SAS® Visual Investigator 10.2.2: Tutorials and Examples

SAS® Documentation
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SAS® Visual Investigator 10.2.2: Tutorials and Examples

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About This Documentation

Tutorials, Examples, and Other SAS Visual Investigator Resources

The documentation included in *SAS Visual Investigator: Tutorials and Examples* highlights some of the features of SAS Visual Investigator to help you get started. To access all documentation for SAS Visual Investigator and see more details about these and other tasks, go to http://support.sas.com/documentation/prod-p/visgator/index.html.

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Alert Triage and Disposition

Alert Lifecycle Examples

This SAS Visual Investigator tutorial explains what an alert lifecycle is and provides a few examples of typical alert lifecycle paths.

About Alert Lifecycle States

Alerts can exist in several states. Alerts move through these states in a lifecycle that is based on user interaction and applied disposition methods. Alerts can be active, suppressed, or closed.

This section contains examples of the following types of alert lifecycles.

- alerts that are not dispositioned
- suppressed alerts

Alerts That Are Not Dispositioned

A large volume of alerts might arrive at the queue of an investigator. Not all alerts require attention. As part of the triage process, investigators determine which alerts need to be addressed and in what order. For each queue, your solution administrator can assign a predetermined length of time to allow an alert to remain in the queue without activity (in other words, without having a disposition applied to it). After the time limit is reached, the alert is closed automatically.

The lifecycle process of automatic alerts that are not worked on is as follows:

1. The alert is created and routed to a queue.

2 The alert sits in the queue. A disposition is not applied to it.

3 The time limit specified for alerts to remain in this queue without any activity is reached.

4 The alert is closed automatically by the system.

Suppressed Alerts

Sometimes it is harder to discern whether an alert should be closed or warrants further investigation. In some instances, it makes sense to suppress the alert, pending additional information. The alert could be suspended for a specific amount of time or until a specified action (for example, a score increase) takes place. The alert is reactivated by the system after the imposed time period has passed or when the specified activity occurs. Any of the dispositions that are assigned to the queue in which the alert exists can be applied to the reactivated alert.

The lifecycle process of suppressed alerts is as follows:

1 The alert is created and routed to a queue.

2 The investigator applies a disposition that suppresses the alert for a specific amount of time or until a specified action occurs.

3 The time limit is reached or the activity occurs.

4 The alert is reactivated automatically by the system and is redisplayed in the queue.

Note: When an alert is reactivated by the system, the investigator triages the alert as if it were just created.

Reviewing Alert Details

This SAS Visual Investigator tutorial describes one method of accessing details related to a specific alert.

The **Alert Details** tab is a custom view of the alert. Administrators can also define the **Alert Details** tab to open other tabs containing more details or a different view of existing details.

1. On the **Alerts** page, select the alert of interest.
2. Review the summary information related to the selected alert.
3. To open an alert, double-click it.

   Note: An alert can be open for editing by one person at a time. If the alert is opened by subsequent users, a message indicating that the alert is currently being edited by another user is displayed at the top of the page, and the alert is opened as read-only to the other users.

   The **Alert Details** tab is displayed, and if an associated network is assigned, then the network opens in a **Workspace** tab by default.
4. Explore the information available at the **Alert Details** tab and any other associated tab that is open in this view.

In general, investigation of an alert and the associated details can be followed by applying an alert action (that is, a disposition method). Alternatively, you might continue the investigation by evaluating the alert in other views.

Applying a Disposition Method

This SAS Visual Investigator tutorial describes the process for applying a disposition method to determine how an alert is handled.

1. With an alert selected in the alert list pane or opened on an **Alert Details** tab, expand the options in the **Disposition** menu.

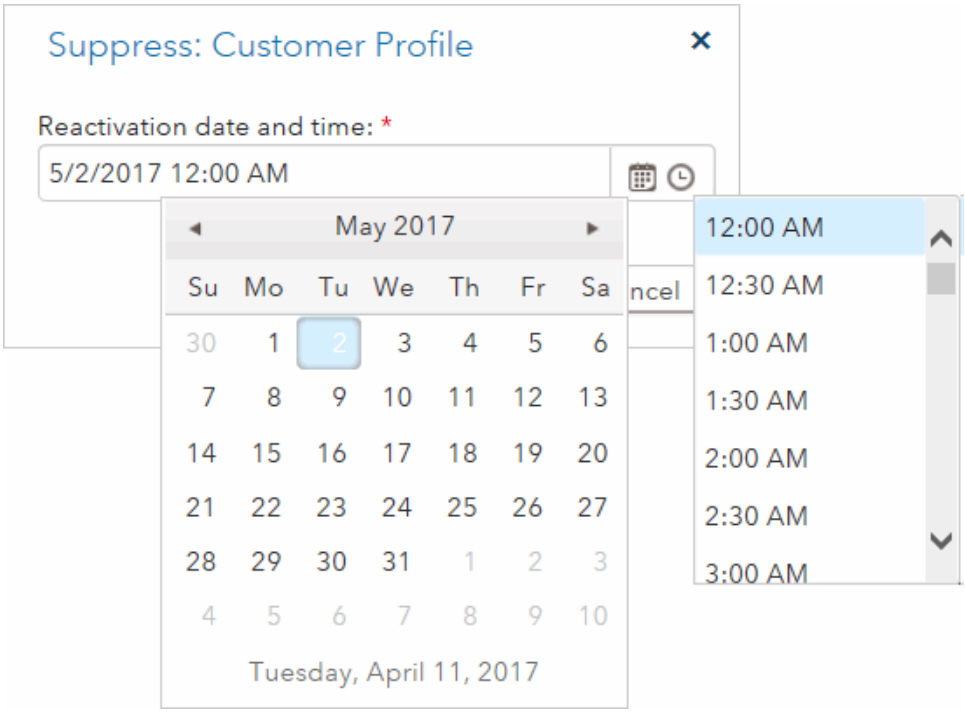
   Note: If another user has the alert open, a message indicating that the alert is currently being edited by another user is displayed at the top of the page. The alert is opened as read-only.

2 In the **Disposition** menu, select the disposition to apply.

Note: If you selected more than one alert on the **Alerts** page, only those dispositions that can be applied to all of the selected alerts are displayed.

3 If prompted, enter any extra information that is required by the disposition (for example, a date and time).

Note: If a date and time are required, if you do not select a time, a default time of 12:00AM is added to the entry.



4 Click **OK**.

If an alert is open and you apply a disposition that closes or suppresses that alert, the **Alert Details** tab closes. If an alert is open and you apply a disposition that keeps the alert in an active state, the alert is checked in but the **Alert Details** tab remains open.

Reviewing Possible Alert Disposition Methods

This SAS Visual Investigator tutorial lists and describes the most common disposition methods generally available to apply to an alert.

Administrators can create dispositions that cover a variety of situations. You can apply a disposition to an alert in the alert list on the **Alerts** page, or to an open alert. In general, alerts enable you to take the following types of actions:

- **Close an alert**: Depending on how the disposition is defined, the alert might be closed immediately or in a number of days specified by your administrator. No additional action is required. The alert is removed from the list immediately and marked as closed.
- **Suppress an alert**: Hides the alert from view. Depending on how the disposition is defined, any of the following might occur:
  - The alert is suppressed and remains that way unless a score increase causes it to be reactivated.
  - The alert is suppressed for a specified amount of time. Depending on how the disposition is created, you might be prompted to enter the suppression duration.
  - The alert is suppressed for a specified amount of time unless a score increase causes it to be reactivated sooner. Depending on how the disposition is created, you might be prompted to enter the suppression duration.

  Note: The system performs a check every 5 minutes to see whether there are suppressed alerts that should be reactivated. If you enter a reactivation time that is less than 5 minutes, the alert is reactivated after 5 minutes.
- **Move an alert**: Moves an alert to another queue. Depending on how the disposition is defined, you might be prompted to select the queue to which the alert is moved. The list of available queues includes any queues to which you have been granted access. The queues do not have to be part of the current strategy.

Note: Queues that belong to a closed or inactive strategy do not appear in the list of available queues.

The alert remains active after the disposition is applied.

- **Link to an object**: Creates a link between an alerted entity and an object (for example, a police report or case). The object type is specified by your solution administrator. When you apply the disposition, you can create a new object of that type, or choose to link to an existing object. If you choose to create a new object, you are prompted to enter the information the object requires.

  If more than one relationship exists between the alerted entity and the object, a **Relationships** tab appears, in which you select the relationships that you want to use.

  The link is placed on the item that was alerted on, rather than on the alert itself.

  Depending on how the disposition is defined, if the alert was triggered by more than one scenario-fired event, you might see an **Activity** tab. You can use this tab to select the scenario-fired events that identified the suspicious behavior.

  When the disposition is applied, the application opens the document to which the alert is linked. The alert remains active, and the **Alert Details** tab stays open, but the alert is checked in.

- **Send alert information to an external system**: Sends an alert record to an external system. Depending on how the disposition is created, you might see a **Details** tab in which you are prompted to enter additional information that is sent with the alert record.

  When the disposition is applied, the alert remains active, and the **Alert Details** tab stays open, but the alert is checked in.

You can apply a disposition to an alert in the alert list on the **Alerts** page, or to an open alert.

The alert list displays all the active alerts in all the queues that belong to the selected strategy. Your administrator can assign different dispositions to the queues in a particular strategy. If the selected strategy has multiple queues, only the dispositions that are common to all of the queues are displayed in the **Disposition** menu that appears on the **Alerts** page. However, if you open an individual alert, all the dispositions

that are assigned to the queue to which that alert belongs appear in the **Disposition** menu that is displayed on the **Alert Details** tab.

Adding Attachments and Comments to Objects

You can add and manage object attachments and comments from within SAS Visual Investigator.

Adding and Managing Object Attachments

This SAS Visual Investigator tutorial describes the procedures for adding an attachment to an object and for managing attachments associated with an object.

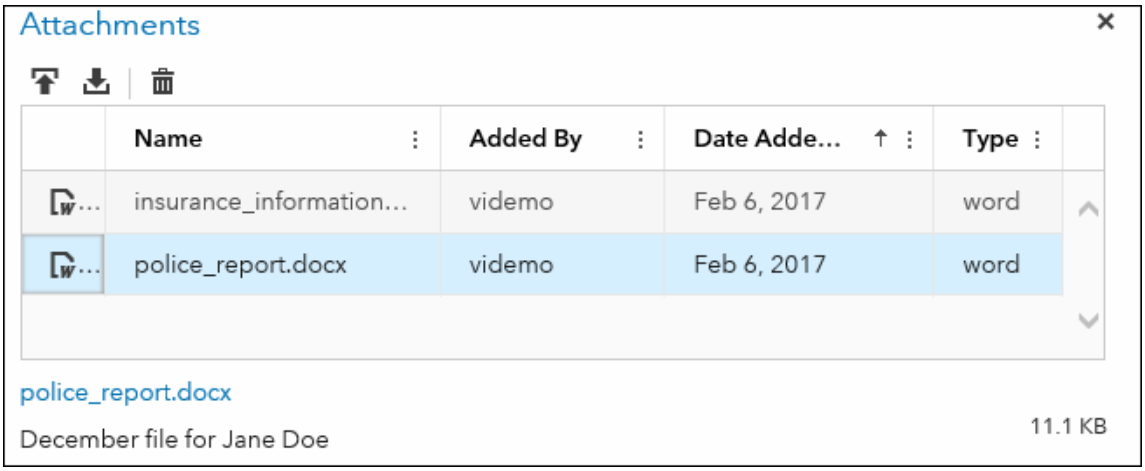
The Attachments window enables you to attach one or more files to the current object. The types of files that you can use as attachments include DOC, XLSX, PDF, MP3, MP4, WMV, JPG and PNG. Each attachment can be a maximum of 100 MB in size.

Your solution administrator determines the entities that support attachments. If you can attach files to an object, the **Attachments** button appears in the toolbar. The button displays the number of attachments the object has.

To add an attachment to an object:

1 Click the **Attachments** button.

   The **Attachments** pane is expanded.



2 Click **Upload Attachment** ( ) and select a file from an accessible location. You can change the name displayed in the **Name** field and add text to the **Description** field if you want to.

3 Click **OK** to continue.

Note: When you select an attachment in the list, the filename, size, and description appear below the list.

To download an attached file:

- Select the attachment that you want to download. Click **Download Attachment** ( ). If prompted by your browser, indicate the desired option, either open or save, for the attachment.

To delete an attachment:

- Select the attachment that you want to remove. Click **Delete Attachment** ( ). At the Delete Attachment window, select **Yes** to continue with the deletion. The attachment is no longer associated with this object.

Adding and Viewing an Object Comment

This SAS Visual Investigator tutorial describes the procedures for adding and viewing an object comment.

The Comments window enables you to add comments to the current object. Your solution administrator determines the entities that support comments. If you can add a comment to an object, the **Comments** button appears in the toolbar. The button displays the number of comments that have been added to the object.

To add a comment to an object:

1. Click the **Comments** button.

   The **Comments** pane is expanded.

2. Enter text in the comment text box in the **Comments** pane.

   You can use the built-in formatting functionality to choose how your comment is displayed. If the administrator has enabled categories, then you can indicate the category to which a comment should be assigned.

3. Click **Post** to add the comment to the object.

When you save the object, your comments are indexed and are searchable within SAS Visual Investigator.

To view a comment associated with an object:

- Click the **Comments** button.

  The associated comments are revealed and are marked with the user name of the person who made the comment and the date and time at which the comment was added.

  TIP Click **Date** to choose whether the comments are ordered in descending or ascending date order

Creating a Manual Alert

This SAS Visual Investigator tutorial describes the method for creating a manual alert.

If the option is available, perform the following steps to create an alert:

1. Open the object that you want to base the alert on.

   Note: You can create an alert based an internal or external entity, but not for a child entity.

2. Click **Create an Alert** (⚠) on the toolbar.

3. In the Create an Alert window, select the queue in which to create the alert.

   Note: The list of queues includes only those queues that accept manual alerts and which belong to strategies to which you have been granted access. Your solution administrator determines which queues accept manual alerts.

4. In the **Note** field, you can provide text to accompany the alert.

5. Click **OK** to save the alert.

   The system creates an alerting event and treats it the same way it would one that is sent to SAS Visual Investigator from any other source. The system infers the appropriate alert domain from the queue that is selected when the alert is created. The system then looks to see whether an alert already exists for the selected entity and follows standard routing rules.

   For each strategy, your system administrator determines whether a workspace is created for the alert and the number of levels that are expanded in the network.

Using Workspaces to Explore Data

This SAS Visual Investigator tutorial describes a workspace and includes instructions for managing workspaces as well as objects within workspaces.

What Is a Workspace?

A workspace enables you to gather together items of interest to your investigation from your data repository. Within your workspace, you can visualize your data in multiple ways, enabling you to see relationships between objects and information from different perspectives. You can update your workspace as your investigation progresses, adding to it as new information comes to light, or removing items that have proved to be irrelevant.

A workspace is a living object. If the underlying data changes, the information displayed in your workspace also changes. If you need to keep a snapshot of your investigation at a single point in time, you can create an **Insights** tab to capture this.

A workspace is always associated with an existing object within SAS Visual Investigator, typically one that represents an investigation or an alert. This object keeps the information together for a particular investigation, and can have multiple associated **Workspace** tabs and **Insights** tabs as the investigation develops. Your solution administrator configures which types of objects can have workspaces added to them.

By default, the data is displayed in **Detail View**, but you can choose to view your data in a variety of views. The **Workspace** tab has its own menu, including options for adding information to other workspaces and **Insights** tabs and options for managing the workspace itself.

Creating a Workspace

To create a new, blank workspace:

- Click **Add Sheet** (+) and select **Add Workspace**.

You can add as many workspaces to your investigation as you need.

Adding Objects to a Workspace

You can add objects to a workspace to enable you to develop your investigation.

When you identify a piece of information that you want to add to a workspace:

- Select the required item and click **Add object to Workspace** (.) on the menu.

For example, if you have search results displayed in the **Search** page, you can select one or more of the results and click **Add object to Workspace** (.) on the menu to add the selected results to a workspace.

> **TIP** From within your workspace, you might want to investigate a subset of the data still further, or perhaps take your investigation in a slightly different direction. You can select objects on the **Workspace** tab and add them to either a new workspace or an existing workspace.

After an object has been added to a workspace, the object can be visualized in a variety of views, thereby enabling you to see relationships between objects and information from different perspectives.

Renaming a Workspace

To change the name of a workspace:

1. Select **Rename Workspace** from the **Workspace** tab's **More** () menu.

   The **Rename Workspace** dialog box is displayed.

2. Update the workspace name.

3. Click **OK** to save the new name, or click **Cancel** to discard your changes and keep the original name.

Removing Objects from a Workspace

If you decide an object is no longer relevant to the path your investigation is taking, you can remove it from the workspace.

To remove an object from a workspace:

- Select the object and select **Object** ▶ **Remove object from Workspace** from the **Workspace** tab's menu.

Deleting a Workspace

If you decide that a workspace is no longer relevant to the path your investigation is taking, you can delete it.

To delete a workspace:

1. Select **Delete Workspace** from the **Workspace** tab's **More** ( ) menu.
2. Click **OK** to confirm the `Delete Workspace` message, or click **Cancel** to retain the workspace.

Using Insights to Document Investigation Findings

This SAS Visual Investigator tutorial describes an **Insights** tab and includes instructions for managing **Insights** tabs as well as items and cells within **Insights** tabs.

What are Insights?

Insights are static representations of selected parts of an investigation at a specific point in time. The **Insights** tab acts as a container for information from within your data repository and from external data sources. This information might include objects, maps, network diagrams, text, and images. These items can be moved around and resized as needed. Your solution administrator configures which types of objects can have **Insights** tabs added to them.

Even if the underlying data changes, the information displayed in your **Insights** tab remains the same. If you want to work with evolving information, you can create a workspace to track your investigation as it progresses.

Adding Items to an Insights Tab

You can add many types of information to an **Insights** tab to represent your investigation at a particular point in time. If you are viewing information from your data repository in **Detail View**, **Timeline View**, or **Table View**, you can add the specific rows or items that you have selected. However, when in **Map View** or **Network View**, you can add the map or network diagram only.

Objects added to an **Insights** tab are always added to cells. That is, objects are added to a rectangular bounding region to help control the layout of the objects on the page.

To add information to an **Insights** tab:

1. Click **Add *object* to Insights** (.) on the menu. For example, if you have search results displayed in the **Search** page, you can select one or more of the results and click **Add tile to Insights** on the **Insights** tab's menu to add the selected results to an **Insights** tab.

   The Add tile to Insights dialog box appears. This dialog box lists all the currently open objects that support insights and, for each of these, offers you the option to either create a new **Insights** tab or add to an existing **Insights** tab if one already exists. If you do not currently have an object open that supports insights, you can choose to create a new object from a list of objects that support insights.

   Note: The dialog box name changes depending on which view you have selected. For example, in **Detail View**, it is named Add tile to Insights. However, in **Map View**, **Network View**, and **Timeline View**, it is named Add map to Insights, Add network to Insights, and Add row to Insights, respectively.

2. Choose the **Insights** tab to which you want to add the objects and click **OK**.

   The relevant **Insights** tab is displayed.

When you have an **Insights** tab already open, you can also add information to it from external sources to further support your investigation. This can be in the form of your own notes, which you can enter directly onto the **Insights** tab, or you can add images or paste information that you have gathered from elsewhere.

To add notes to an **Insights** tab:

- Click anywhere in an empty cell and simply start typing.

To add an image to an **Insights** tab:

1. Move your mouse pointer over an empty cell and click **Add Image** (🖼).

   The Open dialog box is displayed.

2. Navigate to the image that you want to add, and click **Open**.

   The image is displayed in the selected cell.

To paste data from the Microsoft Windows clipboard into an **Insights** tab:

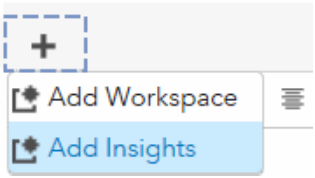
- Move your mouse pointer over an empty cell and click **Paste** (📋).

  The data from the clipboard is displayed in the selected cell.

Create a New, Empty Insights Tab

To create a new, empty **Insights** tab:

- Click **Add Sheet** and select **Add Insights** from the menu.



You can add as many **Insights** tabs to your investigation as you need.

Copy Specific Insights Content to a Different Insights Tab

From within your **Insights** tab, you might want to copy a subset of the data to another **Insights** tab, either new or existing.

To copy existing content to a different new or existing **Insights** tab:

- Select cells on the **Insights** tab and click the button on the **Insights** tab's menu, or right-click a cell and select from the pop-up menu.

  Note: The button name and menu option change depending on which type of cell you have selected. For example, if you have a map selected, they are labeled **Add map to Insights**, whereas if you have a network diagram selected, they are labeled **Add network to Insights**, and so on.

Renaming an Insights Tab

To change the name of an **Insights** tab:

1. Select **Rename Insights** from the **Insights** tab's **More** ( ) menu.

   The **Rename Insights** dialog box is displayed.

2. Update the name of the **Insights** tab.

3. Click **OK** to save the new name, or click **Cancel** to discard your changes and keep the original name.

Removing Cells from an Insights Tab

If you decide that specific content is no longer relevant to the path your investigation is taking, you can remove the cell containing the content from the **Insights** tab.

To remove a cell from an **Insights** tab:

- Select the cell and click **Delete Cell Contents** ( ), and then select **Yes** from the Delete Cell Contents window to remove the cell from the **Insights** tab.

Deleting an Insights Tab

If you decide that an **Insights** tab is no longer relevant to the path your investigation is taking, you can delete it.

To delete an **Insights** tab:

1 Select **Delete Insights** from the **Insights** tab's **More** ( ) menu.

2 Click **OK** to confirm the `Delete Insights` message, or click **Cancel** to retain the **Insights** tab.

Using Selection Tools

This SAS Visual Investigator tutorial describes how to use the selection tools to view a subset of your data.

When investigating, you often want to select a subset of your data (for example, to add to a workspace or an **Insights** tab for further examination). SAS Visual Investigator provides several ways to select objects in any of the visualization views. When an object is selected, navigating to the **Tools** pane and selecting **Selection** from the drop-down menu reveals options for making selections from the displayed data.

The selection tools available at the **Tools** pane differ based on the view selected.

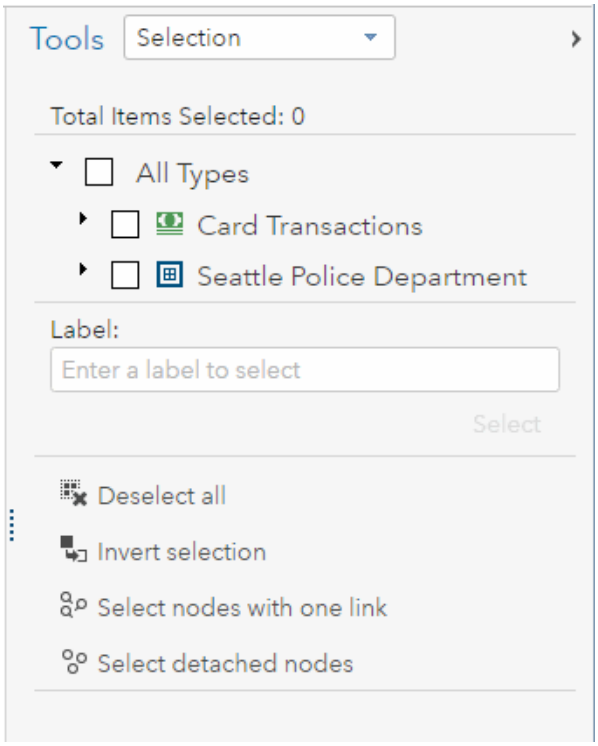
When you view an object in **Network View**, for example, you can do the following:

- see a count of the number of objects currently selected
- select check boxes to select objects by type
- enter text to select objects that have labels containing this text
- clear all selected objects
- invert the selection, meaning that all objects currently selected are deselected, and all objects not currently selected are selected

  Note: Inverse selection is not supported for custom nodes on a network diagram — that is, nodes that you have manually added yourself.
- select nodes with one link, meaning that all objects connected to only one other object are selected

- select detached nodes, meaning that all objects not connected to any others are selected

Here is an example showing the selection tools available in **Network View**:



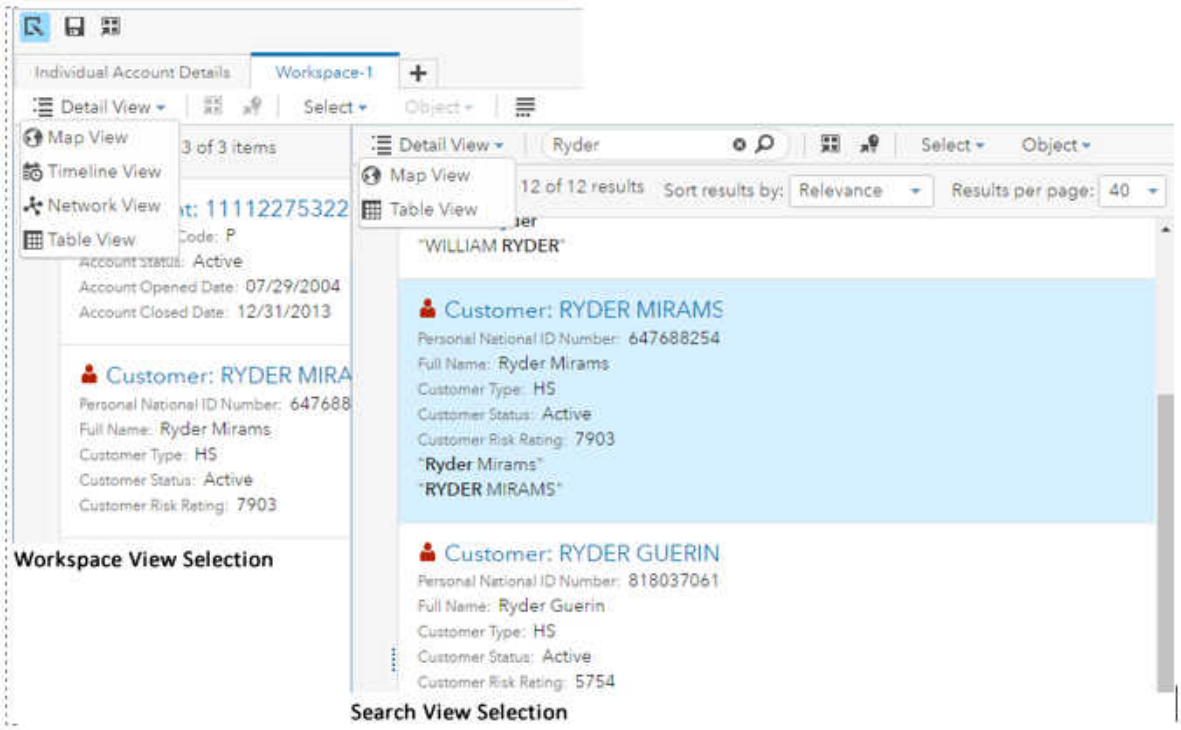
3

View Exploration

Understanding Data Views

This SAS Visual Investigator tutorial describes the different ways that you can view your data to get a better understanding of the investigation.

SAS Visual Investigator enables you to view your data, such as the results of a search or the contents of a workspace, in multiple ways.



Switching between different views can help you understand your data. When you change views, the layout of the details pane changes accordingly. Any items selected in the original view remain selected in the new view.

You can select the following views from the search results toolbar or from the **Workspace** tab's menu:

- **Detail View** is the default view. **Detail View** displays a summary of your data to enable you to easily see information relevant to your investigation.
- **Map View** enables you to view locations associated with your data plotted on a map.
- **Timeline View** enables you to view events associated with your data plotted on a timeline.
- **Network View** enables you to view relationships within your data and to expand connections for additional information.
- **Table View** enables you to view your data in table format.

Not all views are available from all parts of SAS Visual Investigator.

View Data in Detail

This SAS Visual Investigator tutorial describes how to view your data in **Detail View**.

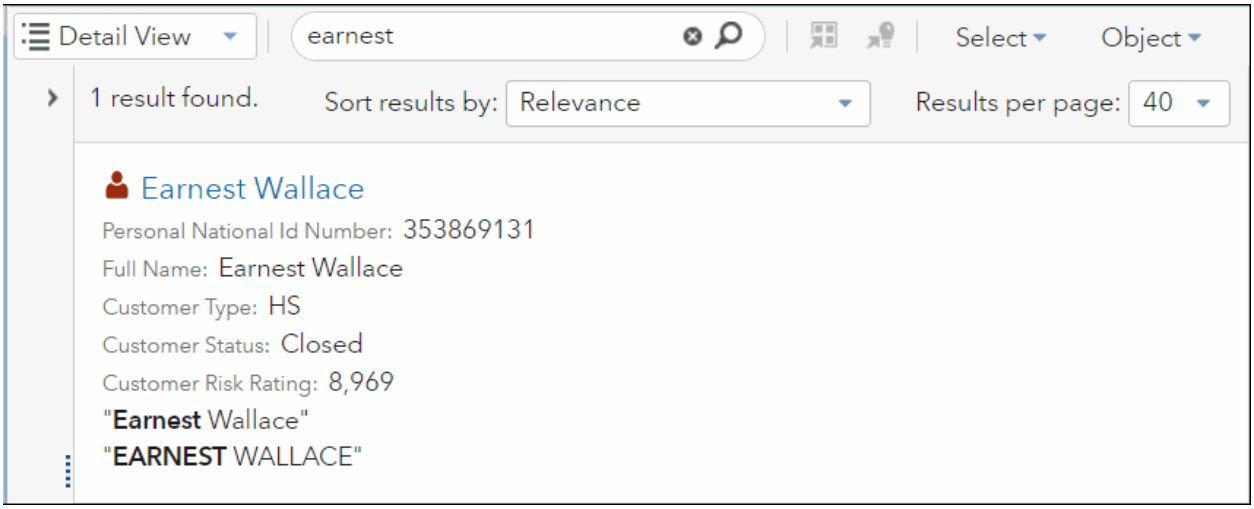
Detail View is the default data view for search results and in a workspace. In **Detail View**, the details pane shows the objects that you are viewing, with an individual tile that shows summary information for each object.

Each object has an associated icon as a visual indicator of its object type. If you are viewing search results, and if the information includes summary-type details, then any words that match your search terms are displayed in bold, enabling you to see your search term in context. You might also see a short synopsis of information about the object. The summary information displayed for each object type is configured by your solution administrator.

To display data in **Detail View**:

- From a search result or from within a workspace, select **Detail View** from the view menu.

The following figure shows the details pane for the search term *earnest*.



View Data in a Map

This SAS Visual Investigator tutorial describes viewing data in **Map View**.

In **Map View**, the objects that you are viewing are associated with locations on a map. This enables you to see your objects in relation to one another in a geographical context. If an object contains multiple pieces of geographical data (latitude and longitude), they are all plotted on the map. If you then select one of these items, all the other items associated with that particular object are also selected.

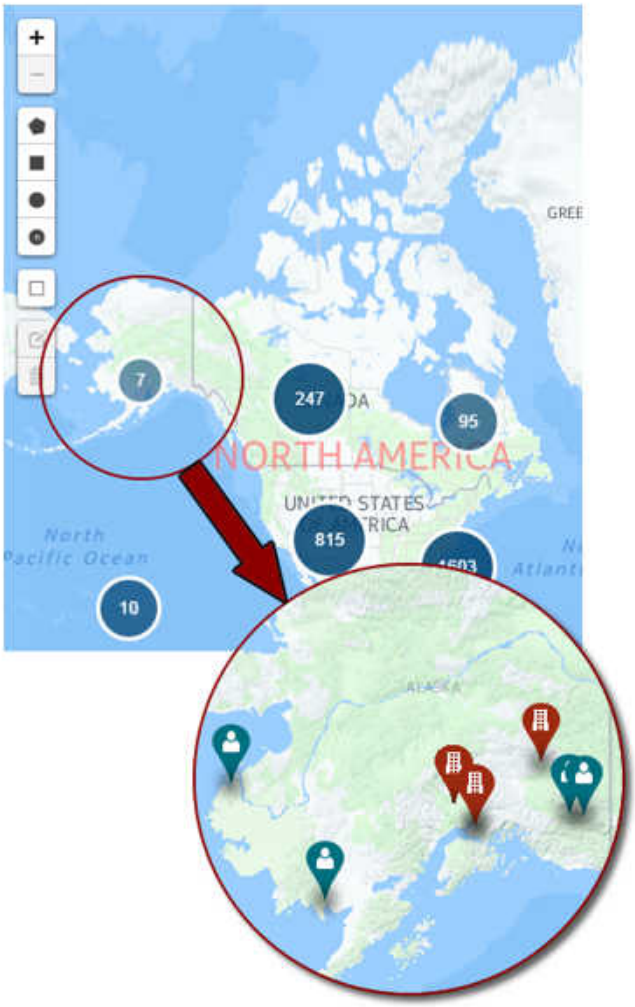
To display data in **Map View**:

- From a search result or from within a workspace, select **Map View** from the view menu.

  Data is displayed on the map either as individual points marked with pins or as clusters of points marked with blue circles.

  Note: If a displayed object does not have any associated geographical data, it is not displayed on the map. For example, if 16 items are returned from a search, and only three of those items have geographical data associated with them, then only those three items are displayed in **Map View**.

Pins display an icon to indicate which type of object they mark. Clusters display a number to indicate how many points are grouped together in that area. If you zoom in on a cluster, it expands to display individual points where possible.



You can double-click on a cluster to zoom in on it. If there are multiple objects at the same exact location, the pin icon displays a number indicating how many objects are located there.

View Data in a Timeline

This SAS Visual Investigator tutorial describes viewing data in **Timeline View** and how to display data in the view.

In **Timeline View**, the details pane displays the date and time of events associated with the objects that you are viewing. This enables you to see the chronological relationship between the objects.

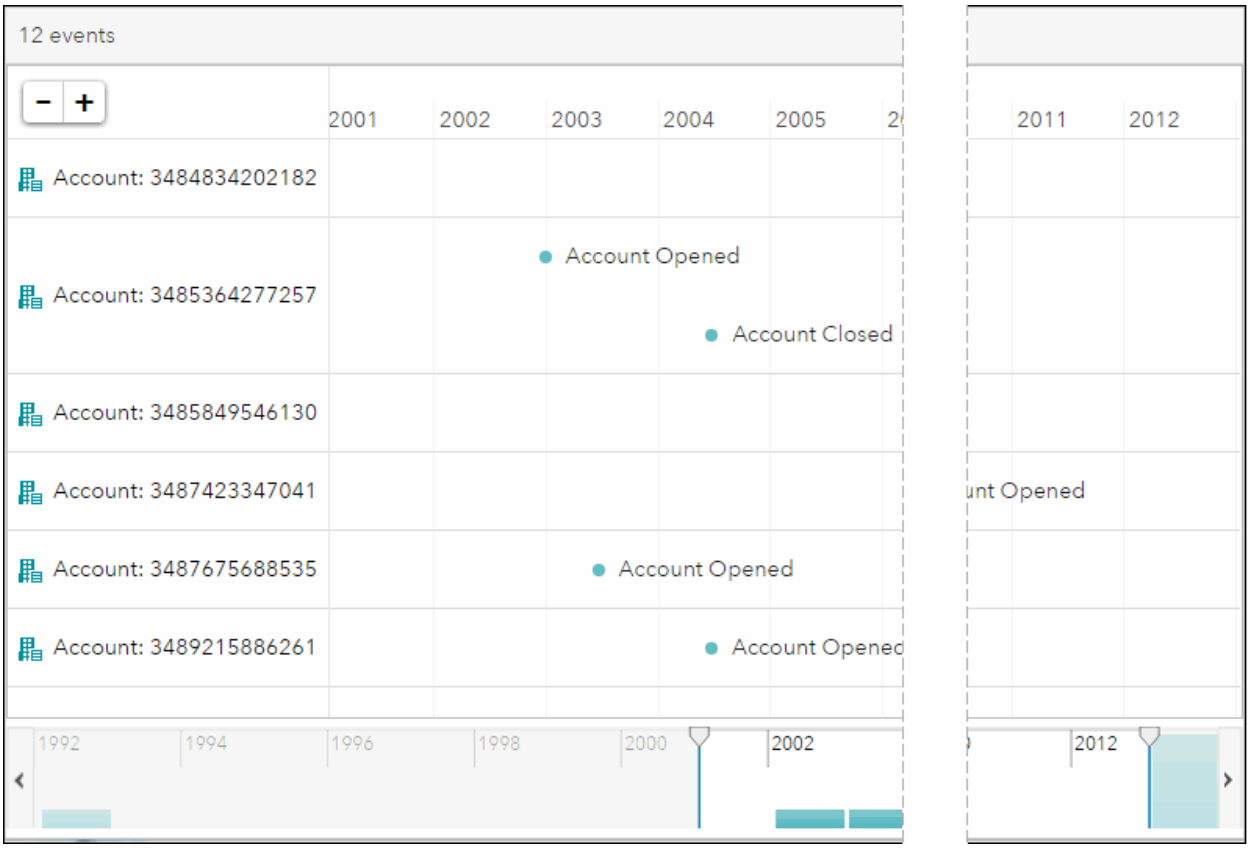
To display data in **Timeline View:**

- From within a workspace, select **Timeline View** from the view menu.

  Data is displayed on the timeline as individual events marked with dots and labeled to describe the event.

  Note: If an object does not have any associated date/time data, it is not displayed on the timeline.

The following figure shows the details pane in **Timeline View** for several customer bank accounts.



You can use your mouse wheel to zoom in and out, or click the plus symbol to zoom in and the minus symbol to zoom out.

You can click on the timeline, hold the mouse button, and then move your mouse pointer to pan horizontally to another section of the timeline. The time slider at the bottom shows the currently displayed time period between two time bars.

View Data in a Network

This SAS Visual Investigator tutorial describes using **Network View**.

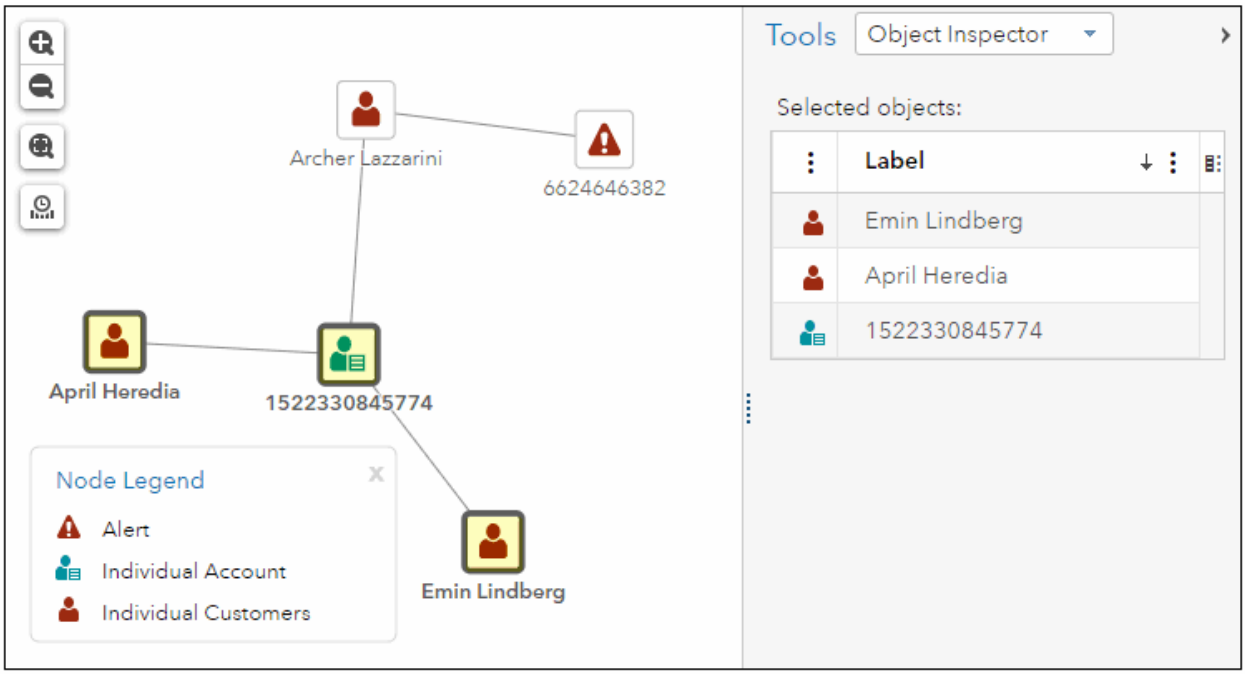
Network View enables you to view and examine the connections and relationships within your data. You can focus in on areas of interest, expand nodes to see which other

nodes they are related to, and manipulate the display of your data to provide additional information.

To display data in **Network View**:

- From within a workspace, select **Network View** from the view menu.

The following figure shows an example of a simple network in a workspace with three nodes selected.



Each object is displayed on the network diagram as a node, with an icon as a visual indicator of its object type. By default, each node has a label to identify it, although you can switch off the display of labels in the network properties tool.

Links are shown as lines between the nodes. There are two types of links: social links and transaction links. Social links show a connection between entities. For example, they can show the connection between an individual and their address, phone number, or employer. Transaction links show an action transference. For example, they might represent a deposit or withdrawal that an individual made to a specific account.

The Node Legend maps icons to the object types that each represents. If the Node Legend is not visible, you can use the network properties tool to display it.

View Data in a Table

This SAS Visual Investigator tutorial describes how to view data in **Table View**.

In **Table View**, the details pane displays your data in a table with one object in each row. Your solution administrator can configure which columns are available for each object type.

To display data in **Table View**:

- From a search result or from within a workspace, select **Table View** from the view menu.

The following figure shows an example of data, including multiple object types, displayed in a **Table View** in a workspace.

Label	Entity Type
Ella Fuller	Individual Customers
Ella Samuel	Individual Customers
Ella Samuel	Individual Customers
2693 ELLA STREET SAN FRANCISC US	Address
3516 ELLA STREET PALO ALTO US	Address
Catching Dinosaur Media Inc	Business Customer
Kneeling Horse Brewing NV	Business Customer
Raul Cole	Individual Customers

To view additional information about an object, click an individual row in the table to display the object in the object inspector.

Note: If your table contains more than one type of object, only the common columns **Label** and **Entity Type** are available.

Note: You can use the Shift key and click to select multiple objects only on the currently displayed page of the table. In addition, you can use the **Selection** tool to make more complex selections.

4

Search and Discovery

Perform a Free-Text Search

This SAS Visual Investigator tutorial describes using the free-text search.

Depending on how your solution administrator has configured your system, you might be able to perform your search from the **Search** page, or you might enter your search directly into the **Search** box on your **Home** page.

To find information from the **Search** page:

1. Click **Search** on the main menu.

   The **Search** page is displayed.

2. Enter your search term into the **Search** box.

3. Press **Enter**, or click .

Your search results are displayed in the currently selected view. The search term is shown in bold. Choose a different view to see your results displayed in that view.

TIP To clear search results, enter a space between quotation marks (“ “) and then press Enter.

To find information from the **Search** box on the **Home** page:

1 Enter your search term into the **Search** box.

2 Press **Enter**, or click .

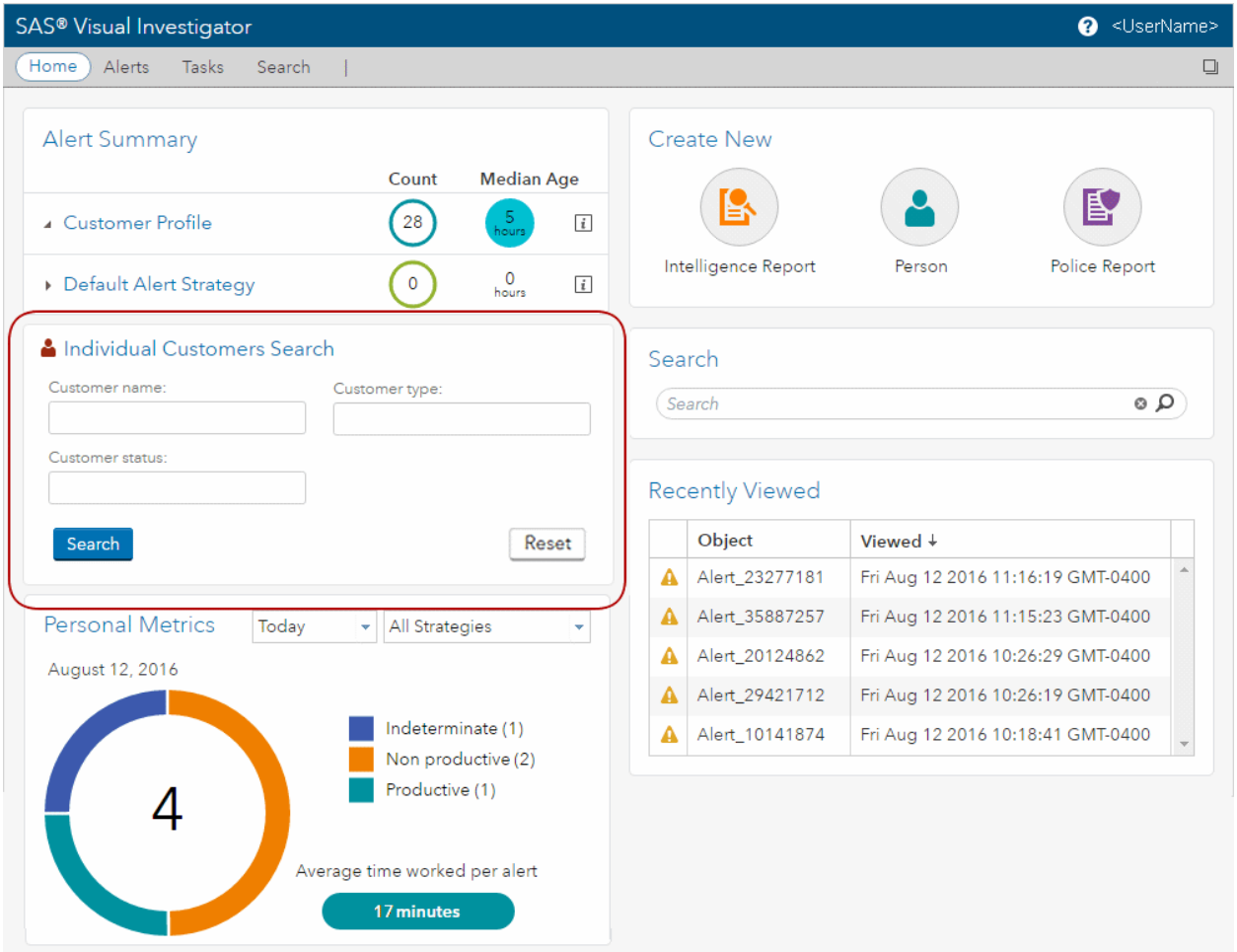
Your search results are displayed in the currently selected view. The search term is shown in bold. Choose a different view to see your results displayed in that view.

Perform a Form-Based Search

This SAS Visual Investigator tutorial describes the use of a form search, when available at the **Home** page, to retrieve specific results.

Depending on how your solution administrator has configured your system, a form-based search (represented by a custom search form) might be available.

Here is an example showing a form search area on the **Home** page.



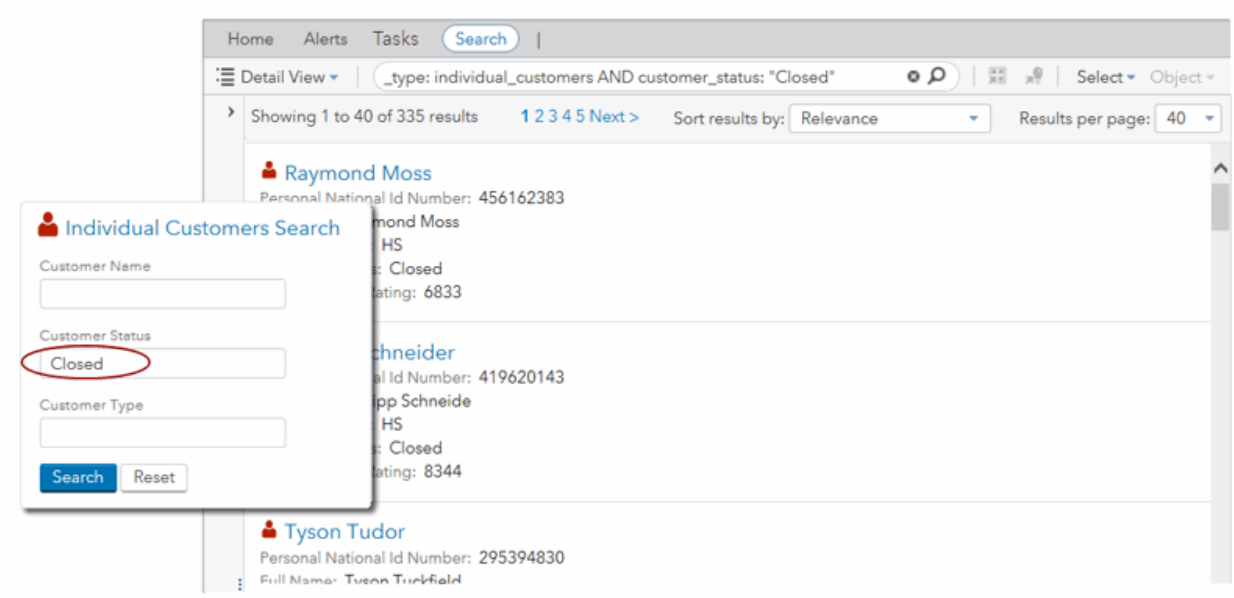
The form search functionality enables you to search directly from your **Home** page, using criteria specified in fields, rather than accessing the **Search** page to initiate a free-text search. Initiating a form-based search from the **Home** page takes you directly to the **Search** page, which displays your results.

To use a search form displayed on the **Home** page:

1 Populate the fields needed in order to specify the criteria for the search.

2 Click **Search** to initiate the search.

Here is an example showing an **Individual Customers Search** form populated with ‘Closed’ as the **Customer Status**. Clicking **Search** initiates the search and displays the search results with the list of matches.



At the top of the **Search** page that displays the search results, the **Search** box contains the search criteria derived from the form and can be edited to refine the search if needed.

Perform Map-Based Search

This SAS Visual Investigator tutorial describes how to perform a search within specified areas in a **Map View**.

To reveal search results in **Map View**, do one of the following:

- If a standard search indicates some areas of particular interest, you can draw shapes on the map to mark those areas. You can then search again to return only locations within the bounds of the shapes.

Or

- Start from a map with no search results displayed, draw your search shapes, and then enter your search terms to search only in the selected areas.

Use Search Operators to Optimize Results

This SAS Visual Investigator tutorial lists various search operators that can be used to optimize search results.

Object of Search	Text to Enter	Results Returned	User's Guide Reference
Results matching multiple search terms	`Jack AND Jill`	All indexed data containing the words "Jack" and "Jill."	Search Using Boolean Operators
Results matching one or more of the search terms	`Jack Jill` **Note:** This is equivalent to entering `Jack OR Jill`.	All indexed data containing the words "Jack," "Jill," or both "Jack" and "Jill."	Search Using Boolean Operators
Results excluding particular search terms	`Jack NOT Jill`	All indexed data containing the word "Jack" that does not also contain the word "Jill."	Search Using Boolean Operators
Results containing an exact phrase	`"Jack and Jill"`	All indexed data containing the phrase "Jack and Jill" in that order.	Search for an Exact Phrase

Object of Search	Text to Enter	Results Returned	User's Guide Reference
Results containing your search terms within a specified proximity	`"Jack Jill"~3`	All indexed data containing the words "Jack" and "Jill" within three words of each other, in any order.	Perform Proximity Searches
All data	`*`	All indexed data.	Search Using Wildcards
Results containing words where one specific character can be replaced with any number of values, or none.	`*ill`	All indexed data containing the words "Jill," "hill," "will," "thrill," "ill," and so on.	Search Using Wildcards
Results containing words where one specific character can be replaced with any single value	`?ill`	All indexed data containing the words "Jill," "hill," "will," and so on. Does not return data containing "ill" or "thrill."	Search Using Wildcards
Results containing words similar to your search term	`tubmling~`	All indexed data containing the word "tumbling."	Perform Fuzzy Searches
Results containing your search term in a specific field	`text: Jack`	All indexed data containing the word "Jack" in a field named text.	Search in a Specific Field
Results containing a reserved character	`1\+1`	Results containing 1+1.	Search for Reserved Characters

View Search Results

This SAS Visual Investigator tutorial describes how to view the search results and apply different visualizations to the results.

The solution administrator configures the operation of the search feature and controls what is searchable as part of an entity. As a result of this configuration, all data fields might not be searchable and therefore will not surface as search results. However, if the search term represents valid entries, then the results are displayed in **Detail View** by default, and different visualizations can be applied to the results.

Note: You can click an alert that is listed in the search results to open it in View mode. If the alert is active or suppressed, you can apply a different disposition to it. In addition, you can click the **Edit** button to check it out and modify it.

To reveal information about a search result item:

- Select the item and then choose **Object Inspector** from the **Tools** selector.

To select a subset of results:

- Select **Selection** from the **Tools** selector and then indicate the items from the results tree that you want to see selected in the search results. Selected items are shown highlighted.

To sort by either relevance or date:

1. Make sure the search results for which you want to apply display preferences are active.
2. Ensure that **Detail View** is the active view for the search results.
3. Select the appropriate option, either **Relevance** or **Date created**, from the **Sort results by** drop-down menu.

   When sorting by date, the search results are displayed in the order in which the record for the object was created, listing the search results by the newest item first.

To change the number of results that are displayed after obtaining results from a search:

1. Make sure the search results for which you want to apply display preferences are active.
2. Ensure that **Detail View** is the active view for the search results.
3. Select an option from the **Results per page** selection menu.

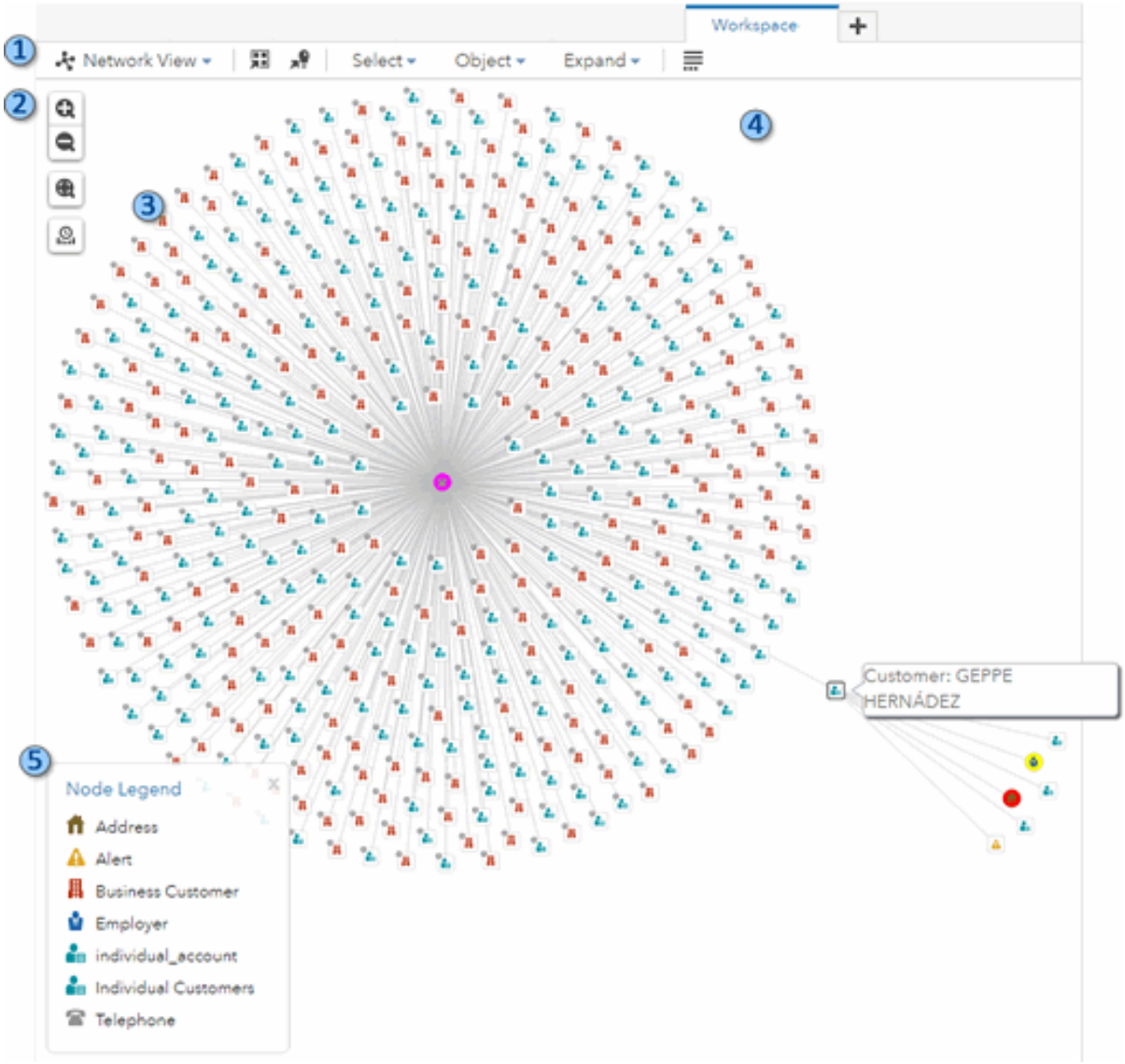
5

Network Management

Managing a Network Diagram

This SAS Visual Investigator tutorial describes the features available to manage a network diagram.

Exploration of the network diagram and its associated objects is performed within a workspace. From within the workspace, there are several tools and areas that enable you to view and manage different aspects of a network diagram.



Area	Item	Description
1	**Workspace** tab menu	Many network management options, including adding a snapshot to an insight, can be implemented from the **Workspace** tab menu.
2	Floating toolbar	The floating toolbar enables you to zoom in or out, fit to the canvas, and apply a timeline to the visualization.

Area	Item	Description
3	Network diagram	The network diagram contains nodes and links and can be customized to reflect the relevant information that you want to display. Selecting an item in the network diagram often displays additional information about that item in the Object Inspector of the **Tools** pane. Functions, such as the application of network analytics in the form of single-click centrality measures, are generally performed from the **Tools** menu within the **Tools** pane.
4	Canvas	By right-clicking the canvas, you can retrieve a pop-up menu that provides access to a variety of network management features.
5	Node legend	The node legend is displayed by default. It can be hidden or moved. The content of the node legend is updated automatically to reflect the in-view nodes.

Setting Network Pan or Select Mode

This SAS Visual Investigator tutorial describes navigating a network diagram based on the mode selected.

How you move around the network diagram to view different areas differs depending on whether you are in pan mode or select mode.

- In pan mode, which is enabled by default, you can click on the background of the network diagram, hold the mouse button, and then move your mouse to pan to another area of the diagram.
- In select mode, these behaviors are reversed. If you click and drag, you draw a selection rectangle on the network diagram.

To switch between pan mode and select mode:

- Right-click the background of the network diagram and select **Pan mode** or **Select mode** from the pop-up menu.

  TIP If you are in the default pan mode, you can hold down the Shift key and click and drag to draw a selection rectangle on the network diagram. When you release the Shift key, you are returned to pan mode.

The currently active mode has a check mark next to it on the pop-up menu.

Specifying Double-Click Behavior for Nodes

This SAS Visual Investigator tutorial describes how to specify what actions are performed as the result of double-clicking a node.

You can specify the results of double-clicking a node. The specifications are saved with the network and are active each time the network is accessed.

To specify the action that results when a node is double clicked:

1. Make sure that the network for which the double-click action preference is to be specified is displayed in the active **Workspace** tab.
2. Select **Network properties** from the **Tools** menu.
3. At the **Double-click on node to** option, do one of the following:
   - Select **Expand** to cause the node to expand to its maximum expansion level whenever a double-click action is applied.

     Note: If no further expansion can be performed, then double-clicking the node has no effect.
   - Select **Open** to cause the node's associated form to open to show information about the node.

Specifying Node and Link Text Display Options

This SAS Visual Investigator tutorial describes how to show or hide node and link text.

Nodes might have associated text in the form of annotations or labels. Links might have associated text in the form of labels. You can indicate whether the text associated with nodes and links should be displayed in the network.

To manage node and link text options:

- From within a workspace with the **Network View** option selected, select the options that you want from the **Network Properties** of the **Tools** pane.

  Here are the actions that can be performed to accomplish a specific task.

Task	Action
Show node annotations	Select the **Show node annotation** option.
Hide node annotations	Deselect the **Show node annotation** option.
Show node labels	Select the **Show node labels** option.
Hide node labels	Deselect the **Show node labels** option.
Show link labels	Select the **Show link labels** option.
Hide link labels	Deselect the **Show link labels** option.

When you make a selection, the network updates to reflect the change. The network is saved and retrieved with the options specified.

Showing or Hiding the Network Node Legend

This SAS Visual Investigator tutorial describes how to show or hide the network node legend.

A node legend can be associated with each network diagram. The legend is updated in real time as nodes are added to and removed from the network.

To indicate your preference for visibility of the network legend:

1. Make sure that a network is displayed in a **Workspace** tab.
2. Select **Network Properties** from the **Tools** menu.
3. Do one of the following:
   - To indicate that the node legend is to be displayed with the network, select the **Show legend** option.
   - To indicate that the node legend is not to be displayed with the network, deselect the **Show legend** option.

     When you make a selection, the network updates to reflect the change. The network is saved and retrieved with the options specified.

Note: In pan mode or in select mode, if nodes are behind the **Node Legend**, you can click the legend and drag the mouse pointer to move the entire network.

Applying a Timeline to the Network View

This SAS Visual Investigator tutorial describes using a time slider to view only particular nodes for a specified time.

In many instances, the nodes of a network represent the entry of a person into the investigative arena, the beginning of an activity, or another type of object for which a time stamp can be applied. When nodes have a time or interval component, it is helpful to control the view of nodes by using a time slider. Adjusting the time slider shows the entrance and exit of nodes and enables you to see only the nodes that are active at a particular time.

To use a time slider to control the view of nodes so that inactive nodes are dimmed:

1. Make sure that a network is displayed in a **Workspace** tab.
2. Make sure that the time slider is visible at the base of the network.

   TIP To toggle the time slider on and off, click **Time slider** ( ) in the network floating toolbar.

3. Select **Network Properties** from the **Tools** menu.

   When the time slider is displayed, the **Network Properties** options include a **Time slider range** selection. This enables you to specify which nodes are included (visible) in the range indicated by the time slider.

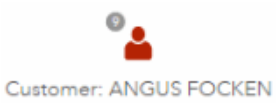
4. Do one of the following:
   - To indicate that inactive nodes should be dimmed, select the **Exclude nodes starting before** option in the **Time slider range** area.
   - To indicate that all nodes should be active regardless of entry point, deselect the **Exclude nodes starting before** option in the **Time slider range** area.

Expanding Nodes

This SAS Visual Investigator tutorial describes expanding nodes to view the connections between certain objects.

The expansion feature enables you to investigate and explore your data by following connections between objects.

Here is an example showing a single object, **Customer: ANGUS FOCKEN**, on an unexpanded network diagram. This customer is linked to nine other objects that are not yet visible on the diagram.

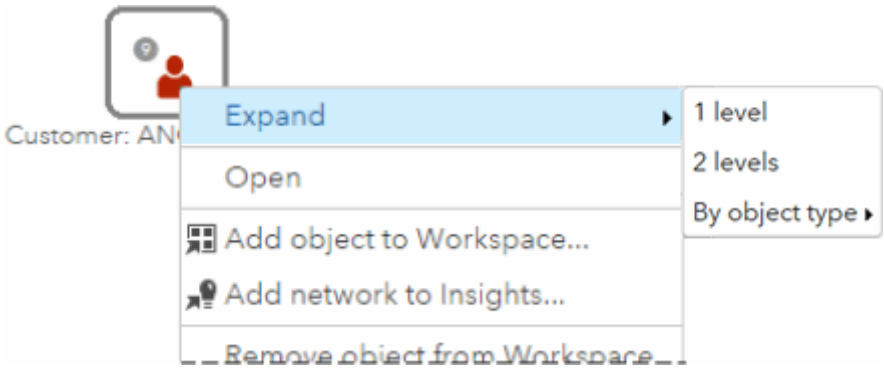


When an expansion of a node occurs, you might notice that the values of other unexpanded nodes have changed or been removed. This is normal and indicates that when the source node was expanded, it caused expansion of nodes associated with other nodes. The values attached to the nodes adjust to retain an accurate depiction of the state of the node relationships.

Note: The solution administrator can set a limit on the total number of objects an expansion can add to a network diagram. If you attempt an expansion that exceeds this limit, a prompt asks you to confirm that you want to proceed. Resolved entities with more than 2000 linked objects cannot be expanded. If the number of objects linked to a node exceeds this limit, the node displays “X” instead of the number of linked objects.

To display any objects linked to a node on the network diagram:

- Right-click the node, select **Expand**, and then select the expansion level that you want.

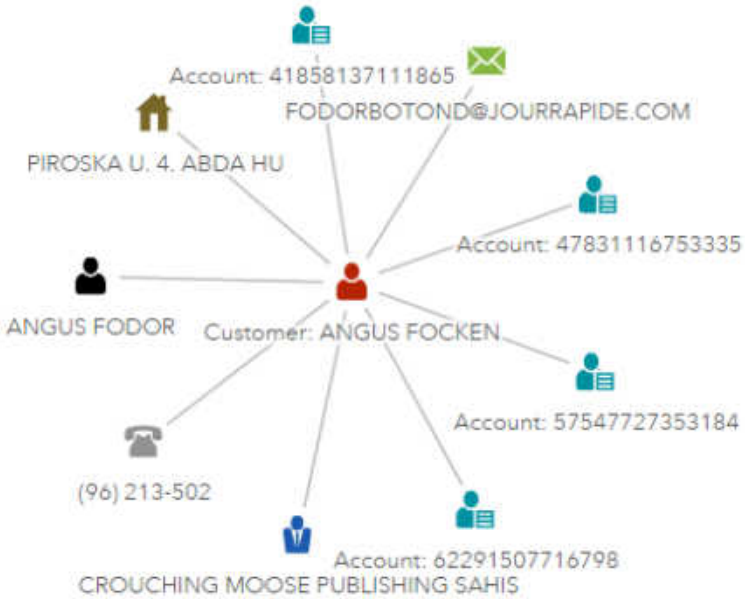


Note: The network diagram is refreshed and redrawn each time you expand a node in a workspace. If the underlying data has changed, the updates are reflected in the network diagram.

To display any objects directly linked to a node on the network diagram:

- Right-click the node and select **Expand** ▶ **1 level** from the pop-up menu.

  This image shows the **Customer: ANGUS FOCKEN** node expanded one level to show the nine linked objects.



To display directly linked objects and also objects directly linked to those objects in turn (that is, objects that are at two removes from the original node):

- Select **Expand** ▶ **2 levels** from the pop-up menu.

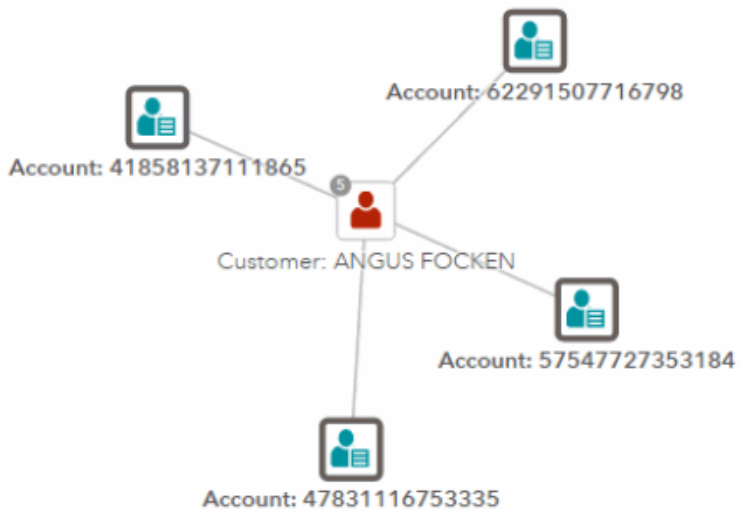
TIP If you select multiple nodes, you can expand them at the same time.

To expand by object type (that is, expand to display only links to nodes of a specified type):

- Select the nodes that you want to expand, and select **Expand** ▶ **By object type** ▶ ***required object type*** from the **Workspace** tab's menu.

  Only object types linked to the selected node and not already expanded are listed in the menu options.

  The following figure shows the node from the previous example expanded to show only the accounts linked to the customer. The number five indicates that there are five objects not yet displayed on the diagram that are linked to the same customer.



By default, you can double-click a node to expand it by one level. You can change this behavior in the network properties tool.

Adding and Deleting Node and Group Links

This SAS Visual Investigator tutorial describes adding and removing links from nodes.

The links between objects in a network diagram represent connections between the linked objects. Your investigation, however, might indicate that there are object connections not represented accurately by the data or that a linkage is not relevant for the investigation. SAS Visual Investigator enables you to add links to and remove links from the diagram to more fully represent the investigative results.

Managing Node Links

You can link new nodes to existing nodes on the network diagram or link existing nodes to other existing nodes.

Note: Linking group nodes has a subset of issues that are not relevant for linking single nodes.

To add a link between nodes:

1. Right-click the node from which the link will begin and then select **Draw a link to** from the pop-up menu.

   A link now connects your selected node and your mouse pointer.

2. Click the node to which you want this node to be linked.

   A link now connects the two nodes.

   Note: Nodes can have many links to many nodes.

You can edit your new link's display properties in the **Link Properties** tool in the **Tools** pane.

To remove a link between nodes:

- Right-click the link that you want to remove from the node relationship and select **Remove Link** from the pop-up menu.

The nodes are no longer connected by the link.

Managing Group Links

You can link new groups to existing nodes or groups on the network diagram or link existing groups to other existing nodes and groups.

Note: When a group is linked to any object, all members of the group are individually linked to the destination object. This becomes obvious when groups are ungrouped.

To add a link between a group node and any other type of node:

1. Right-click either the group or object node representing the **From** node, and do one of the following:
   - If the selected node is an object node, select **Draw a link to** from the pop-up menu.
   - If the selected node is a group node, select **Draw a link from members to** from the pop-up menu.

     A link is tethered to the source node.
2. Click the object node or the group node to which you want this node to be linked.

   A link now connects the two nodes.

   Note: Nodes can have many links to many nodes.

You can edit your new link's display properties in the **Link Properties** tool in the **Tools** pane.

To remove a link between nodes:

- Right-click the link that you want to remove from the node relationship and select **Remove Link** from the pop-up menu.

  The nodes are no longer connected by the link.

Adding and Deleting Nodes

This SAS Visual Investigator tutorial describes adding and deleting nodes from a network diagram.

The nodes of the network diagram represent objects in the connected data source displayed in the workspace. Your investigation, however, might take you outside of the boundaries of the data source. SAS Visual Investigator enables you to add nodes to the diagram to more fully represent the investigative results. Likewise, during an investigation, you might be able to eliminate objects based on lack of relevant interaction with the objects of interest in the network. In this case, it might be worthwhile to delete the node from the diagram.

Note: Any nodes you add manually are visible only within the current workspace; they do not exist elsewhere in the system.

To add a node to a diagram:

1. Right-click the canvas of the network diagram and select **New custom node** from the pop-up menu.

   The mouse pointer carries the silhouette of the new node which, by default, is a pentagon shape.

2. Click the canvas where you want the node to be placed.

   After the node is on the canvas, you can move the node around and link the node to other nodes in the network.

To remove a node from a diagram:

- Select the nodes that you want to delete and select **Object** ▶ **Remove object from Workspace** from the **Workspace** tab's menu.

  Note: Deleting a node from the network diagram removes the object from the diagram only; the object itself is not deleted. Any links the node has to other nodes are also removed from the diagram.

Grouping and Ungrouping Network Nodes

This SAS Visual Investigator tutorial describes organizing your network objects by grouping and ungrouping them.

Grouping nodes (that is, combining a collection of nodes as an apparent single node) enables you to treat the collection as one object. This is one way to organize network objects and to present the network as less crowded.

To create a grouped node:

1 Select the nodes that you want to group.

   Note: You cannot create a group that contains another group. Nested groups are not allowed.

2 Right-click a node in the selection and choose **Group nodes** from the pop-up menu.

   The selected nodes collapse into a single group node, represented by the Group icon.

You can modify the properties of the group by using the **Node properties** options available at the **Tools** menu.

Viewing Network Node Transactions

This SAS Visual Investigator tutorial describes how to show transaction links and the associated transaction details.

Transaction links represent interactions between objects. For example, emails or phone calls between an individual and his employer or doctor could be considered

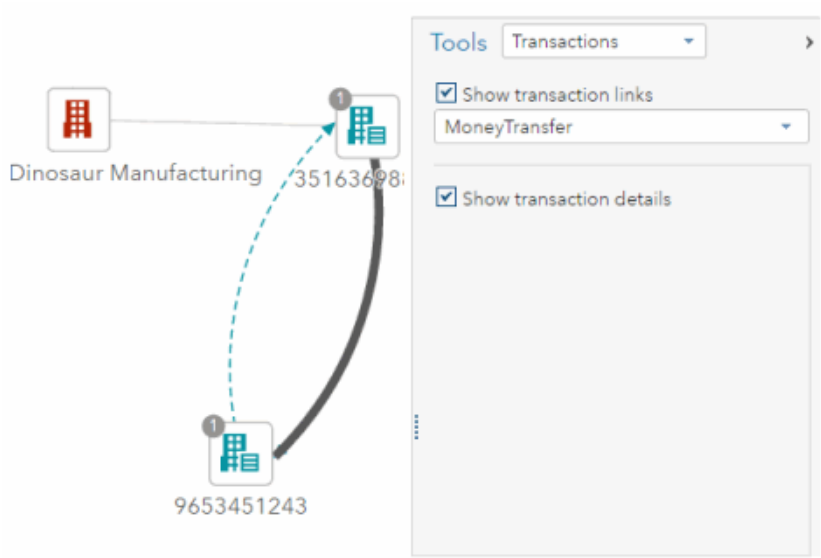
transactions. Deposits or withdrawals that a person makes to their bank account could be considered money transfer transactions. The transaction types that appear in the **Tools** pane are defined by your solution administrator.

The **Transactions** option displays transaction links and their related information in the network diagram.

To show transaction links in the network diagram:

- Select **Show transaction links**, and then select the transaction type in the list.

  Transaction links appear as dashed curved lines in the network diagram.



To see details about transactions represented by a dashed line:

- Select a transaction link in the network diagram, and then select **Show transaction details**.

  The transactions that exist between the objects joined by the link are listed in a table below the diagram. The information that appears for the transactions in the table is defined by your solution administrator.

Hiding and Revealing Nodes

This SAS Visual Investigator tutorial describes hiding and showing nodes.

To hide nodes:

1. Select the nodes that you want to hide.
2. Select **Object** ▶ **Hide node** from the **Workspace** tab's menu.

   The node selection is hidden from view.

Depending on how a network is configured, it might open with some nodes hidden. Or, during the process of your investigation, you might hide nodes to remove them from view. Hidden nodes can be revealed as needed.

Note: If the network diagram does not contain hidden nodes, then the option to show hidden nodes is unavailable on the menu.

To show hidden nodes:

- Right-click an empty area of the network canvas and select **Show hidden nodes** from the pop-up menu.

  When hidden nodes are shown, they are displayed at the location that they were in when they were hidden.

Applying Network Analytics

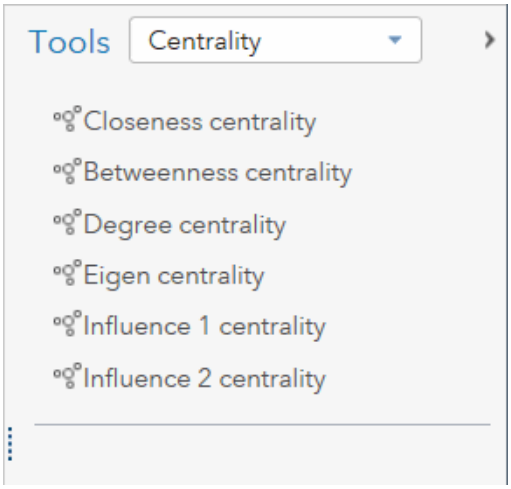
This SAS Visual Investigator tutorial describes the **Centrality** option and how to apply it to the network visualization.

In SAS Visual Investigator, entity analytics such as centrality measures can be applied to the network visualization when the **Centrality** option is enabled for your deployment.

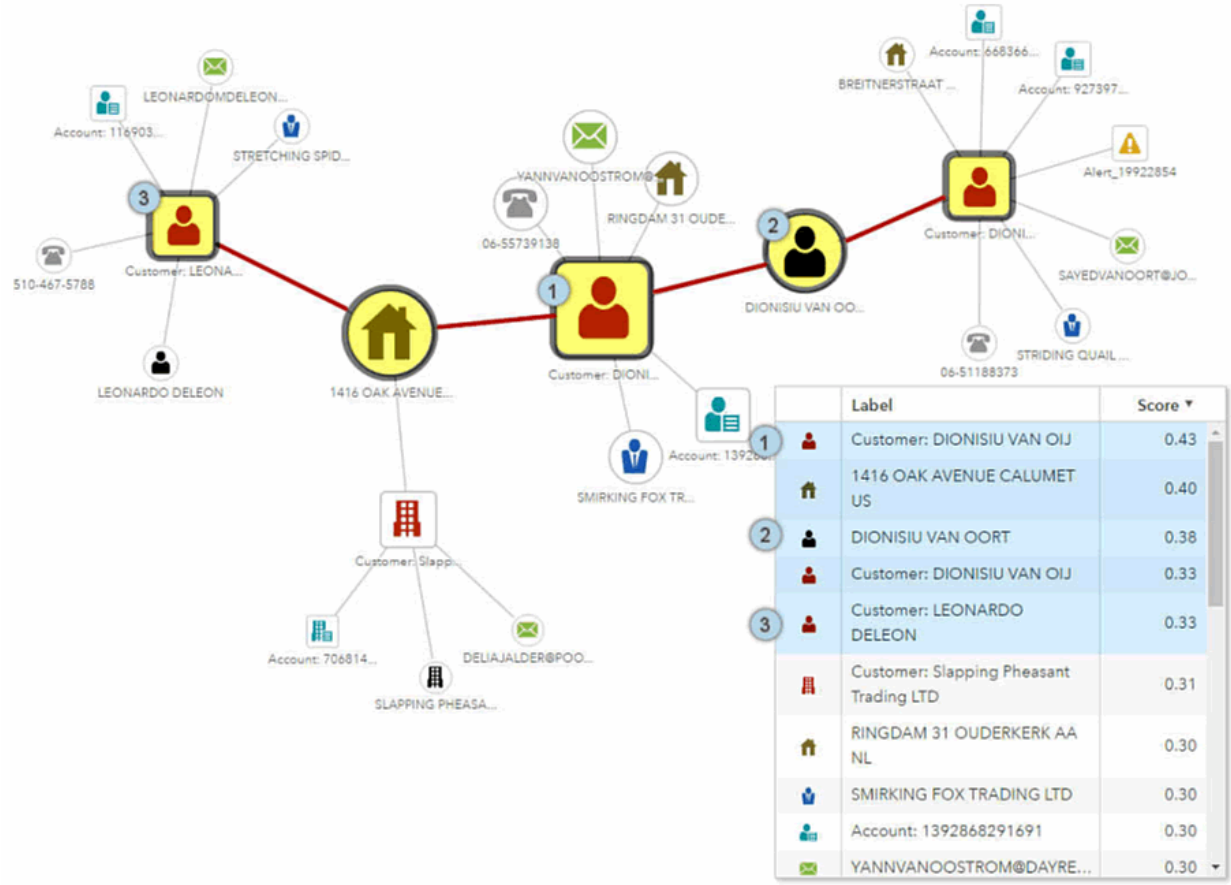
If the **Centrality** option does not appear on the **Tools** menu, then the feature is not enabled for your deployment. Contact your solution administrator to enable the option if it is needed.

To apply a centrality measure to an active network:

1. Select **Centrality** from the **Tools** menu.
2. Choose one of the available centrality measures.



The network diagram updates to show the relationship significance with respect to the indicated centrality measure.



Using Selection Tools

This SAS Visual Investigator tutorial describes how to use the selection tools to view a subset of your data.

When investigating, you often want to select a subset of your data (for example, to add to a workspace or an **Insights** tab for further examination). SAS Visual Investigator provides several ways to select objects in any of the visualization views. When an object is selected, navigating to the **Tools** pane and selecting **Selection** from the drop-down menu reveals options for making selections from the displayed data.

The selection tools available at the **Tools** pane differ based on the view selected.

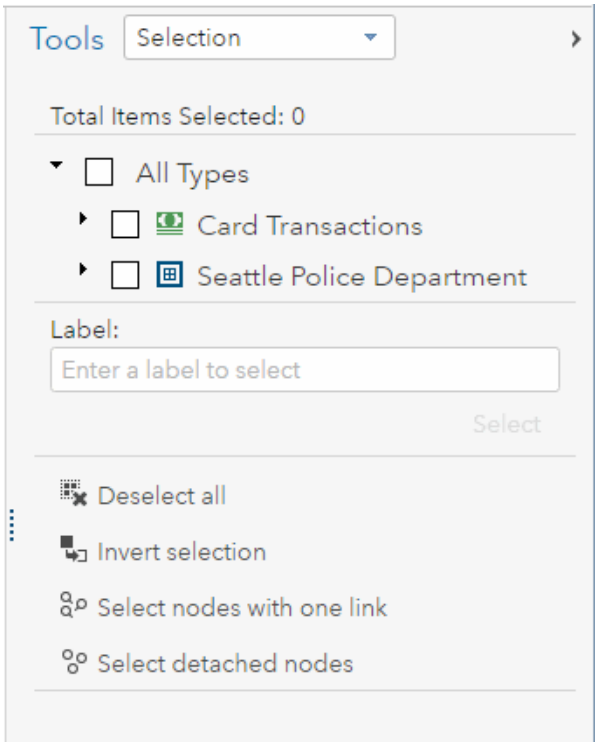
When you view an object in **Network View**, for example, you can do the following:

- see a count of the number of objects currently selected
- select check boxes to select objects by type
- enter text to select objects that have labels containing this text
- clear all selected objects
- invert the selection, meaning that all objects currently selected are deselected, and all objects not currently selected are selected

  Note: Inverse selection is not supported for custom nodes on a network diagram — that is, nodes that you have manually added yourself.

- select nodes with one link, meaning that all objects connected to only one other object are selected
- select detached nodes, meaning that all objects not connected to any others are selected

Here is an example showing the selection tools available in **Network View**:


Tools
Selection
Total Items Selected: 0
All Types
Card Transactions
Seattle Police Department
Label:
Enter a label to select
Select
Deselect all
Invert selection
Select nodes with one link
Select detached nodes

6

Advanced Tutorials

Conduct Design, Configuration, and Import or Export Actions

Designing Page Templates

This SAS Visual Investigator tutorial describes using Page Builder to design pages or to edit existing pages.

Page Builder enables product administrators to design and implement the pages that are used when working with data within SAS Visual Investigator.

You can create and edit pages from several areas within SAS Visual Investigator. The primary area for page development is the Page Builder interface, available by selecting **Pages** in the administration interface. When configuring entities or resolved entities on the **Data Objects** page, you can also create or edit new or existing pages.

To create a new page:

1 On the **Pages** page, click **New Page** ( ).

   Note: If an entity or resolved entity has been saved, you can also create a new page or edit an existing page by selecting the entity or resolved entity at the **Data Objects** page and then double-clicking the entity or resolved entity to open a series of related tabs. Click the **Pages and Toolbar** tab to see the list of existing pages in the **Pages** section. Click the **New Page** option at the **Pages** section to begin to create a new page, or double-click an existing page to open a template for editing.

2 When creating a new page, start to design your page by dragging layout options and controls onto the canvas.

   Each time you add a new layout option or control to the canvas, the properties pane updates, enabling you to configure parameters specific to that control. For example,

when you add a **3 Columns** option to the canvas, you can define the width of each of the columns as they will appear for SAS Visual Investigator users. After adding a **Map** control, the properties pane updates, enabling you to define the data source for location information, using either GeoJSON or latitude and longitude data.

3 Click **Save** to save the page as you work on your design.

The basic page is designed and saved. You can expand the basic functionality of the page by configuring additional tabs that will be associated with the base page.

4 To expand the page functionality, click **Page Properties** (Page Properties) from within the page design to open the **Configure page** window.

Using this window, you can configure the following:

- **Allow Workspace Creation** – Select this option to allow users to create workspaces from this record.
- **Allow Insights Creation** – Select this option to allow users to create insights from this record.
- Tabs – You can extend the functionality of the base page by adding one or more of the following types of tabs:
  - Standard – Adds an additional page, which can be designed using the Page Builder layout options and controls.
  - Related Objects – Adds an additional page, which can be configured to display objects related to the base page using preconfigured traversals. Unlike a standard page, this page cannot be modified with additional layout options or controls.
  - IFrame – Adds a new page containing an IFrame control, which enables HTML documents to be embedded in the current HTML document (current page template).

5 When you finish creating your page, click **Preview** (Preview to view the page as it will be viewed by users of SAS Visual Investigator.

Note: When you preview a page, functionality is limited, and little if any data is populated from data sources.

6 Click **Save** ( ) to save your page.

Alternatively, click **Save Page as New** ( ) to save the page with a different name.

Configuring a New Entity Type

This SAS Visual Investigator tutorial describes configuring entities, including external, internal, child, and resolved entity types.

The **Data Objects** page enables administrators to configure entities.

Entity Type	Entity Description
External entity	External entities represent data from source systems external to SAS Visual Investigator (for example, an insurance policy, a bank account application, or a tax return).
Internal entity	Internal entities represent data managed by SAS Visual Investigator (for example, an intelligence report or investigation).
Child entity	The data describing an external or internal entity might be broken into multiple child entities. Each refers to a particular component, often an individual party, or can be used for repeating information.
Resolved entity	The result of entity resolution is a new set of objects that are extracted from internal or external entities and combined to form a resolved entity. Resolved entities represent real-world objects and are created using a combination of elements to create a compound.

To create a new internal, external, or child entity:

1. At the **Entities** tab of the **Data Objects** page, select **New** from the menu. Depending on the type of entity that you want to create, choose either **New Internal Entity**, **New External Entity**, or **New Child Entity** from the options available at the **New** menu.

2. Complete the configuration tabs for entity creation as needed.

   - **New Internal Entity** – Configure **Settings**, **Fields**, **Views**, **Dates and Locations**, and **Filter Facets**. Add child entities if needed.
   - **New External Entity** – Configure **Settings**, **Fields**, **Views**, **Dates and Locations**, and **Filter Facets**. Add child entities if needed.
   - **New Child Entity** – Configure **Settings**, **Fields**, and **Dates**. Make sure that the correct parent entity option is selected.

3. Click **Save entity** to save your changes.

   After you have saved the entity, the **Pages and Toolbar** tab becomes available. This tab enables you to configure the buttons that are displayed when a record is opened, as well the template the record will use when it is accessed in different modes.

To create a new resolved entity:

1. At the **Resolved Entities** tab of the **Data Objects** page, select **New Resolved Entity** from the menu.

2. Complete the entity creation configuration.

   - **New Resolved Entity** – Configure **Settings**, **Views**, and **Page**. Make sure that you select at least one compound from the **Compounds** area at the **Settings** tab.

     Note: The **Page** tab becomes available only after you have saved the resolved entity.

3. Click **Save** to save your changes.

Entities are displayed in the **Entities** tab of the **Data Objects** page, and resolved entities are displayed at the **Resolved Entities** tab.

To edit entities or resolved entities:

1. Locate the item of interest on the **Entities** tab or the **Resolved entities** tab on the **Data Objects** page.
2. Double-click the item.

   The item opens and can be edited.
3. Click **Save** `Item-Type` from the menu.

   If needed, re-index in order for your changes to take effect.

   You can also import entity data.

Performing Ad Hoc Data Import

This SAS Visual Investigator tutorial describes importing a flat file into the product or connecting to an external database.

The data object import feature provides a way to import a flat file into the product or to connect to an external database in order to add entities (rather than create them manually). When importing data from a file or connecting to a database using the import feature, you are creating a new data object, an entity, that you can manage and configure from within the administration interface of SAS Visual Investigator. Imported data is analyzed to present data type suggestions, is validated against the declared data type, and is indexed for search by default.

Note: The behavior and limitations of a flat-file import are different from those of a connected database. In addition, there are differences between database table and database view source import.

One way to import a data object is to upload a file containing data in a supported, delimited format. Supported delimited types are comma-separated, tab-separated, and pipe-separated.

To add a data object from a file:

1. Make sure that you have a supported file accessible to SAS Visual Investigator.

2 Navigate to the **Import** page of the administrator interface and make sure that the **Upload** option is selected.

3 Drag and drop a file onto the **Drop Data Here** area.

When data import is initiated using a flat file as the source, data is analyzed to determine the data type of each column, and data details and a read-only list of the fields are displayed in the window.

4 Review the data details.

The information that is displayed, including the column names, is read-only in this view. The import feature makes an intelligent guess at whether the imported flat file contains a header row.

5 If the selection for **First row header** is incorrect, change the value of the **First row header** check box as appropriate.

If you do not indicate a first row header, columns will be named Var1, Var2, Var(*n*).

6 Click **Next** to go to a preview page that shows the data that you will be importing.

Icon indicators reveal information about the fields, such as data type, data associations, and unique field identifiers.

7 On the preview page, configure the data to be imported.

Configuration is done on a per-column basis by clicking the cell beneath the column heading of the column that you want to configure. This displays a window that enables you to view or modify field characteristics for the selected column.

8 Click **Next** to configure additional properties of the new entity.

Configuration properties include those related to entity identification, detail view fields, and table view fields as described in the following list:

- the icons and pin color for the entity.
- a display label for the entity type.
- the object label. This is how individual entities of this type will be labeled in places such as the node link diagram.

- the set of fields to display in search results for both **Detail View** and **Table View**.

9 Click **Finish**.

This creates a new object type in SAS Visual Investigator and starts indexing the new object in a background process. You can access the object at the **Entities** tab of the **Data Objects** page, where you can continue to configure the entity.

Besides flat files, you can also import new entities from database tables or views that are visible in a data store. Supported databases are PostgreSQL and Oracle (versions 11x and 12x).

To add a data object from a database:

1 Navigate to the **Import** page of the administrator interface.

2 Click **Connect**.

3 Choose a source from the **Data store** drop-down menu, and click **Show Data**.

If the data store does not contain any tables, you are prompted to select another data store.

4 Select a table or a view, and then click **Connect** at the base of the list of tables and views.

Tables are indicated by the icon and views are indicated by the icon.

In some instances, not all tables are presented. If table names are greater than 30 characters long, contain characters such as $ or #, or start with a number, the tables are not included in the list of displayed tables. Only tables that have not yet been configured through the **Properties** page are available for selection.

5 On the preview page, configure the data to be imported.

Note: Data store tables on remote customer sites can contain column data types that are not supported by SAS Visual Investigator. In those instances, those columns are not imported when the table is registered. You will notice that those columns are not displayed in the preview page.

Configuration is done on a per-column basis by clicking the cell beneath the column heading of the column that you want to configure. This displays a window that enables you to view or modify field characteristics for the selected column. For tables and views, you can change only the field label, matching element, and field role value.

6 Click **Next** to configure additional properties of the new entity. Configuration properties include those related to entity identification, detail view fields, and table view fields as described in the following list:

- the icons and pin color for the entity.
- a display label for the entity type.
- the object label. This is how individual entities of this type will be labeled in places such as the node link diagram.
- the set of fields to display in search results for both **Detail View** and **Table View**.

7 Click **Finish.**

This creates a new object type in SAS Visual Investigator and starts indexing the new object in a background process.

8 Navigate to the **Data Objects** page and select the object that you imported from the list of entities. You can continue to customize the entity.

Configuring Strategies

This SAS Visual Investigator tutorial describes configuring strategies.

To create a strategy:

1 From within the Administration interface, from the **Alerts** page, select the **Strategies** tab, and then click **New Strategies** (New Strategy).

2 On the **Strategy** tab, in the **Strategy Details** section, select the appropriate alert domain and enter a name for the strategy.

3 Under **Alert Grid**, do the following:

   a Specify the field used to sort the alerts list.

   b Specify whether to sort the field values in ascending or descending order.

   c Click **Select fields for alert grid**.

   d In the Select Fields for Alert Grid window, select each field to include in the alerts list.

   e To create a new field, click the **New Field** button.

   In the New Field window, enter the information for the new field , and click either **Save & Continue** or **Save & Close**.

   Note: The prefix `enrichmentJson.`, which appears in front of the field, is added to the field name that you enter.

   Select the newly created field in the Select Fields for Alert Grid window.

   f When you have added all of the fields that should be included in the alert list, click **OK**.

4 Under **Alert Recipients**, select the user group that has access to this strategy and all of its queues.

5 To specify the color coding for the score indicator in the alert grid and alert scorecard, enter a **Low Threshold** and **High Threshold** value.

6 Specify whether a workspace should be created for the alert, and specify the number of levels that should be expanded in the network for the actionable entity.

7 Click when you have finished.

After you have saved the strategy, you can select **Associated Queues** to create or associate a queue with the strategy.

Configuring Queues

This SAS Visual Investigator tutorial describes configuring queues to associate with a strategy.

To create a queue:

1. From within the Administration interface, from the **Alerts** page, select the **Strategies** tab, and then select the strategy for which you want to create a queue.

   The existing queues for this strategy appear in a list at the bottom of the page.

2. Click **New Queue** (New Queue).

3. On the queue page, under **Queue Details**, enter a name for the queue.

4. Under **Associated Pages**, select the template to use for the alert summary, **Alerts Details** tab, and object inspector.

5. To create routing rules for the queue:

   a. Indicate whether an alert must meet only one or all of the rules in order to be routed to the queue.

   b. Click **New** to add a row to the **Routing Rules** grid.

   c. Under **Column**, select the field.

   d. Select the appropriate condition.

   e. Enter a value for the selected field.

6. To add more routing rules, repeat step 5.

7. To specify a default number of days for which an alert should be suppressed, enter a value in the **Default suppression duration (days)** field.

8. To specify a default number of days after which the alert should be closed automatically, enter a value in the **Auto close after (days)** field.

9 Specify whether alerts should be allowed to move out of this queue.

10 Specify whether manually created alerts can be added to this queue.

11 To select dispositions for the queue:

   a Click .

   b In the Select Dispositions window, select all the dispositions that users can apply to the alerts in this queue.

   c Click **OK**.

12 Click when you have finished.

Importing Custom Map and Pin Icons

This SAS Visual Investigator tutorial describes how to upload custom icons and map pins.

A set of default icons is supplied as part of your SAS Visual Investigator system. However, you can create and upload your own icons, in SVG format, to better match your organization's requirements. The Manage Icons and Map Pins window is opened from the **Views** tab in the **Data Objects** page when you are working with entities. This window enables you to upload icons, rename or replace icons, and delete existing icons.

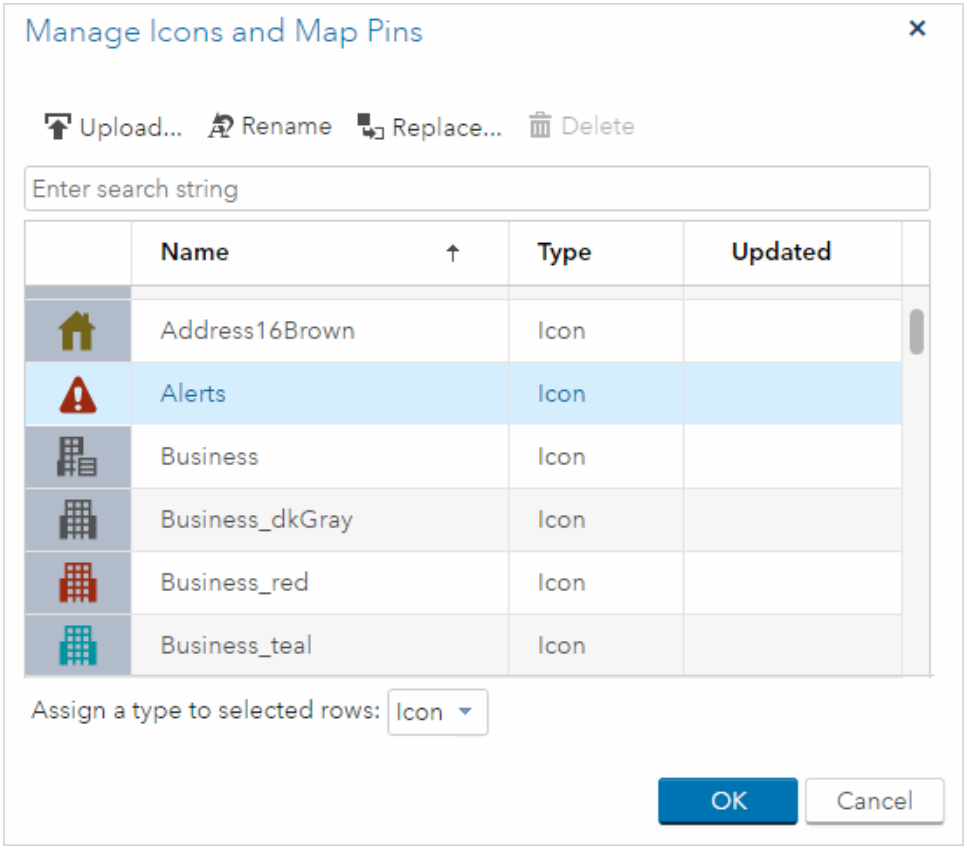
Note: You can delete only icons immediately after uploading them–that is, before clicking **OK** to close the Manage Icons and Map Pins window.

To manage icons and map pins from the Administration interface:

1 With an entity open from **Entities** tab of the **Data Objects** page, click the **Views** tab.

2 In the **Icons and Label** area, click **Manage icons and map pins**.

   The Manage Icons and Map Pins window is displayed:



Using the **Manage Icons and Map Pins** window, you can perform the following tasks:

- Click **Upload** to navigate to any custom icons saved on your local computer or local network.

  The icon that you are uploading should be in SVG format.

- Click **Rename** to change the name of an existing icon or map pin. Icon and map pin names can contain alphanumeric characters and underscore characters only, cannot start with a number or underscore, and must be no longer than 25 characters in length.

- Click **Replace** to navigate to an updated icon saved on your local computer or local network.

- Click **Delete** to remove an icon from the list.

- Specify whether the icon type is **Icon** or **Map Pin** by selecting from the **Assign a type to selected rows**.

  You cannot change the type of an icon that is already associated with an entity or resolved entity.

3 Click **OK** when you have finished managing icons and map pins.

Understanding and Using Relationships

This SAS Visual Investigator tutorial describes what relationships are and provides details for creating and configuring relationships.

Relationships represent connections between entities. Types of relationships include one-to-one, one-to-many, many-to-one, or many-to-many.

Creating and Configuring Relationships

When you create relationships, string fields can be joined only with fields of the same type. Small integer, integer, long, and numeric fields can also be joined to fields of the same type, as well as to other types of field. In addition, when creating a relationship, the “one” side must be the entity’s key field. The “many” side of a relationship can be any compatible field.

To create and configure relationships from within the Administration interface:

1 On the application toolbar, click **Relationships**.

  The relationships object list is displayed

2 Click **Create New Relationship** (New Relationship) to create a new relationship.

  Alternatively, double-click an existing relationship to edit it.

  The relationship detail page is displayed.

3 From the entity type drop-down lists, select the **From entity** and **To entity** for which you want to create a relationship.

4 From the **Cardinality** drop-down list, select **One-to-One**, **One-to-Many**, **Many-to-One**, or **Many-to-Many**.

If you select **One-to-One** or **Many-to-Many**, you can select **Symmetric** (that is, the relationship is the same in both directions).

Note: If you select the **Symmetric** option, you can create relationships between entities of the same type based on the entity selected in the **From entity** drop-down list.

5 In the **Primary label** box, enter a label to describe the relationship. If the **Symmetric** check box is clear, you can add a label for both directions of the relationship.

6 In the **Relationship Condition** area, select the **Bridge table type**:

- **Internal**

  Relationships between internal entities are always of the type **Internal**, and are always stored in the default data store. If you select **Internal**, the **Bridge table name** and **Join conditions** are populated automatically.

- **External**.

  Relationships between external entities can be of the type **External** or **Internal**. If you select **External**, you must specify the data store in which the relationship will be saved, as well as the **Bridge table name** and **Join condition**. When you select the bridge table, the contents of the bridge table are displayed in the lower section of the page.

  If you want your external relationship to use incremental updates or deletions, you must assign the role of **Last updated at time field** to a timestamp field on the bridge table for the relationship. To do this, in the **Bridge Table Fields** area, select the field that you want to assign this role. From the **Role** drop-down menu, select **Last updated at time field**. A calendar icon ( ) is displayed in the Last Updated Time Field column of the relevant row.

  If you want to use incremental deletions, you must also select the relationship's associated delete table from the **Deleted records table name** drop-down list in the **Details** area.

Note: The **Details** area is displayed only when **External** is selected as the bridge table type.

- **(none)**

  Relationships between external entities from the same data store (for all cardinalities except many-to-many) are always set to **(none)**.

Note: Relationships between external entities and internal entities, and between external entities from different data stores, must be internal. Internal relationships between records can be created only by using the SAS Visual Investigator application, whereas external relationships can be created by using existing primary/foreign key relationships in the database.

7 When you have finished creating the relationship, click **Save** ( ).

Creating and Configuring Heterogeneous Relationships

Heterogeneous relationships can be created for external entities only, and for **One-to-One** and **Many-to-One** cardinalities. Heterogeneous relationships allow relationships to be created between many different entities that share a common field. This means that when defining a relationship, only the starting entity is needed.

To create and configure heterogeneous relationships from within the Administration interface:

1 On the **Relationships** toolbar, make sure that the **Relationships** tab is selected.

2 Click **Create New Relationship** (New Relationship) to create a new relationship.

  Alternatively, double-click an existing relationship to edit it.

3 From the **From entity** drop-down list, select an external entity.

4 From the **Cardinality** drop-down list, select either **One-to-One** or **Many-to-One**.

5 From the **To entity** drop-down list, select **(multiple types)**.

  The **Entity field** drop-down list containing a list of string fields on the **From entity** is displayed.

6 From the **Entity field** drop-down list, select the field to be used as the field common to entities in the relationship.

7 In the **Primary label** field, enter a name for this relationship.

8 From the **Join condition** drop-down list in the **Relationship Condition** area, select the field that will contain the ID of the linked entity.

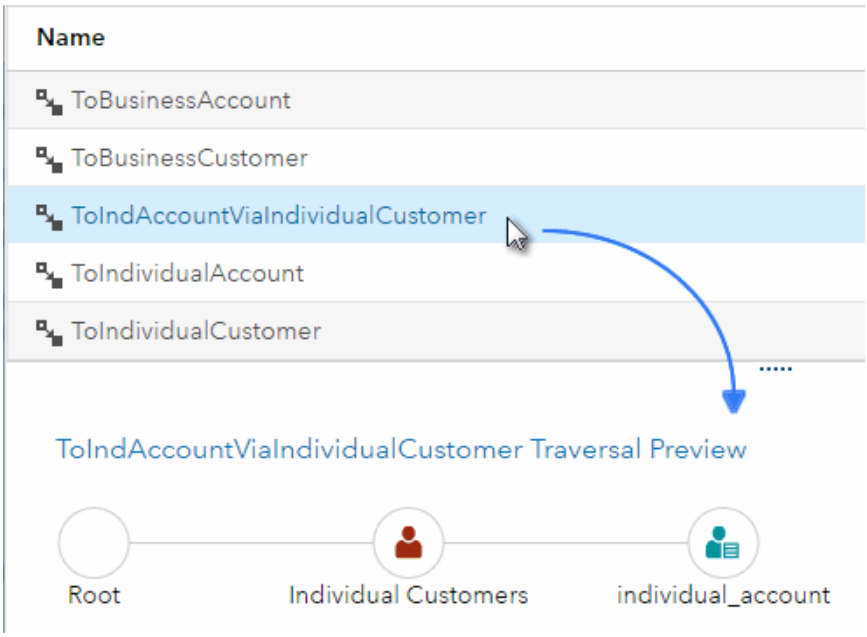
9 When you have finished creating the relationship, click **Save** ( ).

Understanding and Using Traversals

This SAS Visual Investigator tutorial describes when and how to use traversals.

Traversals offer a flexible way for you to describe a path through existing relationships between entities and resolved entities in order to return objects of a specified type. For example, a network of companies can be related through transactions to a fraudulent activity.

A traversal starts from the current object and can follow any number of defined steps to its endpoint. The following figure shows an example:



To create and configure traversals from within the Administration interface:

1 Click **Relationships** on the application toolbar, and then click the **Traversals** tab.

The traversals details page appears.

In a new SAS Visual Investigator installation, no traversals appear until the administrator creates them.

2 Click **New Traversal** (New Traversal) to create a new traversal. Alternatively, to edit an existing traversal, double-click a traversal in the summary list.

The **New Traversal** window appears.

3 Enter a name for the traversal, and then click **OK**.

The **Traversal Designer** page appears.

4 From the **Entities** list, drag an entity or resolved entity onto the canvas. A new node is linked to the **Root** node.

5 Continue to add nodes to the traversal configuration. Each node that you add is automatically added as the last node in the configuration.

6 When you have finished adding nodes to the configuration, click **Save** ( ). Alternatively, if you are editing an existing configuration, click **Save as** ( ) to save the traversal configuration with a new name.

Understanding and Using Transactions

This SAS Visual Investigator tutorial describes what transactions are and when they should be used.

Standard social links are displayed in network visualizations to show the connections between entities. A social link can represent a link between a person and items that are related to that person. To show an action transference, you can define transactions. A transaction link can represent an email that an individual sends to his employer or a withdrawal that a customer makes from a bank account. By default, transactions are shown as hashed blue-line links in the network visualization. They show directionality.

To create and configure transactions:

1 Access the **Relationships** tab at the administrator interface and select the **Transactions** tab.

2 Click **New Transaction** and then specify the transaction settings and add details.

- Transaction settings are considered those that define the identity and source for the data related to the transaction.
- Transaction details are the specific parameters that govern and display the flow of associated activity. You must specify all of the **From** and **To** details.

To specify transaction settings on the **Settings** tab of a new transaction:

1 Under **Identification**, enter the transaction name and label.

2 Under **Details**, select the data store that has the table that includes the transaction data, and then select the table in the **Table name** field.

3 Under **Date and Time**, you must select one column from the table that specifies datetime information. If the table that you select includes only one such column, it is selected automatically.

4 Add and delete fields at the **Fields** table. Columns identified as primary key and at least two fields must be included for each transaction.

5 If you want to use incremental updates or deletions, you must assign the role of **Last updated at time field** to a timestamp field on the table for the transaction. To do this, in the **Fields** table, select the field to which you want to assign this role. From the **Role** drop-down menu, select **Last updated at time field**. A calendar icon ( ) is displayed in the Last Updated Time Field column of the relevant row.

6 Save the settings and click the **Transaction Details** tab to complete the tasks needed to create or manage a transaction.

The transaction details are the specific parameters that govern and display the flow of associated activity. You must specify all of the **From** and **To** details.

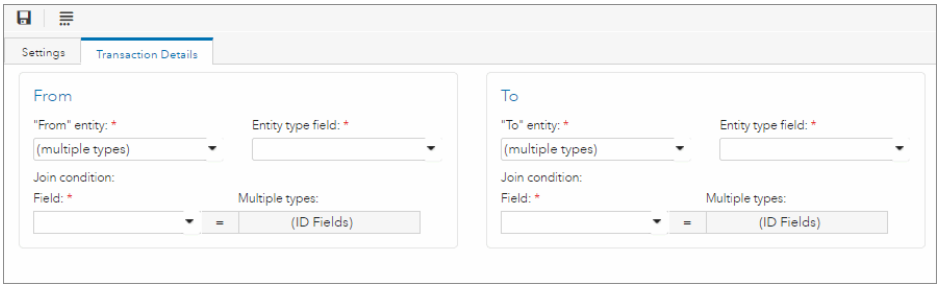
To specify details about the **Transaction Details** tab of a new transaction:

1 Under **From**, identify the entity that sends the transaction. For example, in the following figure, the **From** settings identify where an email starts. In the **From entity** field, specify the table that holds the entity. Under the **Join condition** field, identify the field in the selected table that uniquely identifies the entity. In the **Transaction field**, identify the field in the transaction data table that corresponds to the field in the entity table.

   Note: The transaction data table is the table that you selected on the **Settings** tab.

2 Under **To**, you identify the same information for the entity that receives the transaction. For example, in the following figure, the **To** settings identify where the email goes. In the **To entity** field, identify the entity that receives the transaction. Under **Join condition**, specify the field in the transaction data that corresponds to the entity in the selected table. In the last field, enter the field in the entity table that uniquely identifies the entity.

Figure 6.1 Transaction Details Tab



Note: If (**multiple types**) is selected for the **From** or for the **To** entity, then you must specify the field that identifies the entities. If an entity type is selected, an optional join condition is displayed for each detected primary key field for that entity. At least one join condition must be specified.

3 Save the transaction.

Note: You must re-index and resolve entities before you can expect to see complete and accurate transactions displayed in a network visualization.

Re-indexing Data and Performing Entity Resolution

This SAS Visual Investigator tutorial defines re-indexing and resolving entities and discusses when to re-index and when to resolve.

Indexing data makes the contents of data loaded into your system available to SAS Visual Investigator users. When you re-index and resolve all entities, the contents of the search index are deleted, entity data is loaded, and all entities are resolved. When you re-index a selected entity, the contents of the search index are deleted for that entity, the entity data is loaded, but no entities are resolved. You can manually force a re-index of some or all objects on the **Data Objects** page.

Only objects that have been marked for index inclusion on the **Data Objects** page can be re-indexed.

To index or re-index data:

1 In the administrative application, click **Data Objects** on the menu.

2 Do one of the following:

- To index a new object, ensure that the **Indexed for search** option is selected.
- To re-index an existing entity, either select or open the entity from the **Entities** tab of the **Data Objects** page, and then select the index option from the menu.
- To re-index all, select **Re-index all and resolve entities** from the menu.

If a message indicates that re-indexing documents and resolved entities might take a long time, click **Yes** to continue.

When re-indexing is complete, SAS Visual Investigator users are able to access any new or updated objects.

Note: When an entity is indexed, its associated links are also indexed. For example, if an entity is the **From** or **To** entity in a relationship, then the links for those relationships are indexed automatically.

Create and Manage Workflows

Creating and Accessing a Workflow

This SAS Visual Investigator tutorial describes the process for creating a workflow and provides information for accessing available workflows.

To create a workflow, from the Administration interface:

1 Navigate to the workflow window.

2 In the workflow window, select an element and drag and drop it into the workflow workspace.

Note: The **Start** element is already provided in the editor. Continue to drag and drop elements until you have the workflow that you want.

TIP You can also right-click an element already in the workspace to display an element menu ( ). The displayed menu is based on the element on which you right-click. Click any element in the menu to add it to the workspace.

3 Add properties to your workflow elements.

4 Select the **Enable workflow** check box on the toolbar if you are ready for this workflow to run when new objects are created.

5 Click **Save** ( ) to save the workflow.

Note: Workflows must be valid to be saved.

To access a workflow for editing and management, from the Administrator interface:

1 From the **Data Objects** page, make sure the **Entities** tab is highlighted.

2 Double-click a **Name** that has Internal as the Type.

3 Select the **Pages and Toolbar** tab.

4 Click **Edit Workflow** on the bottom right.

Note: If the workflow has not yet been created and enabled, a Status: Disabled label is displayed next to the **Edit Workflow** button. If a workflow has been created and enabled, a Status: Enabled label is displayed next to the **Edit Workflow** button.

The workflow window is displayed.

Creating or Importing Workflow Variables

This SAS Visual Investigator tutorial describes the process for creating workflow variables and for importing workflow variables.

Workflow variables provide a way to update values during the workflow process. These variables can be used by various elements in the workflow. For example, an exclusive gateway often uses workflow variables to determine which path is chosen to continue the workflow process. Two types of variables, user defined and entity defined, can be created, imported, and managed, depending on various factors.

To create user-defined workflow variables from within the workflow window of the Administration interface:

1. Click **Manage Workflow Variables** ( ).
2. Click **Create New Workflow Variable** ( ).
3. Enter the appropriate information.
4. Click **OK** to save the variable.

Repeat these steps to create other workflow variables.

Note: You cannot change the data type of any previously saved workflow variable.

Entity-defined variables refer to workflow process variables that are based on the database columns in the table that was created in the **Fields** tab when an internal entity was created.

To import entity-defined workflow variables from within the workflow window of the Administration interface:

1. Select the **Start** element in the workflow editor.

   Note: The **Start** element must be selected when you import the entity-defined variables. If the **Start** element is not selected, the initial values of the variables are not available for the workflow.

2 Under **Workflow variables imported from entity fields**, click **Import Workflow Variables from Entity Fields** ( ) to display theAdd Entity Field window.

3 Select one or more fields from the list and click **OK**.

The variables are prefixed with `svi_` to distinguish them from user-defined variables.

Adding User Tasks to a Workflow

This SAS Visual Investigator tutorial describes the method for adding a user task to a workflow.

A task is a workflow element that represents a step or unit of work in the workflow.

To define a new user task, from the workflow window in the Administrator interface:

- Select the **User Task** element and drag and drop it into the desired position on the workspace.

  Note: If you want to add a user task from an element already in the workspace, right-click the element and click **User Task** ( ) from the pop-up menu.

Enabling Tasks for User Access

This SAS Visual Investigator tutorial describes how to make tasks accessible to users.

After you create workflows for an internal entity, there are some steps that need to be taken so that these workflow tasks are available to the user in the SAS Visual Investigator user interface. These steps include the following:

- Add the **My Tasks** control to the **Home** page.
- Configure the page toolbar for the entity.

Users need to be able to see what tasks they have claimed when they log on to SAS Visual Investigator. Users can do this by looking at the **My Tasks** control on the **Home** page. To add the **My Tasks** control to the **Home** page, from the Administrator interface:

- Follow the instructions for creating and configuring a **Home** page and make sure that you add the **My Tasks** control to the template.

For a user to view and act on tasks for an entity, certain items must be added to the entity's page toolbar:

- Left and right divider – This enables the **Workflow Task** button and any other toolbar controls to be anchored on the right of the toolbar instead of on the left.
- **Workflow Task** button – Clicking this button displays the task pane where a user can claim a task.

These items are added from the Administrator interface. You can add other toolbar items as appropriate.

Configure Surveillance Strategy Assets

Understanding the Scenario Administrator Operation and Process

This SAS Visual Investigator tutorial describes the operation and use of the Scenario Administrator.

The Scenario Administrator is a powerful and versatile analytic component in SAS Visual Investigator. It provides fraud detection authoring and surveillance capabilities.

The Scenario Administrator is a data-driven tool, designed for users who want to explore their data and then author a basic rule for a surveillance strategy, as well as for more sophisticated users who want to develop a complex decision flow. The Scenario Administrator provides the capability to create flows and scenarios for use in a batch environment.

The tool enables you to perform the following tasks:

- explore, analyze, and summarize source data using visually based tools
- discover behaviors of interest (for example, fraudulent activity) by creating scenarios that provide easy-to-use features for authoring rules
- test the impact of scenarios, enabling you to perform an operational analysis of the output events that they generate
- route the output events to the applicable location for further investigation

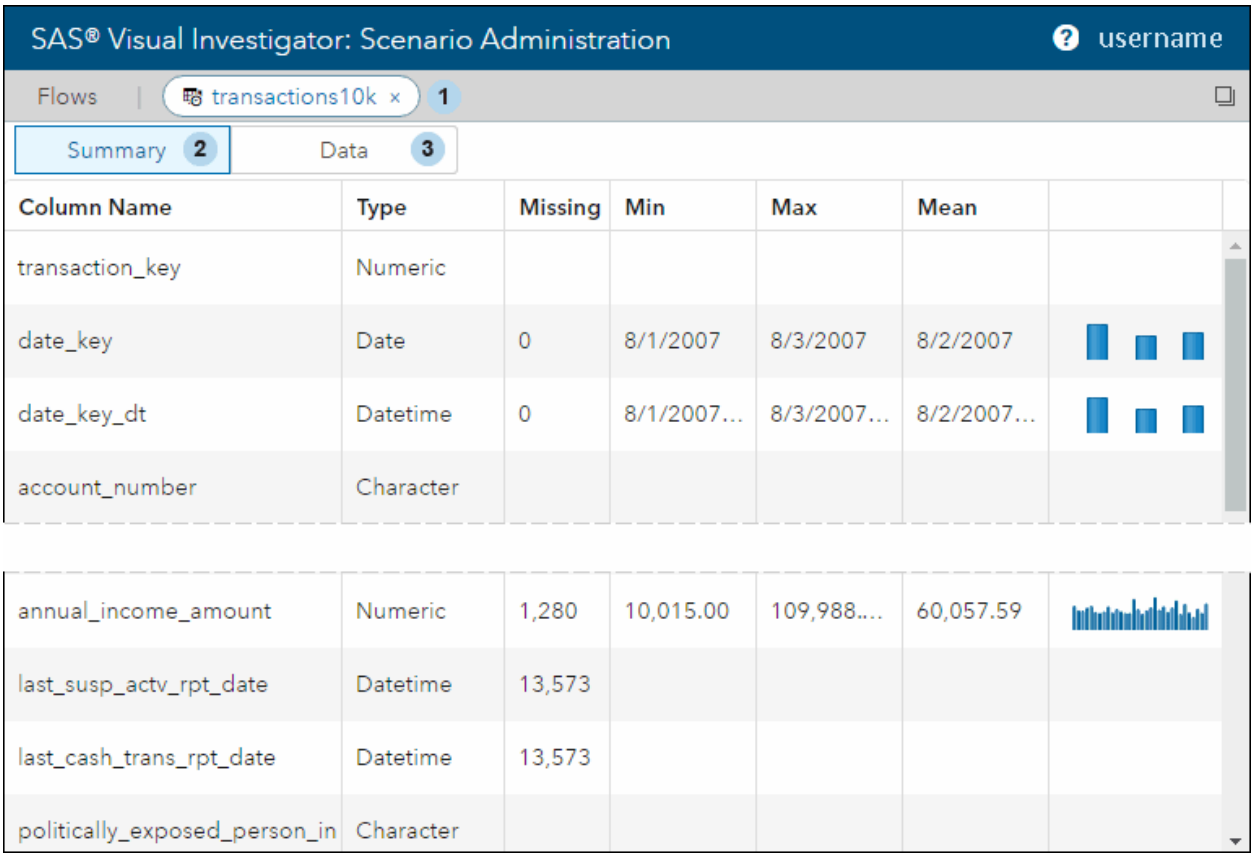
Viewing Flow Data

You use the data viewer to view a data source in a summarized format or at the individual record level.

The data viewer is accessible from the flow object page. Depending on how you access a data source from the flow object page, the data viewer appears either on its own page or in a details pane as follows:

- When you select **Flow Properties** in the navigation pane, the details pane includes the **Data** table, listing all available data sources. Click **View data** ( ) to open the associated data source in its own page.
- When you select a data source name in the navigation pane of the flow object page, the details pane displays the selected data source.

Here is an example of a data source opened in the data viewer page, showing the data in a summarized format:



The following table identifies the components on the data viewer page:

Item	Description
1	The data source object in the toolbar. The data source object remains available in the toolbar until you close it.
2	**Summary** tab. Click this tab to display summarized data, by column. This includes general information, such as data type, and data metrics about each column in the data source. When you view a data source in the details pane of a flow object page, check boxes enable you to select and deselect columns for the flow.
3	**Data** tab. Click this tab to display record-level data for 500 records.

Both the **Summary** and **Data** tabs display data metrics that include a histogram summarizing value distribution. To display the range of values that are associated with a bar in the histogram, position your mouse pointer over the bar.

Note: Data metrics are not provided for character columns or for any numeric column that is a primary key.

Example Scenario Type: Grouping

In a grouping scenario, the Scenario Administrator surveils data at an aggregated level, either by an entity or one or more data columns that you select. You can also specify a span of time for which to aggregate the data, and when to start that aggregation.

You might use a grouping scenario if, for example, you want to surveil deposit data aggregated by account. The output of a grouping scenario is one row per unique group by value.

In general, to create a grouping scenario:

1. Open the flow in which you want to create a scenario, and click **New Scenario** ( ).
2. Click **Grouping Scenario** ( ).
3. Specify the information related to this new grouping scenario and save the record. The procedure for this process is as follows:
   - Specify grouping scenario properties.
   - Identify grouping aggregation columns and create rules.
   - Review scenario test results.

Here is an example showing relevant details of grouping scenario creation.

Example

The intent of the example scenario in this section is to group data by account number, and then generate a scenario-fired event when the aggregated value of a column is greater than 100,000.

View the slideshow in SAS Help Center.

Example Scenario Type: Record-level

In a record-level scenario, the Scenario Administrator surveils all records at the level in which they exist in the data source (no aggregation occurs). You might use a record-level scenario if, for example, you want to surveil deposit data by individual transactions. The output of a record-level scenario is all records in the data.

In general, to create a record-level scenario:

1. Open the flow in which you want to create a scenario, and click **New Scenario** ( ).
2. Click **Record-Level Scenario** ( ).
3. Specify the information related to this new record–level scenario and save the record.

Here is an example showing relevant details of record-level scenario creation.

Example

The intent of the sample scenario in this section is to generate a scenario-fired event by account when the following conditions exist:

- The value that is assigned to a currency column is greater than 50,000.
- The value that is assigned to a state column matches one of several specified states.

View the slideshow in SAS Help Center.

Example Scenario Type: DATA Step

If you are creating scenarios by specifying SAS DATA step code, you are not bound by the operational constraints offered by the user interface. If a scenario requires more than one DATA step to achieve the desired output, you can include sequential DATA steps in the scenario.

To create a scenario by specifying SAS DATA step code:

1. Open the flow in which you want to create a scenario, and click **New Scenario** ( ).
2. Click **DATA Step Scenario** ( ).
3. Specify the information related to this new DATA step scenario and save the record.
4. Expand **DATA Step Code**, and then enter the code in the editor, remembering to validate, check the syntax, and save as needed.

Example

The intent of the following DATA step scenario is to generate a scenario-fired event for a customer when the customer's account data meets specific criteria and the cash deposit value exceeds the cash_threshold value.

Note: In this scenario, cash_threshold and lookback are user-defined parameters. The value assigned to cash_threshold is 10,000. The value assigned to lookback is 1.

View the slideshow in SAS Help Center.

The following **Test Results** page shows the results of running the scenario:

DATASTEP > Test Results

Total records: 13,583

Summary

4 (0.03 %)
Records

3 (0.14 %)
Distinct Entities (PTY)

Results by Rule

Rule	Logic	Records	Distinct Entities (PTY)	Score	Select
-	(DATA step code)	4	3		
-	(no rule conditions met)	13,579	2,135		
-	(total)	13,583	2,138		

Output Records

Scenario Fired	Entity Key (party_number)	Score	Message	norm_scenario_score_value
Yes	10501899	12,400.00	Daily cash deposit totalUSD 12400 exceeds 100...	0.12
Yes	10253711	37,500.00	Daily cash deposit totalUSD 37500 exceeds 100...	0.38
Yes	10507736	12,983.54	Daily cash deposit total 12983.54 exceeds 1000...	0.13
Yes	10507736	10,112.30	Daily cash deposit total 10112.3 exceeds 10000...	0.10

1 - 4 of 4 items

In the page, you can see the following:

- The data source contains 13,583 total records.
- There are four records that match the rule criteria. Therefore, the Scenario Administrator generated four scenario-fired events. This represents 0.03% of the total records.
- Among the scenario-fired events there are three distinct entities. Therefore, one entity generated two scenario-fired events.
- The Results by Rule table shows the categorized results. Again, you can see here that four records matched the rule, and that there were three distinct entities for which scenario-fired events exist. The DATA step code assigned the sum of the daily cash deposit as the score value. Therefore, the indicator in the Score column shows the occurrence and distribution of those values.

- The Output Records table shows the details of the scenario output data. Because the first row is selected in the Results by Rule table, the table shows the records that met the criteria defined in the DATA step code.

Creating a Scorecard

This SAS Visual Investigator tutorial describes the process of creating a scorecard for the Scenario Administrator.

A scorecard enables you to perform final processing using the scenario-fired events that are produced by the scenarios in the flow. This provides you with more control over when to generate an alerting event for an actionable entity.

To create scorecard:

1. Open the flow in which you want to create a scorecard, click **New scenario** ( ), click **Scorecard** ( ), and then click the applicable actionable entity.

2. Perform configuration tasks such as the following:
   - Change default baseline properties if needed.
   - Evaluate and manage contributing scenario scoring, including creating new columns if needed.
   - Define the score aggregation column for use in the scorecard rule definition if needed.
   - Specify your choices for rules that assign scoring and routing.

3. Confirm that the information entered is accurate and make sure that everything is saved.

Testing a Scenario

This SAS Visual Investigator tutorial describes the process of testing a scenario in the Scenario Administrator.

Before you run a flow, you can test the scenarios contained within it to assess their effectiveness.

To test a scenario:

1. In the flow object navigation pane, click the scenario that you want to test.
2. Click **Test Scenario** ( ).

   Note: The **Test Scenario** button is not available unless all of the required scenario fields are complete.

   The **Running** indicator appears. When testing is complete, the **Test Results** page appears.

If necessary, after reviewing the test results, you can fine-tune the scenario configuration and then run another test until you achieve the desired results.

Publishing and Running Flows

This SAS Visual Investigator tutorial provides instructions for publishing a flow and for running a flow.

Before you can run a flow, you must publish the flow to enable it to be run. You use the **Publish Flow** page to publish and run flows.

To publish a flow:

1. Open the flow that you want to publish.

   Note: If the open flow contains unsaved changes, save the flow. You cannot publish a flow that has unsaved changes.

2 Click **View published** ( ) to display the **Published Versions** page.

3 On the **Published Versions** page, click **View published** ( ) to display the Publish Flow window.

4 In the Publish Flow window, enter any information that you want saved with the published version, and then click **OK**.

The Scenario Administrator adds the version to the **Published Versions** page. An entry with an assigned version number and corresponding date and time stamp is listed in the navigation pane. Property information is populated in the associated details pane.

To run a flow:

1 Open the flow that you want to run, and then click **View published** ( ) to display the **Published Versions** page.

2 In the navigation pane, select the published version of the flow that you want to run.

Note: You must select a published version that is assigned the available status (green indicator). You cannot run a published version that is assigned the revoked status.

3 Click **Run** (▶).

A message appears that indicates the status of the flow run and, when the run is complete, the outcome. If the flow run completes successfully, all of the events that are associated with the flow are transferred to the alert service.