titled "Multiple Visualizer Analysis". It contains two main tables and a toolbar at the bottom.

Entities in the Selected Visualizers

Found In	Entity Name	Entity Type	Image	Unique ID
3	Brian	Person		119
3	Mark	Person		102
2	Kelly	Person		95
2	Mary	Person		218

Record: 1 Of 5

Visualizers the Selected Entity is in

Title	Entities	Relationships	Created By	Created Date
4 People	4	0		8/1/2021 6:13:30 PM
5 People	5	0		4/7/2021 1:49:14 AM
Four people	4	0		4/10/2020 11:04:47 AM

Record: 1 Of 3

Toolbar: Visualize All, Visualize Selected, View Entity, All to Excel, Reports

Entities in Two or More Visualizers with Found In Column and the Visualizer List in the Bottom Grid

The toolbar at the bottom is similar to viewing other entity lists where you can send the selected entities to a new Visualizer, entity form, and Excel.

The Reports button opens a report grouped by Found In in descending order.

Common Entities Across Visualizers		
Entity Name	Entity Type	Entity ID
Found In 3		
Brian	Person	1863
Mark	Person	1862
Found In 2		
Kelly	Person	1861
Mary	Person	1864
Thomas	Person	1860
Selected Saved Diagrams		
Four people		
5 People		
4 People		

Common Entities Across Visualizers Report

Send to Visualizer

If two or more saved Visualizers are selected, the [Send to Visualizer] button is enabled.



Send to Visualizer Options

The [Send to Visualizer] button opens a new Visualizer window with these items:

Only Common Entities

Send the entities that are in EVERY selected saved Visualizer.

Only Common Entities and Relationships

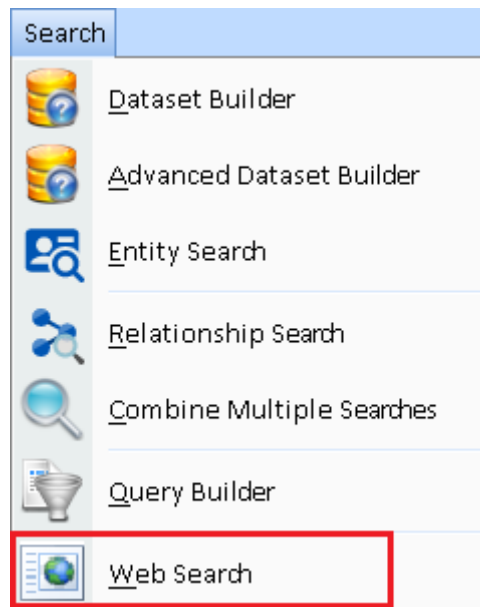
Send the entities and relationships that are in EVERY selected saved Visualizer.

All Entities and Relationships

Send the entities and relationships in ANY of the selected saved Visualizers.

Web Search

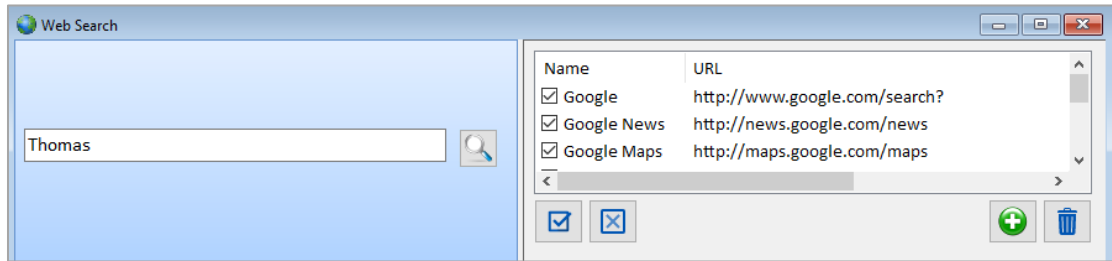
SentVi can search the web for information across multiple search engines at one time. The Web Search feature is available from the 'Search' tab, on the Menu Tool bar.




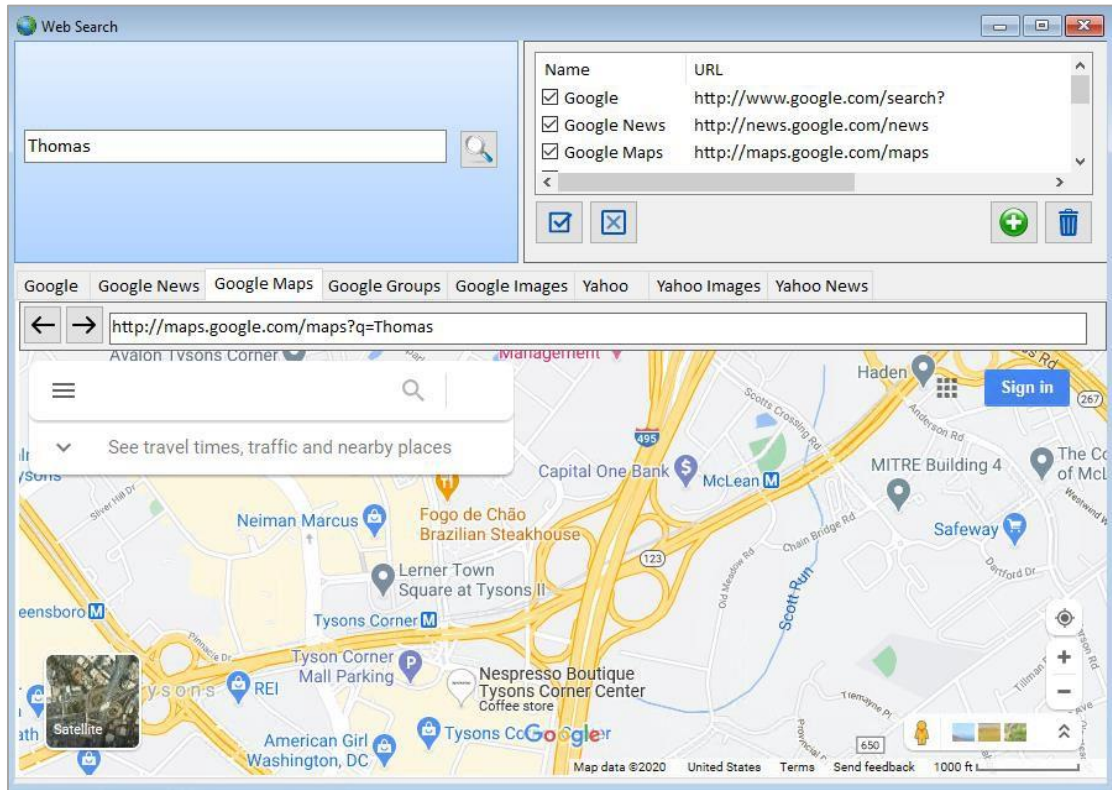
It is also available from the Entity form's toolbar:



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 SentVi 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:

The screenshot shows a dialog box titled "Add a New Site" with a close button (X) in the top right corner. The dialog contains three text input fields:

- Site name:** Microsoft Bing
- URL:** www.bing.com
- Search token:** search?q=

At the bottom right of the dialog are two buttons: "OK" and "Cancel". The "OK" button is highlighted with a blue dashed border.

- 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 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.

Chapter 20: Query Builder

SentVi 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. It then builds a result list that can be previewed, or sent to the Visualizer, reports, Excel, or an XML file.

Query Builder Basics

The Query Builder lets you visually find entities and relationships in your database.

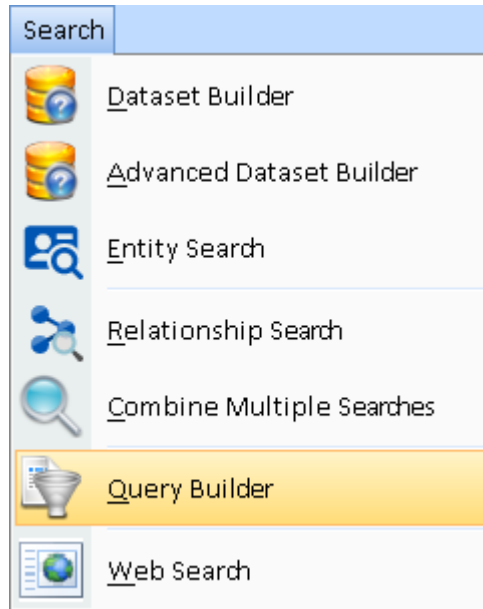


Example of finding Female Blondes who Made Returns at Stores in 2023 or later.

- Create boxes for Entities and Relationships and set criteria for their columns to select them.
- Set criteria values to find matching, not matching, contains, starts with, ends with, greater than, less than, etc.
- For columns with a lookup table, select from a dropdown value.
- For non-required columns, search for blank or not blank values.
- Link Entity boxes to the relationship’s Entity TO and Entity FROM sides.
- An unlimited number of metadata filters can be applied on entities to find entities with multiple values or one of several.
- Combine unlinked Entity and Relationship boxes (UNION queries among them).

Start the Query Builder

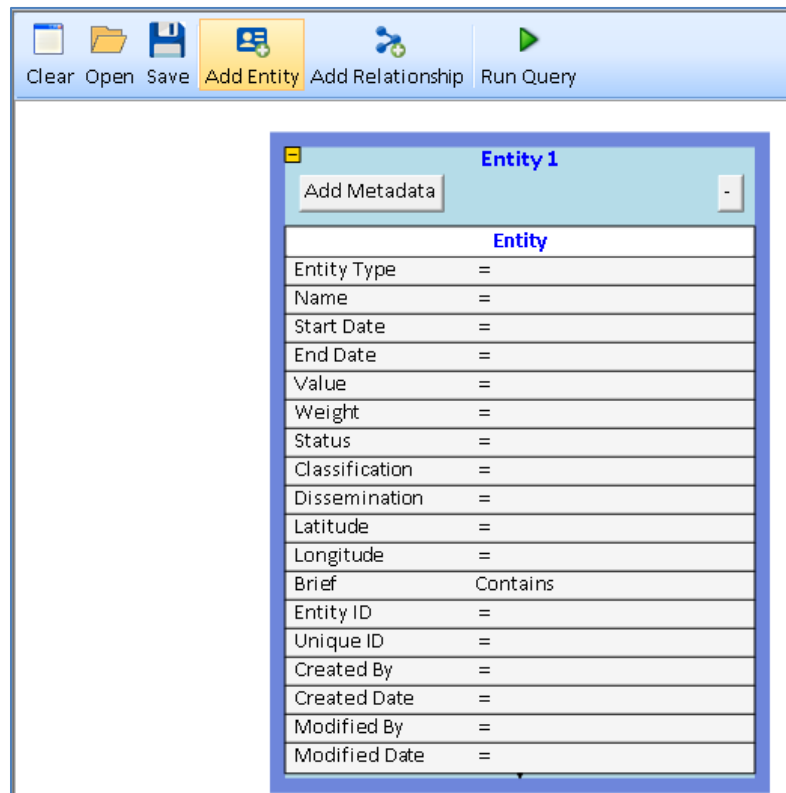
To launch the Query Builder, click the 'Search' tab on the Tools menu and select [Query Builder].



The Query Builder screen is like Import where you place boxes for entity and relationships and enter values for the columns.

Add Entity Criteria Box

To query entities, click [Add Entity] on the toolbar to create an entity criteria box.

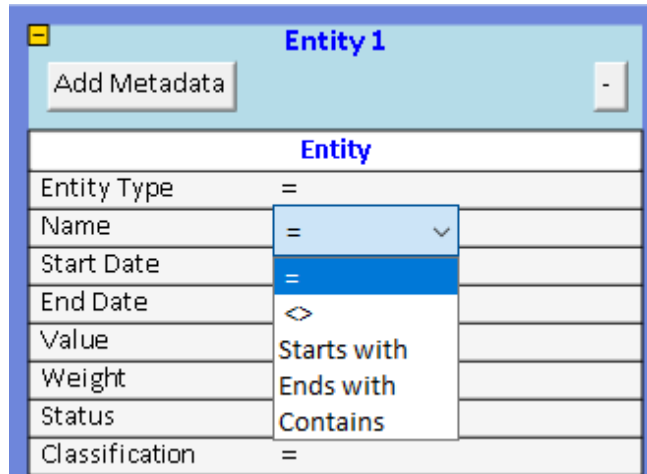


Toolbar's [Add Entity] Button Creates an Entity Criteria Box

Click on the border to select the box and drag it to another location. Click [Delete] to remove the box. The top of the box has a title (Entity 1) that you can click to rename. There are some buttons and a grid with a row for each column to specify the values you seek.

Criteria Operators

The grid has three columns. The left column lists all the entity field names. The next column specifies the operator, and the last column is for your criteria.



Operators for Searching Entity Name

The default operator is =. To specify a different operator, click on the = sign and select from the drop-down list. The following operators are available:

Operator	Function
=	Exactly equal
<>	Not equal
>=	Greater than or equal to (for numeric and date columns)
<=	Less than or equal to (for numeric and date columns)
Starts with	Match phrases that start with the specified criteria
Ends with	Match phrases that end with the specified criteria
Contains	Match phrases that have the specified criteria anywhere in the string
Blank	Blank values
Not Blank	Non-Blank values

Blank and Not Blank options are available on columns that are not required.

Criteria Search

Double click on the blank area to the right of the operator to enter criteria. For lookup fields, a dropdown list appears for selection. The list only contains values used in your database, and not all the values available for that lookup.

Entity		
Entity Type	=	<input type="text" value=""/>
Name	=	<input type="text" value=""/>
Start Date	=	<input type="text" value=""/>
End Date	=	<input type="text" value=""/>
Value	=	<input type="text" value=""/>
Weight	=	<input type="text" value=""/>

Select an Entity Type from the Dropdown List

For fields without lookup lists, enter your criteria directly:

Entity		
Entity Type	=	<input type="text" value=""/>
Name	=	<input type="text" value=""/>
Start Date	=	<input type="text" value=""/>
End Date	=	<input type="text" value=""/>
Value	>=	5000
Weight	=	<input type="text" value=""/>

Search for Entities with Value Greater Than or Equal to 5000

Based on the column, the entry is validated to be a date, number, integer, etc.

Wildcard Search

Instead of changing the operator, wildcard searches can also be used with the % character.

Entity		
Entity Type	=	Person
Name	=	M%

Select People with Names Starting with the Letter M

The Wildcard character can be put in the front to find values that end with a character (e.g. %M), or at the front and back for contains (e.g. %M%).

Multiple Name Search

For names, multiple values can be entered by separating them with commas:

Entity		
Entity Type	=	<input type="text" value=""/>
Name	=	Mary, Brian

Select Entities named Mary or Brian

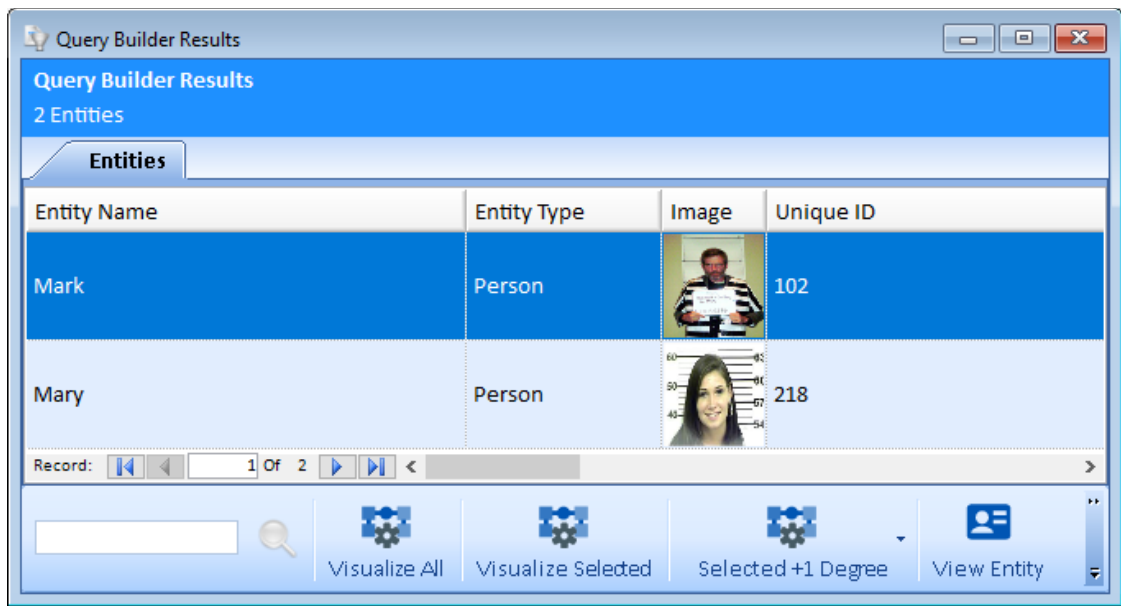
Run the Query

Once your criteria is entered, click the [Run Query] button to see the results.



Run Query Button on Toolbar

A new form opens with the query results:



Query Results

The form is identical to the results from the dataset builder. Sort by clicking the column header to toggle the order and adjust column widths. The toolbar has options to send the entities to the Visualizer, view the entity details, export to Excel, etc.

You can leave this form open, go back to the Query Builder form, make changes, and run the query again to open another results form.

Metadata Selections

The [Add Metadata] button creates a metadata grid at the bottom of the box: Add Metadata

Metadata	
Metadata Type	= Gender
Metadata Value	= Female

Metadata Grid to Specify Metadata Type and Value

Entities with a Metadata Type

For entities with a metadata type regardless of its value, select the type with a blank value:

Metadata	
Metadata Type	= Hair Color
Metadata Value	=

Select All Entities with Hair Color

Entities with a Metadata Value

Leave the Metadata Type blank and enter a Metadata Value to select entities with that Metadata Value for any Metadata Type. For instance, Brown may apply to the metadata type Hair Color, Eye Color, and other types:

Metadata	
Metadata Type	=
Metadata Value	= Brown

Select All Entities with a Metadata Value Brown

Wildcard Search

Wildcard searches can also be applied using the % character.

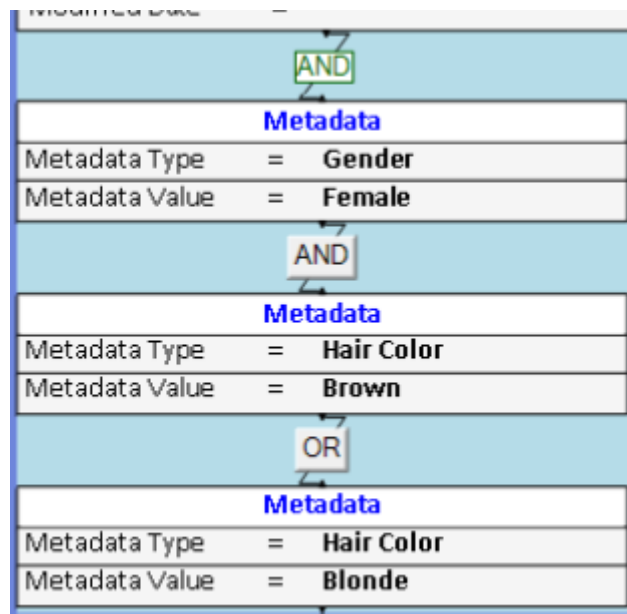
Metadata	
Metadata Type	= Hair Color
Metadata Value	= B%

Select Hair Colors Starting with the Letter B

Multiple Metadata Searches

You can add as many Metadata grids as you need. Click on the metadata grid and press [Delete] to remove it. This example selects Females entities who have Hair Color that is Brown or Blonde:

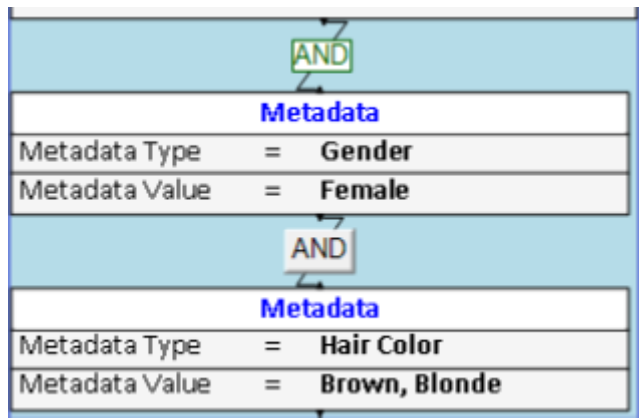
Notice the links to the second and third metadata grids have a box that says AND and OR. Click on them to toggle between AND and OR. Note that the first one is always an AND.



Three Metadata Grids are Added and Criteria Entered

Combine Multiple Values for One Metadata Type

Rather than having several metadata grids for the same Metadata Type connected with OR, you can enter all of those values as one comma separated entry (e.g. Brown, Blonde):

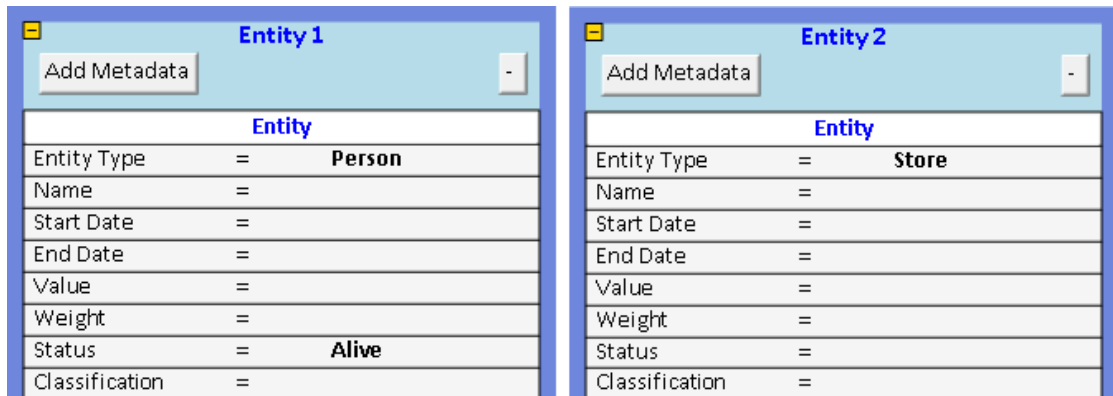


Select Females with Brown or Blonde Hair

Remember that you can also use Wildcard Syntax with the % character to select multiple values.

Multiple Entity Criteria Blocks

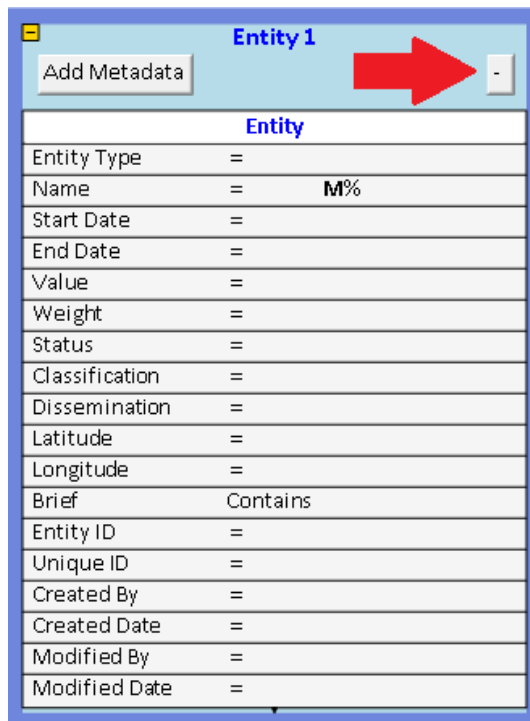
You can add multiple Entity Criteria blocks. Each one creates an AND condition. This example retrieves Entities that are People who are Alive, plus all Stores:



Combine Two Lists of Entities

Minimize and Expand the Boxes

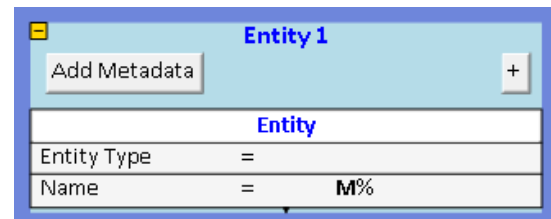
If you have multiple boxes, you can shorten them to more easily see the relevant criteria. The [-] button at the top right minimizes the box to the lowest row with criteria. The [+] button at the top right expands the box back to the full size.



The image shows a window titled "Entity 1" with a minus sign (-) in the top right corner. A red arrow points to this minus sign. The window contains a table with the following data:

Entity	
Entity Type	=
Name	= M%
Start Date	=
End Date	=
Value	=
Weight	=
Status	=
Classification	=
Dissemination	=
Latitude	=
Longitude	=
Brief	Contains
Entity ID	=
Unique ID	=
Created By	=
Created Date	=
Modified By	=
Modified Date	=

Full Size Entity Box



The image shows a window titled "Entity 1" with a plus sign (+) in the top right corner. The window is minimized, showing only the top row of the table:

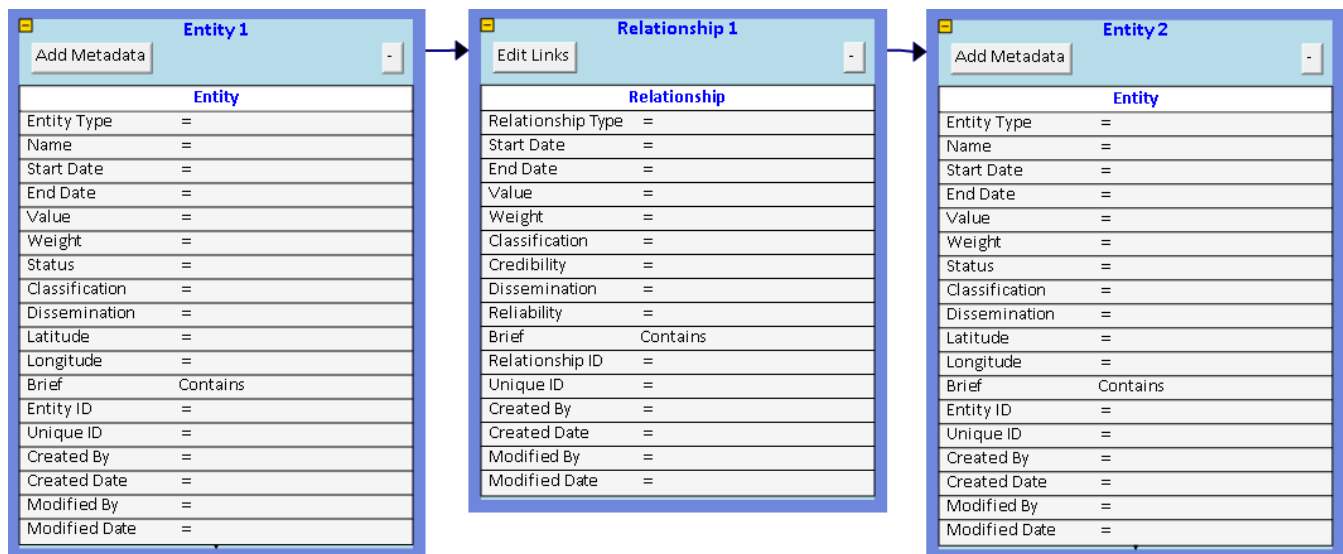
Entity	
Entity Type	=

Minimized Box

Click the [+] to expand back to the full size.

Relationship Criteria

Adding relationship criteria allows you to query for entities and relationships. With a blank screen, clicking [Add Relationship] adds a Relationship box between two Entity boxes.



The image shows three windows arranged horizontally, connected by arrows. The first window is "Entity 1" (full size), the middle is "Relationship 1" (full size), and the last is "Entity 2" (full size). The "Relationship 1" window contains the following data:

Relationship	
Relationship Type	=
Start Date	=
End Date	=
Value	=
Weight	=
Classification	=
Credibility	=
Dissemination	=
Reliability	=
Brief	Contains
Relationship ID	=
Unique ID	=
Created By	=
Created Date	=
Modified By	=
Modified Date	=

Relationship Between Two Entities

Similar to the Entity box, criteria are entered in the Relationship box.

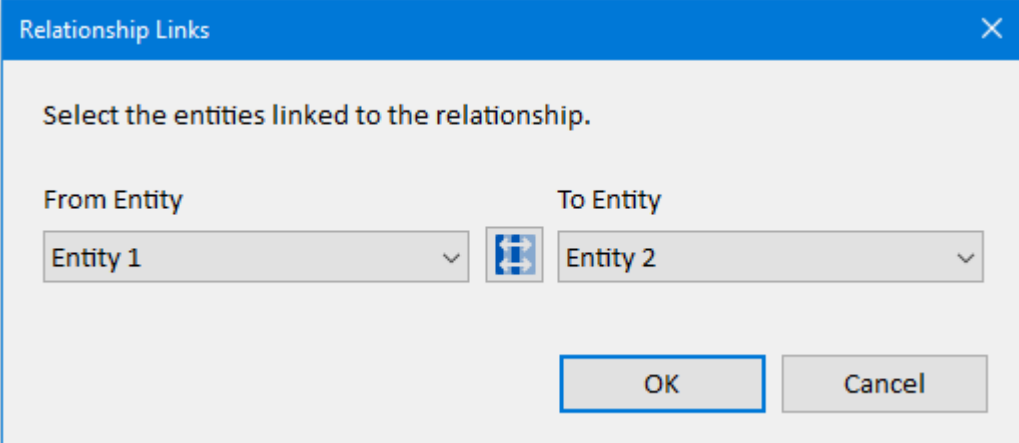
The links to the Entity boxes lets you filter the relationships based on their Entity TO and FROM. If you don't want to specify entity criteria, you can leave it empty or delete the Entity box.

You can also have the relationship box with no entities. If you select Relationships from that (e.g. select a Relationship Type), the results show the list of relationships plus their entities.

Multiple relationship boxes can be added to combine all the relationships (UNION query).

Edit Links

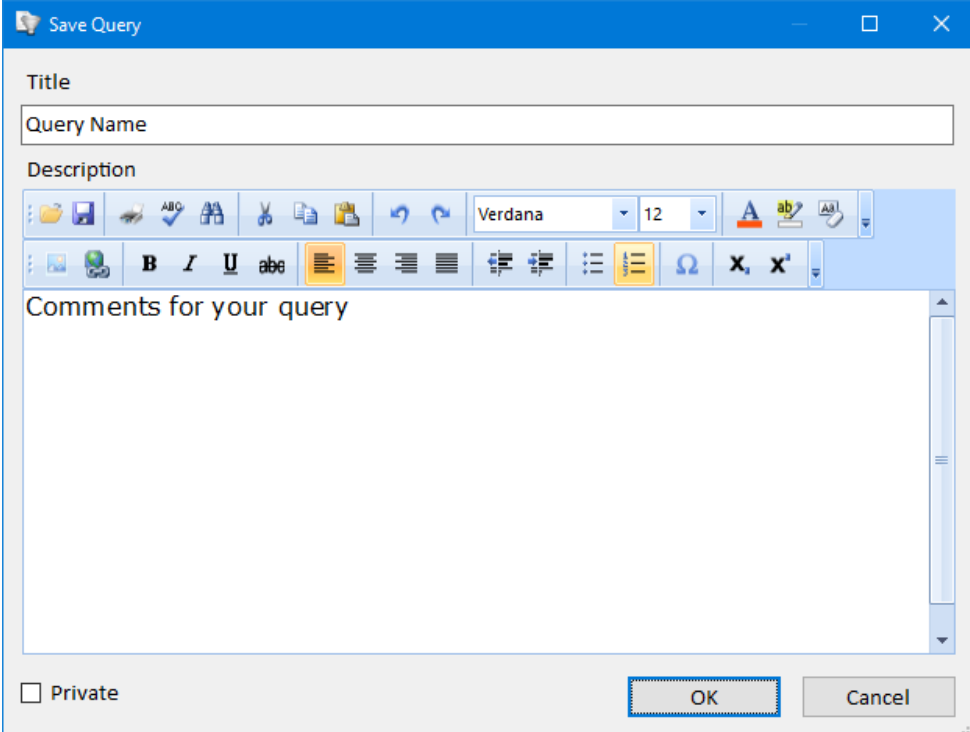
You can modify the Entity TO and FROM by clicking on the [Edit Links] button:



Select the From Entity and To Entity values from the dropdown lists. A blank removes entity limits on that side of the relationship. Click the middle button to swap them.

Save and Open Queries

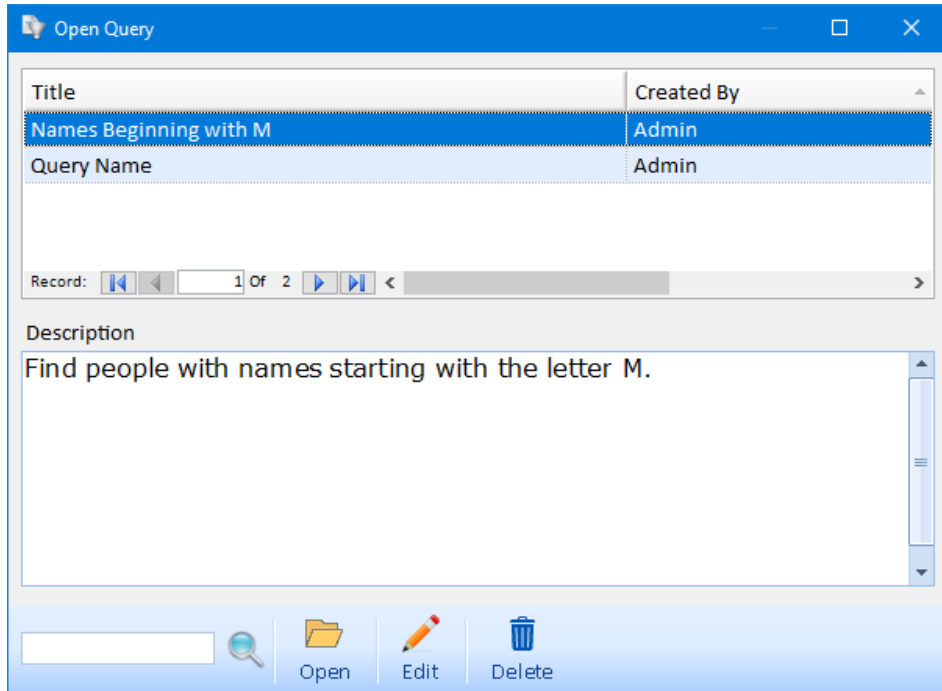
Click the [Save] button on the Query Builder toolbar to open the Save Query form.



Specify a name for your query, and optionally enter a description. Then click the [OK] button to save the query. Queries are saved in your database. If you check Private, only you can view it.

Open a Saved Query

To load an existing query, click the [Open] button on the toolbar. The Open Query form appears:



Select the query to load and click the [Open] button. Click [Edit] to change the name and description, and [Delete] to delete it.

Query Builder Difference from other Search Features

In addition to the Query Builder, SentVi has other search features like Entity Search, Relationship Search, Dataset Builder and the Advanced Dataset Builder. Those searches share the same user interface to enter criteria for entities and relationships. For more details, visit:

- [Advanced Entity Search](#) on page 67
- [Advanced Relationship Search](#) on page 83
- [Advanced Dataset Builder](#) on page 98

Some significant differences are the Query Builder uses a graphical interface to layout the entity and relationships with links between them. It lets you find relationships with different criteria for the TO and FROM entities. And the Query Builder also performs UNION queries across multiple entity and relationship searches. Here are some of the major differences:

Search Feature	Query Builder	Other Search
User Interface	Graphic boxes for entities and relationships	Entity and Relationship forms to enter and select criteria
Different criteria for each Entity side of a relationship	Yes. Different criteria for Entity TO versus FROM	Entity criteria is same for both entities of relationships

Search Feature	Query Builder	Other Search
Combine Multiple Entity Searches	Yes. Create and combine separate entity criteria.	No.
Combine Multiple Relationship Searches	Yes. Create and combine separate relationship criteria	No.
Blank and Not Blank	Yes	Yes
Date and Numeric Value	Yes	Yes
Date and Numeric Ranges	No. Only exact value or greater or less than a value	Yes, specify low and high values
Lookup Values	One value	Select one or more values from a list
Metadata Search for Entities	Unlimited combination of AND and OR.	Up to 3. All AND or all OR. Lookup list provided if type uses a lookup list.
Search for entities with a Metadata Value	Yes, Find a metadata value for any metadata type.	No. Metadata Type must be specified.
Metadata Search for Relationships	No	Yes, up to 3
Search Documents, Notes and Topics	No	Yes

Chapter 21: Creating and Opening Databases

SentVi 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 SentVi

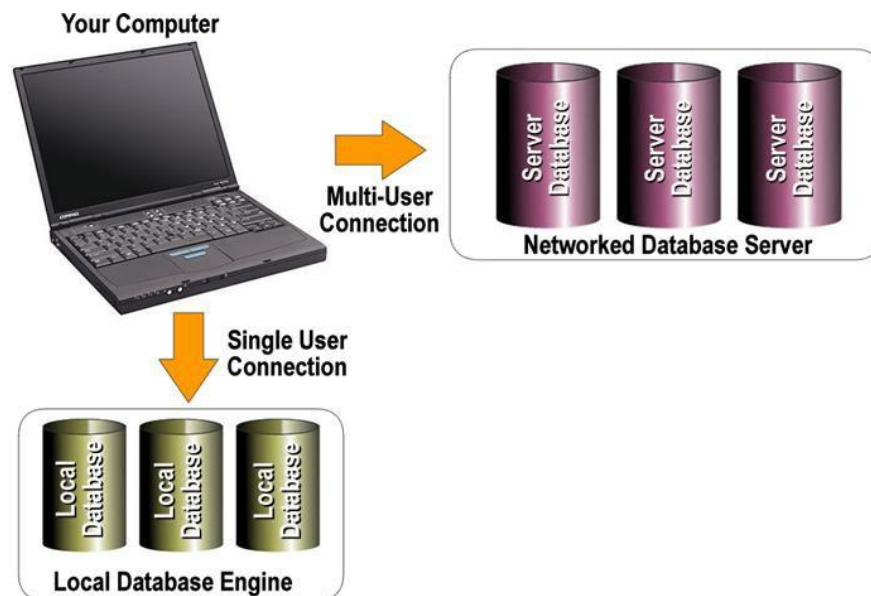
The following terms are used to describe SentVi database types:

Local Database

A database is stored on your computer and managed by the database engine installed by SentVi. Local databases are single user only. You can create Local Databases with any edition of SentVi.

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 multiuser, which accommodates multiple concurrent SentVi users. You can create and access Shared Databases with the Premium and Ultimate Editions of SentVi.



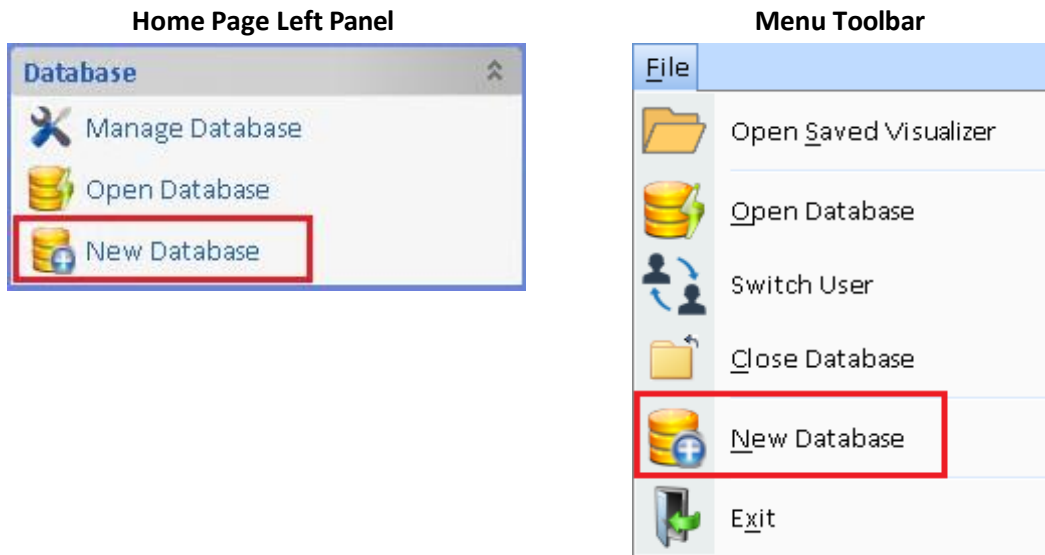
Create a New Database

Shared Databases

The Premium and Ultimate editions of SentVi support the sharing of a multiuser database. Create the database on a shared server running Microsoft SQL Server 2012 or later. You can also use databases hosted by Microsoft SQL Azure and other cloud providers, subject to the limitations they have versus on-premise versions. Microsoft SQL Server must be installed and configured on a computer accessible to SentVi users through the network or Internet connection.

Create a Database

To create a new local or shared database, select New Database:



Once the New Database form opens, select the server and enter the database name (no spaces).

The screenshot shows a dialog box titled 'New Database' with a close button (X) in the top right corner. It contains two input fields: 'SQL Server name' with a dropdown menu showing 'My Databases' and a downward arrow, and 'New database name' with a text input field containing 'NewName'.

New Database Dialog for Local Server

If you choose a shared server, you need to specify the user and password for the database, plus the connection settings to the server.

New Database Dialog for a Shared Server

Fill in the following information:

User name

Each SentVi 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.

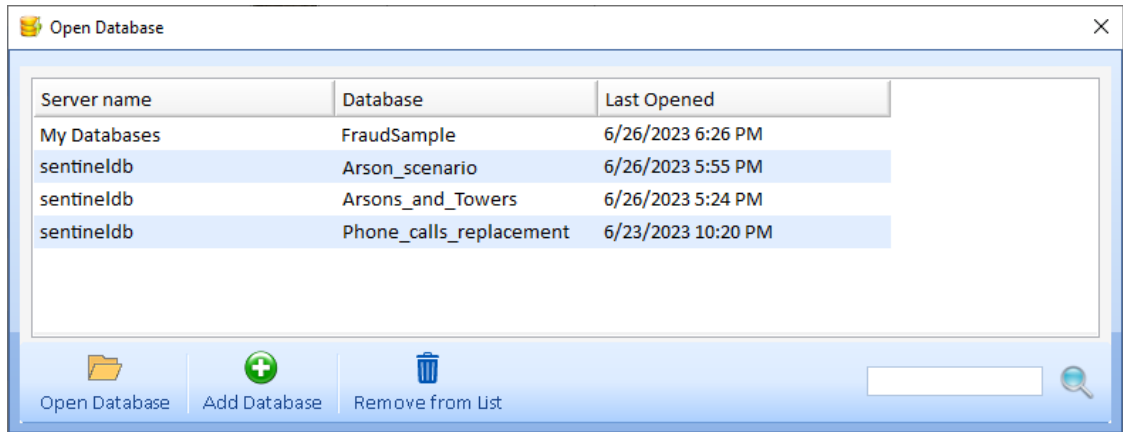
Database Connection

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.

Open a Database

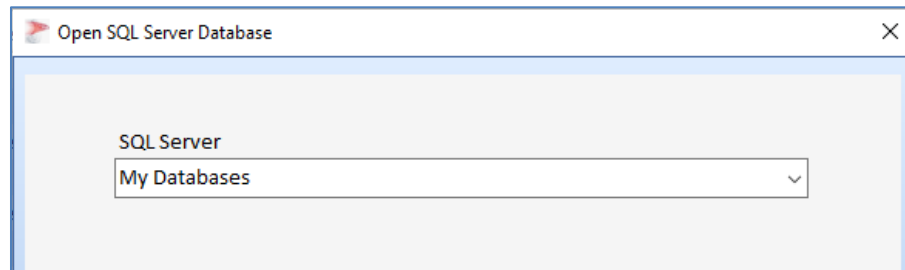
To open an existing database, choose [Open Database] from the Database Menu to display the Open Database form with the recently opened databases:



If your database is in the list, select it and click the [Open Database] button.

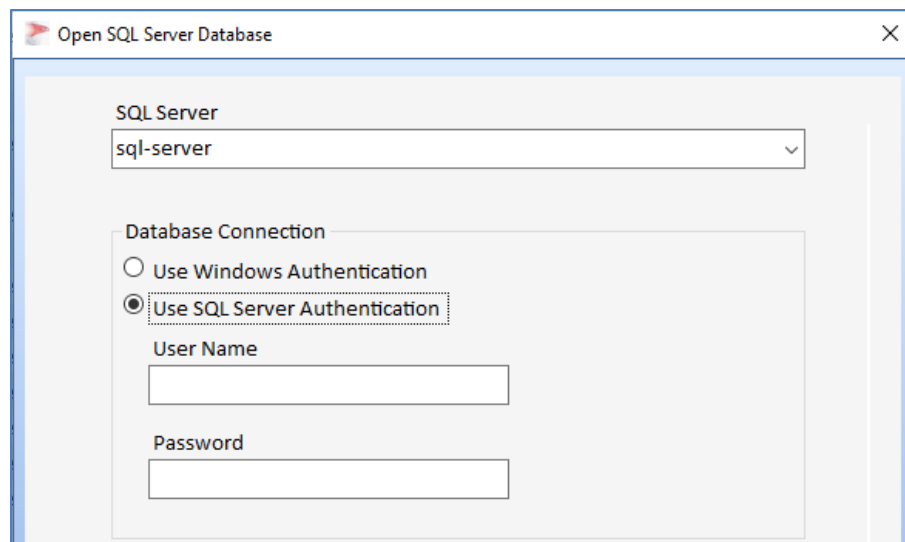
Add a Database to Your List

If your database is not on the list, click the [Add Database] button. For the local databases, choose the "My Databases" server.



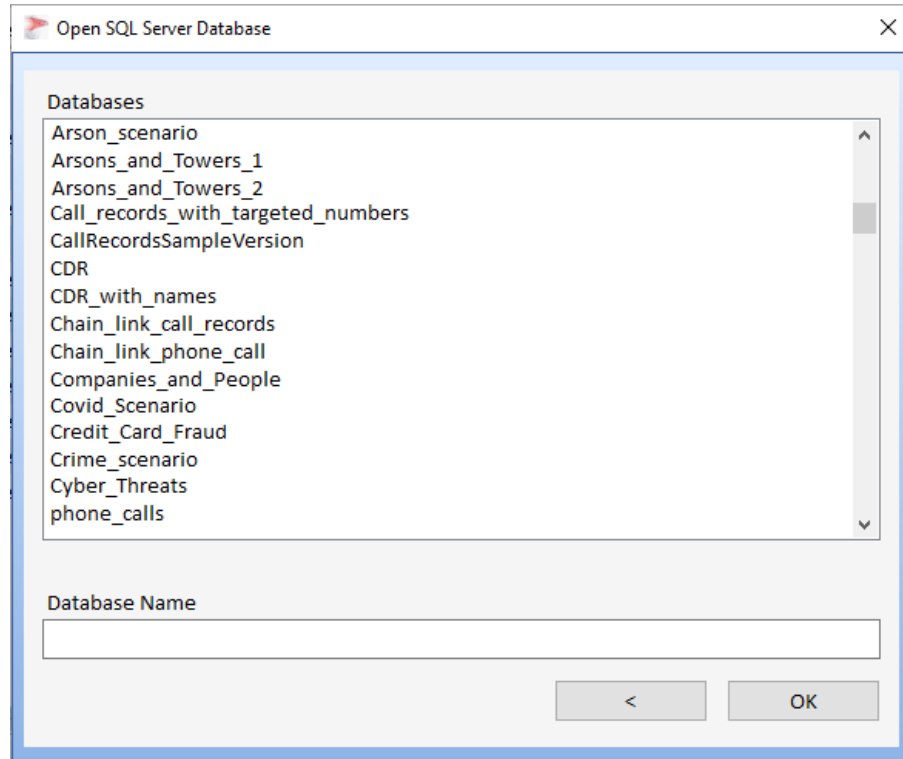
Select a Database from the Local SQL Express Server

For shared servers, enter your SQL Server name and connection options:



Shared Server with Connection Options

Database connection options may be based on Windows Authentication or a specific user name and password for your database. Ask your database administrator if you're not sure or unable to access your database. Click the [>] button to see a list of databases on that server.

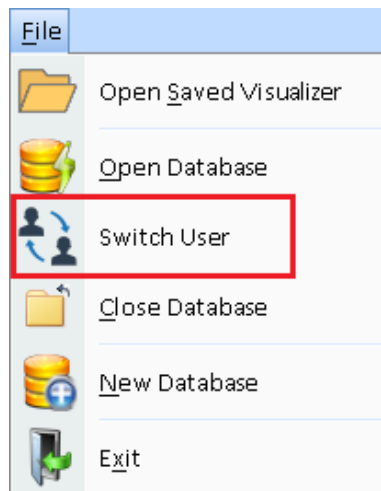


List of Databases in the Server

Click on the database you want from the list or type letters in the Database Name box to filter the list. Press [OK] to select it.

Switch User Name

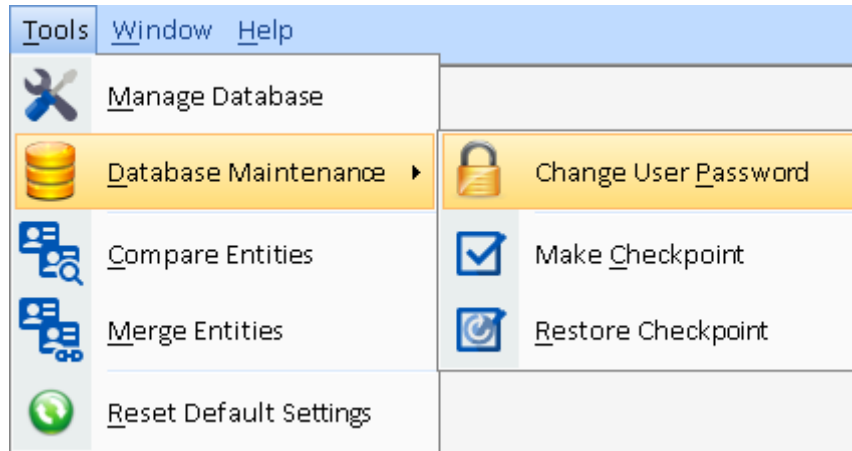
You can open a database under different login credentials by selecting [Switch User] from the File menu.



The Open Database dialog appears to let you change your login.

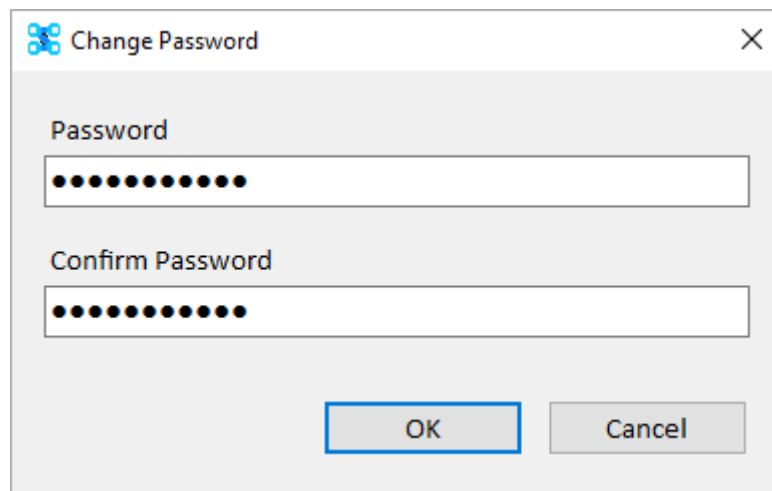
Change Your Password

To change your login password, from the Tools menu, select [Database Maintenance], then [Change User Password].



Change User Password

The Change Password form appears:

A screenshot of a 'Change Password' dialog box. The dialog has a title bar with a close button (X) and a logo. It contains two text input fields: 'Password' and 'Confirm Password'. Both fields are filled with black dots, indicating that the password is masked. At the bottom of the dialog, there are two buttons: 'OK' and 'Cancel'.

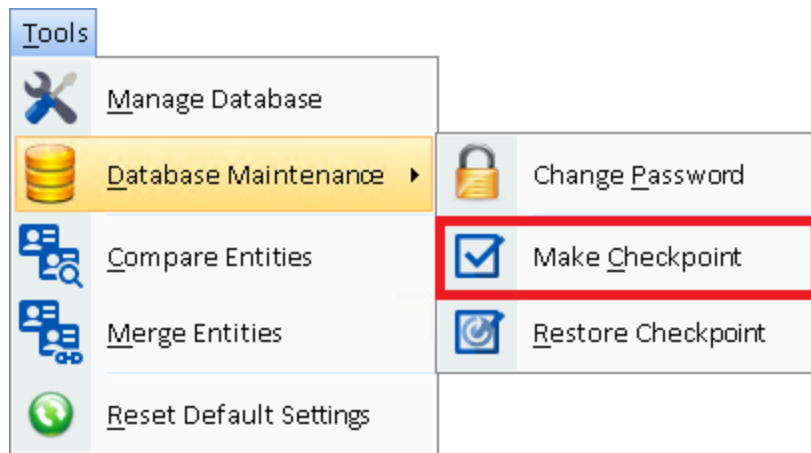
Enter your new password twice, then press [OK].

Make and Restore Checkpoints

SentVi 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.

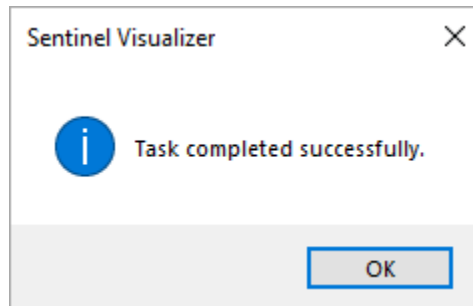


On the Make Checkpoint form enter a description for the checkpoint, then click [OK].

A screenshot of the 'Make Checkpoint' dialog box. The dialog has a title bar with 'Make Checkpoint' and a close button. Below the title bar is a 'Name' label and a text input field containing the text '5/5/2023 5:44:39 PM'. At the bottom right of the dialog are two buttons: 'OK' and 'Cancel'. The 'OK' button is highlighted with a blue border.

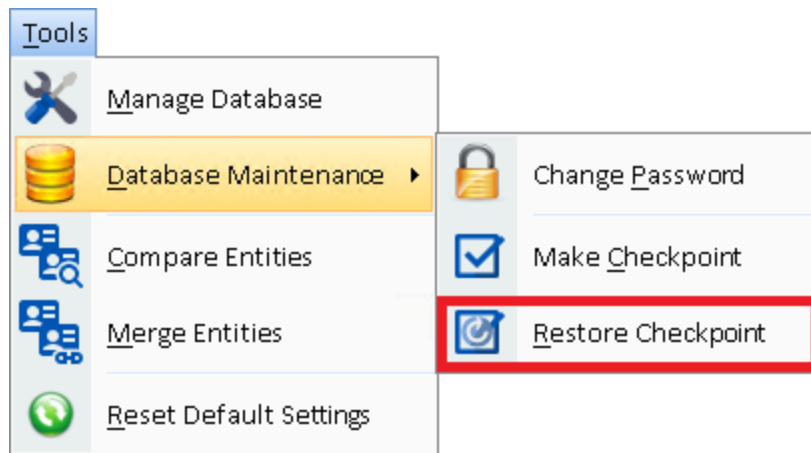
Enter a Description for your Checkpoint

A confirmation appears when the checkpoint is created.

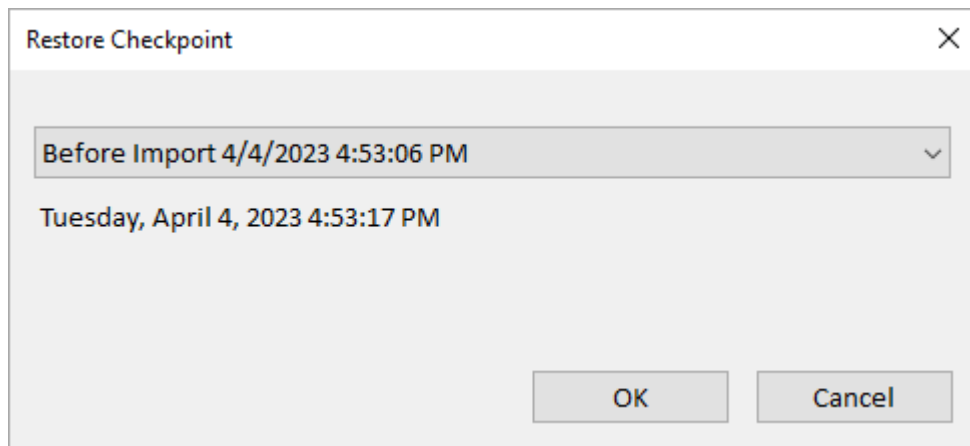


Restore a Checkpoint

To restore a SentVi database, from the Tools menu, select Database Maintenance, Restore Checkpoint. This is also available on the Manage Database form.

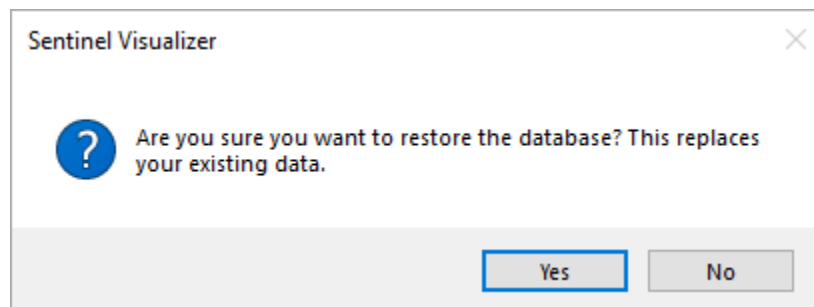


If forms are open, you are prompted to close them. The Restore Checkpoint dialog lets you select from a dropdown list of existing checkpoints. There may be checkpoints automatically created by SentVi during certain processes like Import. The date and time of the checkpoint (independent of the description) is displayed after you select it.



Select the Checkpoint to Restore

Select the checkpoint and click [OK]. It confirms overwriting the current database:



Click [Yes] and a prompt confirms the restore was completed

Chapter 22: Importing Data

SentVi can import external data into its database from a variety of sources including Excel spreadsheets, Access and SQL Server databases, and text files. You can also limit the records retrieved by specifying a WHERE clause. Specifications can be saved and reused across databases.

Introduction to Data Imports

The Import feature allows you to retrieve data from a variety of common formats:

- Microsoft Excel
- Microsoft Access
- SQL Server
- Text

Additional data sources, such as MySQL and Oracle, are supported by linking to them with Microsoft Excel or Access.

The Data Import feature allows you to visually “map” columns from your input file to the appropriate fields in the SentVi database. The process for using this feature is summarized as follows:

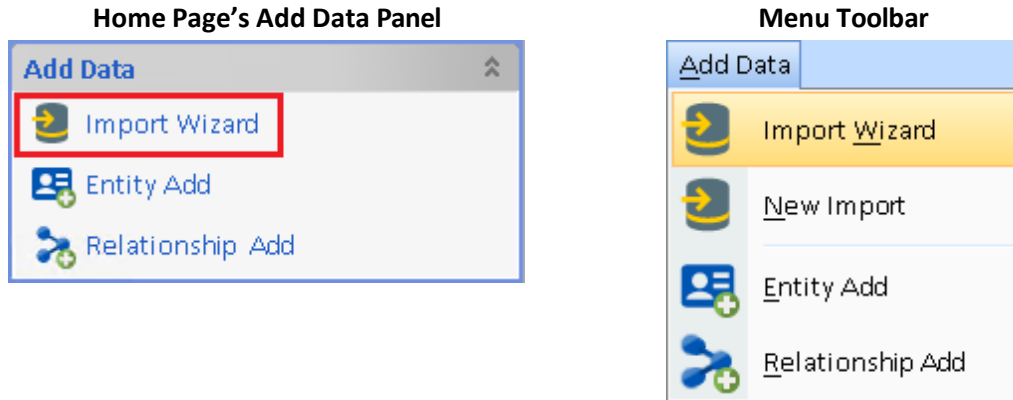
- Select your source data.
- SentVi reads the data file and detects the file schema.
- Add Entity and Relationship boxes to define the data to assign to them.
- Assign values directly or connect your source data columns to the SentVi columns.
- Set import settings defining date formats, topic, definition of unique entities, and replacement options if it already exists in the database.
- Preview the data before it’s imported to confirm the column assignments.
- Import the data.

Import Wizard

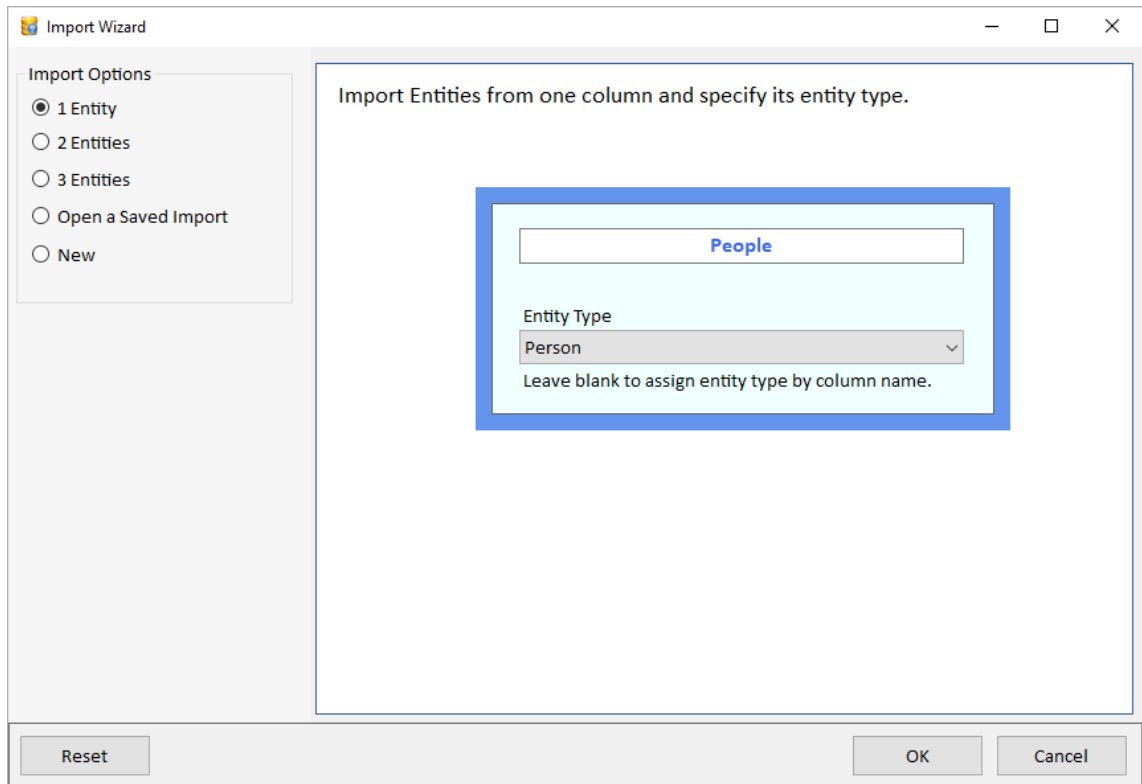
Launch the Import Wizard

The Import Wizard is a good way to get started if you're not familiar with importing data.

On the Home Page, select [Import Wizard] from the Add Data panel, or on the menu, under 'Add Data', select [Import Wizard].

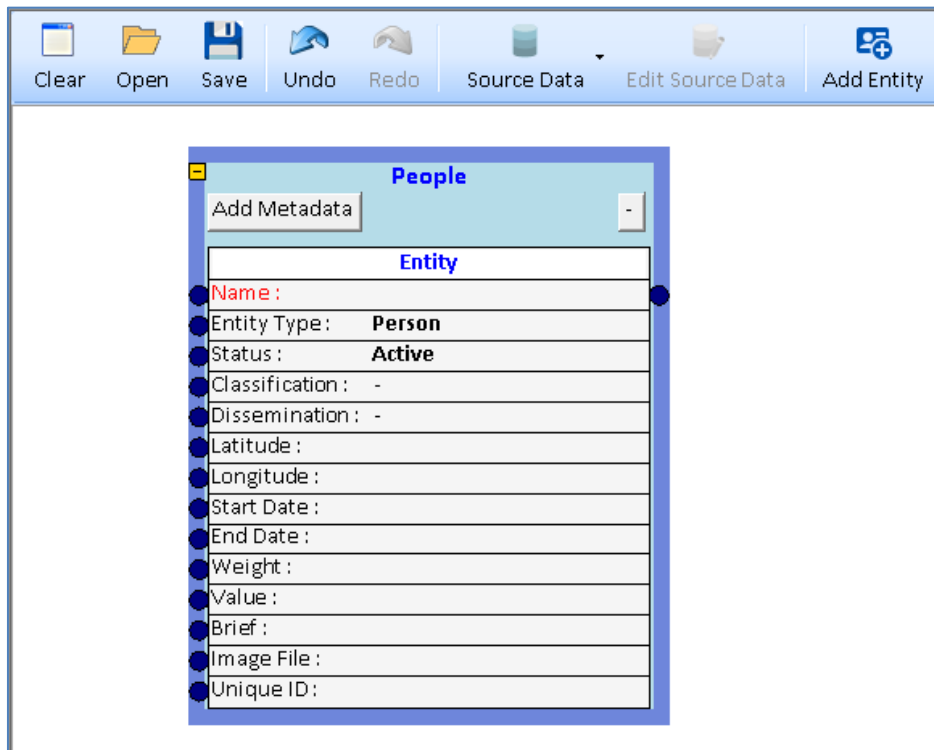


Import Wizard: 1 Entity



Import Wizard, One Entity

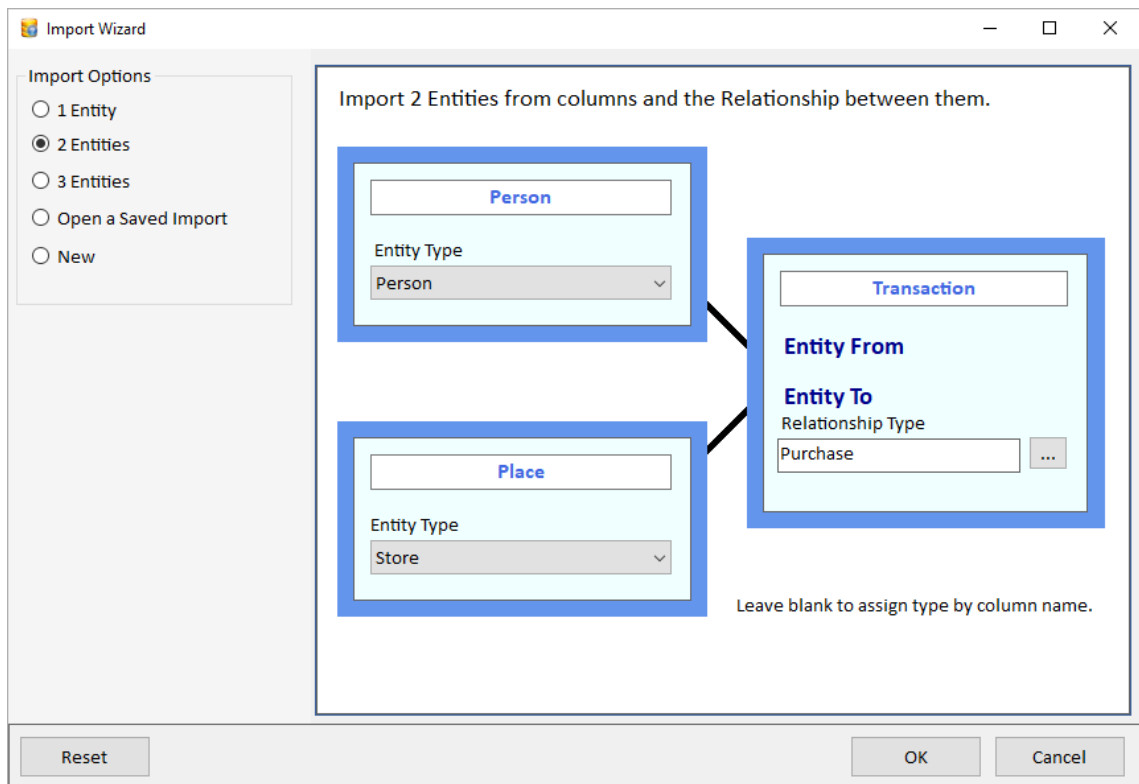
The initial screen of the Import Wizard displays an Entity box where you can edit the Title and select the Entity Type. When you press OK, it appears on the Import Form:



Import Form with Entity Box

2 Entities and 1 Relationship

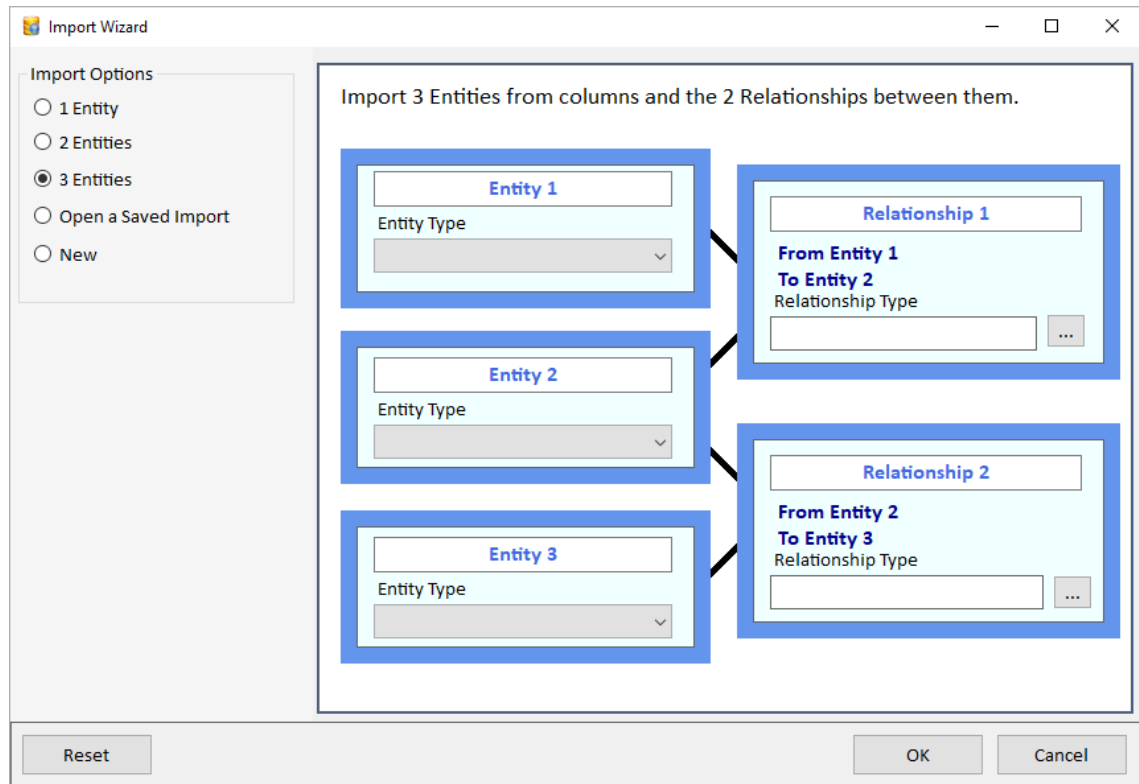
The 2 Entities option creates two entity boxes with a relationship between them. Set the titles for each box, entity types and relationship type:



Import Wizard, Relationship

3 Entities and 2 Relationships

The 3 Entities option creates three entities with two relationships between them:



Open a Saved Import

Select a saved import file (*.SVIX or *.SVI3) from disk or pick from previously opened Import files for this database.

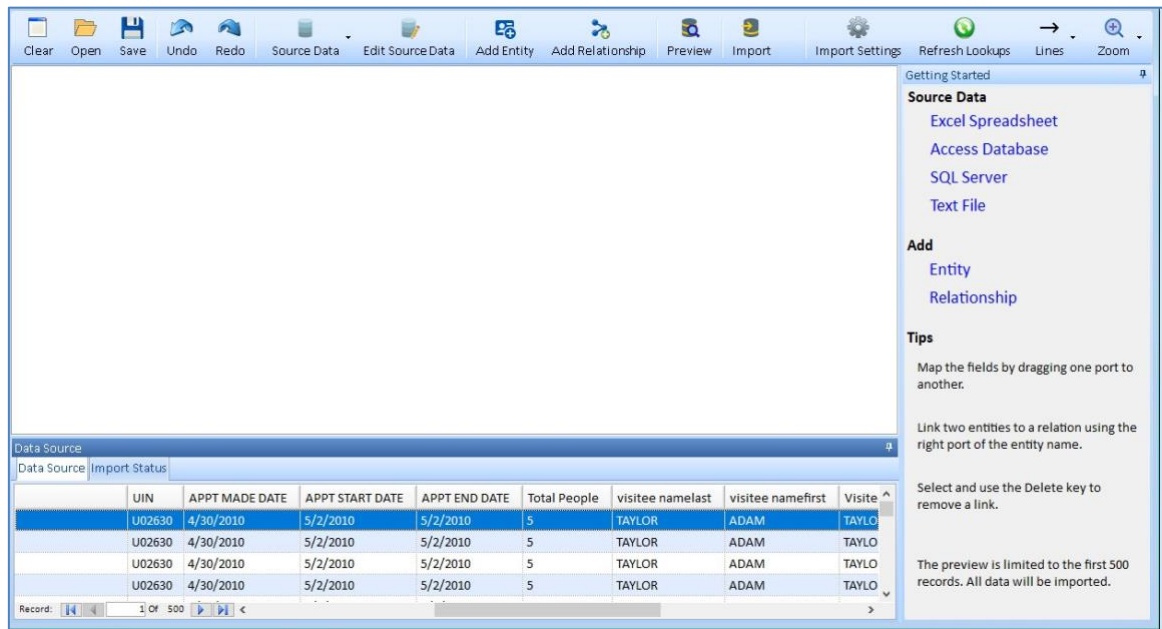
New

Create a blank Import Designer.

Import Designer

The Import Designer has five main areas:

- **Toolbar:** Access common tasks.
- **Main Pane:** Visually design your data import.
- **Bottom Panel:** Data Source tab to view the first 500 records of the source data, and Import Status tab with details of the source data.
- **Right Panel:** Quick tips and shortcuts for the import process.



Empty Import Form

Import Toolbar

The toolbar across the top performs the actions and is organized into three parts.

These are on the far left:



- **Clear:** Clears the form (same as New).
- **Open:** Opens a previously saved import file.
- **Save:** Saves your current import specifications.
- **Undo and Redo:** Undo and redo changes.

The middle of the toolbar has the main buttons:



- **Source Data:** Import data from a variety of common formats.
- **Edit Source Data:** Change the current data source settings.
- **Add Entity:** Add an entity to the main pane.
- **Add Relationship:** Add a relationship to the main pane.
- **Preview:** See what would be imported with the current specifications.
- **Import:** Import information to Visualizer.

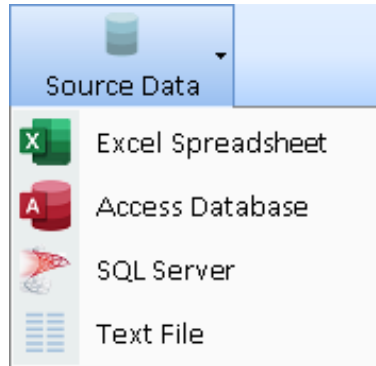
The right side has Import and user interface settings:



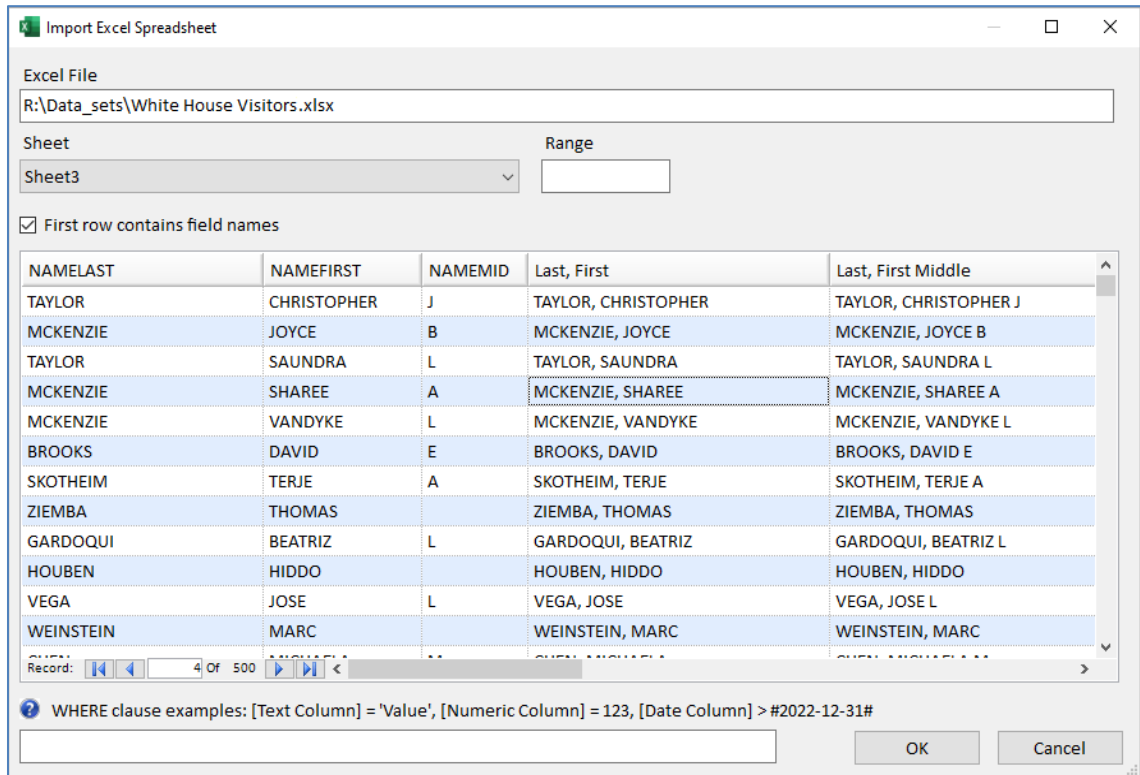
- **Import Settings:** Options for import definitions.
- **Refresh Lookups:** Reload the lists on the boxes if the lookup data changed.
- **Lines:** Move lines to the front or back; hide secondary lines.
- **Zoom:** Change the zoom level and fit to page.

Select Source Data

From the [Source Data] button on the toolbar, choose the type of data to import:



After choosing Excel, Access, or Text File, a file dialog appears to select it.

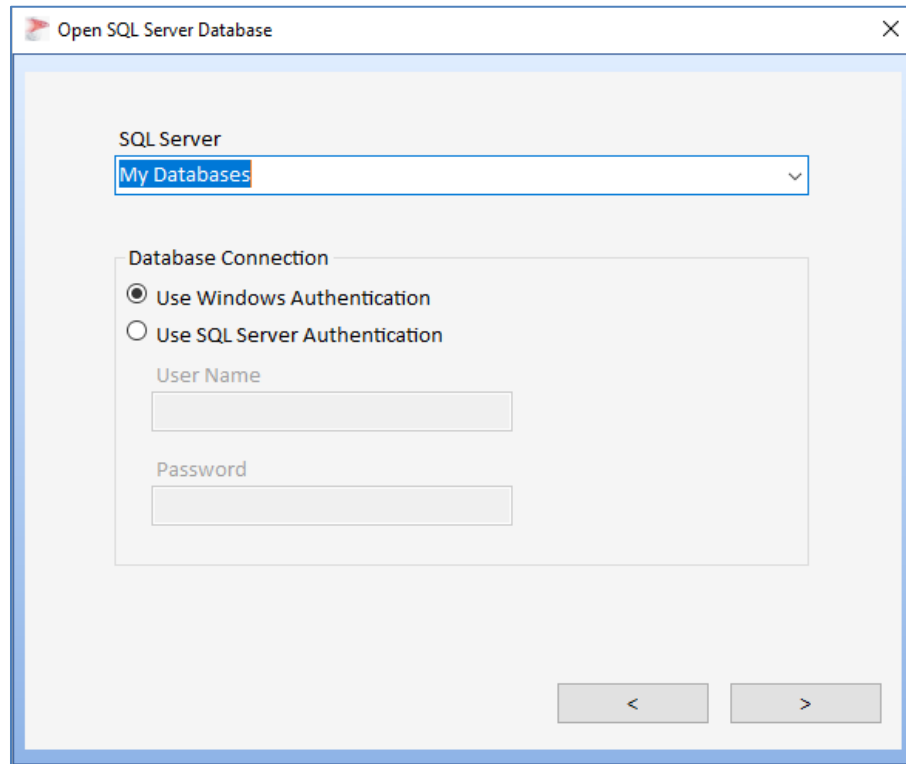


Import Excel Spreadsheet

There is a different form to let you select the Excel worksheet, Access table or query, or text file options depending on your data type. A preview of the data is displayed for the first 500 rows.

Open SQL Server Database

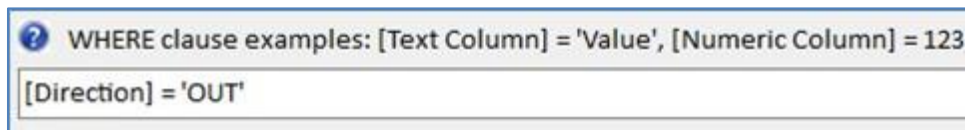
If you select SQL Server as your Source Data, the Open SQL Server Database dialog appears to select the server, enter the SQL credentials, and pick the database, followed by the form to select the table or view.



Open SQL Server Database


WHERE Clause

By default, the WHERE clause is blank and all the records are imported. You can use the WHERE clause to select a subset of the source data rows based on values in the columns:



Import WHERE clause

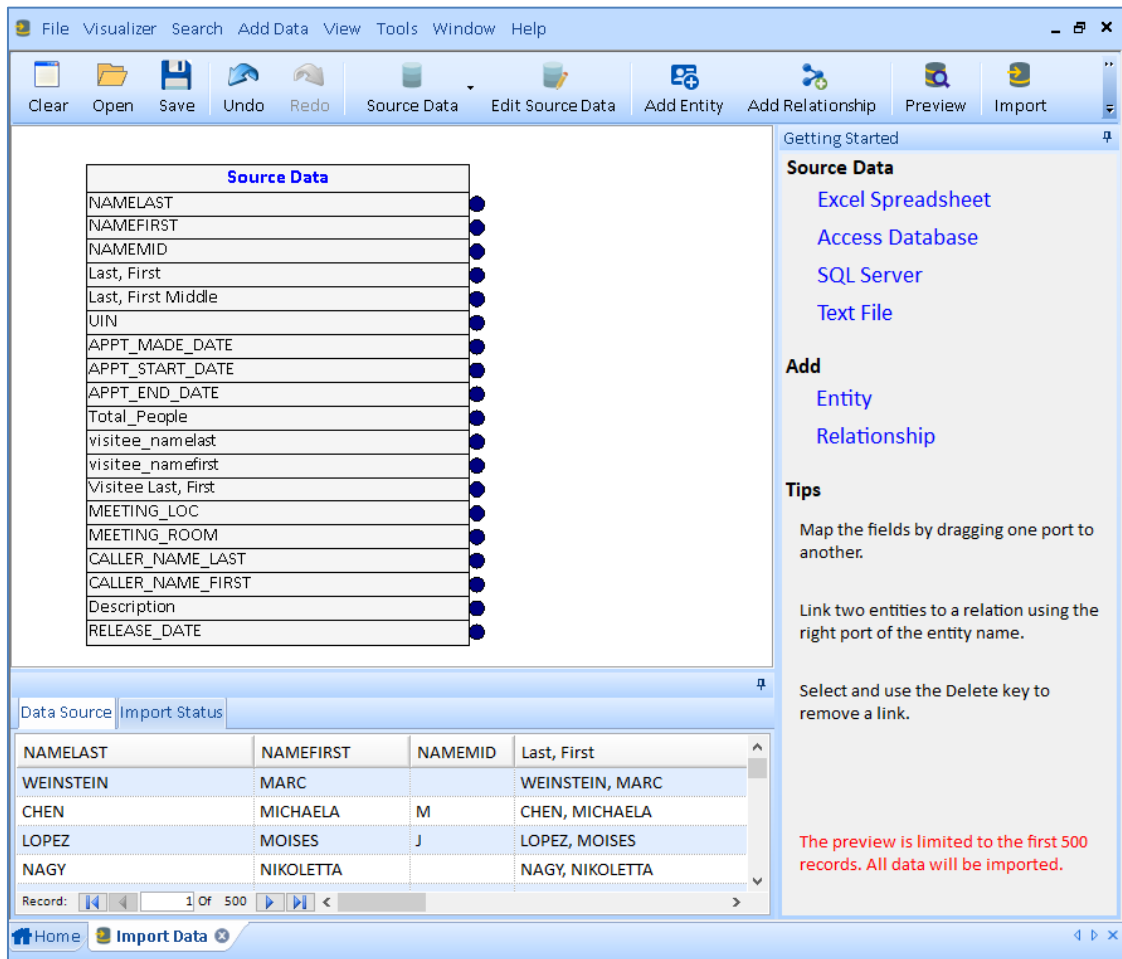
For instance, you may have call data records and want to import Incoming versus Outgoing calls differently. If there's a column that defines the difference, you can filter on that like the example above for records with 'OUT' in the Direction column. After you enter the value, the preview data is updated to your criteria.

For more information on the WHERE clause syntax, click the help button  to open a webpage with details.

Click [OK] to add the source data on the import form.

Import Form with the Source Data

The Import Data screen shows a box representing the source data with its list of columns.



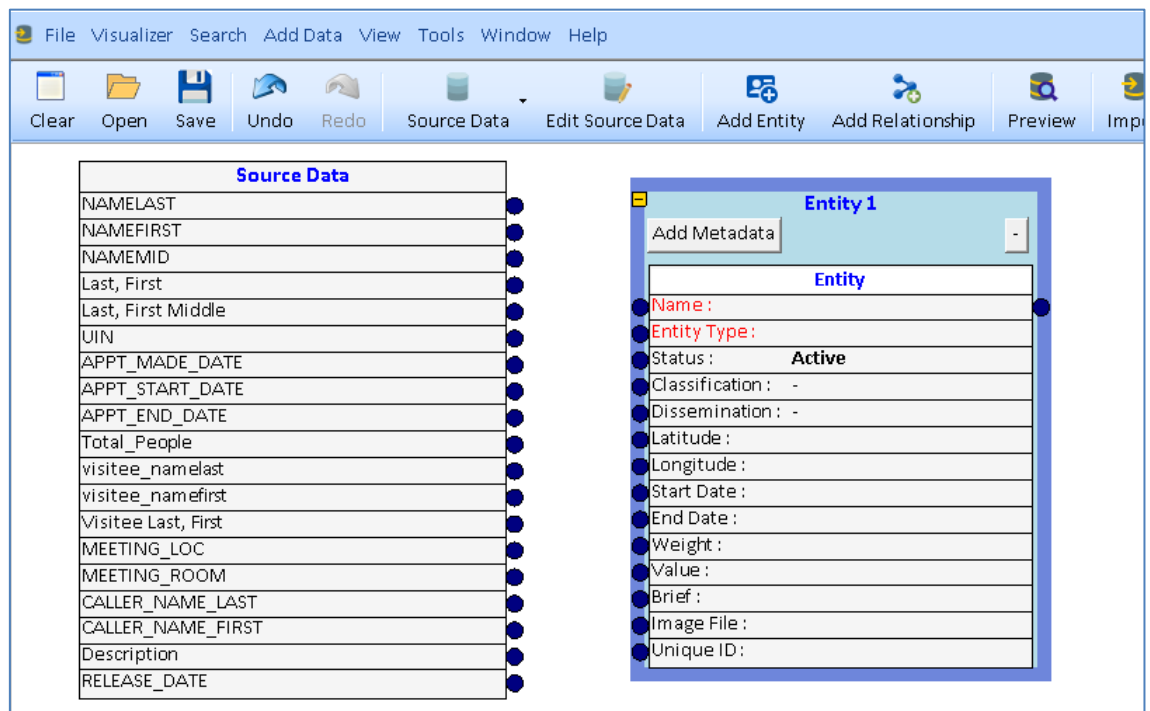
Source Data Added to Import Form

If you want to modify the Source Data, click the [Edit Source Data] button to return to the previous screen.

Add Entity

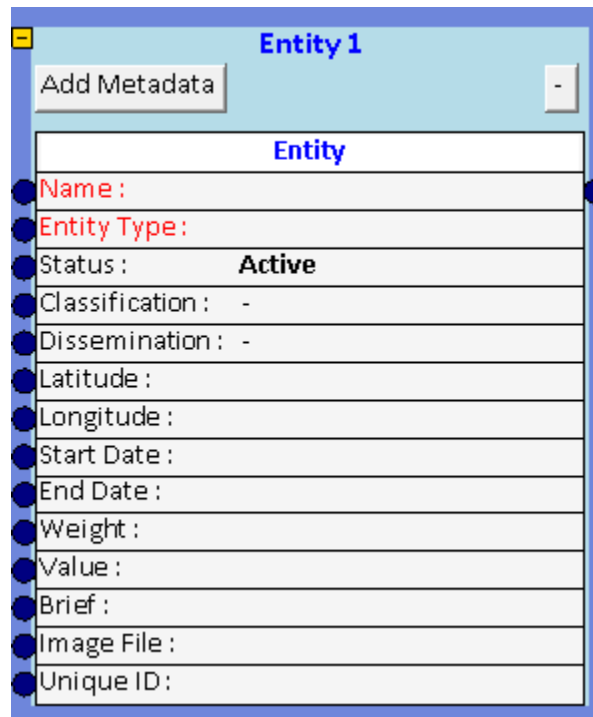
Define which data from the Source Data is to be used to create entity records. Click on the [Add Entity] button to add an entity box to map the columns.





Entity Box

Each row in the entity box represents a column in the Entity table. For more information on them, see **General Entity Fields** on page 54. The rows in Red are required and must be assigned. Some items (Entity Type, Status, Classification and Dissemination) are assigned from the dropdown box next to it. The others can be left blank.



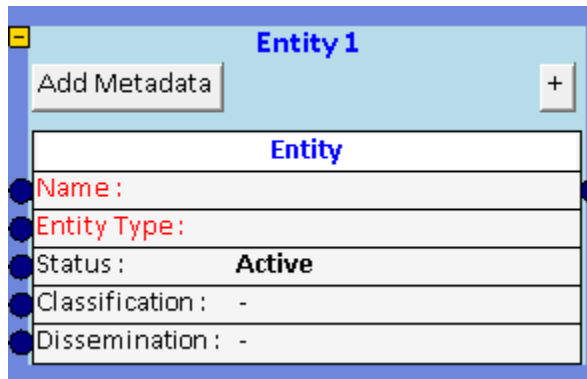
Fill any of the columns with data from a column in your Source Data by dragging the column from the Source Data to the Entity column. For instance, using a column for Entity Type from your Source Data lets you import multiple types of entities at one time.

Optional columns can be left blank or given a specific value for all the entities without having to assign a Source Data column to it:

Latitude :	38.9166
Longitude :	-77.22717
Start Date :	10/10/2022
End Date :	12/31/2023
Weight :	90
Value :	2145.45

Set Specific Values for All Entities without a Source Data Column Assignment

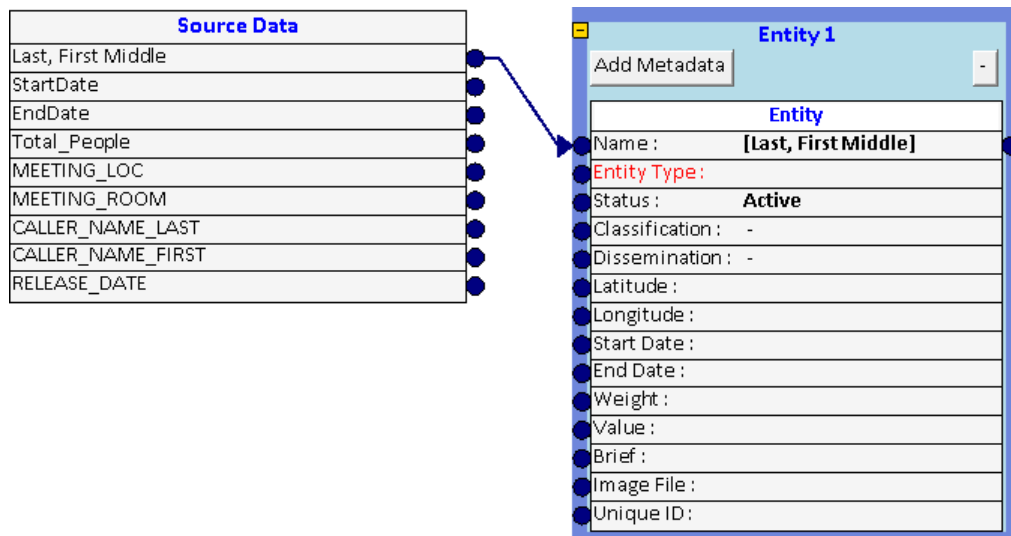
The [-] button in the top right shrinks the height of the box by hiding all the unassigned rows at the bottom of the box. After clicking [-], it becomes [+] to restore it:



You can rename the entity box by clicking on the text “Entity 1” and typing the new name. The width of the box can also be adjusted.

Draw Assignment Lines

Notice the connection circles to the left and right of the rows in the entity box. The Source Data has similar circles for each of its columns. Click your mouse on a circle and with your mouse button pressed down, drag it to another to create a link.

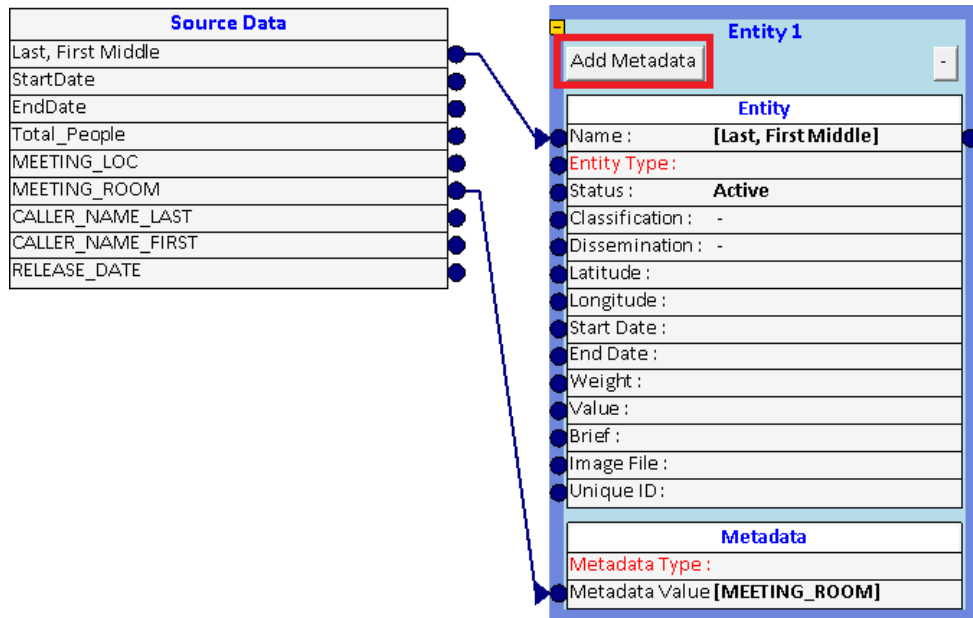


Source Data Column Assigned to Entity Name

This assigns a column from the Source Data to the Entity Name column. The name of the Source Data column appears in the Entity Name row.

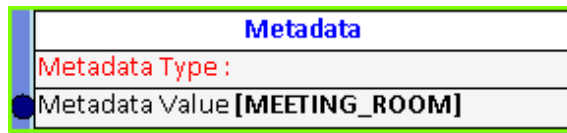
Add Metadata

Click the [Add Metadata] button in the Entity box to create a grid to assign values to the Metadata table. For more information on metadata, see **Metadata Lookups** on page 283.



The Metadata Type is specified from the dropdown list next to it. The Metadata value is assigned from one of your Source Data columns.

To remove a Metadata grid, click on it to highlight it (green border), then press [Delete].



Metadata Grid Selected

Add Relationship

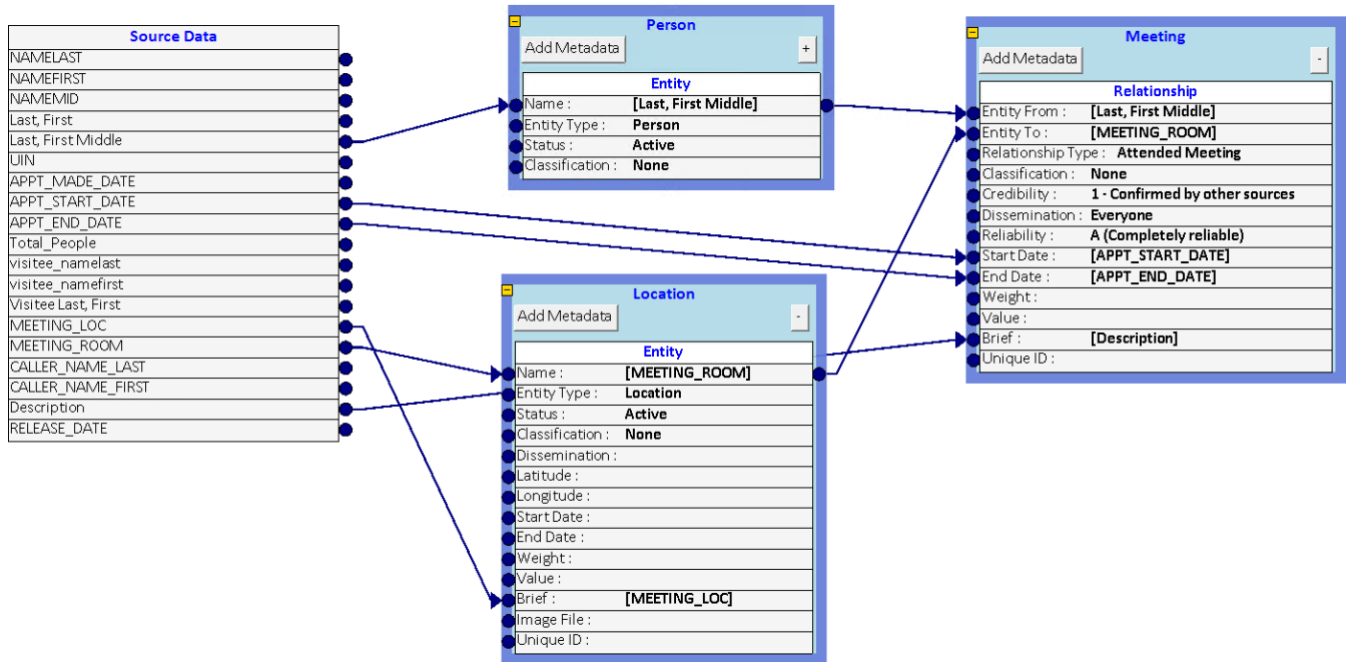
Relationships tie entities together. To import relationships, the two entities need to be defined, then connected to a relationship box. Make sure there are at least two entity boxes, then click the [Add Relationship] button:



Assuming the entity boxes already have assignments from the Source Data, add lines to define the relationship.

1. Create a line from Entity 1's name to the Relationship's Entity From row.
2. Create a line from Entity 2's name to the Relationship's Entity To row.

With the Entity boxes' height shrunk by pressing their [-] key in their top right, their relationship is defined:



The Relationship Type is required. It can be selected from its dropdown list or assigned from a column in the Source Data. Other relationship columns can be defined similar to entity columns.

Import Settings

From the toolbar right side, click [Import Settings] to specify import options.

A form with three tabs appears.



General Tab

The General tab sets the format of Date/Time columns if the source data is text field rather than a date/time field. Click the [...] button to select the Date/Time format:

The screenshot shows the 'Import Settings' dialog box with the 'General' tab selected. The 'Date/Time Format' section is expanded, showing the 'Expected source data format (only applies to date fields formatted as text):' field with a value of 'yyyyMMdd HHmss'. Below this, the 'Assign new entities and relationships to this Topic:' dropdown menu is set to 'Default'. The dialog has 'OK' and 'Cancel' buttons at the bottom right.

You can also specify which topic the new entities and relationships are assigned to.

Matching Tab

When entities are imported, they are compared against entities in your database. If it already exists, it uses the existing one and does not add a duplicate.

Prior to version 10, entities were defined as having a unique combination of Entity Type and Name. While that prevented duplicate names, there may be situations where there are two or more entities with the same name (and type), or lots of different names for the same person.

A Unique ID field can now be used to disambiguate them. The Matching tab lets you define how unique entities are determined:

The Unique ID field differentiates entities with the same name.

Choose the combination of Entity fields to determine an Entity's uniqueness:

- Entity Type and Name (Unique ID is ignored)
- Entity Type and Unique ID (name is from the first time the Unique ID is imported)
To save ignored Entity names for the Unique ID, choose a Metadata field to store them:
(not specified)
- Entity Type, Name and Unique ID (combination of all three fields define each entity)

Relationships match on Entity From, Entity To, Relationship Type, Start Date, End Date, and Value.

OK Cancel

The first option is the default Type and Name uniqueness.

The second option defines an entity based on the combination of Type and Unique ID. For instance, a Unique ID could be a social security number, serial number, passport ID, etc. The name of the entity is based on the first record encountered with the Type and Unique ID. If additional records are encountered, they are considered the same entity regardless of the name. There's an option to save those additional names to a metadata field you specify.

Entity Type and Unique ID (name is from the first time the Unique ID is imported)

To save ignored Entity names for the Unique ID, choose a Metadata field to store them:

Alias Name

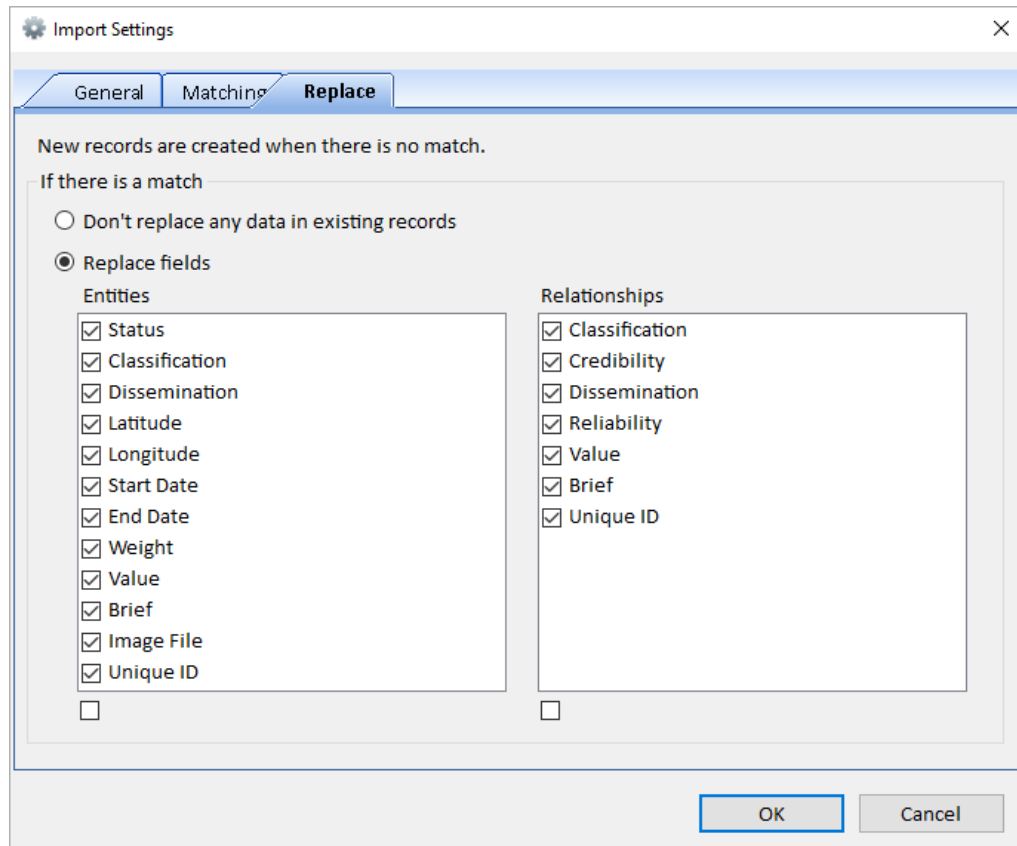
The third option defines an entity based on its Type, Name and Unique ID columns.

If an entity isn't assigned a Unique ID value, selecting option 2 or 3 doesn't matter as the entity uniqueness will be defined using option 1.

Replace Tab

The Replace option controls how existing data is updated if a duplicate is encountered. If your import data matches an existing record (as defined on the Matching tab), the data in the existing

record may be updated. For instance, you're importing latitude and longitude data for entities that were previously imported with bad or no location data.



Replacement Options for Matching Entities and Relationships

The first option avoids changing existing entities, so only new records are imported while existing ones ignored.

The second option updates existing entity and relationship records. You can choose all the fields or specific ones. The checkbox below the list selects or deselects all. If the import data has a blank value for a field, the existing value is not replaced.

How Import Settings are Saved and Restored

Import Settings are saved in the Import SVIX file. When opened later, the saved settings are used. When you create a new import, the Import Settings are the last values you used (not specific to the current database).

Preview Import

The Preview feature lets you review the data before updating your database. It's an opportunity to confirm your import specifications are correct. The [Preview] button opens a form with the list of Entities and Relationships to be added from the first 500 rows of your source data. Don't worry, the actual import process all the rows.



Preview is Local

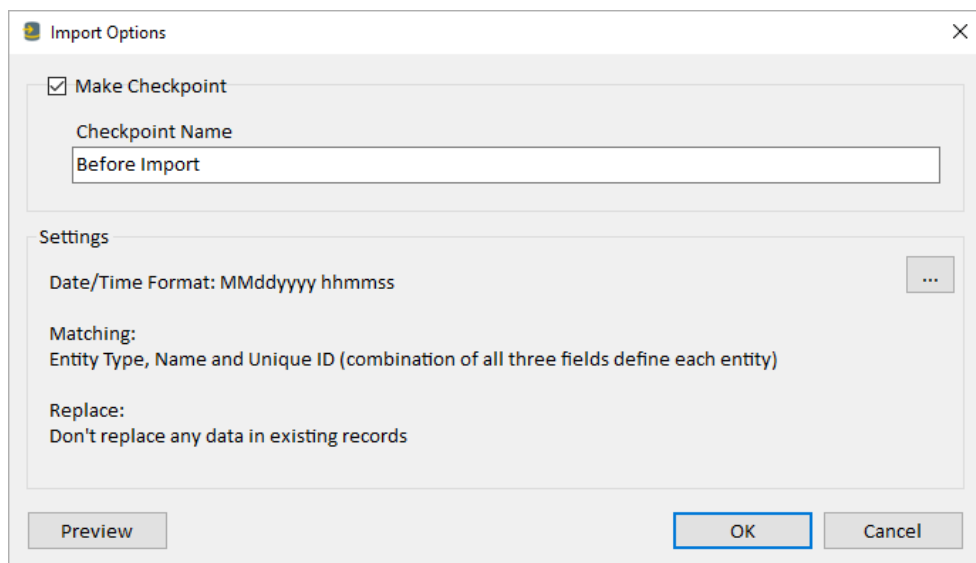
The Preview data is local and not in your database. The Preview shows the entities and relationships as if there were no existing entities and relationships. They could duplicate data in your database. Matching occurs when the data is actually imported, and not during Preview.

Next Steps

If you don't like the preview, go back to the Import form, modify your specifications and preview it again. The Preview form remains open until you close it, so you can have multiple copies open to see how your import choices change. After confirming the Preview, you are ready to run the Import to add the data to your database.

Run Import

Click the [Import] button to run the import process. This form appears for final confirmation:

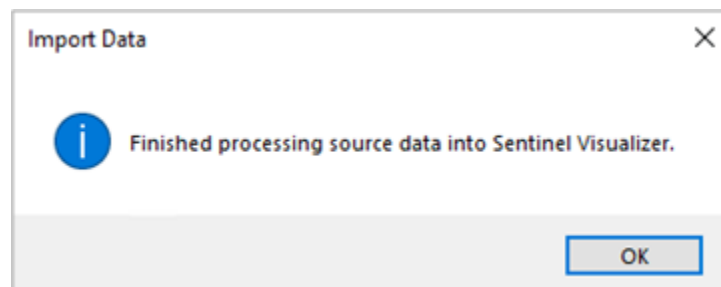


Import Confirmation Form

- Optionally make a database checkpoint so you can rollback to the current database if you do not like the import. You can overwrite the name. See [Create a Checkpoint](#) on page 252 for more information.
- A summary of the Import Settings is shown. Press the [...] if you want to change them.

Press the [OK] button to start the import. The time to import your data depends on the size of your Source Data, hardware, and network/Internet connectivity speed if your data is remote.

You are notified once your data is imported.

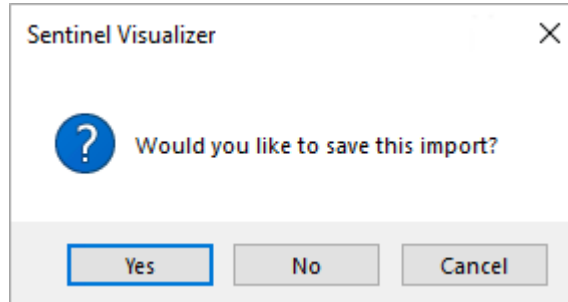


Save Import to File

To save the Import settings, click the [Save] button on the toolbar. The import specifications, including Source Data, are saved in an encrypted *.SVIX file. That file can be used for other databases and other machines running SentVi.

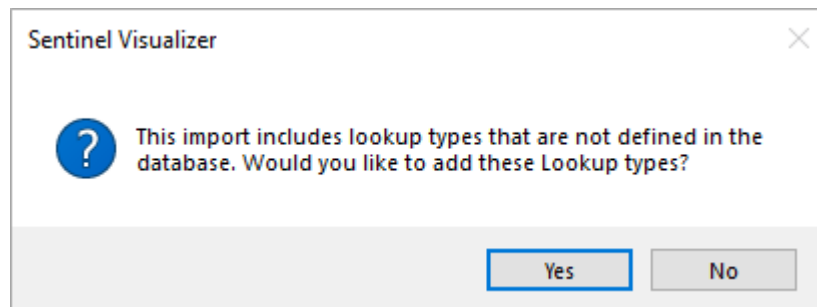


If you close the Import form without saving it, a dialog box appears.



Open an Import File

Opening a saved SVIX file loads the boxes, connections between them, assigned values, and import settings. If the Source Data existed when it was saved, a prompt asks to load it.



If a saved import file assigns lookup values on dropdown lists (like Entity Type) which doesn't exist in the current database's lookup table, a prompt asks to add it for you.

Lines and Zoom Menus

Lines Menu

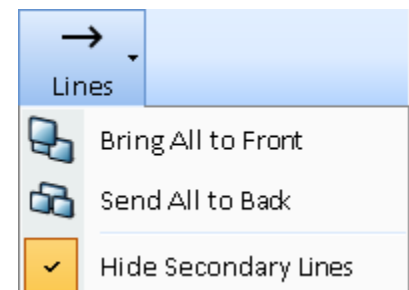
The Lines toolbar menu offers three options adjusting the connector lines between the boxes.

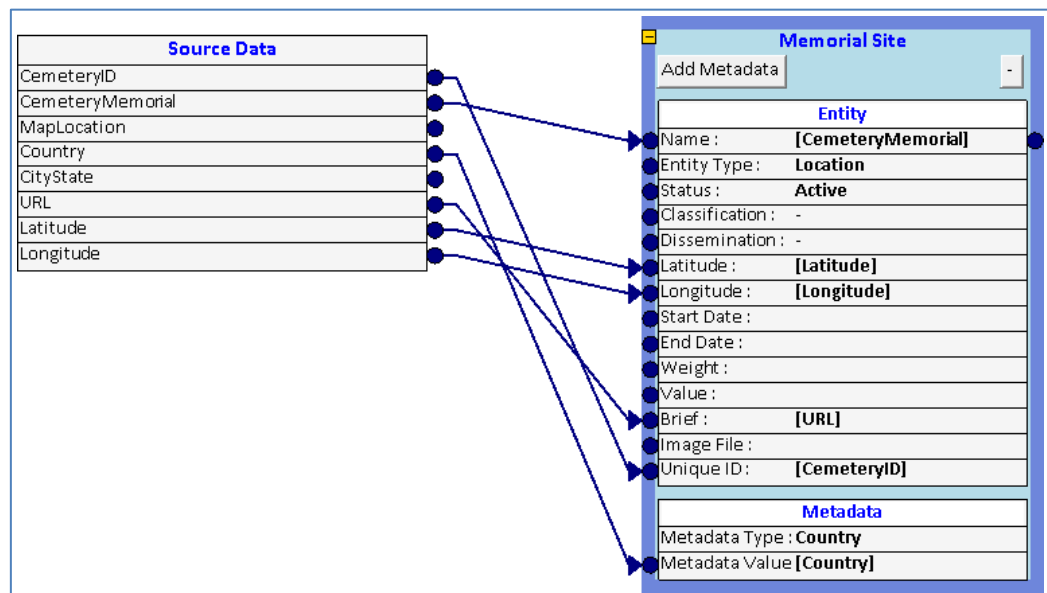
You can move all the lines to the front or back so they are above or below the Entity and Relationship boxes.

Hide Secondary Lines

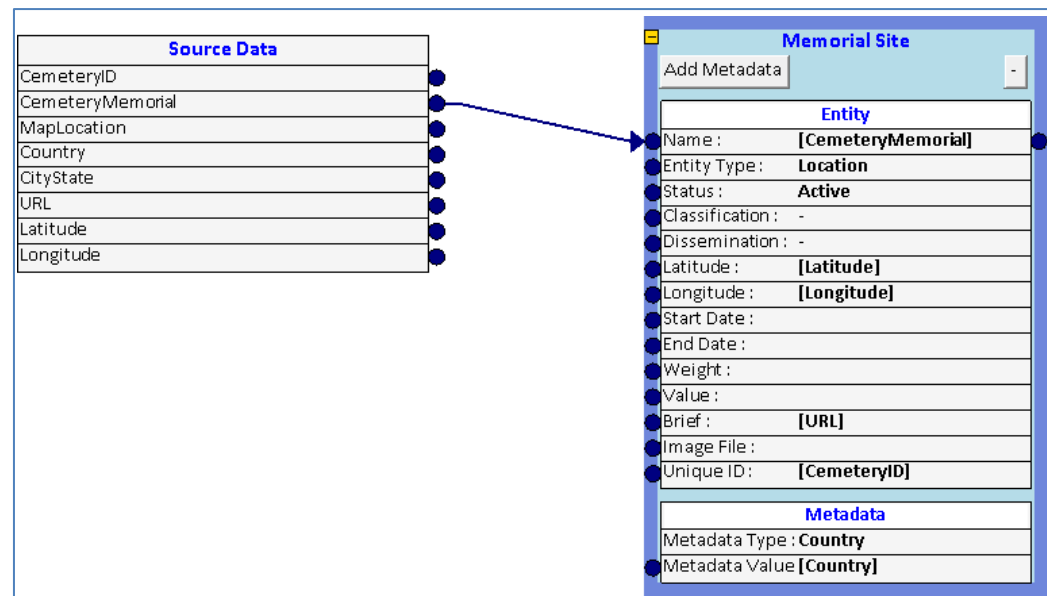
The Primary lines are for the Entity Name. The secondary lines are the other lines which can be hidden.

[Hide Secondary Lines] is a one-time action to hide the lines. If you create new secondary lines after this, they are not hidden. This menu item is a toggle. Selecting it again displays all the lines and unchecks it.





All Lines Shown

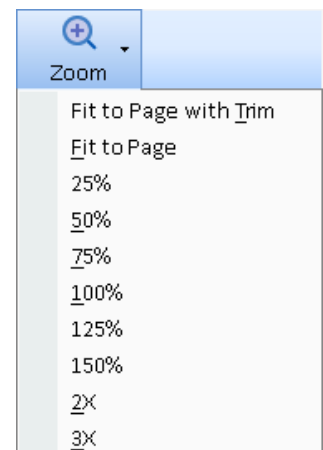


Secondary Lines Hidden

Zoom Menu

The Zoom menu offers different magnification levels including [Fit to Page].

The [Fit to Page with Trim] removes the whitespace around it.



Chapter 23: Configuring Your Database

SentVi 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 SentVi 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, simply select it from a list.
- **Lookups prevent data issues.** By requiring the selection of a value from a pre-defined list, all records have consistent values.

When SentVi 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

SentVi 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, SentVi automatically adds a default list of Metadata types to each new database you create. You can then edit this list.

Printing Lookup Table Reports

SentVi 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 105.

Configuration in a Multiuser 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 SentVi 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

SentVi 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.

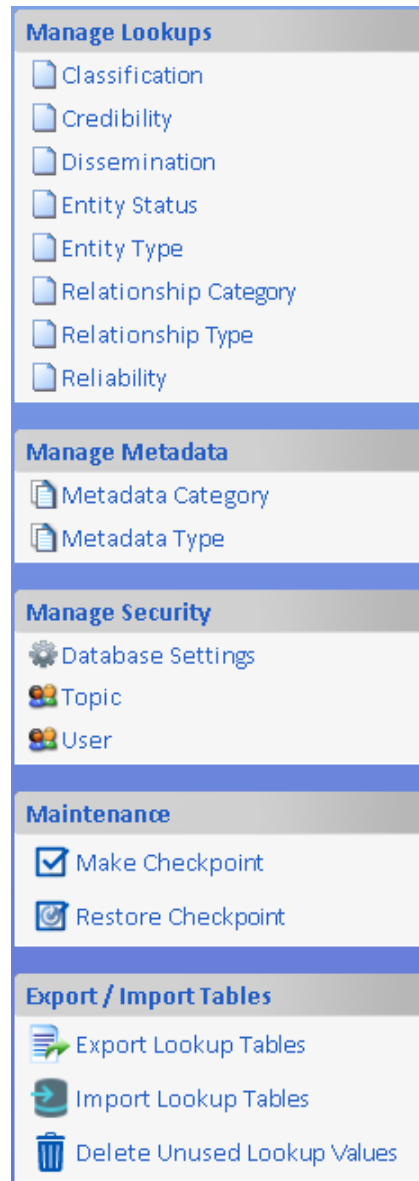
SentVi handles this by disallowing the deletion of any lookup or metadata value that is in use in an entity or relationship record. Instead of deleting the lookup or metadata values, you should generally edit the values to be more appropriate. In the “widget” example, the real issue is that the organization 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 SentVi 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].



Overview of Editing Lookup Tables

SentVi 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.

SentVi 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.

SentVi Lookup Tables

Below is a list of the SentVi Lookup tables:

Lookup Table	Description	Typical Values
Classification	Security classification level that can be assigned to entities and relationships	Confidential, Secret, Top Secret, etc.
Credibility	Rating the credibility of information of a relationship	Confirmed by other sources, Probably true, Doubtful, etc.
Dissemination	Dissemination rule for an entity or relationship	Private, Public
Entity Status	Disposition of an entity	Alive, Dead, Incarcerated, Unknown, etc.
Entity Type	Type of an entity	Person, Organization, Location, etc.
Relationship Category	Category for a relationship type	Familial, Organizational, Transactional, etc.
Relationship Type	Type of relationship	Phone called, Brother of, Member of, etc.
Reliability	Rating the reliability of the source providing the relationship data	Completely reliable, Fairly reliable, Unreliable, etc.

Editing Lookup Lists

The lookup editor offers these options on the toolbar:



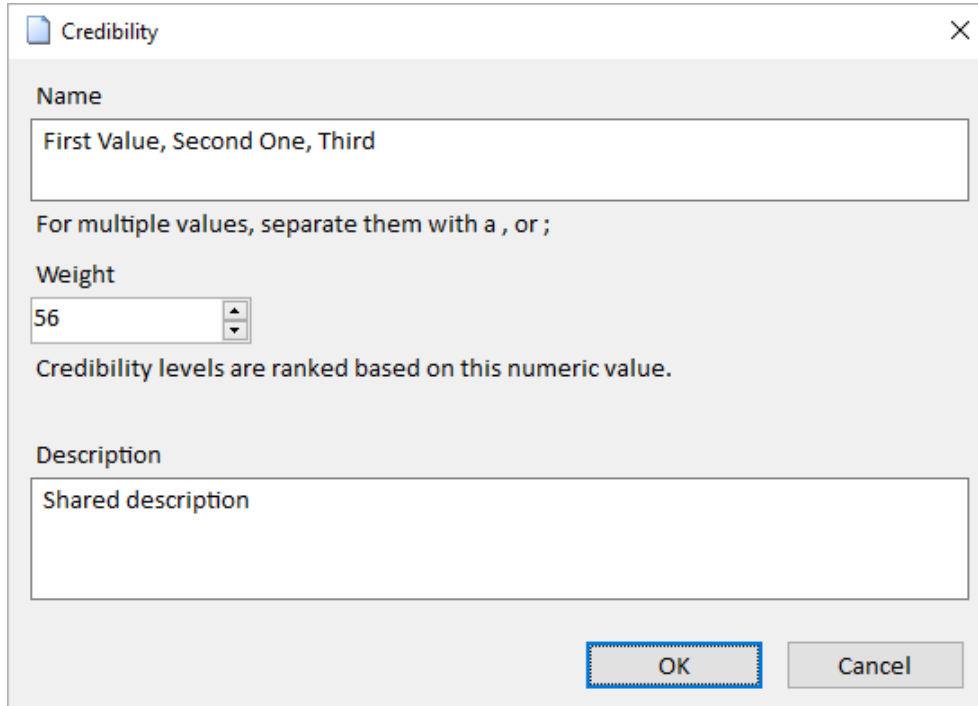
- **Search** – enter text and filter the rows.
- **Add** - Add a new item to the lookup list.
- **Edit** - Modify the selected row.
- **Delete** - Remove the selected row or rows if they are not used.
- **Output to Excel** - Export the lookup values to an Excel spreadsheet.
- **Output to XML** - Export the lookup values to an XML file.

Grid Features

Like other grids, the Lookup grids let you click the column headers to toggle the sort order and adjust column widths.

Adding Multiple Values at One Time

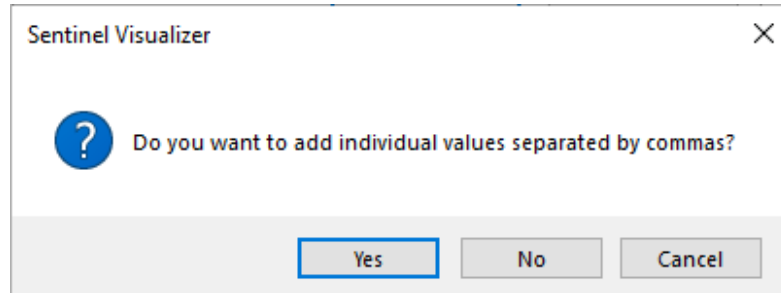
When adding lookup values, multiple values can be added by entering them separated by commas or semicolons, or as rows (pasted from Excel). If there are other values like Weight or Description, they are applied to each of the new items.



The screenshot shows a dialog box titled "Credibility". It has a "Name" text box containing "First Value, Second One, Third". Below it is the instruction "For multiple values, separate them with a , or ;". The "Weight" is a spinner box set to "56", with the text "Credibility levels are ranked based on this numeric value." below it. The "Description" text box contains "Shared description". At the bottom right, there are "OK" and "Cancel" buttons. The "OK" button is highlighted with a blue dashed border.

Add One or More Lookup Values with Additional Values

Click [OK] to save. If commas or semicolons are entered, a question appears whether they are multiple values.



The screenshot shows a dialog box titled "Sentinel Visualizer". It features a blue question mark icon and the text "Do you want to add individual values separated by commas?". At the bottom, there are three buttons: "Yes", "No", and "Cancel". The "Yes" button is highlighted with a blue border.

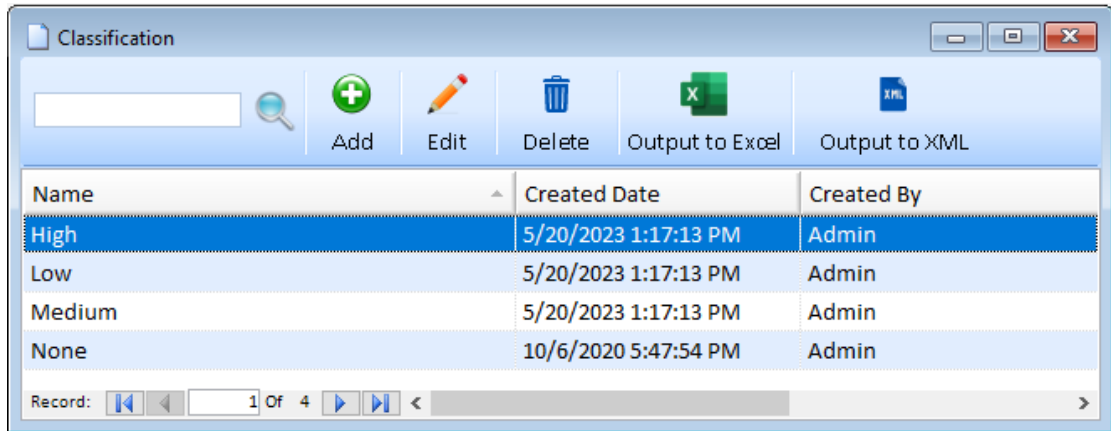
Confirm Adding Multiple Values

- [Yes] processes them as multiple values.
- [No] adds it as one value with the separators.
- [Cancel] goes back to the previous screen without saving anything.

Basic Lookup Tables

Classification Lookups

Classification is used by entities and relationships to denote the classification level of the item. This can be used to search and filter your entities and relationships.



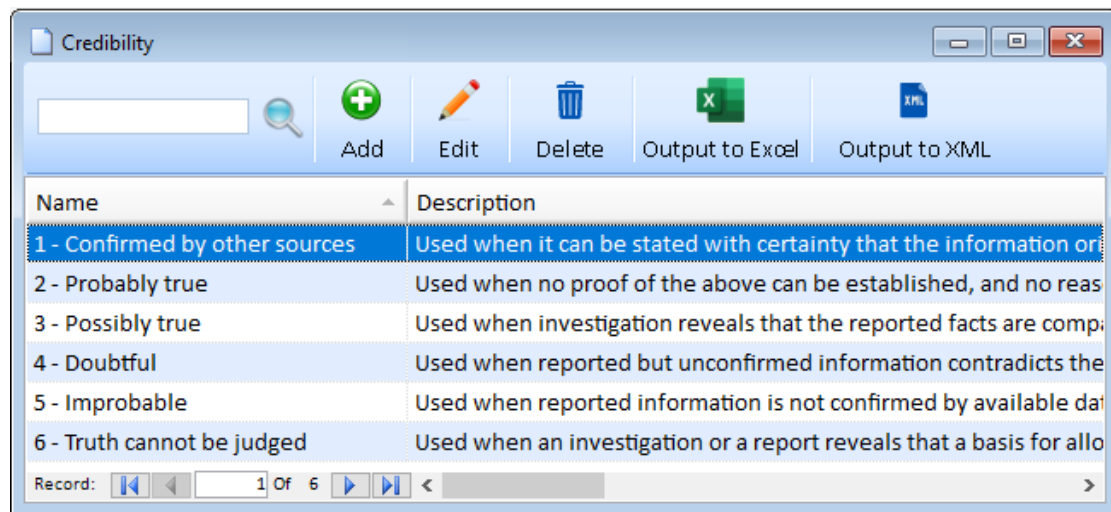
The screenshot shows a software window titled "Classification" with a search bar and several action buttons: Add, Edit, Delete, Output to Excel, and Output to XML. Below the buttons is a table with three columns: Name, Created Date, and Created By. The table contains four rows of data.

Name	Created Date	Created By
High	5/20/2023 1:17:13 PM	Admin
Low	5/20/2023 1:17:13 PM	Admin
Medium	5/20/2023 1:17:13 PM	Admin
None	10/6/2020 5:47:54 PM	Admin

Record: 1 Of 4

Credibility of Information Lookups

Credibility is used for relationships to denote the credibility of the information.



The screenshot shows a software window titled "Credibility" with a search bar and several action buttons: Add, Edit, Delete, Output to Excel, and Output to XML. Below the buttons is a table with two columns: Name and Description. The table contains six rows of data.

Name	Description
1 - Confirmed by other sources	Used when it can be stated with certainty that the information or
2 - Probably true	Used when no proof of the above can be established, and no reas
3 - Possibly true	Used when investigation reveals that the reported facts are comp
4 - Doubtful	Used when reported but unconfirmed information contradicts the
5 - Improbable	Used when reported information is not confirmed by available dat
6 - Truth cannot be judged	Used when an investigation or a report reveals that a basis for allo

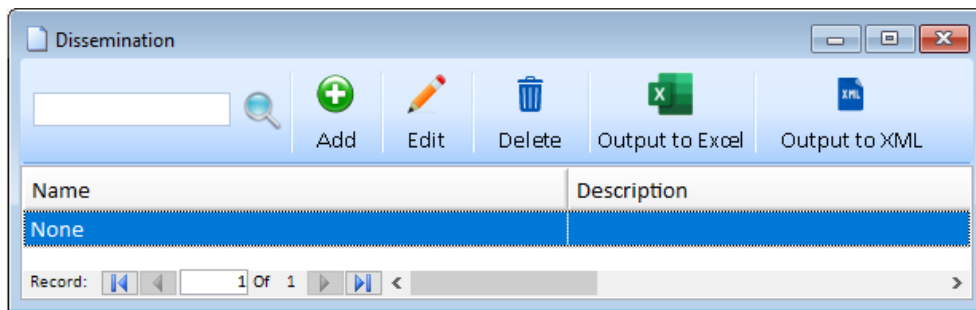
Record: 1 Of 6

Each Credibility record has a Weight field that identifies its position relative to others to rank them. When you add new relationships to SentVi, the Credibility defaults to the lowest weight.

SentVi uses this value when performing various analyses on a network. For more information, refer to [Calculating Network Values](#) on page 193.

Dissemination Lookups

Dissemination is used in entities and relationships to denote how the information may be passed on to external users or systems. Each value can also have a description.



Entity Status Lookups

Entities are assigned a status value. Each Entity Status has a Weight that sets its priority.

For example, an Entity Status of “Alive” has a higher weight than “Deceased.” SentVi uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 193.

The 'Entity Status' window displays a table with the following data:

Name	Weight	Created Date	Created By	Modi
Active	100	3/17/2023 12:35:42 PM	Admin	
Alive	100	3/17/2023 12:35:42 PM	Admin	
Deceased	20	3/17/2023 12:35:42 PM	Admin	
Inactive	1	3/17/2023 12:35:42 PM	Admin	
Incarcerated	50	3/17/2023 12:35:42 PM	Admin	
None	1	3/17/2023 12:35:42 PM	Admin	
Unknown	100	3/17/2023 12:35:42 PM	Admin	

Record: 1 Of 7

Relationship Category Lookups

Relationship Types use the Relationship Category to group the many types.

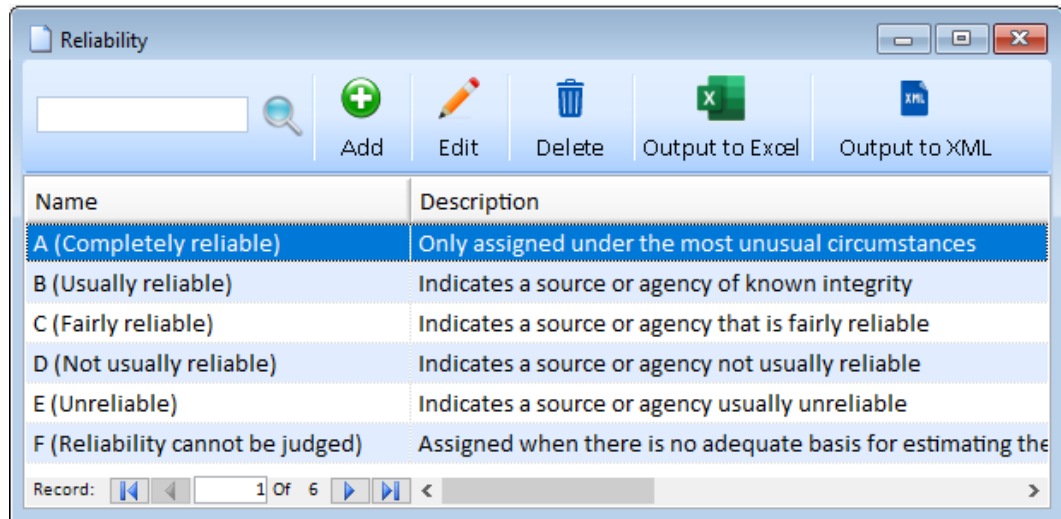
The 'Relationship Category' window displays a table with the following data:

Name	Created Date	Created By
Communication	3/17/2023 12:35:42 PM	Admin
Crime	3/17/2023 12:35:42 PM	Admin
Family	3/17/2023 12:35:42 PM	Admin
Location	3/17/2023 12:35:42 PM	Admin
Organization	3/17/2023 12:35:42 PM	Admin
Other	3/17/2023 12:35:42 PM	Admin
Social	3/17/2023 12:35:42 PM	Admin
Transactions	3/17/2023 12:35:42 PM	Admin

Record: 1 Of 8

Reliability Lookups

Reliability is used by relationships to denote the reliability of the source of the information.

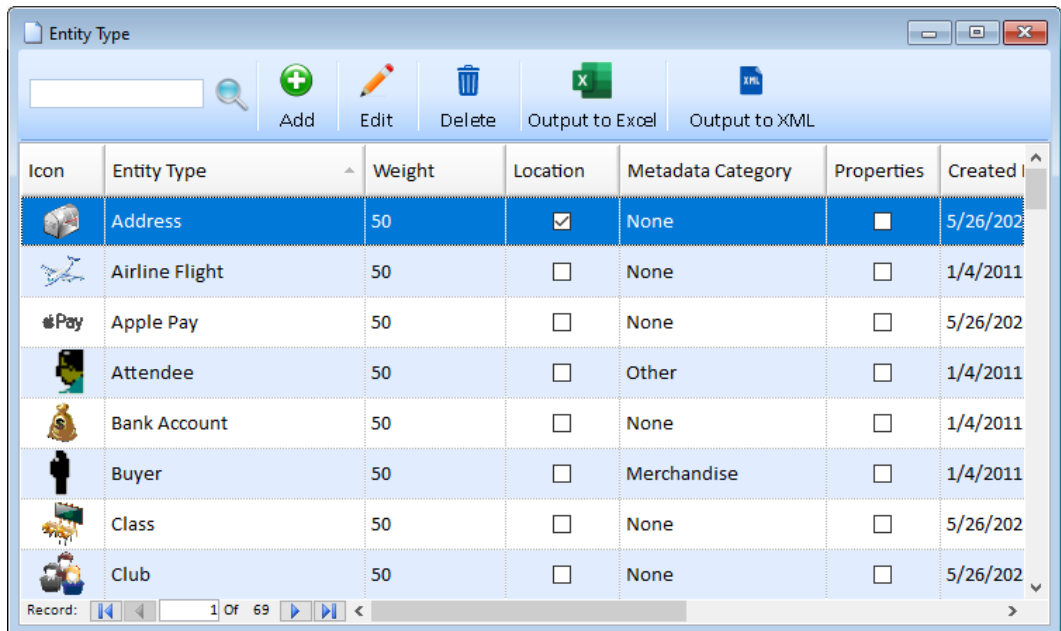


Name	Description
A (Completely reliable)	Only assigned under the most unusual circumstances
B (Usually reliable)	Indicates a source or agency of known integrity
C (Fairly reliable)	Indicates a source or agency that is fairly reliable
D (Not usually reliable)	Indicates a source or agency not usually reliable
E (Unreliable)	Indicates a source or agency usually unreliable
F (Reliability cannot be judged)	Assigned when there is no adequate basis for estimating the

Each Reliability item has a Weight field to rank them. SentVi uses this value when performing various analyses on a network. For more information, refer to [Calculating Network Values](#) on page 193.

Entity Type Lookups

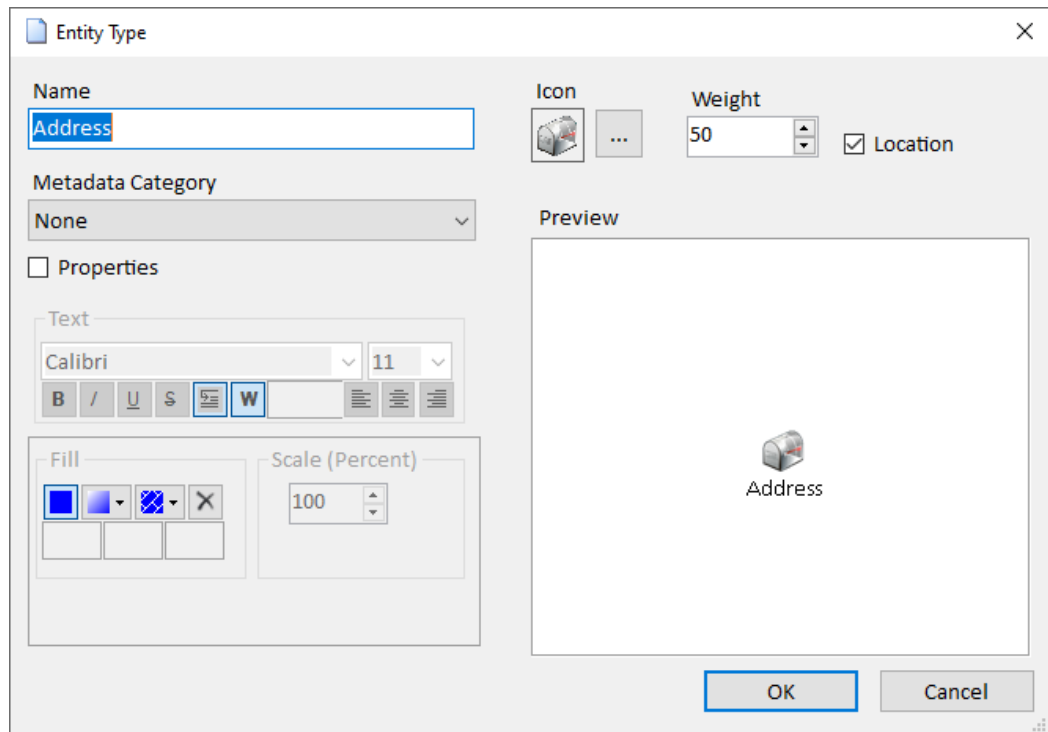
Entity Type is used by entity records to denote its type. For example, an entity could be a person, phone number, bank account, etc. To manage Entity Type lookups, click the [Entity Type] link on the left sidebar:



Icon	Entity Type	Weight	Location	Metadata Category	Properties	Created
	Address	50	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	5/26/202
	Airline Flight	50	<input type="checkbox"/>	None	<input type="checkbox"/>	1/4/2011
	Apple Pay	50	<input type="checkbox"/>	None	<input type="checkbox"/>	5/26/202
	Attendee	50	<input type="checkbox"/>	Other	<input type="checkbox"/>	1/4/2011
	Bank Account	50	<input type="checkbox"/>	None	<input type="checkbox"/>	1/4/2011
	Buyer	50	<input type="checkbox"/>	Merchandise	<input type="checkbox"/>	1/4/2011
	Class	50	<input type="checkbox"/>	None	<input type="checkbox"/>	5/26/202
	Club	50	<input type="checkbox"/>	None	<input type="checkbox"/>	5/26/202

Add and Edit Entity Types

To add a new Entity Type, click the [Add] button. Click [Edit] to modify the current row:

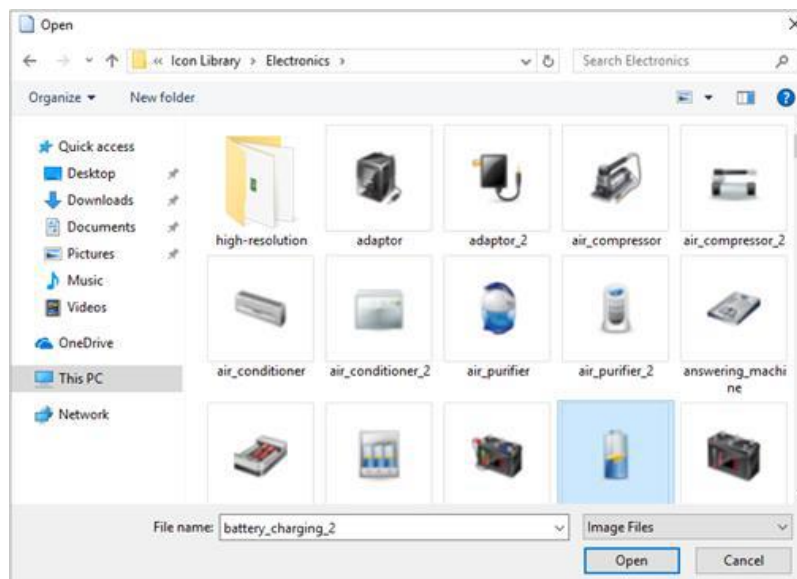


Enter a name, select an icon, and set its weight. Check [Properties] to specify how entities of this entity type should appear if the entity doesn't have its own image.

Icon

An icon visually represents the type of entity on the Visualizer if the entity doesn't have its own picture. Use the [...] button to select an icon file. You can use your own or one of our 9,000+ high resolution Icons (128x128 pixel png files) are included in the Icon Library folder in the SentVi installation folder. This folder is selected by default when you browse.

One way to find an icon matching the entity type 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:



Weight

Each Entity Type has a Weight field that can prioritize it versus other Entity Types. 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.

SentVi uses this value when performing various analyses on a network. For more information, refer to **Calculating Network Values** on page 193.

Metadata Category

Select the Metadata Category for this entity type. When an entity is created under Add Entity, the metadata for the Metadata Category are automatically added. Click [OK] to save your changes, or [Cancel] to discard them.

Properties

Similar to setting entity properties on the Visualizer diagram, the entity type can also have custom properties so that entities of the type without their own image or properties use the entity type's settings. Click the [Properties] checkbox and set the appearance. The Preview updates with your selection.

From the Visualizer, if an entity's properties are customized, right clicking on the entity lets you save those settings for the entity type.

Relationship Type Lookups

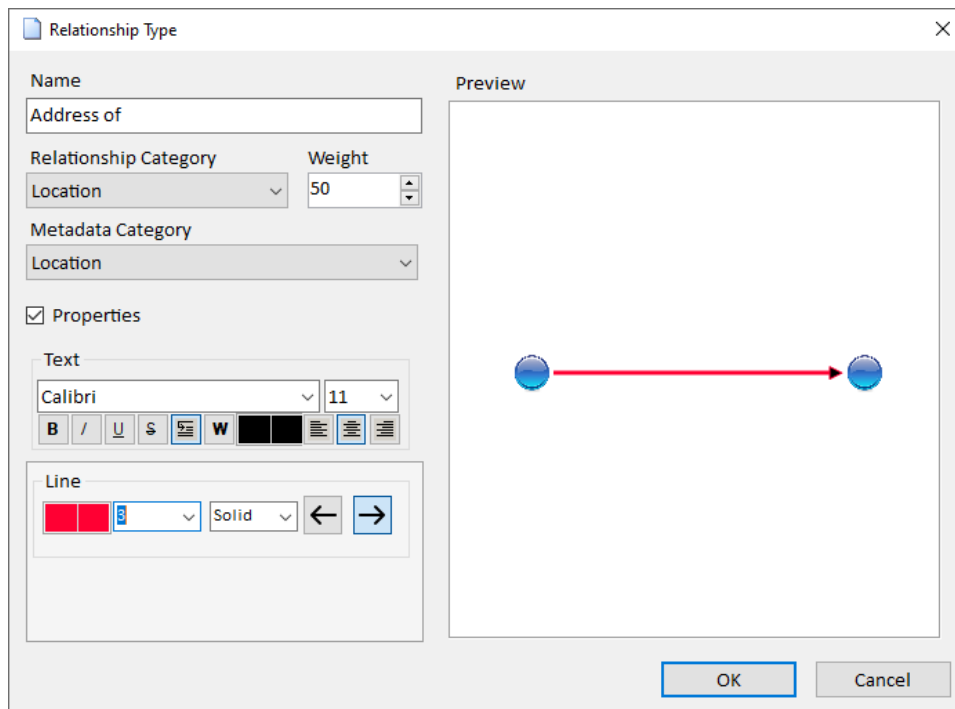
Relationship Type is used by relationship records to denote its type. To manage Relationship Type lookups, click the [Relationship Type] link on the left sidebar:

Name	Category	Weight	Metadata Category	Properties	Cre
Accomplice of	Crime	50	None	<input type="checkbox"/>	1/4/
Acquaintance of	Social	50	Other	<input type="checkbox"/>	6/1/
Address of	Location	50	Location	<input type="checkbox"/>	1/4/
Arrested by	Crime	50	Other	<input type="checkbox"/>	1/4/
Associate of	Social	50	Other	<input type="checkbox"/>	1/4/
Attended	Social	50	Location	<input type="checkbox"/>	1/4/
Attended a meeting	Social	50	Location	<input type="checkbox"/>	1/4/
Attended an event	Social	50	Location	<input type="checkbox"/>	1/4/

Add and Edit Relationship Types

To add a new Relationship Type, click the [Add] button. Click [Edit] to modify the current row.

Enter the Relationship Type name and select a Relationship Category. The categories are from the Relationship Category lookup table—use that lookup table to add or edit categories.



Weight

Each Relationship Type lookup record has a Weight field that identifies its importance to all other Relationship Types. For example, a Relationship Type of “Brother” would have a higher weight than “Acquaintance.”

SentVi uses this value when performing various analyses on a network. For more information, refer to [Calculating Network Values](#) on page 193.

Properties

Similar to setting relationship properties on the Visualizer diagram, the relationship type can also have custom properties so that relationships of the type without their own properties use the relationship type’s settings. Click the [Properties] checkbox and set the appearance. The Preview updates with your selection.

From the Visualizer, if a relationship’s properties are customized, right clicking on the line lets you save those settings for the relationship type.

Metadata Lookups

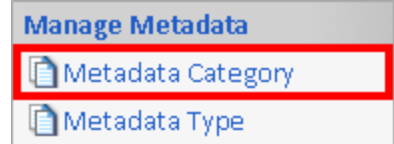
SentVi supports the concept of Metadata, which allows you to define additional data fields for entities and relationships. You can use Metadata fields to capture additional entity and relationship detail data that is not built into SentVi.

Categories and Types

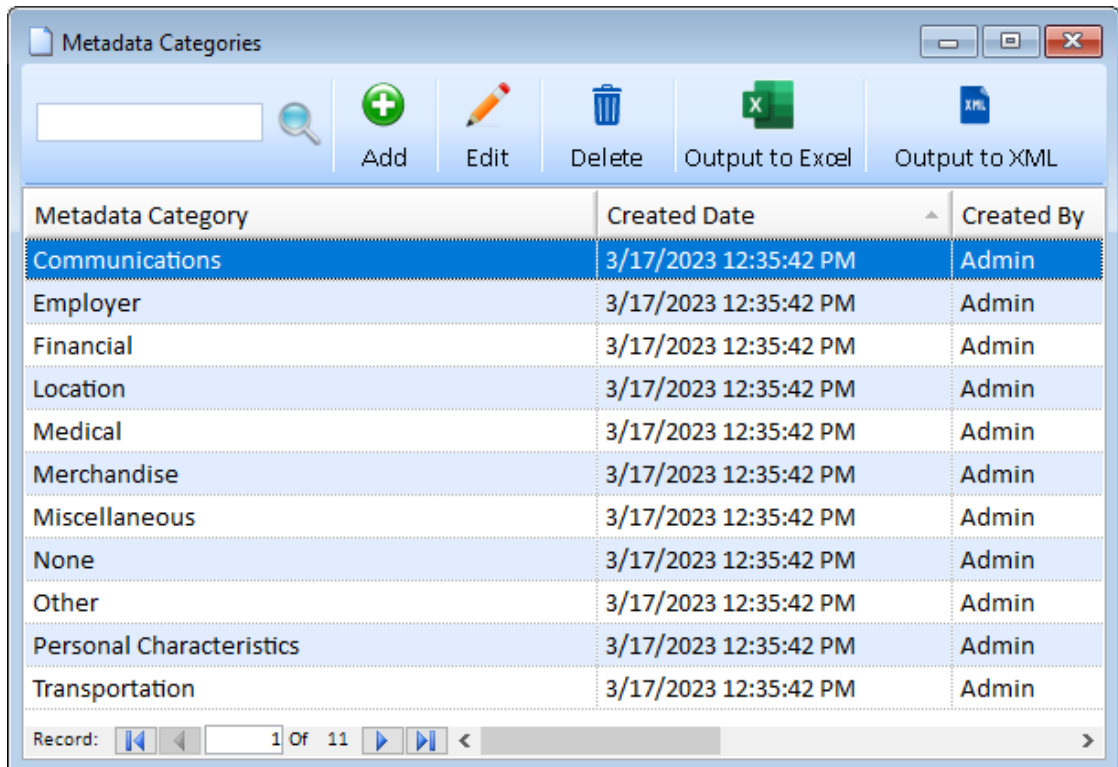
Metadata Types are the additional “fields” you add to your database. Metadata Categories are groupings of these types that facilitate the automatic addition of Metadata Types to new entities and relationships. You can create an unlimited number of Metadata categories and link them to entity and relationship types.

Metadata Categories

Metadata Categories are groupings of Metadata Types. For example, for an Entity Type Person, you can have Metadata types such as “Alias Name”, or “Hair Color”. 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.



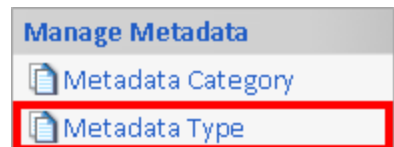
The screenshot shows the 'Metadata Categories' application window. It features a toolbar with icons for search, add, edit, delete, output to Excel, and output to XML. Below the toolbar is a table with the following data:

Metadata Category	Created Date	Created By
Communications	3/17/2023 12:35:42 PM	Admin
Employer	3/17/2023 12:35:42 PM	Admin
Financial	3/17/2023 12:35:42 PM	Admin
Location	3/17/2023 12:35:42 PM	Admin
Medical	3/17/2023 12:35:42 PM	Admin
Merchandise	3/17/2023 12:35:42 PM	Admin
Miscellaneous	3/17/2023 12:35:42 PM	Admin
None	3/17/2023 12:35:42 PM	Admin
Other	3/17/2023 12:35:42 PM	Admin
Personal Characteristics	3/17/2023 12:35:42 PM	Admin
Transportation	3/17/2023 12:35:42 PM	Admin

At the bottom of the window, there is a record navigation bar showing 'Record: 1 Of 11'.

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 SentVi 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	Lookup	Similar Search	Category	Created Date
Account	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Financial	9/16/2020 2:21:32 PM
Address	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Location	9/16/2020 2:21:45 PM
Airline Carrier	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transportation	9/16/2020 2:21:59 PM
Alias Name	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Personal Characteristics	1/4/2011 4:29:34 PM
Cellular Number	<input type="checkbox"/>	<input type="checkbox"/>	Communications	9/16/2020 2:22:21 PM
City	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Location	9/16/2020 2:22:38 PM
Eye Color	<input type="checkbox"/>	<input type="checkbox"/>	Personal Characteristics	1/4/2011 4:29:34 PM
Gender	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Personal Characteristics	1/4/2011 4:29:34 PM
Hair Color	<input type="checkbox"/>	<input type="checkbox"/>	Communications	10/13/2011 3:06:10 PM
Train	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transportation	9/16/2020 2:22:09 PM

Metadata Type Form

Click the Add or Edit Button to open the Metadata Type form.

Metadata Type Name: US State

Category: Location

Support Similar Search

Use lookup list of values for data entry and colors

Value	Color
CA	Yellow
DC	Red
MD	Green
VA	Blue

Record: 4 Of 4

OK Cancel

- **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 finished, click [OK] to save your changes, or [Cancel] to discard them.

Support Similar Search

SentVi can 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]:

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.

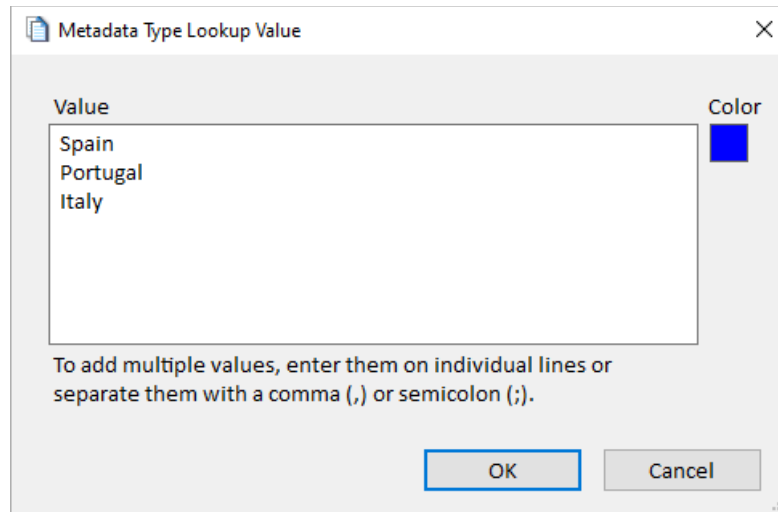
The lookup values are only used to simplify the assignment of metadata values to entities and relationships. If you change a lookup value, it does not update the previously assigned values.

Manage 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:


Value	Color
Canada	Blue
France	Purple
Germany	Pink
Mexico	Yellow
United Kingdom	Orange
United States	Green


Click the  Add button to add items. A form appears to add values and specify a color:




Add One or More Metadata Type Value



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 it. 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 these values are not in the lookup list, you have the option to add it with a color you specify. This makes it easy for your lookup list to have all the values in your database.

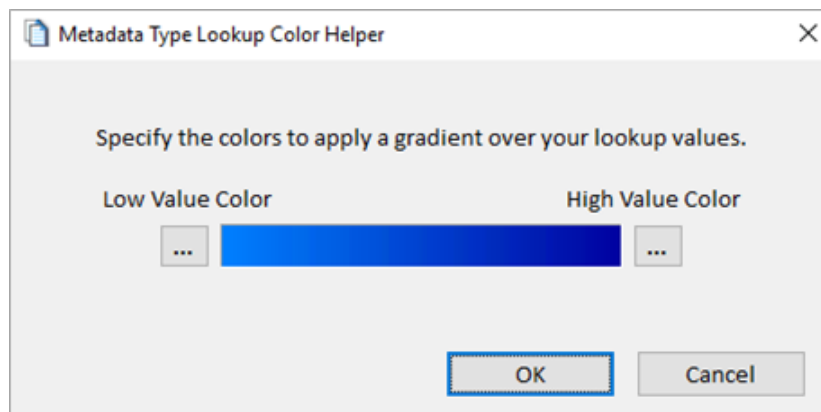
Reorder Lookup Values

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

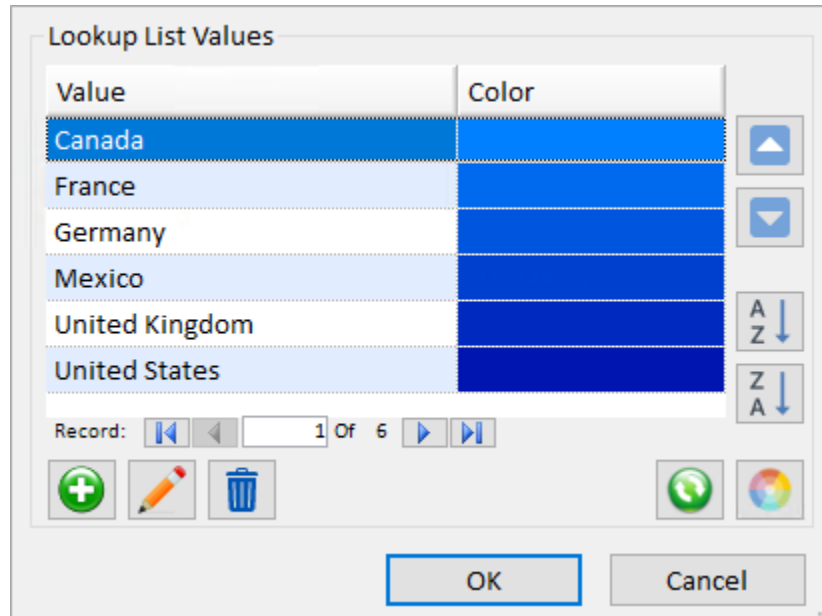
The color option allows you to specify the color to use when coloring Entities by metadata in the Visualizer, such as Blue for Male, Red for Female, and Green for Unknown, etc.



Color Gradient

If there are many values, it may be too cumbersome to set their colors individually. Sort the list to the order you want and use the  Color button to assign all of them with a color gradient.

Pressing [OK] applies the gradient to the values:

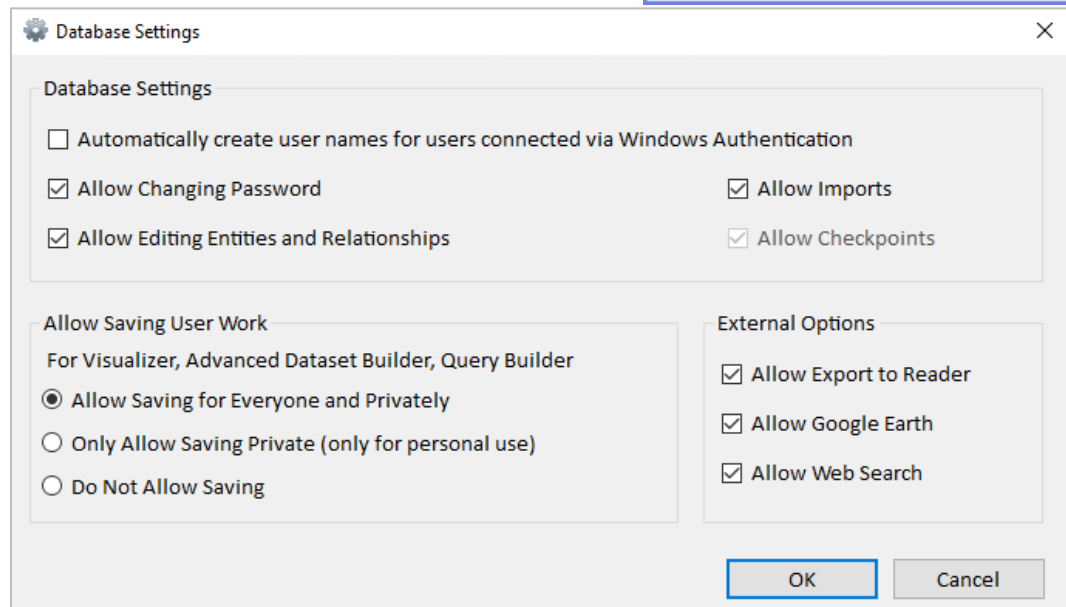
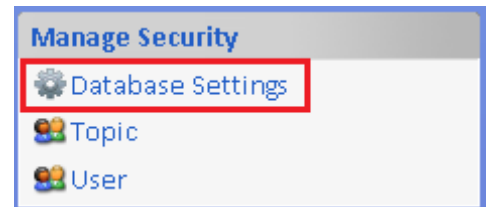


Color Gradient Applied to Lookup Values

Security Lookups

Manage Database Settings

Database settings allow an Administrator to specify database security options.



Database Settings

Automatically create username for users connected via Windows Authentication

This enables automatic user creation for databases using Windows Authentication. When enabled, users do not enter a username or password when connecting to the database.

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 been enabled when Allow Imports is enabled.

Allow Saving User Work

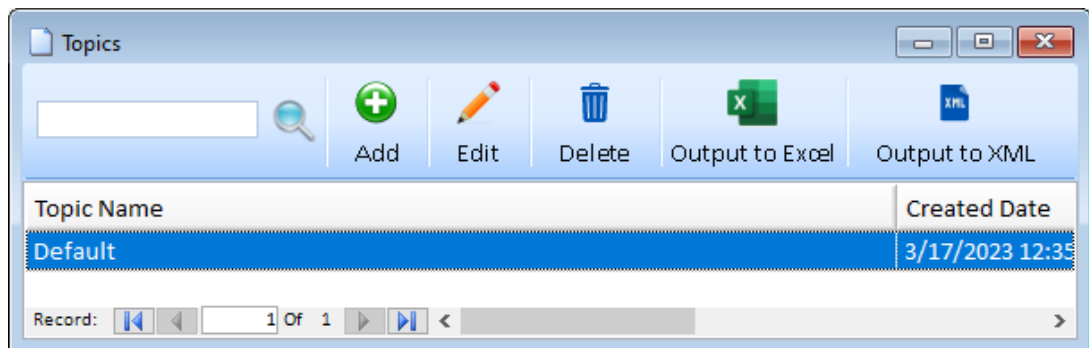
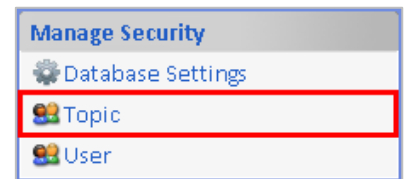
- **Allow Saving for Everyone and Privately** – Users can save private diagrams and diagrams accessible to all other users.
- **Only Allow Saving Private (only for personal use)** – Users can only save private diagrams. No other users can see their saved diagrams.
- **Do Not Allow Saving** – Do not allow any Diagrams to be saved.

External Options

- **Allow Export to Reader** - Disabling this prevents users exporting data to Reader files.
- **Allow Google Earth** - Disabling this prevents users from exporting data to Google Earth.
- **Allow Web Search** - Disabling this option prevents users from performing web searches.

Manage Topics

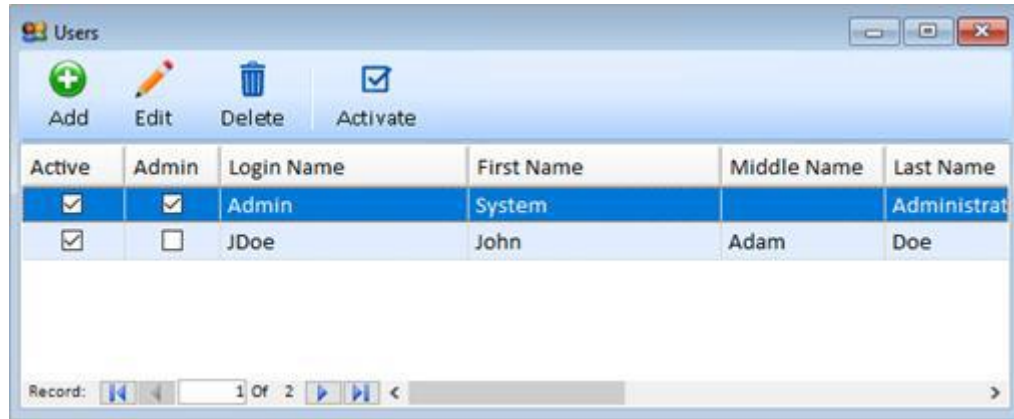
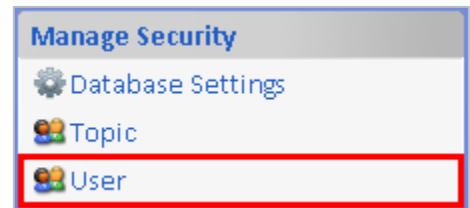
Topics are categories of information that allow you to categorize entity and relationship information. To manage Topics, click the [Manage Database] link on the left sidebar. Then, under the section labeled 'Manage Security', click the [Topic] link.



Manage 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.

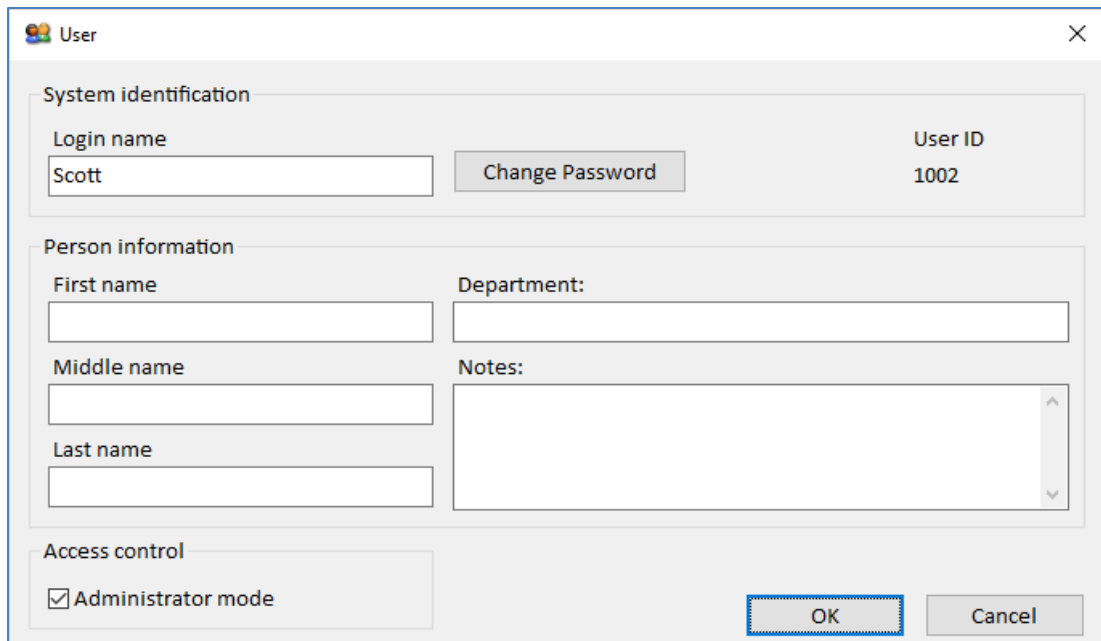


User Types

SentVi provides two types of users:

- **Standard:** Can view and edit entity and relationship data but cannot make changes to lookup values with the Manage Database form.
- **Administrative:** All rights of Standard users plus running Manage Database.

To add a new user, click the [Add] toolbar button and the Add New Users form appears:



The image shows a 'User' form with the following sections:

- System identification:** Login name (text box with 'Scott'), Change Password button, User ID (text box with '1002').
- Person information:** First name, Middle name, Last name (text boxes); Department (text box); Notes (text area).
- Access control:** Administrator mode.

At the bottom right, there are 'OK' and 'Cancel' buttons.

You can designate any SentVi 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:

- **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 SentVi system.
- **User ID:** The User ID field is a unique numeric identifier for the user. This field is system-maintained and cannot be changed.
- **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, 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.

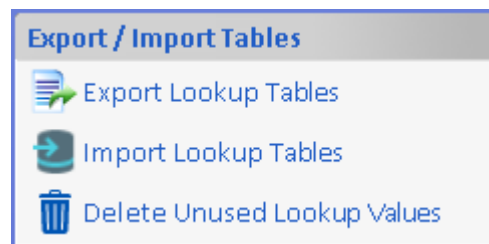
Deleting and Deactivating Users

SentVi allows you to delete existing users, but only if that user has not created or edited any records. SentVi 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, Deactivate them. This retains the user information but does not allow that user to access the system.

Export and Import Lookup Tables, and Delete Unused Values

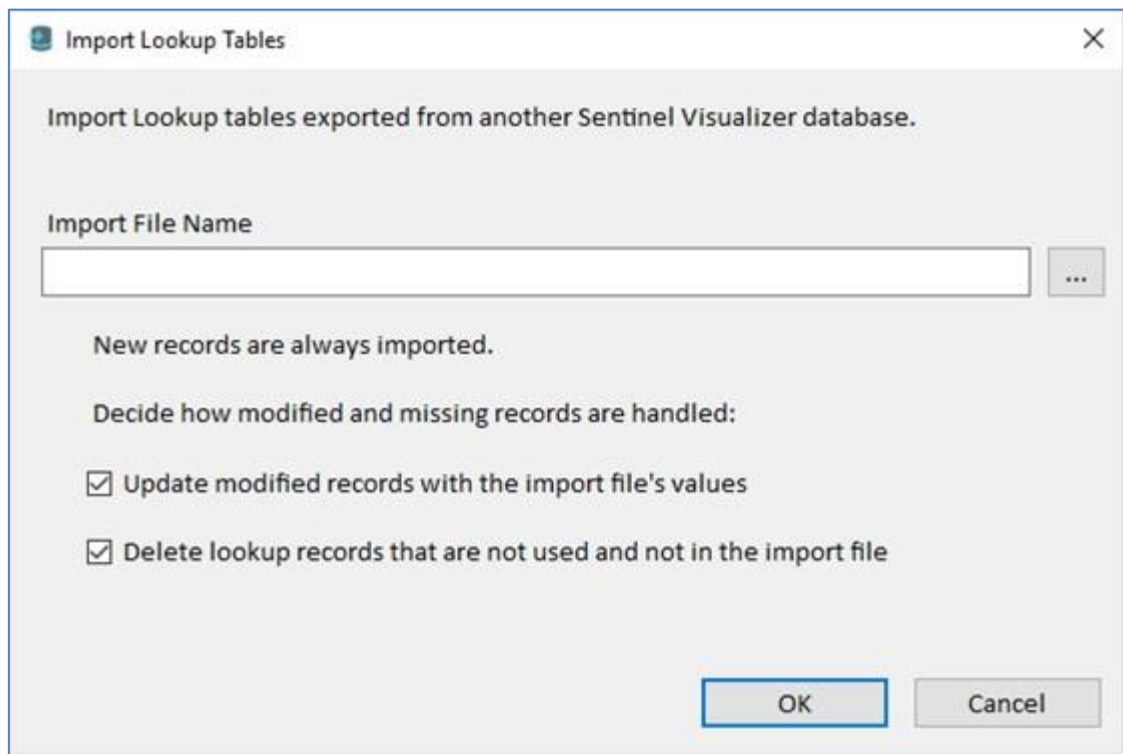


Export Lookup Tables

All the values in your lookup tables can be exported to a SentVi 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.

Import Lookup Tables

Import the lookup tables exported from another database.



New values are always added with options to update existing records and delete unused items. 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 24: Multiuser Shared Databases

The Premium and Ultimate Editions of SentVi 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 SentVi documentation. Please refer to the appropriate Microsoft-provided documentation for complete information.

Backup and Restore SQL Server Databases

Backing up your SentVi 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 SentVi 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 SentVi 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 SentVi. 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 SentVi. 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 SentVi 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 SentVi database for the new login created in (3a).
 - b. Add the user to the SentinelApp role in the SentVi 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 SentVi.

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 SentVi 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. SentVi 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 SentVi Domain Group

As discussed earlier, you need to create a new domain group that acts as the central authentication token that SentVi 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 SentVi Users

Identify the initial set of SentVi 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 SentVi Domain Group

Once you identify the list of existing domain users, you add them to your SentVi domain group. Use the standard Windows Server tools to accomplish this task.

Data Access and Multiuser Concurrency

The Premium and Ultimate Editions of SentVi 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 multiuser environment, it is helpful to understand how SentVi manages this process.

How Records are Accessed

When you use a search feature or request entity or relationships information, SentVi sends your request to the database server. The server checks your user account for permission, and retrieves the data from your database.

After that, the connection between your computer and the database is closed—you are looking at a local copy of the data as it existed on the database when the request was made. This means that no “locking” occurs. This non-locking design, typical in client/server systems, ensures a high degree of availability, and provides optimal performance, even with many users.

If your database is constantly changing, to ensure you are viewing the most current data, do not rely on what is on your screen if it was retrieved a while ago. Press the [Refresh] button to update the data on the screen (e.g. edited names and relationship types), but that does not perform tasks like Get Links which would get additional linked entities if they were added. You need to repeat your previous operations to retrieve the latest data from your database.

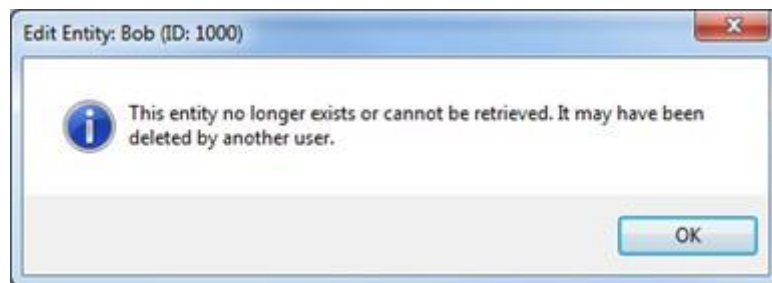
Multiuser Concurrency

SentVi handles multiple users attempting conflicting operations. For example, assume you open the “Bob” entity record and edit it. Before you save, someone else opens “Bob,” edits it, and saves their changes. When you try to save after that, you are prompted to save your changes and overwrite the newer data, or to lose your changes:



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 editing an entity and another user deletes the record or changes permissions so you no longer have permissions for it. 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 25: Compare, Merge and Clone Entities

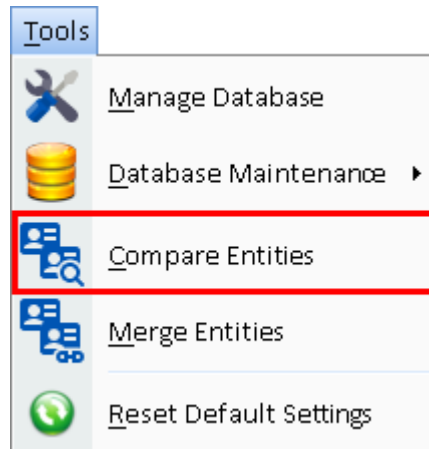
As you work with entities, you may find similar or duplicate data. This chapter describes how to compare, merge, and clone entities.

Compare Entities


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.

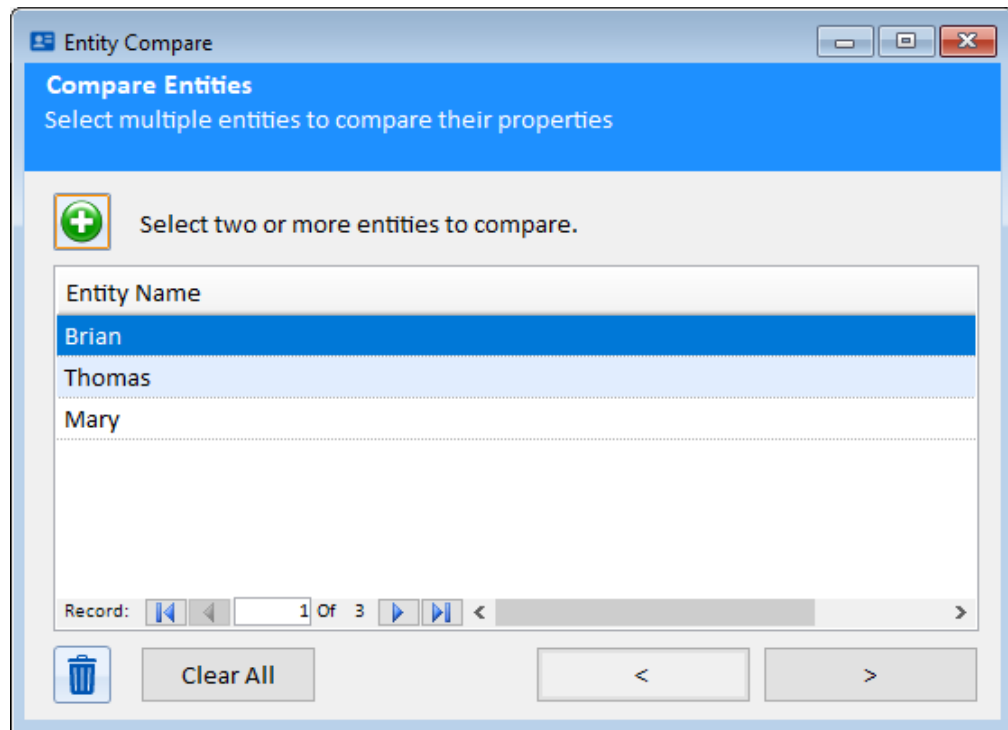
Choose the Entities to Compare

To run Entity Compare, click [Tools] on the menu and select [Compare Entities].



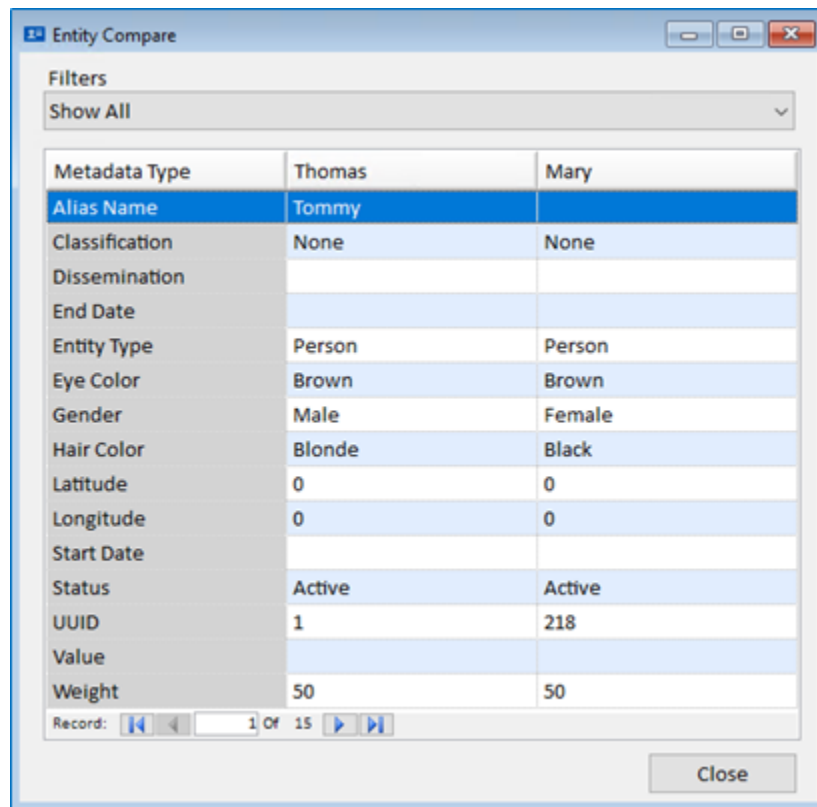
This opens the standard Entity Picker form that uses the search features described in **View Entity Information** on page 52. Select the entity you want to compare. Click on [OK] button. Each entity you add appears in the Selected Entities area of the form.

Click on the green [+] button to add two or more entities to compare. Use the  Delete button to remove the selected entity from the list, or [Clear All] button to remove all entities.

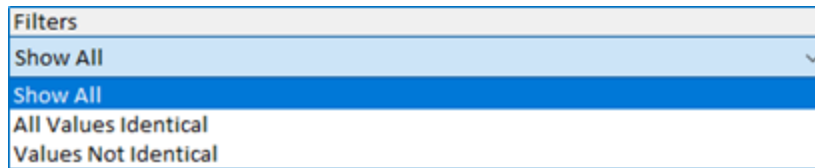


Comparison Results

After selecting the entities to compare, click the [>] button. SentVi 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.

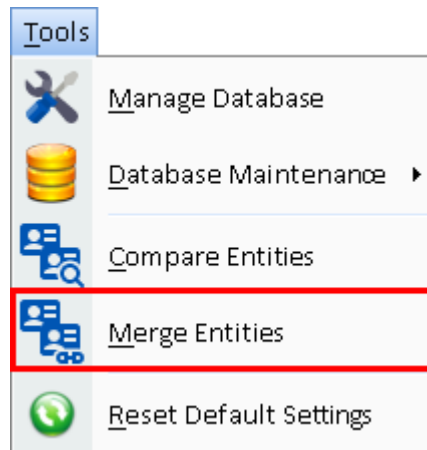


- **Show All:** Shows all metadata values for each entity.
- **All Values Identical:** Shows only the metadata values that are identical.
- **Values Not Identical:** Shows only the metadata values that do not match.

Merge Entities

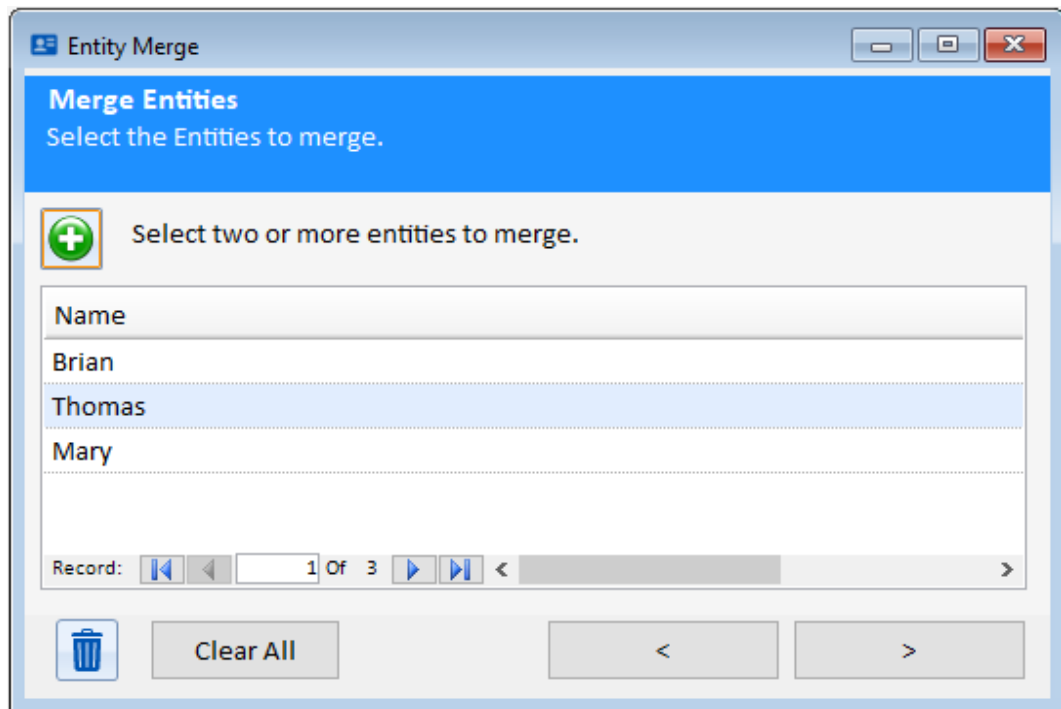
Entity Merge allows you to select two entities and merge them into one record. This is useful when you find duplicate entities that contain different data or relationships, and you want them merged into a single record.

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

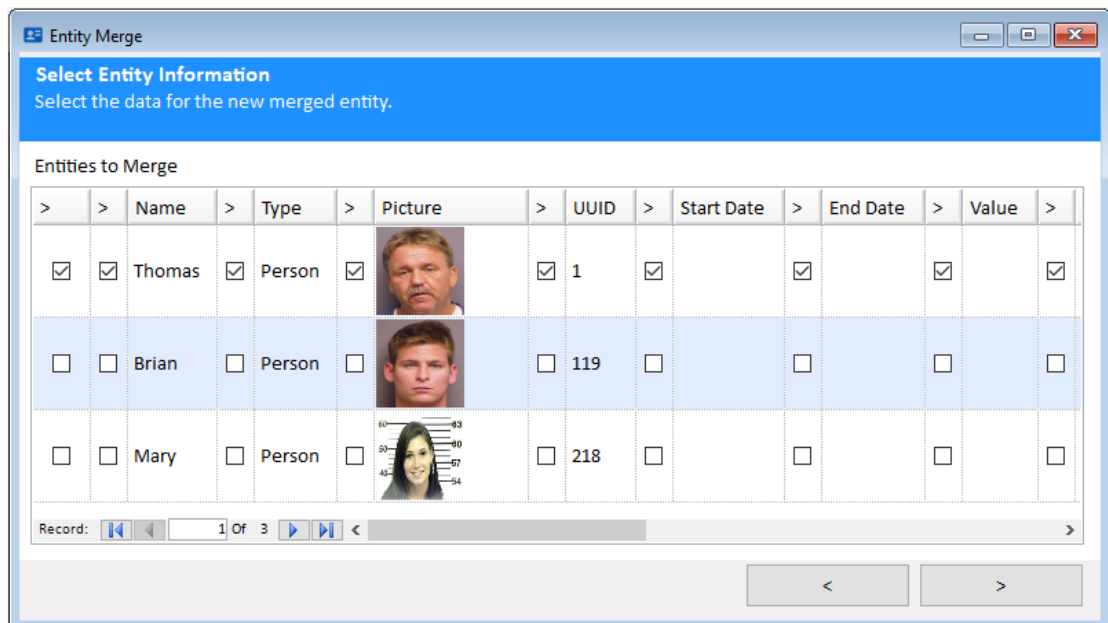
Click the [+] button add an entity to merge. This opens the standard Entity Picker form that uses the search features described in **View Entity Information** on page 52. After locating the first entity to merge, click [OK] and then use the [Select Entity] button again to add the second entity. You can add an unlimited number of entities to merge into one.



After selecting two or more entities, click the [>] button. The Select Entity Data form 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 form appears:

Select Notes and Topics
Select the data for the merged entity. Unselected items are deleted.

Notes

>	Title	Notes	Entity Name
<input checked="" type="checkbox"/>	Locations	The locations where the giftcards were used.	Thomas
<input checked="" type="checkbox"/>	Stores - Returned	The stores were the stolen products returned to.	Thomas

Record: 1 Of 2

Topics

>	Topic
<input checked="" type="checkbox"/>	Default

Record: 1 Of 1

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

Select Documents and Metadata
Select the data for the merged entity. Unselected items are deleted.

Documents

>	Icon	Embedded	Description	Path
<input checked="" type="checkbox"/>		<input type="checkbox"/>	People.xls	C:\Program Files (x86)\FMS\Sentinel Visualizer :
<input checked="" type="checkbox"/>		<input type="checkbox"/>	Thomas and Friends	https://www.thomasandfriends.com/en-us/

Record: 2 Of 2

Metadata

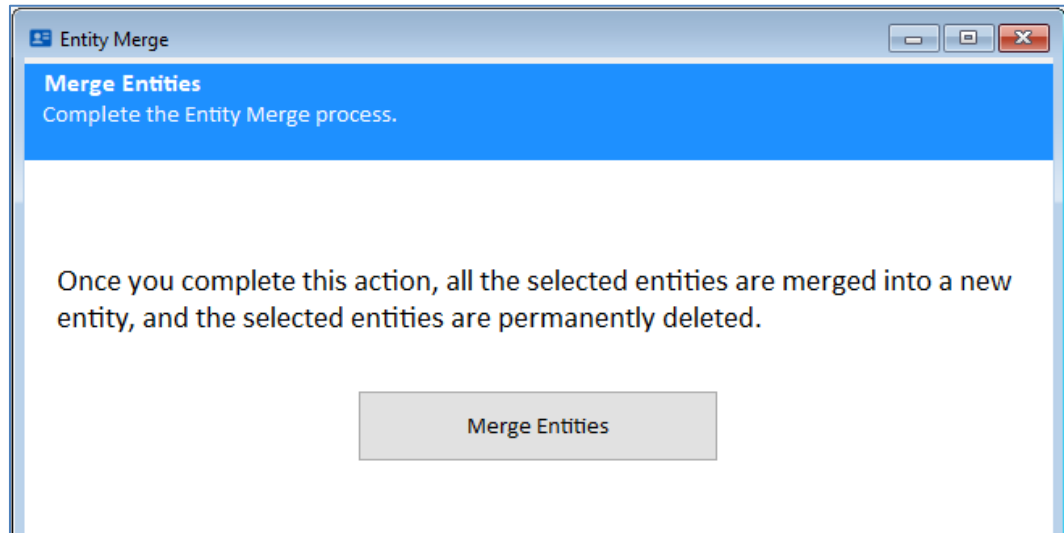
>	Metadata Type	Metadata Value	Notes	Entity Name
<input checked="" type="checkbox"/>	Alias Name	Tommy		Thomas
<input checked="" type="checkbox"/>	Eye Color	Brown		Thomas
<input checked="" type="checkbox"/>	Gender	Male		Thomas
<input checked="" type="checkbox"/>	Hair Color	Blonde		Thomas

Record: 1 Of 4

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.

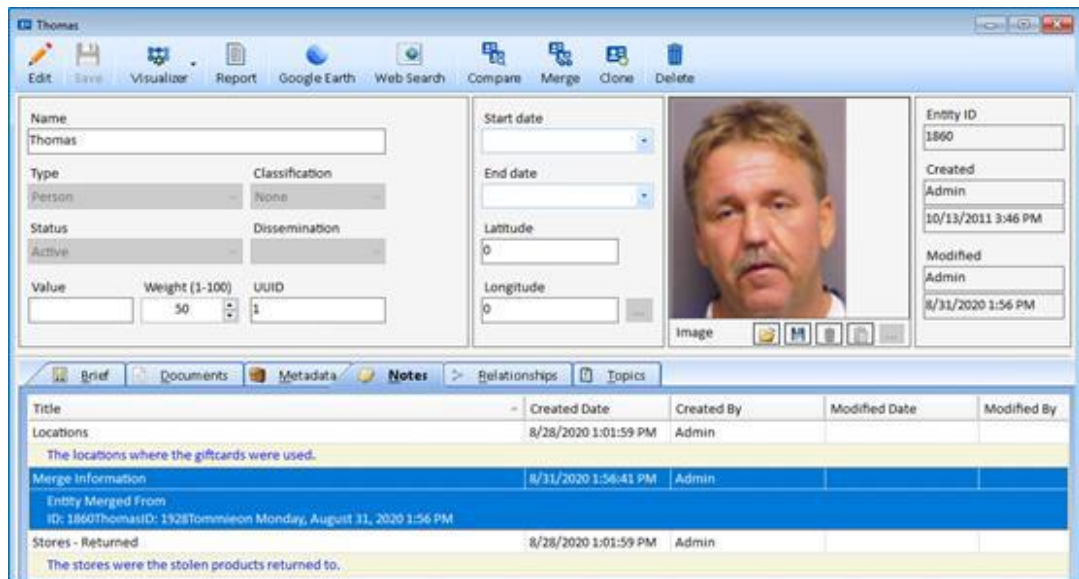
Entity Merge Confirmation

The final Entity Merge form 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.

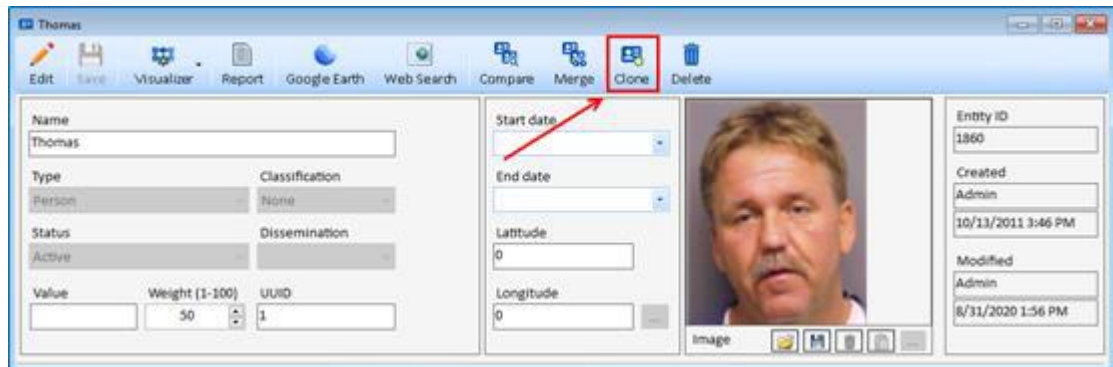
After merging the entities, the new entity has the data you selected, along with a new Note record titled "Merge Information."



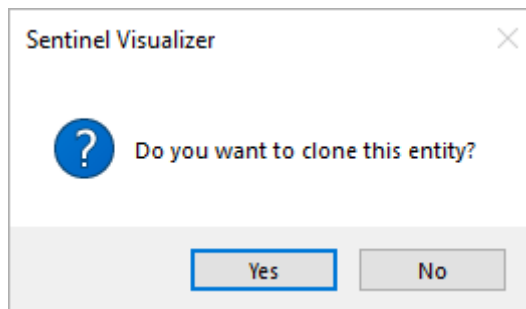
Clone Entities

Entity Clone makes a copy of an Entity with all its data except relationships. This is useful to duplicate an entity, or if a single entity is two entities. For example, you discover an entity is really two different people. Use Clone to make another entity and clean them up.

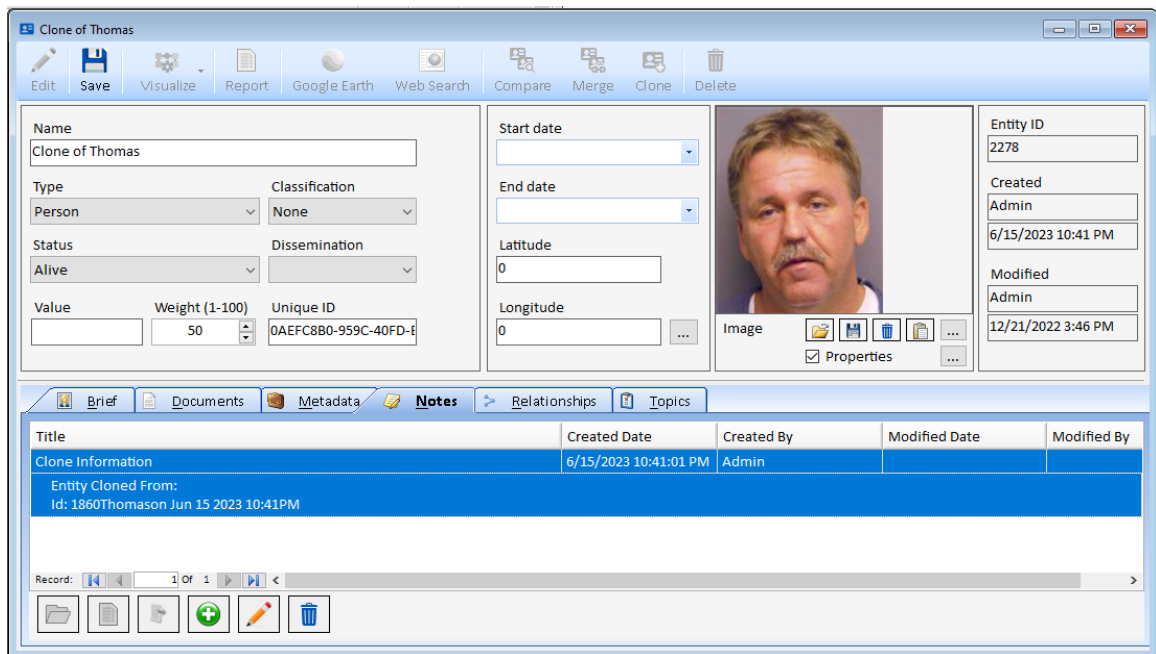
To use Entity Clone, open the Entity on the entity you want to copy. Once the entity is open, click the [Clone] button on the Entity Viewer toolbar.



SentVi asks if you want to clone this entity. When you click [Yes], the new copy is opened using the Entity Viewer.



SentVi opens the new cloned entity named "Clone of" original name. A Note is added with the clone information and time.



The clone is already in your database. Make more changes and click the [Save] button.

Chapter 26: Command Line Options

SentVi can be launched from the DOS command line with options to specify a particular server, database, user, entity, etc. This chapter is not necessary if you run the program from the Start menu.

Launching SentVi from Other Applications

SentVi allows other software applications to launch it. The commands are executed via the Command Prompt, a BAT file, or within the other software's application.

Use Case Scenario

Another software application may be looking at an entity/record and would like to view that entity's information and/or link chart in SentVi without having to re-enter the entity name in the search form of SentVi. If that program "knows" the entity's identification number in the SentVi database, it can perform a variety of functions.:

An Entity's identification number can be found in two places:

- ID field of the Entity record in the SentVi software.
- EntityID field in the dbo.Entity table in the database.

Program Path and Name (ProgramEXE)

By default, the SentVi program (SentinelVisualizer.exe) is in this folder:

```
C:\Program Files\FMS\Sentinel Visualizer 10\
```

It is in another location if you changed the default folder during installation. Confirm the location of the EXE program before using the command line options.

To launch the program, use this command:

```
"C:\Program Files\FMS\Sentinel Visualizer 10\SentinelVisualizer.exe"
```

This starts SentVi with its most recent database. We'll refer to this command, including the double quotes at the beginning and end, as **ProgramEXE**.

You can put **ProgramEXE** in a *.BAT file and run it to launch the (default) language-version of SentVi and open the most recent database.

Command Line Options

Command line options follow **ProgramEXE** to offer additional features. They are a slash (/) followed by a word, space, and value. These options are available:

Option	Followed by This Value
/database	Database name
/server	Server name (. \SENT4EXPRESS is the local server)
/user	SQL Server username – not the username in the SentVi database
/pwd	SQL Server password – not the password in the SentVi database
/es	Search value (to find an entity with this name)
/ev	Entity ID (to open the Entity View for that entity)
/ve	Entity ID (to open the Visualizer for that entity)
/la	Language Code
/filename	Path to a Reader file (*.SVX)

The order you specify the commands does not matter.

Command Line Examples

To ensure that the correct server and database are opened, you should include the server and database names, but it uses the last one opened if they are not provided.

Database Name Examples

Open the last database:

```
ProgramEXE
```

Open a specific database on the last server that was opened:

```
ProgramEXE /database DatabaseName
```

Open a specific database on your computer's local (not shared) server:

```
ProgramEXE /database DatabaseName /server . \SENT4EXPRESS
```

Server Name Examples

Open the most recent database on a server:

```
ProgramEXE /server ServerName
```

To open a specific database on a specific server:

```
ProgramEXE /server ServerName /database DatabaseName
```

Log into a Shared Database

```
ProgramEXE /server ServerName /database DatabaseName /user username  
/pwd password
```

or

```
ProgramEXE /server SentinelDB /database MyDB /user sa /pwd  
S3ntinELLogin:7@FMS
```

where SentinelDB is the name of the server, MyDB is the name of the database, sa is the SQL Server username, and S3ntinELLogin:7@FMS is the SQL Server password.

Open Entity View for an Entity

Open the Entity View for an entity. This opens Entity ID 1920 in the last opened database:

```
ProgramEXE /ev 1920
```

Open Visualizer for an Entity

Open a new visualizer for the specified Entity ID.

```
ProgramEXE /ve 1920
```

Open Search Form for an Entity Name

Open the Entity Search form with the search term in quotes. For example, search for Brian:

```
ProgramEXE /es "Brian"
```

Search for an entity name in a specific server and database:

```
ProgramEXE /server .\SENT4EXPRESS /database MyDB /es "Brian"
```

where .\SENT4EXPRESS is the local server, MyDB is the database, and the entity name is Brian.

Open a Sentinel Reader File

Reader files (*.SVX) let you distribute your Visualizer link charts and data to users not connected to your database. Use double quotes around the full path to the file:

```
ProgramEXE /filename "K:\Sentinel\Analysis.SVX"
```

Reader Version

If your user installed the free SentVi Reader, **ProgramEXE** needs to be adjusted. By default, the Reader is installed in this folder:

```
C:\Program Files\FMS\Sentinel Visualizer Reader 10\
```

The program is still named: SentinelVisualizer.exe

Specify Language Version

SentVi has localized versions in several languages. If one is installed, you can open it with the language command line flag, /la, followed by the language abbreviation:

- en English
- es Spanish
- kr Korean
- fr French
- ru Russian
- tr Turkish

This launches the Spanish version:

```
ProgramEXE /la es
```

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