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Chapter 1
Introduction

Product Overview

SAS Infrastructure for Risk Management is a high-performance job execution engine with a web-based user interface and a programming interface for SAS that you can order and deploy with one or more SAS solutions. SAS Infrastructure for Risk Management solutions are delivered as industry-specific content releases that you download after you install SAS Infrastructure for Risk Management. Calculations are performed using job flows.

For development purposes, you can order SAS Infrastructure for Risk Management 3.4 as a stand-alone product that you can use to create custom content using parallel programs called job flows. For more information about SAS Infrastructure for Risk Management 3.4 development using the SAS-based interface, see SAS Infrastructure for Risk Management: Programmer’s Guide.

The SAS Infrastructure for Risk Management platform is designed to be customizable and flexible. The architecture of SAS Infrastructure for Risk Management provides a simplified way to develop and run the fastest analytics.

What’s New In SAS Infrastructure for Risk Management 3.4

SAS Infrastructure for Risk Management 3.4 provides a higher level of automation and integration than prior releases to support workflows that integrate the SAS MultiVendor Architecture, SAS Viya, third-party data sources, and deep learning.

SAS Infrastructure for Risk Management 3.4 introduces the role of a developer persona and SAS Studio support to provide an integrated development platform for high-performance analytics that leverages the power of parallel computing.
SAS Infrastructure for Risk Management 3.4 introduces the following features and enhancements:

- custom content development using a personal federated area and the SAS Infrastructure for Risk Management scripting client
- private custom content development using SAS Studio, which provides the following capabilities:
  - tasks and job flow development
  - backing up and restoring job flow instances
  - macros that simplify data partitioning
  - data visualization
- enhanced New Instance window, which provides the following features:
  - uploading input files when creating a job flow instance
  - hierarchical selection of base dates and entities
  - display of the federated area identifier that is associated with the job flow instance
  - ability to edit the name and description of an existing job flow instance
  - summary diagram for a job flows
  - support for temporary libraries, which reduce disk space footprint
  - support for generic library definitions in the libnames.txt file of a federated area, which simplifies access to third-party data
  - fixes and performance enhancements

About This Book

SAS Infrastructure for Risk Management is designed for the following users:

- the power user or administrator who is responsible for processing and modeling data marts and developing base analysis configurations and reports
- the analyst who is responsible for configuring analyses and developing reports
- the business user who needs to generate and access regulatory reports
- the executive who is charged with oversight of regulatory compliance
- programmers who are responsible for the content development or are responsible for creating parallel programs.

The scope of this guide is primarily limited to tasks that analysts and business users are likely to perform through the web-based user interface.

For detailed information about administrative tasks, such as product installation, customization, configuration, assignment of roles and permissions to users, and data management, see *SAS Infrastructure for Risk Management: Administrator's Guide*.

Recommended Reading

- *SAS Infrastructure for Risk Management: Administrator’s Guide*—Provides information about administrative tasks such as product installation, customization, configuration, assignment of roles and permissions to users, and data management.

Chapter 2

Getting Started With SAS Infrastructure for Risk Management

Common SAS Infrastructure for Risk Management Functions

For more information about the concepts and elements of the functions that you can perform, see “Elements Of SAS Infrastructure for Risk Management”.

SAS Infrastructure for Risk Management solutions provide predefined job flow definitions that you can use to perform calculations. You work with these job flows by creating and managing job flow instances through the user interface.

For detailed information about the terms used in the list below, see “Elements Of SAS Infrastructure for Risk Management”.

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Common functions that you perform when working with job flows include the following:

- Create an instance of a job flow that you want to run for a specific entity, base date, or configuration set.
  
  An instance consists of underlying flows. To view the underlying flows that are a part of an instance, click the instance in the instance list view. Each flow consists of one or more tasks. A task is a pre-constructed analytical or reporting-oriented element of processing that has defined input and output.

- Enable debug logging for an instance to obtain more information about the execution of the tasks in an instance.

- Upload input data sets and edit the variables of a data set as needed when creating a job flow instance.

- Edit an existing job flow instance.

- Share and publish instances to allow other users to view the instances that you create.

- Filter the list of instances by specific attributes and values.

- Manage a view by adding or removing columns, sorting columns, and saving the view for future reference.

- View the tasks that are a part of an instance, view the input and output files of a specific task, and modify an input file of a task.

- Access task-level documentation.

The SAS Infrastructure for Risk Management web interface is self-explanatory. The sections in this chapter provide a high-level overview of the user interface and how to use it to complete basic functions, including the previously listed functions.

Create an Instance

1. Click 🔄. The New Instance window is displayed.

2. In the Instance field, enter a unique name for the job flow instance.

3. (Optional) To enable debug logging, select Debug logging. Debug logging collects information about the execution of the tasks of an instance. You can use this information for troubleshooting issues.

4. In the Base date field use the drop-down menu or click Select to select a value for the base date. The calculation is performed for the date that you select.

   You can select a base date from the drop-down menu, or you can click Select to the right of the Base date field to display the Select Base Date dialog box.

   In the Select Base Date dialog box, you can filter the available base dates by a combination of year, month, and day.

   • Click  and  to expand and collapse the list of values for all attributes.

   • Click  and  to the left of an attribute to display or collapse the list of values for only that attribute.

Note: Selecting a base date for which there is no input available generates an error message and the instance cannot be created.
5. In the **Entity** field, use the drop-down menu or click **Select** to choose an entity. The entity is the subset of your corporation that you want to include in the calculation.

You can select an entity from the drop-down menu. You can also click **Select** to the right of the **Entity** field to display a hierarchal list of entities in which you can search for and select an entity.

6. Click **Solo** or **Group** to specify whether to treat the entity as a solo entity or as a group entity.

   *Note:* The **Solo** or **Group** entity configuration option does not apply to all SAS Infrastructure for Risk Management federated content.

7. In the **Configuration** field, select a configuration set from the drop-down menu. Your administrator provides you with one or more configuration sets. Configuration sets contain parameters and settings for your calculation.

8. In the **Category** field, select a category from the drop-down menu. The flows are assigned to categories in order to simplify the management of flows.

9. In the **Flow** field, select a job flow from the drop-down menu. The federated area to which the flow belongs displays to the right of the **Flow** field.

10. (Optional) Enter a description of the instance in the **Description** field.

11. Click **Create**.

12. To edit the values of specific input data sets when creating a job flow instance, click next to **Inputs** and complete the following steps:

   a. Under **Data Sets**, click **Load Data Sets** and select the data set for which you want to edit values.

   b. Click the name of the data set to display the list of variables and their values under **Variables**. As necessary, modify the value of the data set variables.

13. (Optional) To create multiple new instances in a row without having to repopulate all of the fields in the New Instance window, select **Create another**, and click **Create**. When you create your last new instance, deselect **Create another**, and click **Create**.

   *Note:* The federated area that is associated with one or more of the job flow instances that you create is displayed under **Federated Area**: on the New Instance window. To display documentation about the content of the federated area, click the name of the federated area.

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### Open an Instance

1. In the instance list view, click the name of the instance that you want to open.

2. In the window of the opened instance, you can perform the following functions:

   - When you create an instance, by default all input and output files that are associated with the tasks in that instance are displayed in the instance view. To hide all input and output files, click 📦. To display the files, click 📦.

     *Note:* You can hide or display input and output files for subflows as well.

   - To facilitate navigating large job flow instances, you can quickly zoom in to an area of an instance. To zoom in to an area of an instance, press Shift and click
and drag the box over the area in to which you want to zoom. To toggle between
the views, press Shift + Z.

• To display information about a task in an instance, place the cursor on the task.
This information includes the name and purpose of the flow and the federated
area with which it is associated. In addition, you can place the cursor on input
data for a task to view the table name of the input data.

  Note: Because a job flow can contain tasks that are located in different federated
areas, the ability to display information about the task, including the
federated area with which it is associated, is helpful troubleshooting
information.

• Click `.` to search for an object used by the instance. (See “Search for Objects
Used by an Instance”.)

• If viewing an instance that a user has shared with you, click `.` to ensure that
you are viewing the most current version of that instance.

---

### Run an Instance

After you create an instance, it is automatically executed. To run an existing instance:

1. Select the check box to the left of the instance in the instance list view.

2. Click `.` on the toolbar and select **Run**.

3. To cancel the execution of the instance, click `.` on the toolbar and select **Cancel
execution**.

  Note: Tasks that are in the process of being executed will be completed before the
job is canceled.

  Note: If a task is not running, SAS Infrastructure for Risk Management has detected that
the task has been previously executed and its input and output files have not
changed. Therefore, the task does not need to be executed again.

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### View the List of Instances

• The order of the columns in the instance list view can be rearranged by dragging and
dropping the column name. In addition, you can click `.` in the header of the list of
instances and select **Columns** to rearrange and choose columns that you want to
display or hide.

• The **Status** column reports the status of the last time each instance was run. Possible
values are as follows:

  ![✓]

  The instance completed successfully.

  ![✗]

  The instance completed with errors. To view the errors, open the instance and
select **Errors** on the right side of the window.
The instance is currently running.

The instance was canceled while it was executing.

The input files that are used by the instance have changed since the instance was last executed.

Note: To view detailed status information, open the instance and select Status on the right side of the window. In addition, the status icons also appear on the actual task in the open list window. This enables you to easily identify the status of each task.

- If any values in an input file for a task have changed, the Modified column displays 🔄.

- The State column indicates whether an instance has been shared or published.

  - The instance is published for others to view, but not to modify or run.

  - The instance is shared with others.

  - The instance is shared with you, but you cannot run or modify it.

Note: Instances with no icons are your private instances.

The following options are available on the main banner:

- To see notifications, click 📣.

  Note: Notifications are not supported in SAS Infrastructure for Risk Management 3.4.

- To access documentation about the product and deployment, click 📖.

- To access product-level settings or to sign out, click the user name in the top right corner of the application banner. The Settings window includes accessibility, language, and theme settings.

The following options are available on the toolbar:

- 🔄 Creates an instance of a job flow definition.

- 📱 Displays the results for the selected instance.

- 🔪 Opens the Edit instance window from where you can change the name and description of an instance and modify its input data set.

- 🔄 Refreshes the list of instances.

- 📜 Displays the View dialog box from where you can change the instance list view.
Edit an Existing Job Flow Instance

1. In the instance list view, select the check box to the left of the instance that you want to edit and click ↪. The Edit job flow window is displayed.

2. In the **Instance** field and the **Description** field, enter a new name and a new description.

3. To edit the values of specific input data sets, click ▼ next to **Inputs** and complete the following functions:
   a. Under **Data Sets**, click **Load Data Sets** and select the data set for which you want to edit values.
   b. Click the name of the data set to display the list of variables and their values under **Variables**. As necessary, modify the value of the data set variables.

4. Click **Save**.

*Note:* Renaming an instance or changing its description does not trigger the instance to rerun.

Manage Instances

1. In the instance list view, select the instance and click ▪ on the toolbar.

2. Select from the following options:
   - **Share** — Shares the instance with users of the same entity. This option is active only when you are the owner of the instance.
   - **Unshare** — Unshares the instance. This option is active only when you are the owner of the instance.
   - **Publish** — Publishes the instance for other users to see, but not to run or modify. Depending on the capabilities that are assigned to you by the administrator, this option might not be active.
   - **Open** — Opens the instance.
   - **Run** — Executes the instance. This option is active only when you are the owner of the instance.
   - **Cancel execution** — Cancels the execution of the instance. This option is active only when you are the owner of the instance and the instance is running.
   - **Delete** — Deletes the instance. This option is active only when you are the owner of the instance.

Pop-up menu from where you can choose to share, unshare, publish, open, run, cancel the execution, or delete the selected instance. In addition, you can save the current view.
• **Save current view** — Saves the instance list view. When you save a view or select a view from the list of saved views, that view becomes the default view until you save or select a different one.

---

**Enable or Disable Debug Logging for an Instance**

1. Open the instance for which you want to enable or disable debug logging.
2. Click on the toolbar.
3. To turn on debug logging, select **Enable debug and run**. To turn off debug logging, deselect **Enable debug and run**.
4. To view any errors that occurred when the instance was executed, click **Errors**.

*Note:* Alternatively, you can enable debug logging when creating an instance. By default, debug logging is disabled.

---

**Share and Publish Instances**

1. Select one or more instances in the instance list view.
2. Click on the toolbar and select **Share** to share one or more instances with other users of the same entity.
3. Click on the toolbar and select **Publish** to enable other users to see, but not to run or modify an instance.

*Note:* The actions that a user can perform (for example, to publish an instance or to delete a published instance) are determined by the capabilities that are assigned by an administrator. For more information about capabilities, see *SAS Infrastructure for Risk Management: Administrator’s Guide*.

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**View the Results of an Instance**

1. On the instance list view, select the instance for which you want to view the results.
2. On the toolbar, click [H].
3. Search for and click the results that you want to view.

*Note:* Alternatively, you can view the results for an instance by opening the instance and selecting **Results** on the right side of the window.
Filter Instances

1. Click on the instance list view.

2. In the Filters pane, select values for one or more attributes on which to filter the list of job flow instances.
   - Click to expand the list of values for all attributes. Click to collapse the list of values for all attributes.
   
   Beside each value of an attribute is a count of the instances that have that value.
   - Use the scroll bar on the right of the Filters pane to scroll through the lists of attributes and values for each attribute.

3. Select the attributes on which to filter the list of instances.

   As you select attributes, the list of instances in the table on the right side of the window displays only those instances that match the filter. The attributes of the filter are listed as buttons on the toolbar at the top of the instance list view. These buttons are known as facets.

4. To clear the values that you selected for an attribute, click Reset to the right of the attribute. Click Reset all to clear the attributes that you selected.

5. Click to return to the instance list view.

Search for Objects Used by an Instance

You can search for subflows, tasks, and input and output files that are used within a job flow instance.

1. Open the instance.

2. Click .

3. In the Search field, enter the name of the object that you want to search for. To search within folders, select Search within folders.

4. The center pane lists (in table format) where the object is used.
   - To expand or collapse an object in the table, click the arrow to the right of its name. You can drill down to view the input and output files for a task within a subflow.
   
   You can filter by execution status or type of object (for example, input file, modified input files, output file, tasks, and so on).
   - The facets of your filter are included on the toolbar. To remove a facet from your filter, click .
   - To return to the hierarchy view, click .
To expand the list of subflows and tasks in the table, click ⬇️. To collapse the list of tasks, click ⬆️.

Manage Views

- To reorder columns, click the column heading and drag and drop it in the preferred column position.
- To prevent a column from being dragged and dropped, right-click the column heading and select Freeze. The column is moved to the far left side of the table, and you can scroll through the list of instances without scrolling that column. To release the column, right-click and select Unfreeze.
- To manage the columns that are displayed:
  1. Click ☰️ to the right of the column heading, and select Columns.
  2. In the Columns window, move columns between the Hidden columns list and the Displayed columns list and reorder the columns as appropriate.
  3. To save your choices, click OK.
- To sort the table data by a selected column, right-click a column heading.
  1. Select Sort (ascending ) or Sort (descending ).
  2. To create a secondary sort column, right-click a different column and select Sort ⇒ Add to sort (ascending) or Sort ⇒ Add to sort (descending).
  3. To remove sorting, right-click a sorted column and select Sort ⇒ Remove sort.
    Note: Selecting a new column on which to sort removes all previous sorting selections.
- To save the current view:
  1. Click ☰️ on the toolbar and select Save current view. The Save View window is displayed.
  2. Enter a unique name for the view and click Save.
- To manage saved views, click 📚.

In the Views window:
- To use a view, select it. The active view is denoted by a small circle.
- To delete a view, click ☰️ to the right of the view.
- To display a view that contains all available columns, click Full View. To display only the columns that you selected in the Columns window, click Compact View.

Note: When you save a view or select a view from the list of saved views, that view becomes the default initial view until you save or select a different one.
View the Input or Output Files of a Task

You can download and view a task’s input or output files, or you can view them in SAS Studio.

*Note:* To view files in SAS Studio, ensure that your browser has been configured to allow pop-up windows.

1. Open the instance.
2. Right-click the input or output file that you want to view.
   
   *Note:* To view the table name of the data input file, place the cursor over the input file.
3. To download and open the file, select **Download**.
   
   To view the file in SAS Studio, select **Open in SAS Studio**.

*Note:* If no input or output files appear to be associated with the tasks in an instance, ensure that the files are not hidden. To display the input and output files, click in the instance view.

Edit the Input File of a Task

identifies input files that you can edit.

1. Open the instance.
2. Right-click the input file and select **Download** and make changes as necessary.
3. When you have completed your changes, right-click the filename of the input file and select **Upload**. Click **Browse** to navigate to the edited version of the file.
4. Select the file and click **Upload** to complete the update.

A flow that contains input that has been edited is identified with in the instance list view.

*Note:* When you modify a table, the change applies to each task that uses the table as input. For example, if you change a value in Table A for Task 1, and Table A is also used as input for Task 2, the change is effective for both tasks. The last version of the uploaded table takes precedence over previous versions of the table.

View a Task Log

Logs that contain information about the execution of a task are available for tasks that do not contain subflows.

1. Open the instance for which you want to view task logs.
2. Drill down to the task or tasks for which you want to view the log.
3. To open the log, double-click the task or right-click and select **Show Log**.

*Note:* If a show log option is not available, click to run the job flow instance. In addition, if double-clicking a task does not display the log, ensure that your browser has been configured to enable pops-ups.
Appendix 1

Elements of SAS Infrastructure for Risk Management

**Base Dates**

The list of base dates identifies the dates for which data has been provided. Base dates are used as a basis for the calculations. When creating a job flow instance, only specific base dates can be selected.

**Categories**

Categories are groups to which flows are assigned. SAS Infrastructure for Risk Management solution content provides flows that are designed to produce quantitative reports for regulatory requirements. To simplify management of these flows, each flow is assigned to a category. The displayed categories depend on the details of your federated content.

**Configuration Sets**

Configuration sets are collections of data sets that are used when running instances. A data set contains settings and parameters.

*Note:* The creation and management of configuration sets is an administrative function.

**Debug Logging**

Debug logging enables you to view information about the execution of the tasks of an instance. You can enable debug logging when you create an instance or you can enable or disable logging for an existing instance. (See "Enable or Disable Debug Logging for an Instance".)

**Entities**

Entities are logical groupings of your corporate structure. An entity can be the entire company, one or more subsidiaries, a geographical region, a specific business unit, and so on. The analyses that you perform are associated with an entity.

*Note:* Entity creation and management is an administrative function.
Flows

Flows are programs that contain two or more tasks. Instances are flows with a specific set of inputs. Some of the flows contain tasks that are also flows. This facilitates reuse of common flows.

A generic sample federated area is installed with SAS Infrastructure for Risk Management. This federated area contains sample flows that demonstrate the capabilities and functionality of SAS Infrastructure for Risk Management. For details about the sample flows, see the task-level help.

Instance List View

The instance list view consists of the following elements:

- the columns that are visible
- the sequence of the columns
- the sorting of the columns
- frozen columns
- attributes for filtering

Job Flow Definitions

SAS Infrastructure for Risk Management job flow definitions (flows) are provided in the SAS Infrastructure for Risk Management solution federated content package. Job flow definitions are graphical representations of computations. They are a sequence of steps to perform specific goals. For example, a job flow definition might produce a report to prove solvency of an entity at a given point in time. You can create many job flow instances from a job flow definition. You can also nest flows within other flows. Flows can have input and output values.

Job Flow Instances

There can be only one job flow definition. However, you can create multiple instances of that definition that you can run in SAS Infrastructure for Risk Management. An instance is associated with an entity, has a specified base date, and contains defined input data from a configuration set. By default, all job flow instances are private until shared or published.

Tasks

Tasks are the basic building blocks of SAS Infrastructure for Risk Management. They are pre-constructed analytical or reporting-oriented elements of processing that have a defined input or output, or both.

When working with tasks, note the following:

- Tasks can contain subflows. These tasks are denoted by a +. To view the subflows, double-click the task.
- Tasks that do not contain subflows are not denoted by a +. You can view the associated log or help for these tasks. To view the log file or help for a task, right-
click the task and select an option from the pop-up menu. The log file opens in a new browser window. The log file reports the name of the instance and the name of the associated task.

Note: Log files are created only when the instance is run.

- Tasks can have input and output data. Inputs are displayed above the task, and are connected with an arrow pointing to the task. Outputs are displayed below the task with arrows leading from the task. A task requires either a defined input or a defined output, but not both.

- Some tasks can have some input and output SAS data sets and files that are partitioned. Partition tasks enable large amounts of data to be partitioned into smaller units of data and calculated across multiple cores. The task recombines the results of the partitioned data.

- identifies input files that you can edit.

When you modify an input file, the change applies to each task that uses the file as input. For example, if you change a value in Table A for Task 1, and Table A is also an input file for Task 2, the change applies to both tasks. The last version of the uploaded table takes precedence over previous versions of the table.

Note: Some input files are not editable. In general, an input file is not editable because it is an output from a subflow or another task.

- To open sub-tasks, double-click the parent task.
- To explore the files that are associated with a task, double-click the parent task.
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