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JAMS Client

The articles in this section will help you work with the main features in the JAMS Client. This includes Jobs, folders, dates and times, dashboards and reports, SSRS, the monitor, resources, and queues.

JAMS Overview

What is JAMS?

The Job Access and Management System (JAMS) is designed to automate and enhance your organization's batch processing capabilities across multiple platforms. Windows, UNIX, Linux, System i, and more can be easily tied together using the JAMS enterprise scheduling engine.

Whether your organization's servers are virtualized or physical, uniform or diverse, JAMS provides secure control mechanisms that can enable you to submit batch processing jobs or alternatively create schedules for automatic execution.

JAMS is highly customizable and ready to provide benefits right out of the box. In addition, JAMS is scalable, allowing you to grow your business without worry that future upgrades will negate existing work or settings.

Once properly configured, JAMS will enhance and simplify the most complex batch scheduling processes, providing your organization with increased system reliability and reduced cost of operation.

JAMS Components

JAMS integrates three components that work together to create a unique and powerful management system.

1. JAMS Client: Provides the main user controls for JAMS, available in a either a Windows-based or Web-based GUI.
2. JAMS Scheduler: Schedules all Jobs, Scripts, or Tasks that run on your organization's servers. It is also monitors the status of all Jobs and communicates this information to the JAMS Client.
3. JAMS Server: Facilitates communication between the JAMS Clients and the JAMS Scheduler.

Manage Servers

Every JAMS Client must connect to at least one server. If the JAMS Server Service is installed on the same machine as the client, a server definition is automatically added that points to the local server.

You can add, edit, or remove JAMS Servers from the Settings icon in the top right corner of the JAMS Client.
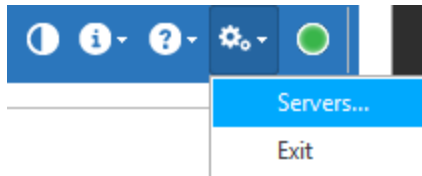
Adding a Server

1. Click the **Settings** icon in the top right corner and select **Servers**.
2. Click **Add** to open the JAMS Server definition dialog.
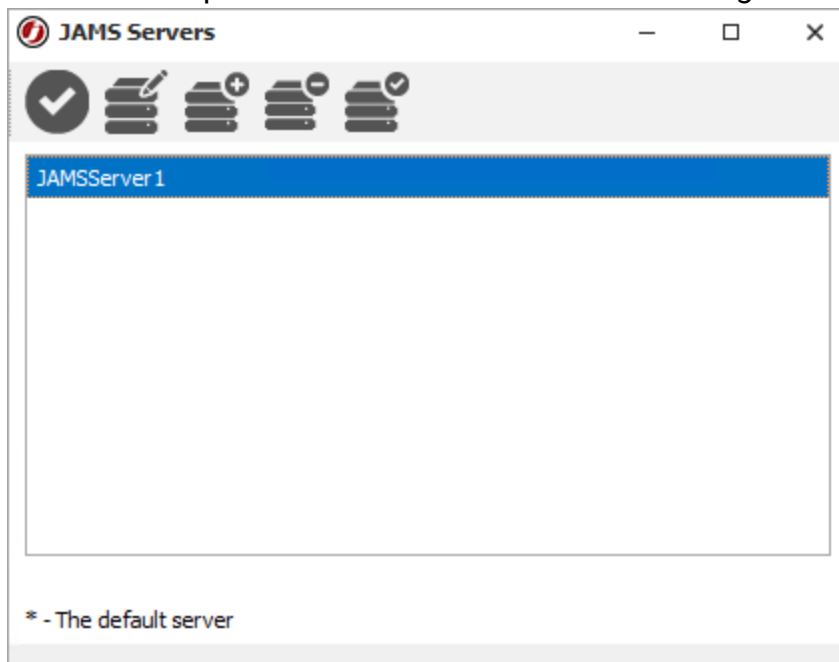
3. In the Server Name property, enter the name of the server as it will appear in JAMS.
4. Enter the Node Name as the actual Windows Server name of the JAMS Server.
5. If required, modify the Port property.
6. Set whether JAMS should Prompt for Authorization when connecting to the Server.

7. Enter a Username and Password to connect to the JAMS Server.

8. Click **Ok**.

Modifying the Server Properties

1. Click the **Settings** icon in the top right corner and select **Servers**.
2. Select the specific server from the list.
3. Click **Edit**.
4. Modify the properties as shown in the screen above.
5. Click **OK**.

Removing a Server

1. Click the **Settings** icon in the top right corner and select **Servers**.
2. Select the server from the list.
3. Click **Delete**.
4. Confirm the settings and click **OK**.

Setting a Default Server

1. Click the **Settings** icon in the top right corner and select **Servers**.
2. Select the specific server from the list.
3. Click **Set Default**.

Connections in JAMS

JAMS Connections are objects stored inside the Connection Store. You can use the Connection Store to create Database Connections, File Transfer Connections, Integration Connections, and Mailbox Connections. These Connections can be reused in multiple Jobs, making it easier to maintain the connection information in one place. You can also use Connections with Job Properties, Job Source, or Job Triggers.

Accessing the JAMS Connection Store

You can access the Connection Store by doing one of the following:

- From the **Shortcuts** menu, click **Connection Store**.
- From the **Common Activities** pane, click **Create a Connection**.

Connection Store screen

The Connection Store screen lets you view all existing Connections, create new Connections, and modify existing Connections. Each Connection displays the following:

- Connection Name – The name of Connection.
- Description – An optional description of the Connection to provide more information.
- Connection Type – The type of Connection that was defined, such as SQL, SFTP, or EWS.

You can add additional columns by using the Column Chooser. Right-click a column heading, and select **Column Chooser**.

Viewing all Connections

1. Click **Connection Store** from the Shortcuts menu.
2. Click a column heading to sort the column.

Adding a Connection

You can add a various Connections in JAMS. See the links below for instructions on each type.

- [*Connections to Database Servers* on page 6](#)
- [*Connections to File Transfer Servers* on page 12](#)
- [*Connections for Integrations* on page 15](#)
- [*Connections to Mail Servers* on page 22](#)

Modifying a Connection

1. Click **Connection Store** from the Shortcuts menu.
2. Right-click a Connection, and select **Properties**.
3. Modify the properties for the Connection as needed. The available properties vary based on the type of Connection.
4. Click **Save and Close**.

Deleting a Connection

You can delete a Connection if it is no longer used. Before deleting a Connection, ensure all Jobs that currently use it have been updated to remove references to it. To view where it is referenced, double-click the Connection and select the References tab.

1. Click **Connection Store** from the Shortcuts menu.
2. Right-click a Connection, and select **Delete**.

Inheriting a Connection from an Execution Method to a Job

A Connection can also be defined on the Execution Method level to populate the Connection property of any Job that would use that Execution Method. It is recommended that you create a custom Execution Method if you are going to modify the Connection property.

Adding a Connection Property to a Custom Execution Method

1. Click **Execution Methods** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the custom Execution Method.
4. In the Base Method field, select an Execution Method to use as a template.
5. Click **Ok**.
6. Click the **Job Properties** tab.

7. Click the **Add** icon.

8. Select a Connection property, such as SQL Connection, Banner Connection, Oracle Connection, File Transfer Connection, or SAP Connection.

9. Click **Ok**.

10. Click **Save and Close**.

11. Create a Job based on this new Execution Method.

Overriding the Connection Property from an Execution Method

The Connection property can also be added or overridden at the Folder or Job levels. Any property set at the Folder level will override the property on the Execution Method level and will inherit to every Job Definition within the Folder. Jobs that do not use this property will ignore it.

The property can be set or overridden on any individual Job within JAMS from the Job Properties tab.

Connections to Database Servers

The Connection Store lets you create Connections to Oracle and SQL Servers. This connection information is saved in one place and can be referenced in one or more Jobs.

Adding a Connection to an Oracle Database Server

This option is available only if the Oracle Integration has been installed. See ***Configuring The OracleStoredProc Execution Method* on page 1** for more information.

Ensure you have created a Credential within JAMS that contains the credentials for connecting to the Oracle database.

> **NOTE:** If you're making a high volume of connections to your Oracle database, we advise consulting your DBA to ensure your Oracle Connection Pool settings are optimal for your usage.

1. Click **Connection Store** from the Shortcuts menu.

2. Click **+**.

3. In the Name field, enter the name, such as OraDatabase.

4. In the Description field, enter a description.

5. In the Type of Connection field, select **Oracle**.

6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Prepare your Oracle Connection String to the Oracle Database. Within the following string, replace the following:

   HOST with the Oracle database host name.

   SID with the Oracle database service name.

   (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = <HOST>)(PORT = 1521)) (CONNECT_DATA = (SERVICE_NAME = <SID>)));

   > **NOTE:** After updating the HOST and SID, copy the Connection String because you need this to update the Connection String field. Use tnsnames.ora as the reference to look up the required values for the Connection String.

8. Click the **Properties** tab.
9. Under Oracle, click the Connection String field. The Oracle Connection dialog is displayed.
10. In the Data Source field, paste the Connection String.

    > **NOTE:** Do not include Data Source = in the Connection String as JAMS automatically inserts it.

11. In the Credential field, select a Credential in JAMS.

12. Click **Test Connection** to verify the connection. If the connection is unsuccessful, a red X is displayed on the Test Connection button. You can hover your cursor over it to get details about the error.

13. Click **OK**.

14. Click the **Security** tab.

15. On the Security tab, review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

16. Click **Save and Close**.

Oracle Connection

The example below shows a JAMS Job that uses the OracleStoredProc Execution Method. You can define the Oracle Connection Store Definition on the Source tab of the Job Definition.
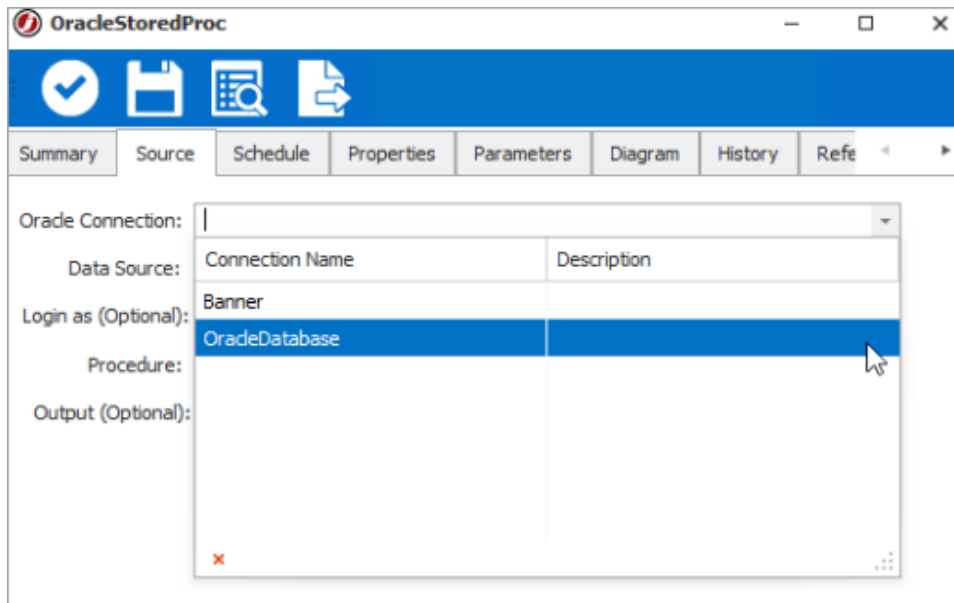
Adding a Connection to a SQL Server

Ensure you have created a Credential within JAMS that contains the credentials for connecting to the SQL Server database. The Credential can use a domain service account for use with Integration security or a SQL Server user account (username/password) for use with SQL Authentication. This can be overridden on the Job level. The Credential can also be used for the Impersonation User.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as SQLDatabase.
4. In the Description field, enter a description.
5. In the Type of Connection field, select SQL Server.
6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.
8. Click the Connection String field.
9. Select an Impersonation User to be used for testing the Connection String within the Connection String Builder, if using Integrated Security. (You can also use SQL Authentication or Azure Authentication.)
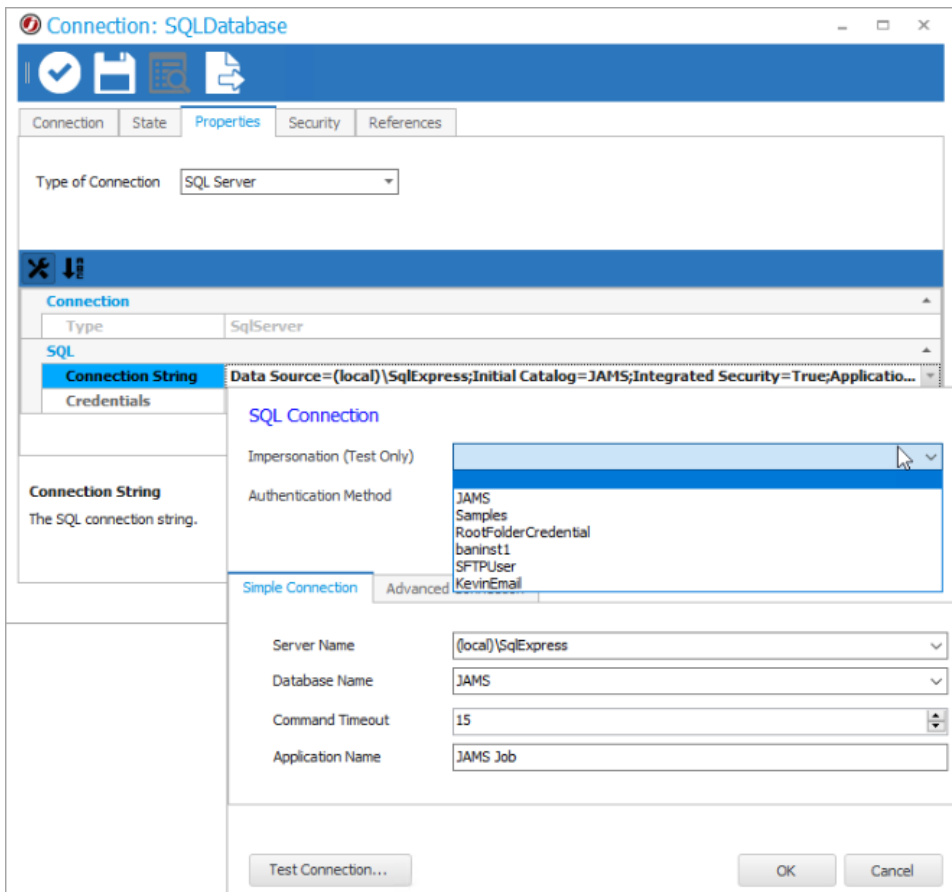
10. In the Server Name field, enter the SQLServer\Instance.

11. In the Database Name field, select the Databases on the SQL Instance.

12. Click Test Connection to verify the connection.

13. Click **OK**.

14. In the Credential field, select a Credential in JAMS.

15. Click the **Security** tab.

16. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

17. Click **Save and Close**.

SQL Connection

The example below shows a JAMS Job that uses the SSISDirect Execution Method within JAMS. You can define the SQL Connection in the Stored Connection field under the Source tab of the Job Definition.
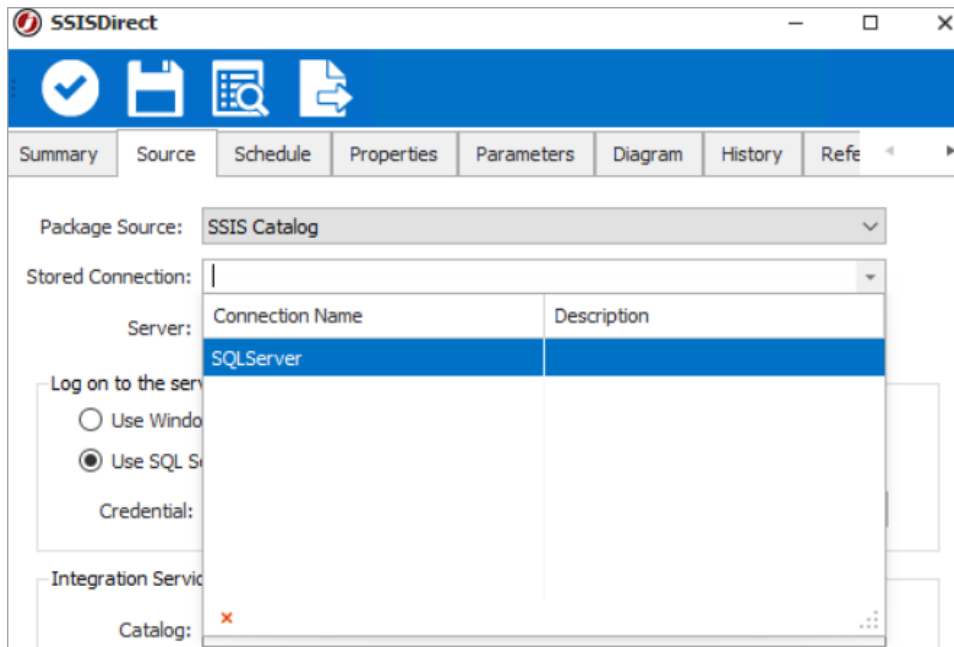
Connections to File Transfer Servers

The JAMS Connection Store lets you configure connection information for transferring files. This connection information is saved in one place and can be referenced in one or more Jobs. You can create Connections to FTP/FTPS/SFTP/SCP servers or an Amazon S3 Bucket.

These Connections can be referenced and applied in File Transfer Jobs or Sequence File Transfer tasks. See the Applying the File Transfer Connection section below.

Adding a Connection to an Amazon S3 Bucket

Before adding an S3 Connection, create a Credential in JAMS. The Credential should store the Access key ID as the Logon As username and the Secret Access key is the password.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the connection.
4. In the Type of Connection field, select AmazonS3.
5. Click **Ok**.
6. Click the **Properties** tab.
7. In the Credentials field, select the Credential that stores the Access key ID and Secret Access key.

8. In the AWS S3 Bucket name field, enter the name of the S3 Bucket.

9. In the AWS S3 Region field, enter the region for the S3 Bucket.

10. In The Address field, enter the AWS address.

11. Optional – In the Folder Name field, specify the Folder within the S3 Bucket that will be used.

12. Set SSL and File Transfer sections as needed.

13. Click **Save and Close**.

Applying an S3 Connection

You can use this Connection within the File Transfer Tasks in a Sequence Job. See Sequence Tasks for more information.

Adding a Connection to an FTP or FTPS Server

Before adding a Connection, ensure a Credential has been configured within JAMS that contains the information for connecting to the FTP Server. You will need the FTP username and password or the client certificate for FTPS.

By default, the SSL Mode for an FTP Connection is set to None. To use FTPS, set the SSL Mode property to a value other than None and configure the Port and File Transfer properties that are described below.

1. Click **Connection Store** from the Shortcuts menu.

2. Click **+**.

3. In the Name field, enter the name, such as FTP Connection.

4. In the Description field, enter a description.

5. In the Type of Connection field, select FTP.

6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.

8. In the Credentials field, select the FTP user from the drop-down.

9. In the Address field, enter the IP address/host name of the FTP(S) Server.

10. In the Port field, enter the port number for the FTP Server. Port 21 is the default. For FTPS, enter 21.

11. For FTPS, complete the following:
    1. In the SSL Mode field, enter either Implicit or Explicit.
    2. In the SSL Versions field, enter the appropriate value(s).
    3. In the Secure Transfer field, ensure the box is checked.
12. Click the **Security** tab.
13. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

14. Click **Save and Close**.

Adding a Connection to an SCP Server

Before adding an SCP Connection, ensure a credential has been configured within JAMS that contains the information for connecting to the SCP Server. You will need the SCP username and password or an SCP username and private key.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as SCP Connection.
4. In the Description field, enter a description.
5. In the Type of Connection field, select **SCP**.
6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.
8. In the Credentials field, select the SCP user from the drop-down.
9. In the Address field, enter the IP address/host name of the SCP Server.
10. In the Port field, enter the port number for the SCP Server. Port 22 is the default.
11. Click the **Security** tab.
12. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

13. Click **Save and Close**

Adding a Connection to an SFTP Server

Before adding an STFP Connection, ensure a credential has been configured within JAMS that contains the information for connecting to the SFTP Server. You will need the SFTP username and password or an SFTP username and private key.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as SFTP Connection.
4. In the Description field, enter a description.
5. In the Type of Connection field, select SFTP.
6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.
8. In the Credentials field, select the SFTP user from the drop-down.
9. In the Address field, enter the IP address/host name of the SFTP Server.
10. In the Port field, enter the port number for the SFTP Server. Port 22 is the default.
11. Click the **Security** tab.
12. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

13. Click **Save and Close**.

Applying a File Transfer Connection

You can define the File Transfer Connection in the File Transfer Connection field. See File Transfer Features for more information.

Connections for Integrations

The JAMS Connection Store lets you save connection information for certain integrations. You can then specify the Connection in the Job.

Adding an Oracle Connection for Banner

This option is available only if the Oracle Integration has been installed. See for more information.

Ensure you have created a Credential within JAMS that contains the credentials for connecting to the Oracle database.

> **NOTE:** If you're making a high volume of connections to your Oracle database, we advise consulting your DBA to ensure your Oracle Connection Pool settings are optimal for your usage.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as OraDatabase.
4. In the Description field, enter a description.
5. In the Type of Connection field, select **Oracle**.
6. Click **Ok**.

   > **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Prepare your Oracle Connection String to the Oracle Database. Within the following string, replace the following:

   HOST with the Banner\Oracle database host name.

   SID with the Banner\Oracle database service name.

   (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = <HOST>)(PORT = 1521)) (CONNECT_DATA = (SERVICE_NAME = <SID>)));

   > **NOTE:** After updating the HOST and SID, copy the Connection String because you need this to update the Connection String field. Use tnsnames.ora as the reference to look up the required values for the Connection String.

8. Click the **Properties** tab.
9. Under Oracle, click the Connection String field. The Oracle Connection dialog is displayed.
10. In the Data Source field, paste the Connection String.

    > **NOTE:** Do not include Data Source = in the Connection String as JAMS automatically inserts it.

11. In the Credential field, select a Credential in JAMS.

12. Click **Test Connection** to verify the connection. If the connection is unsuccessful, a red X is displayed on the Test Connection button. You can hover your cursor over it to get details about the error.

13. Click **OK**.

14. Click the **Security** tab.

15. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

16. Click **Save and Close**.

Banner Connection

You can define the Banner Connection in the Banner Connection field. See ***Banner in JAMS on page 358*** for more information.

Adding an SAP Connection

Creating a Connection for SAP lets you configure the details once and reuse the connection within multiple Jobs and Sequence Tasks. Two connection options are available for SAP.

> **NOTE:** The SAP Integration Pack must be installed from the JAMS Installer before you can set up the SAP Group/Server or SAP Custom Application Server connections below.

SAP (Group/Server Selection)

Select the SAP (Group/Server Selection) option if your site has two or more servers and you are using load balancing.

Before adding an SAP Connection, ensure a credential has been configured within JAMS that contains the information SAP username and password for connecting to the SAP Server.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the connection.
4. In the Description field, enter a description for the connection.
5. In the Type of Connection field, select **SAP (Group/Server Selection)**.
6. Click **OK**.
7. Click the **Properties** tab.
8. On the Properties tab, do the following:
   1. In the Credentials field, enter the SAP credential that was created in JAMS.
   2. In the Client ID field, enter the three-character ID. The values can be between 000 and 999.
   3. In the Group/Server field, enter the appropriate server.
   4. In the Instance Number field, enter the two-character ID. The values can be between 00 and 99.
   5. In the Logon Language field, enter the two-letter language code to be used for connecting to SAP.
   6. In the Message Server field, enter the appropriate server.
   7. In the Message Server Service field, enter the appropriate server service.
   8. In the SAP XBP Version field, enter the version of XBP that SAP is using. By default, version 3.0 is used. Setting this field allows JAMS to connect to older versions of SAP that use version 2.0.
   9. In the SAProuter String field, enter the SAP router string.
   10. In the System ID field, enter the three-character SAP system ID that was defined during SAP installation.
   11. In the XMI Audit Level, field enter the number for the Audit Level. This determines the level of detail logged in SAP.

9. Click the **Security** tab.

10. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

11. Click **Save and Close**.

SAP (Custom Application Server)

Select the SAP (Custom Application Server) option if the connection to your SAP system will be done trhough the Gateway Server. Before adding an SAP Connection, ensure a credential has been configured within JAMS that contains the username and password for connecting to the SAP Server.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the connection.
4. In the Description field, enter a description for the connection.

5. In the Type of Connection field, select **SAP (Custom Application Server)**.
6. Click **OK**.
7. Click the **Properties** tab.
8. On the Properties tab, do the following:

    1. In the Credentials field, enter the SAP credential that was created in JAMS.
    2. In the Application Server field, enter the name of the SAP server that will be used for the connection.
    3. In the Client ID field, enter the three-character ID. The values can be between 000 and 999.
    4. In the Instance Number field, enter the two-character ID. The values can be between 00 and 99.
    5. In the Logon Language field, enter the two-letter language code to be used for connecting to SAP.
    6. In the SAP XBP Version field, enter the version of XBP that SAP is using. By default, version 3.0 is used. Setting this field allows JAMS to connect to older versions of SAP that use version 2.0.
    7. In the SAProuter String field, enter the SAP router string.
    8. In the System ID field, enter the three-character SAP system ID that was defined during SAP installation.
    9. In the XMI Audit Level, field enter the number for the Audit Level. This determines the level of detail logged in SAP.

9. Click the **Security** tab.

10. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

11. Click **Save and Close**.

SAP Connection

You can define the SAP Connection in the SAP Connection field. See *Using SAP Execution Methods to Run JAMS Jobs* on page 373 for more information.

Connections to Mail Servers

You can create Connections to mail servers that can be used with Email Triggers on Jobs. This connection information is saved in one place and can be referenced in one or more Jobs.

Adding a Connection for Graph API

Before adding a Graph API Connection, ensure a credential has been configured within JAMS that contains the Client ID and Client Secret Value, which can be accessed in the Microsoft Azure Portal. You also need to register your application in the Azure Portal so it can access the Microsoft Graph API.

After registering the application in the Azure portal, you must grant it the appropriate Microsoft Graph API permissions. In JAMS, Graph API uses the Open Authorization (OAuth) client credentials flow to authenticate in Microsoft Identity. To send emails, ensure the Mail.Read and Mail.Send permissions have been added in the Microsoft Graph API permissions.

You also need a Credential to specify which mailbox to access.

> **NOTE:** Only the JAMS Desktop Client should be used to configure or modify the Graph API Connection Store item.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as GraphAPIConnection.
4. In the Description field, enter a description.
5. In the Type of Connection field, select **Graph API**.
6. Click **Ok**.
7. Click the **Properties** tab.
8. In the Address field, enter the address of the server (graph.microsoft.com).
9. In the Port field, enter the incoming port number for the server (443).
10. In the OAuth Client Credentials field, select the Credential previously saved within the JAMS Credential Shortcut. This should contain the Client Id and Client Secret Value that are found within the Azure Portal.
11. In the Tenant Id field, enter the Azure tenant ID.
12. In the Mail Credentials field, select the Credential previously saved within the JAMS Credential Shortcut. This should contain the email address. This will also specify what mailbox to access.

13. Click the **Security** tab.

14. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

15. Click **Save and Close**.

Adding a Connection for SMTP

You can create a connection for SMTP to send and receive email messages with JAMS. You need to create a Credential to save the SMTP username and password for authentication.

> **NOTE:** Only the JAMS Desktop Client should be used to configure or modify the SMTP Connection Store item.

1. Click **Connection Store** from the Shortcuts menu.

2. Click **+**.

3. In the Name field, enter the name, such as SMTPConnection.

4. In the Description field, enter a description.

5. In the Type of Connection field, select **SMTP**.

6. Click **Ok**.

7. Click the **Properties** tab.

8. In the Address field, enter the address of the SMTP server.

9. In the Port field, enter the incoming port number for the SMTP server (25).

10. In the Mail Credentials field, select the Credential previously saved within the JAMS Credential Shortcut.

11. In the SSL Heading field, select any SSL Setting for the SMTP server, if needed.

12. Optional - In the FIPS-Only Security field, select or clear the checkbox to use only FIPS-140-2 certified security algorithms.

13. In the SMTP Retry Count field, enter the retry count used to resend SMTP emails if an attempt to send one is unsuccessful.

14. In the SMTP Retry Delay field, enter the retry delta time to wait to resend SMTP emails if an attempt to send one is unsuccessful.

15. Click the **Security** tab.

16. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

17. Click **Save and Close**.

Adding a Connection for EWS

You can create an EWS Connection to be used in Workflow Jobs, PowerShell cmdlets, or Mail Watch Jobs. Before adding an EWS Connection, ensure a credential has been configured within JAMS that contains the Client ID and Client Secret Value, which can be accessed in the Microsoft Azure Portal. This is required for Microsoft Office 365 Modern Authentication. You also need to register JAMS as an application in the Azure Portal.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter the name, such as EWSConnection.
4. In the Description field, enter a description.
5. In the Type of Connection field, select **EWS**.
6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.
8. In the Address field, enter the address of the EWS server (outlook.office365.com).
9. In the Port field, enter the incoming port number for the EWS server.
10. In the Client Credential, select the Credential previously saved within the JAMS Credential Shortcut. This should contain the Client Id and Client Secret Value that are found within the Azure Portal.
11. In the Tenant Id field, enter your tenant ID that is found within the Azure Portal.
12. In the Mail Credentials field, select the Credential previously saved within the JAMS Credential Shortcut. This should contain the email address. This will also specify what mailbox to access.
13. Optional - In the Mail Check Interval field, specify a value for Mail Watch Jobs.

14. In the SSL Heading field, select any SSL Setting for the EWS server, if needed.

15. Click the **Security** tab.

16. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

17. Click **Save and Close**.

Adding a Connection for an IMAP Server

You can create an IMAP connection for monitoring a mailbox for email Triggers. Before adding an IMAP Connection, ensure a Credential has been configured within JAMS that contains the email address and password for the mailbox.

1. Click **Connection Store** from the Shortcuts menu.

2. Click **+**.

3. In the Name field, enter the name, such as IMAP Connection.

4. In the Description field, enter a description.

5. In the Type of Connection field, select IMAP.

6. Click **Ok**.

> **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

7. Click the **Properties** tab.

8. In the Address field, enter the address of the IMAP Server.

9. In the Port field, enter the incoming port number for the IMAP Server (993).

10. In the Mail Credentials field, select the Mail Credentials previously saved within the JAMS Credential Shortcut.

11. In the SSL Heading field, select any SSL Setting for the IMAP Server, if needed.

12. Click the **Security** tab.

13. Review the permissions for this Connection.

> **NOTE:** Ensure the Submit permission is selected for user accounts that will use this Connection.

14. Click **Save and Close**.

Adding a Connection for POP3 Connection

You can create a POP3 Connection for monitoring a mailbox for email Triggers. Before adding a POP3 Connection, ensure a Credential has been configured within JAMS that contains the email address and password for the mailbox.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the connection.
4. In the Type of Connection field, select **POP3**.
5. Click **Ok**.
6. Click the **Properties** tab.
7. In the Address field, enter the address of the POP3 server.
8. In the Port field, enter **995**.
9. In the SSL Mode field, enter **Implicit**.

10. In the Mail Credentials field, select the select the Mail Credentials previously saved within the JAMS Credential Shortcut.

11. Click **Save and Close**.

Mail Trigger Connection

The example below shows a JAMS Job that uses a Mail Trigger within JAMS. You can define the Mail Trigger Connection in the Mail Server field. See ***Triggers on page 137*** for more information.
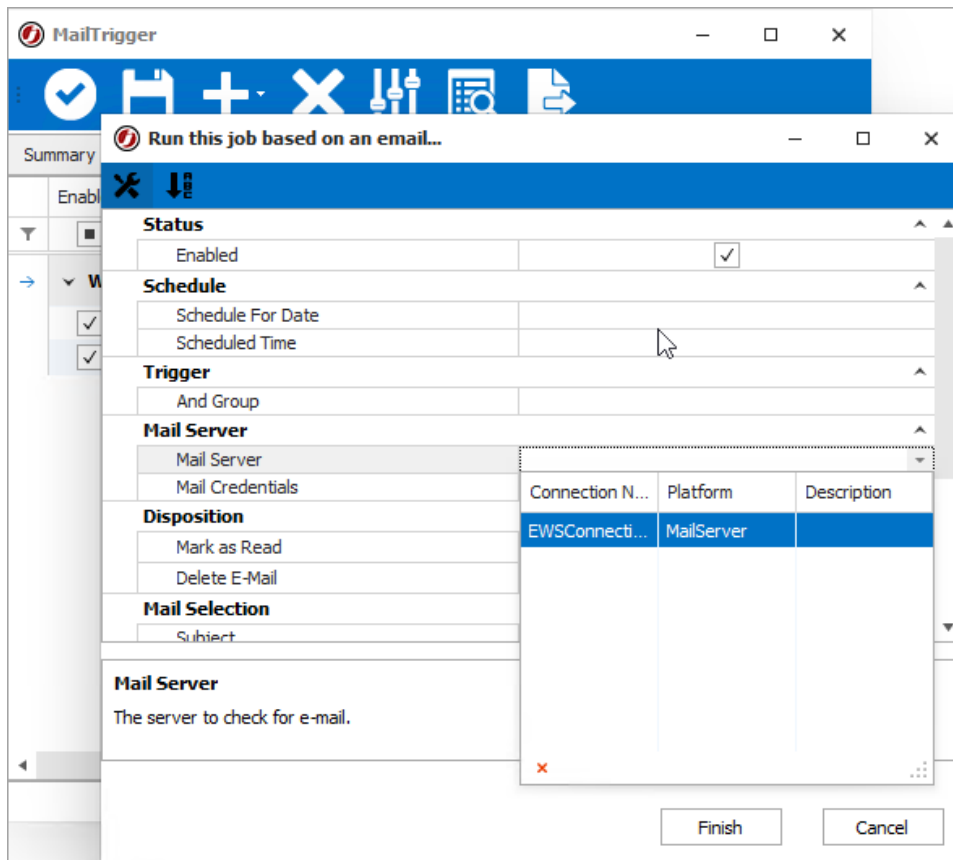
Working with Jobs

Every component in JAMS supports or controls how a Job is defined or run. A JAMS Job includes a number of Properties that modify how and when it should run, as well as actions that should be taken when the Job finishes. A JAMS Job may be configured to ensure that it executes at the right time and under the proper conditions.

Definitions Screen

You can create, modify, or delete Jobs from the Definitions screen. The Definitions screen displays the Folder Navigator, Job Definitions, and Variable Definitions options. For each Job, you can view the following information by default:

- Job Name – The name to identify the Job.

- Description – The optional description to provide more information about the Job.

- Last Change – The date and time the Job was last changed based on the local Scheduler time.

- Last Change UTC - The date and time the Job was last changed based on UTC time.

- Last Changed By – The user account that made the last change to the Job.
- Folder Name – The Folder where the Job is saved.
- Method Name – The type of Execution Method that was selected for the Job.

You can add additional columns by using the Column Chooser. Right-click a column heading, and select **Column Chooser**.

Adding a Job

1. Click **Definitions** from the Shortcut menu.
2. Click the **Job Definitions** tab.
3. Click **Add**.
4. In the Folder field, select the Folder where the Job will be saved.
5. In the Name field, enter a name for the new Job.
6. If desired, give the Job a description.
7. In the Execution Method field, select an Execution Method for the Job from the drop-down list.

8. Click **Ok**.
9. Define the Job Source, Schedule, Properties, Parameters, Documentation, and Security as desired.
10. When the Job has been configured as desired, click **Save and Close**.

Modifying a Job

1. Click **Definitions** from the Shortcut menu.
2. Click the **Job Definitions** tab.
3. Open the properties by doing one of the following:
   - Double-click the Job.
   - Select the Job and then click the **Properties** button in the Control Bar.
   - Right-click the Job and select **Properties**.
4. Modify the Job, Source, Schedule, Properties, Parameters, Documentation, and Security as desired.
5. When the Job has been reconfigured as desired, click **Save and Close**.

Modifying the Properties on Multiple Jobs

You can modify the Agent, Batch Queue, Execute As, and Enabled properties for multiple Jobs at one time. Ensure the Jobs that you want to update are in the same Folder. If you do not have the permission to change Jobs, an error message is displayed.

As you make changes, the dialog displays each change and the number of Jobs that will be updated. Each field has a Reset to Defaults option to set the property to the property value defined in the parent Folder. This allows Jobs to inherit the property from the Folder.

1. Click **Definitions** from the Shortcut menu.
2. Click the **Job Definitions** tab.
3. Select the Jobs you want to modify.
4. Right-click the Jobs and select **Edit Selected**.
5. In the Enabled field, select **Yes, enable** or **No, disable**.
6. In the Agent field, select an Agent.
7. In the Batch Queue field, select a Batch Queue.
8. In the Execute As field, select a JAMS Credential that will be used to run the Jobs.
9. Click **SAVE AND EXIT**.

Deleting a Job

1. Click **Definitions** from the Shortcut menu.
2. Click the **Job Definitions** tab.

3. Do one of the following:

   - Select the Job and then click the **Delete** button in the Control Bar.
   - Right-click the Job and select **Delete**.

4. A dialog is displayed to confirm the deletion. Click **Yes**, **No**, or **Cancel**.

Job Definition Tabs

Summary

This tab includes basic Job information:

- **Job Name** - This property displays the identifier for a JAMS Job and is similar to the filename for a command file. Please note the Job name must be unique to the Folder where it is saved.
- **Description** - This optional property appears in menus, lists, and reports and provides a more detailed explanation for the current Job.
- **Last Changed** - The Last Changed property displays the user (Credential) who last modified this Job along with the date and time of the modification.

Source

You can view or edit the source for the current Job. The Execution Method defines the type of interface that is displayed in this tab.

The Source of a Job in JAMS can be a source code editor containing any number of code languages, a fill-in-the-blank style form, a Sequence editor, or a Workflow editor.

The source for many Execution Methods will be a source code editor that supports syntax highlighting and code coloring to enhance the readability of scripts.

Variable and Parameter references may be embedded in the Job's command file. This variable data can come from the Job's Parameters, JAMS Variables, or JAMS Predefined Symbols.

> **NOTE:** The Source tab has an option to let you edit source code in the PowerShell ISE. If you make edits and close the PowerShell ISE, you need to save the Job, close it, and open it again to make additional edits to the source.
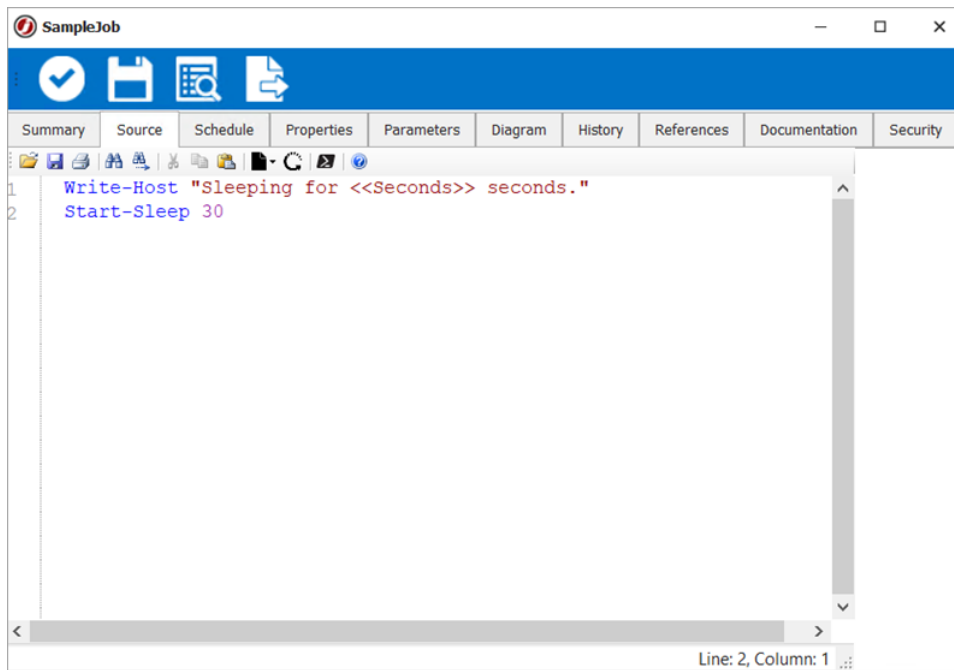
Keyboard shortcut commands for the Job Source Editor are shown in the table below. Use the header to expand the content.

Source Code Editor Keyboard Shortcuts

Clipboard	Shortcut
Copy	CTRL+C, CTRL+INSERT
Paste	CTRL+V, SHIFT+INSERT
Cut	CTRL+X, SHIFT+DEL
Select All	CTRL+A
File Operations	**Shortcut**
Save As	CTRL+S
Open	CTRL+O
Printing	**Shortcut**
Print	CTRL+P
Positioning	**Shortcut**
Go to line	CTRL+G
Go to start	CTRL+Home
Go to end	CTRL+End

Search and Replace	Shortcut
Find	CTRL+F
Find Next	F3
Find Selected	CTRL+F3
Replace	CTRL+H
Undo and Redo	**Shortcut**
Undo	CTRL+Z
Redo	CTRL+Y
Bookmarks	**Shortcut**
Toggle unnamed bookmarks	CTRL+F2, CTRL+K->CTRL+K
Go to next bookmark	F2, CTRL+K->CTRL+N
Go to previous bookmark	F3, CTRL+K->CTRL+P
Toggle named bookmark	CTRL+[index of bookmark]
Go to named bookmark	CTRL+SHIFT+[index of bookmark]
Tabs	**Shortcut**
Add leading tab	Tab with multiple line selection
Remove leading tab	SHIFT+Tab
Outlining	**Shortcut**
Switch on outlining and collapse all	CTRL+M->CTRL+O
Switch off outlining	CTRL+M->CTRL+P
Toggle outlining	CTRL+M->CTRL+M
White Space	**Shortcut**
Show white space	CTRL+SHIFT+W

NOTE: The Source Editor text colors can be customized using a configuration file described in the following article: How to Customize the Source Editor.

Schedule

You can set several types of Schedule Items on a Job. The Schedule tab has a natural language format to let you specify the options below. The **+** button lets you configure each option. See *Schedules* **on page 135** for more information.

Option	Schedule Menu
Triggers	Run this job
Dependencies	This Job depends on a
Job Status	Set this Job's status to
Events and Notifications	When an event occurs
Reports	Send a report

Properties

A list of Properties are available below. These properties are available on any JAMS Job. Additional Properties may be available depending on a Job's Execution Method.

Until a value is set for a property, it will not display in the Properties tab. To display a property, use the **Add** button in the Properties Tab, select the desired Property, then click **OK** in the Add Property dialog.

Status	Description
Enabled	Select or clear the checkbox to enable or disable the property.
Schedule	**Description**
Agent	This property specifies the Agent where the Job will execute when the Job is submitted.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled.
Calendar	This property specifies the Calendar to use for scheduling. When a Calendar is listed, the Job will have access to the Date Types, such as holidays, in the Calendar.
Retry Count	This property specifies the maximum number of retry attempts if the Job fails.
Retry Interval	This property specifies the time interval, in Delta Time, between automatic retry attempts.
Scheduling Priority	This property specifies the priority the Scheduler uses in determining when to start executing Jobs that are waiting on prerequisites. The first number indicates the inherited value from the parent object. (The default is 0.)

Schedule	Description
SLA Time	This property specifies the time of day a Job must complete by to meet a Service Level Agreement.
Submit on Hold	Select or clear this checkbox to submits the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Suppress Menu Display	This property defines if this Job should be omitted from Submit Menus. Clear the checkbox to display this Job on Submit Menus.

Execute	Description
Execute As	This property specifies the set of Credentials the Job will execute as when it is submitted. This property is required for the Job to run properly.
Home Directory	This property specifies the full path to the initial current directory for the Job.
Debug	This property specifies if a Job will run in Debug Mode. When a Job runs in Debug Mode, it will not satisfy Dependencies or Triggers.
JDE Credential	This property specifies the Credentials provided for JD Edwards Jobs within the Job or Folder. If this is not a JD Edwards Job, these credentials are not required.
Add-In Credential	This property specifies the Credentials for third party add-ins, such as Banner, Oracle, or Peoplesoft.
Alternate Credential	This property specifies the alternate Credentials for a Job.
Crystal Reports Credential	This property specifies the Credentials that are used for Crystal Reports.
Force 32 bit	When set to true, this Job will run as a 32 bit process, even on 64 bit machines. This option was included for backwards compatibility following V6 to V7 migrations and it should not be adjusted on a V7 Execution Method.

Execute	Description
Force V2	When set to true, this Job will run using V2.0 of the .NET Framework. This option was included for backwards compatibility following V6 to V7 migrations and it should not be adjusted on a V7 Execution Method. For more information, see Resolving Mixed Mode Assembly error message in PowerShell.
Host As	This property specifies the Host As Credentials for some Execution Methods that start a host process. The Credentials connect to the Agent server using the Execute As Credentials.
Informatica Credential	This property specifies the Informatica User to run the Job.
Informatica Polling Interval	This property specifies the time interval, in Delta Time, between the automatic retry attempts for the Informatica Cloud Activity Log Status update REST call.
Informatica Retry Count	This property specifies the maximum number of automatic retry attempts for the Informatica Clous REST calls.
Informatica Retry Interval	This property specifies the time interval, in Delta Time, between automatic retry attempts for Informatica Cloud REST calls.
Netezza Credential	This property specifies the Credential to use to login in to Netezza.
No BOM	Select or clear the checkbox to enable or disable the Job's source file from having a Unicode byte order mark.
OS Prompt Pattern	This property specifies the regular expression that will match the operating system command when using the SSHPrompt Execution Method. This property sets the format of the prompt that JAMS is looking for, so it can recognize it and send the commands.
Oracle DB Credential	This property specifies the Credential for connecting to an Oracle database.
Oracle EBS Credential	This property specifies the Credential to use when running an Oracle EBS Job.

Execute	Description
People Soft Credential	This property specifies the Credential to use when connecting to PeopleSoft.
Run Priority	This property specifies the execution priority for the Job. The priority is the sum of the Job's priority and any priority value on the parent Folder.
SQL Agent Credential	This property specifies the Credential for running SQL Agent Jobs.
SQL Stored Procedure Credential	This property specifies the Credential for running SQL Stored Procedure Jobs.
SSIS Credential	This property specifies the Credential for running SSIS Jobs.
SSRS Credentials	This property specifies the Credentials that are passed to the SSRS server when the Job is executing.
Search Path	This property specifies a comma-separated list of paths that are searched when trying to resolve references.
Z/OS Ftp Retry Interval	This property specifies the FTP retry interval between 500 and 5000 milliseconds.
Z/OS Max Ftp Retry	This property specifies the maximum number of retries between 1 and 100 for FTP exceptions while connected.
Z/OS Max Status Retry	This property specifies the maximum number of retries between 1 and 1000 to wait for the z/OS status response.
Z/OS Status Retry Interval	This property specifies the z/OS retry interval between 500 and 60000 milliseconds.
Job Concurrent Limit	This property specifies the maximum number of instances of this Job that may execute concurrently.
Single Instance Action	Select an option to define the action to be taken if a Job retries to start while an instance of that Job is currently running. Options include Allow Multiple, Cancel Executing, Cancel Pending, and Wait.

Execute	Description
Host Key Checking	This property specifies the action JAMS should take if the SSH fingerprint does not match when connecting to an SSH server. You can enter the following options: • AcceptHostKey - Accepts the host key and adds the fingerprint to the cache of acceptable fingerprints. (NOT secure. Only use if you are sure of the identity of the server.) • CheckParameter - Checks for a boolean parameter named AcceptHostKey and accepts the key if the parameter value is true. • FailFirstJob - Fails the first Job and adds the fingerprint to the cache of acceptable fingerprints. (Default setting).
Accept Host Key	Select or clear the checkbox to accept or deny the Host Key.

Completion	Description
Notify E-Mail	Select the email addresses that are combined with the addresses in any email notification event.
Bad Regex Pattern	This property specifies a regular expression pattern that indicates a failed execution.
Compare Condition	Select the type of comparison that will be performed.
Compare Value	This property sets the value that will be used in the comparison.
Completion Bearing	This property specifies the acceptable Completion Severity for a Job.
Exit Code Handling	Select the method for how JAMS should evaluate a Job's exit code. Available options include ZeroIsGood, OneIsGood, PositiveIsGood, OddIsGood, EvenIsGood, SpecificGood, and SpecificBad.
Good Regex Pattern	This property specifies a regular expression pattern that indicates a successful execution for this Job.
Minimum Severity	Select the minimum acceptable completion severity. Available options include Success, Info, Warning, Error, and Fatal.

Completion	Description
Notify User	Select or clear the checkbox or enable or disable including the user that submitted the Job when sending notifications.
Report Location	This property specifies the location for OpenVMS reports.
Retain Option	This property specifies how the Job will be displayed in the Monitor after it completes. If set to Always, completed Jobs will never leave the Monitor.
Retain Time	Select the method for displaying the Job in the Monitor when it completes. Available options include Default, Timed, Error, and Always. When the Retain Option is set to Timed, this property is used to specify (in minutes) the amount of time to display the completed Job in the Monitor.
Specific Informational	This property specifies a comma-separated list of integer values for Informational Job completion exit codes.
Specific Values	This property specifies a comma-separated list of integers for the Job completion exit codes.
Specific Warning	This property specifies a comma-separated list of integers for Warning Job completion exit codes.

Log	Description
Log Location	This property specifies the default location for a log file.
Include MS Dynamics Log	Select the checkbox to include MS Dynamics Job Logs. Clear the checkbox to exclude the MS Dynamics Job Logs.
Keep Logs	Select the checkbox to keep the batch log files when the Job completes on OpenVMS. Clear the checkbox to exclude the log files.
Timestamp Logs	Select the checkbox to add a timestamp to batch log files with the extension format "yyyyMMdd_ HHmmssfff.log". Clear the checkbox to not add the timestamp.

MicroFocus	Description
MicroFocus Server	This property specifies the name of the MicroFocus Server.

MicroFocus	Description
MicroFocus Fin Port	This property specifies the port for the MicroFocus bin.
MicroFocus Submit Type	This property specifies the submit type for MicroFocus. The available options are JES2, JES3, or VSE.

Source	Description
Template Library	This property specifies the full file specification that contains the JAMS templates that are used when parsing the Job.

Encoding	Description
Input Encoding	This property specifies the input encoding for the Job. You can enter character types, such as UTF-8 or ASCII.
Output Encoding	This property specifies the output encoding for the Job. You can enter character types, such as UTF-8 or ASCII.

Notify	Description
Halted Level	This property specifies the level that can be used by event handlers to classify events.
Halted Message	This property specifies the notification message when a Sequence is halted.
Halted Notify Event Class	Select the event class that this event will generate when it occurs. Available options include None, Normal, Low, Moderate, High, Urgent, and Critical.
Notify User	This property specifies a comma-separated list of usernames in Active Directory. This list is merged with the list form the Folder Definition.
Print Location	This property specifies the device and directory for reports that are produced by Jobs in this Folder.
Print Queue	The property specifies the default print queue for Jobs in this Folder.

SQL	Description
SQL Connection	This property specifies the Agent Definition that points to the SQL Server.

Automate	Description
Credentials	This property specifies the Credentials that are used to access the Automate server.

Banner	Description
Banner Connection	This property specifies the Banner Connection from the Connection Store.
Banner User	This property specifies the Credential for connecting to Banner.
Printer Name	This property specifies the name of the printer to use.
Banner Job Type	This property specifies the type of Banner Job to run.
Form Name	This property specifies the name of the Banner form to use.
Submit Time	This property specifies the submit time for the Banner Job.
Include .log File	Select the checkbox to include the Banner .log file in the JAMS Job Log. Clear the checkbox to exclude the .log file.
Banner Script Name	This property specifies that name of the Banner script to run.
Include .lis File	Select the checkbox to include the Banner .log file in the JAMS Job Log. Clear the checkbox to exclude the .log file.
Log File Polling Interval	This property sets the polling time for the Banner .log and .lis files. The default is 30 seconds. It is recommended that this value be set to a value that slightly exceeds the expected run time of the Job.
MIME Type	This property specifies the type of file used to format reports/output files. Select PDF or Plain Text.
Special Print	This property specifies the field that may be used to pass information to 3rd-party applications.
PDF Font	This property specifies the type of font to use for PDF reports.
PDF Font Size	This property specifies the size of the font to use for PDF reports.

Banner	Description
Environment Type	This property specifies the type of environment for the Banner instance to either Unix or Windows. By default, this option is set to Unix. If the Oracle database instance is running on Windows rather than Unix, set this option to Windows.

File Transfer	Description
Archiver Credentials	This property specifies the Credential to use when performing a zip operation on a file.
FTP Credentials	This property specifies the Credential for the FTP Job.
File Transfer Connection	This property specifies the Connection that JAMS will use for this Job.
SFTP User	This property specifies the Credential for an SFTP Job.

SAP	Description
SAP Connection	This property specifies the Connection that is used for connecting to SAP.

Parameters

A JAMS Parameter contains a single slice of data that (unlike a Variable) remains exclusive to the associated Job or Folder.

When JAMS interactively submits a Job with Parameters, you are presented with a fill-in-the-blank form to define values for these parameters. When JAMS builds a Parameter form, the Parameters are placed in the order in which they are defined, unless the Parameters were given Sequence numbers.

If a Job uses a parsed Execution Method, you can embed Parameter names into the Job's Source using the **{ParameterName}** specification. When the Job runs, it uses the value of the Parameter in place of this specification.

A JAMS Job may contain zero or more Parameters.

Add a Parameter

1. In any Job Definition dialog, click the **Parameters** tab.
2. Click **+**.
3. Select **Add Parameter**.

4. In the dialog, define the Parameter Name, Data Type, and Default Value of the Parameter.

Add a Parameter	— □ ✕
Parameter Name	**MySampleParameter**
Data Type	**Text** ▾
Default Value	**SampleDefaultValue**
Edit After Adding	✓

Default Value

(Optional) The Default Value of the parameter

	Ok	Cancel

5. Click **Ok**.

6. Define additional Parameter Properties as desired.

Job Parameter: MySampleParameter	— □ ✕

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✕ ↓

Misc		∧ ▲
Description	Job Parameter: MySampleParameter	
Name		∧
ParamName	**MySampleParameter**	
Data Type		∧
DataType	**Text**	
Length	**0**	
User Interface		∧
Allow Entry	✓	
Help Text		
Hide	☐	
Must Fill	☐	
Prompt		
Required	☐	
Sequence	0	
Uppercase	☐	
Validation Data		
Validation Type	None	
Value		∧
Default Format		
Default Value	**SampleDefaultValue**	▾

7. Click **Save and Close**.

8. Click **Save and Close** on the Job Definition dialog.

Parameter Properties

Name	Description
ParamName	This property defines the name of the Parameter. Each Parameter name must be unique within a particular Job.

DataType	Description
DataType	Use the dropdown to specify a data type for the Parameter. • Text • Integer • Date • Time • DateTime • Float • Unknown • Boolean
Length	If the Parameter's data type is set to Text or Integer, specify the maximum length within this property.

User Interface	Description
Allow Entry	When this attribute is enabled, the user can make an entry to this Parameter when submitting the Job.
HelpText	The entered text displays when a user hovers over the Parameter entry field on manual submissions.

User Interface	Description
Hide	This attribute determines if the Parameter is displayed when this Job is submitted. If you have "Manage" access to the current Job, hold down the ALT key when submitting the Job and all hidden Parameters will be displayed.
Must Fill	When enabled, this attribute requires the user to completely fill this Parameter to its Maximum Length as set on the **Data Type** tab.
Prompt	When a Job is interactively submitted, a form is created which is used to prompt the user for the Job's Parameter values. The entered text represents the prompt to the user submitting the Job.
Required	When checked, this attribute requires users to enter a value for this Parameter.
Sequence	An integer used to sort the parameters when presented to end-users.
Uppercase	When checked, this attribute converts all entered data to uppercase.
ValidationData	The value used when attempting to validate the Parameter value.

User Interface	Description
ValidationType	This property allows you to select the type of validation JAMS can perform on the Parameter value. The validation types are: • **None**: No validation is performed. • **Directory**: this validation is used on text parameters. A button is placed next to the parameter's text box that opens a dialog allowing the user to browse the file system for a directory. • **SaveFile**: this is used on text parameters. A button is placed next to the parameter's textbox that opens a dialog allowing the user to browse for a file, which may or may not exist. • **OpenFile**: this is used on text parameters. A button is placed next to the parameter's textbox that opens a dialog allowing the user to browse the file system for a file, which must exist. • **MaskedEdit**: this validation type uses a mask to distinguish between proper and improper user input. The mask is set in the **Validation Data** property.

Value	Description
Default Format	The format string that defines how the Parameter will be formatted. Default formats vary depending on the Parameter's Data Type.

Value	Description
Default Value	The property specifies the default value for this Parameter. The default value for dates may be entered as a specific date or you can use JAMS English language date text such as Today, Last Monday, or First Monday of Month.
Variable	Optionally, you can acquire the Default Value for the Parameter using a JAMS Variable. Use the File Browser button to search for and select an existing variable.

Once the Parameter is configured in the Job definition, it can be specified in the Source tab.

Diagram

The Diagram tab lets you see the prerequisites, triggers, and downstream dependencies related to this Job. This view lets you see the end-to-end process the Job will use to complete, including any other upstream or downstream Jobs that may run.

This tab is useful for the following:

- Setting up Jobs: You can view all of the dependencies between multiple Jobs.
- Auditing Job failures: You can get a better understanding of why a dependent Job failed and the effect on other Jobs.
- Monitoring Critical Jobs: You can more easily view a critical Job if any previous Jobs have an impact on its ability to run.

See for more information.

History

The History tab contains historical Job statistics and completion data broken down using a variety of performance measures.

> **NOTE:** Using the Reset button in the History Tab will remove historical completion statistics and impact the percent completion calculations seen in the Monitor.
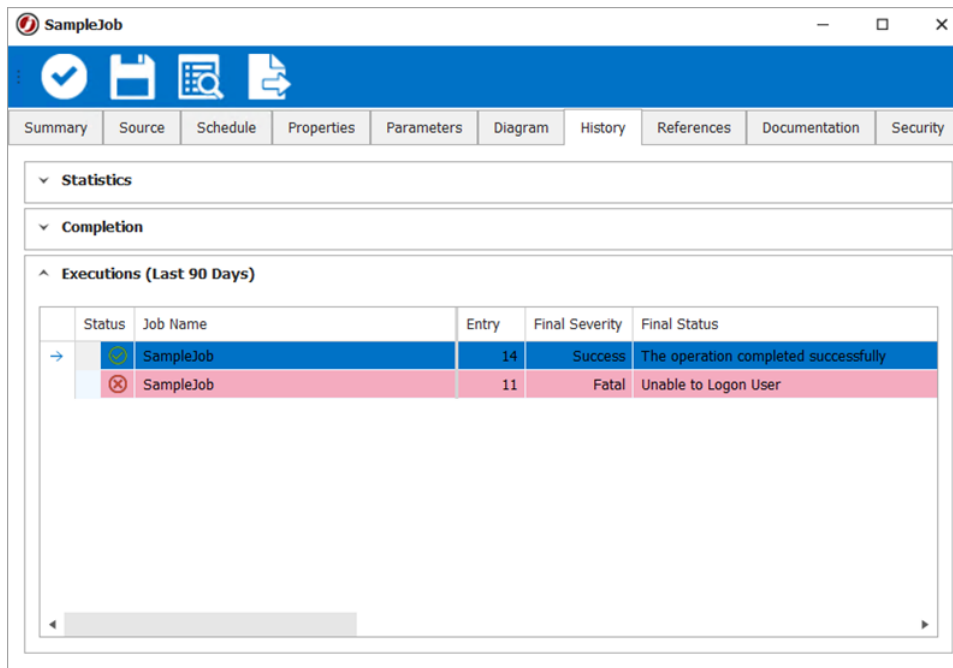
References

The References tab lets you view where the Job is referenced within JAMS.

Documentation

The Documentation tab lets you add more information to a Job. You can add an entry for a description or instructions or a link to an existing file. See ***Documentation Items* on page 178** for more information.

Security

The Security tab acts as an access control list, and it is capable of handling many Access Control Entries (ACE).

> **NOTE:** Removing all ACEs on an object behaves the same as Windows would. When all ACEs are removed from an object, only the GrantAdministratorsBypass group will have access to that object. Previously, removing all ACEs from an object would give all Authenticated Users access to that object.

While Jobs will inherit security from their Folder, a Job's security setting may be configured to override any folder-level security.

Each ACE can specify the following rights on a Job:

- **Abort**: allows the user to access the JAMS Job Monitor to abort or restart an occurrence of this Job.
- **Change**: permits modification of the Job's definition provided the user also has **Change** access to Job Definitions, which is located in the Access Control list on the Ribbon Bar.
- **Control**: permits modification of the current Job's Access Control List.
- **Debug**: allows submission of this Job, but only if the /DEBUG qualifier is used on the JAMS SUBMIT command. This qualifier submits the Job under the submitter's username rather than the username specified in the Job or Folder Definitions.
- **Delete**: permits deletion of the current Job definition provided the user also has Delete access to Job Definitions.
- **Inquire**: allows inquiry into the current Job definition provided that the user also has Inquire access to Job Definitions.
- **Manage**: permits the user to use the JAMS Job Monitor to hold, reschedule, release or delete an occurrence of the current Job.
- **Monitor**: allows the current Job to appear in the Job Monitor.
- **Submit**: grants the right to submit the current Job.

Execution Methods

An Execution Method defines how a Job executes within the JAMS environment. JAMS includes dozens of Executions Methods to run Jobs on Windows, Unix, Linux, OpenVMS, or any operating system supporting connections using SSH. The Execution Methods are set up so they can be used with Job Definitions without any additional configuration. An Execution Method is associated with each Job Definition.

You can also create a new Execution Method by using an existing one as a template. It is recommended that you apply any modifications or customizations to a new Execution Method rather than an existing Execution Method. This helps to ensure any existing Jobs are not impacted. It also helps to ensure any customizations are not affected by an upgrade. For example, you can add a Parameter or a Job Property to an Execution Method and all Jobs that reference it will have the set Parameter or Job Property.

You can also create and customize your own Execution Methods. This is useful if you want to create an Execution Method that uses another programming language, such as Perl or Python. Creating a custom Execution Method is a two-step process that includes creating the Execution Method, and then modifying its properties. Both are described in detail below.

Execution Methods screen

The Execution Methods screen lists all the available Execution Methods in JAMS. Each Execution Method displays the following:

- Method Name - This is the unique identifier for the Execution Method.
- Description - This reference property is used to summarize the Execution Method definition.
- Last Changed - This property displays the date and time this Execution Method parameter was last modified.

Creating a New Execution Method

1. Click **Execution Methods** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the Execution Method.
4. In the Base Method field, select an existing Execution Method that is used as a template.
5. Click **Ok**.
6. Click the **Parameters** tab to add a Parameter.
7. Click the **Template** tab to add any processing for the Execution Method.
8. Click the **Properties** tab to review and modify any Properties that are specific to the Execution Method.
9. Click the **Job Properties** tab set default values for certain Properties that are inherited by the Job Definition.
10. Click **Save and Close**.

Modifying an Execution Method

To make changes to an existing Execution Method, open its Execution Method Definition dialog from the Execution Methods View.

1. Click **Execution Methods** from the Shortcuts menu.
2. Double-click an Execution Method.
3. Modify the Execution Method, Parameters, Template, Properties, and Job Properties as desired.
4. Click **Save and Close**.

Deleting an Execution Method

Before deleting an Execution Method, ensure all Job and Folders that currently use it have been updated to remove references to it. To view where it is referenced, double-click the Execution Method and select the References tab.

1. Click **Execution Methods** from the Shortcuts menu.
2. Click an Execution Method.
3. Click **X**.
4. When you are prompted to confirm the deletion, click **Yes**.

Execution Method Definition Tabs

Execution Method

This tab contains the basic information about the Execution Method.

- Method Name - This is the unique identifier for the Execution Method.
- Description - This reference property is used to summarize the Execution Method definition.
- Last Changed - This property displays the date and time this Execution Method parameter was last modified.

Parameters

Execution Method Parameters work the same way as Parameters within Job Definitions and apply to all Jobs using this Execution Method. To add a new Parameter, click Add on the Parameters tab to access the Add a Parameter dialog. Each Parameter displays the following:

- Parameter Name – The unique identifier for the Parameter.
- Type – The data type for the Parameter.
- Prompt – The text that is displayed on the Parameters tab when you manually submit a Job.
- Default Value – The value that is displayed on the Parameters tab when you manually submit a Job.

> **NOTE:** If a Job has a Parameter with the same name as the Execution Method Parameter, the Parameter value on the Job is used.

Template

Templates provide an easy way to include standard pre and post processing for your Jobs. When a Job is submitted, JAMS parses a Job source using either the template defined on this tab or the module defined in the Job Module property for the Job's source code. Use the built-in text editor to edit the template for this Execution Method.

The example below sets up a simple template that maps two network drives, inserts the Job's source code, and executes a LogJobComplete program:

> **NOTE:** Ensure the <<JAMS.Source>> or {JAMS.Source} is added to the Template tab. This allows the code from the Job Source tab to be used.

```
NET USE E: \\MyServer\EShare NET USE F: \\MyServer\FShare

<<JAMS.Source>>

C:\LogJobComplete.exe <<JAMS.Job.JobName>>
```

Properties

Assemblies Properties	Description
Submit Assembly Name	This property is the name of the assembly that contains the class used to handle additional submit behavior for the execution method.
Submit Class Name	This property is the name of the class that implements ISubmitSSO that handles additional submit behavior for the execution method.
Start Assembly Name	This property is the name of the assembly that contains the class used to start a Job for this execution method.
Start Class Name	This property is the name of the class that implements IJobStart for this execution method.
Edit Assembly Name	This property is the name of the assembly that contains the class used to edit the source for this execution method.
Edit Class Name	This property is the name of the class that implements IViewExecutingJob and IViewJobHistory and will be used to view Jobs that use this execution method.
Edit Module Name	This property is the name of the module that contains the source editor that will be used to edit the source of jobs that use this execution method.

View Assembly Name	This property is the name of the class that implements IEditSource and will be used to edit the source for this Execution Method.
View Class Name	This property is the name of the assembly that contains the class used to view Jobs that use this execution method.
View Module Name	This property is the name of the module that contains the source editor that will be used to view the source of this execution method.
Monitor Context Assembly Name	This property is the name of the assembly that contains the class used to add additional context menu options for Monitor entries.
Monitor Context Class Name	This property is the name of the class that implements IExtendContextMenu and will be used to add additional context menu options for Monitor entries.
Host Assembly Name	This property is the name of the assembly that contains the class used to host this execution method.
Executable Sub Directory	This property is the name of a sub directory that contains JAMSHost.exe or JAMSHostCore.exe executable.
Host Class Name	This property is the name of the class that implements IJAMSHost and will host this execution method.
Host Sub Directory	This property is the name of the sub directory that contains the assemblies needed by this execution method.
Host Executable	This property is the name of the executable that will host this execution method.
Execute Properties	**Description**
Execution Type	This dropdown allows you to choose the Execution Method type. The supported types are: • **Agent** runs a Job using a JAMS Agent. • **Batch** runs a Job by creating a process with a Job or Command. • **Routine** executes a Job using the specified class from a specified assembly using the IJAMSHost interface. • **SSHAgent** executes a Job using a secure shell commands with JAMS AgentX.

Force 32bit	When set to true, this Job will run as a 32 bit process, even on 64 bit machines. This option was included for backwards compatibility following V6 to V7 migrations and it should not be adjusted on a V7 Execution Method.
Force V2	When set to true, this Job will run using V2.0 of the .NET Framework. This option was included for backwards compatibility following V6 to V7 migrations and it should not be adjusted on a V7 Execution Method. For more information, see Resolving Mixed Mode Assembly error message in PowerShell.
No BOM	When this option is set to true, the Job's source file will not have a Unicode byte order mark.
SSH Prompt	This property is a regular expression pattern to handle SSH prompts.
Application	This value is passed to the Win32 Create Process function as the value for the Application Name argument.
Command	This value is passed to the Win32 Create Process function as the value for the Command Line argument.
Options Properties	**Description**
Host Locally	This property indicates that the Job should only be hosted by the machine running the JAMS Scheduler. This setting is used for Execution Methods that need to manage connection to the Agent machine. An example would be the SSH Execution Method which executes locally and uses SSH to connect to the Agent in order to run the actual Job.
Interactive	When this option is enabled, this Execution Method can interact with the desktop. However, this option should not be adjusted. The JAMS Agent Interactive should be used for this functionality. **Caution**: This setting is not recommended since it can lead to potential security issues at the operating system level. The Interactive property has been included here because some applications require access to the desktop to run properly.
No Profile	When this option is set to true, PowerShell profiles will not be executed.
Pass Parameters	When this option is set to true, Job parameters will be passed to a PowerShell Job as PowerShell parameters.
Redirect	This property defines the output redirection behavior to the Job's log.

Run As Job	When this option is set to true, the Job will run as the user defined in the Job even when Host Locally is set to true.
Source Format	This property specifies the format of the source code.
Source Properties	**Description**
Edit After Start	When activated, this setting permits the source to be edited after a manually submitted Job has started.
Edit Source	When activated, this checkbox permits the source to be edited when manually submitting the Job.
Extension	This property specifies the default file extension for source code files.
Job Module	This is the name of a text module in the template library which is used as the starting point for parsing the Job's command procedure. Entering a value in this property implies that this Job is parsed. The template library is a combination of the macros in the BaseMacros.xml file, the file specified in the "DefaultMacroFile" configuration setting and the macros in the xml file specified in the Job's Folder definition. The BaseMacros.xml file is replaced when installing a JAMS upgrade.
Snapshot Source	If this option is enabled, the option allows JAMS to grab a copy of the source when submitting a Job.
Encoding	**Description**
Input Encoding	This property is the input encoding for the Job.
Output Encoding	This property is the output encoding for the Job's log file.
Completion Properties	**Description**
Bad Regex Pattern	This property is a regular expression pattern, matched in log file output, that indicates a failed execution.
Exit Code Handling	This property specifies how JAMS should evaluate a Job's exit code.
Good Regex Pattern	This property is a regular expression pattern, matched in log file outputs, that indicates a successful execution for this Job.
Specific Informational	This property is a comma-separated list of integer values for Informational Job completion exit codes.
Specific Values	This property is a comma-separated list of integer values for the Job completion exit codes based on the Exit Code Handling setting.

Specific Warning	This property is a comma-separated list of integer values for Warning Job completion exit codes.

Job Properties

The Job Properties tab lets you add Properties and default values that will be used by all Job Definitions that use the selected Execution Method. For example, you could add the Agent property to an Execution Method so the Job Definitions will use that Agent. To add a property, click + and select a Property from the list.

References

The References tab lets you view which Jobs are referencing an Execution Method as well as where the Job is located.

Predefined Execution Methods

JAMS ships with dozens of Predefined Execution Methods that can run a variety of Jobs on Windows, Linux, UNIX and and other operating systems detailed below.

Predefined Execution Methods Table

Method	Description	Operating System
Automate	This Execution Method runs a Workflow in Automate.	Windows
Banner	This Execution Method runs a Banner Job on a Unix host.	Unix
BannerProcedure	This Execution Method runs a BannerProcedure Job.	Windows
BannerWin	This Execution Method runs a Banner Job on Windows.	Windows
Command	This Execution Method runs a Windows batch procedure.	Windows
CRJobV12	This Execution Method runs Crystal Reports Job using Crystal Reports version 12.	Windows
CRJobV13	This Execution Method runs Crystal Reports Job using Crystal Reports version 13.	Windows
File Transfer	This Execution Method runs a file transfer (FTP, SFTP, or FTP/SSL) Job.	Windows

Method	Description	Operating System
File Watch	This Execution Method runs a Job to watch for a file.	Multiple
GoAnywhere Project	This Execution Method runs GoAnywhere projects from within JAMS.	Windows
InformaticaCloud	This Execution Method runs an Informatica Cloud task.	Windows
JAMSPowerShell	This Execution Method runs a PowerShell script with JAMSHost.exe.config set for JAMS.	Windows
JAMS Report	This Execution Method generates a JAMS Report.	Windows
JDEJob	This Execution Method runs a J.D. Edwards Job.	Windows
JDEJobSsh	This Execution Method runs a J.D. Edwards Job on Linux via SSH.	Windows
Mail Watch	This Execution Method runs a Job to watch for an email.	Multiple
MF Job	This Execution Method runs a Micro Focus Job.	Windows
MSDAX2012Job	This Execution Method runs a Microsoft Dynamics AX Job.	Windows
NeoBatchCatalog	This Execution Method runs a NeoBatch Job from a NeoBatch Catalog.	Windows
NeoBatchJcl	This Execution Method runs a NeoBatch Job from JCL stored in JAMS.	Windows
NetezzaBackup	This Execution Method runs a Netezza backup Job using SSH.	Unix, Linux
NetezzaLoad	This Execution Method runs a Netezza Load Job using SSH.	Unix, Linux
NetezzaSQL	This Execution Method runs a Netezza Query Job using SSH.	Unix, Linux
OdbcCommand	This Execution Method runs ODBC Commands.	Windows
OleDbCommand	This Execution Method runs OLEDB Commands.	Windows

Method	Description	Operating System
OracleEBSConcurrent	This Execution Method runs an Oracle EBS Concurrent process.	AIX, HP-UX, Linux, Solaris
OracleEBSJobSsh	This Execution Method runs an Oracle E-Business Suite Job via SSH.	AIX, HP-UX, Linux, Solaris
OracleEBSRequestSet	This Execution Method runs an Oracle ES Set Job.	AIX, HP-UX, Linux, Solaris
OracleStoredProc	This Execution Method runs an Oracle Stored Procedure Job.	AIX, HP-UX, Linux, Solaris
OS400	This Execution Method runs IBM System i, OS/400 Jobs.	IBM System i
PeopleSoftJobSsh	This Execution Method runs a PeopleSoft Job using SSH.	Peoplesoft
PeopleSoftJobWindows	This Execution Method runs a PeopleSoft Job on Windows.	Windows
PowerShell	This Execution Method runs a PowerShell script on Windows.	Windows
PowerShell32	This Execution Method runs a PowerShell script (32-bit).	Windows
PowerShellCore	This Execution Method runs a PowerShell Core script on Windows.	Windows
SAPDataService	This Execution Method runs a SAP Business Objects Data Services Job.	Windows
SAPJobV2	This Execution Method runs a SAP multi-step Job.	Windows
SAPProcessChain	This Execution Method runs a SAP Process Chain.	Windows
Sequence	This Execution Method runs tasks such as Jobs and File Transfers in sequence or in parallel. It replaces V6.X Setups.	Windows
SQLAgent	This Execution Method runs a SQL Server Agent Job.	Windows
SQLCommand	This Execution Method runs SQL commands.	Windows

Method	Description	Operating System
SQLStoredProc	This Execution Method runs a SQL Stored Procedure.	Windows
SSH	This Execution Method runs a Secure Shell.	Any
SSHAgent	This Execution Method deploys JAMS AgentX using SSH.	AIX, HP-UX, Linux, Solaris
SSHDeploy	This Execution Method deploys JAMS AgentX using AgentX.	Windows
SSHOpenVMS	This Execution Method runs a Secure Shell with OpenVMS using prompt matching.	OpenVMS
SSHPrompt	This Execution Method runs a Secure Shell using prompt matching.	Any
SSIS	This Execution Method runs SQL Server Integration Services.	Windows
SSISDirect	This Execution Method runs SQL Server Integration Services.	Windows
SSRS	This Execution Method runs SQL Server Reporting Services.	Windows
UnixScript	This Execution Method runs a Unix script based on the shebang on the first line.	Unix/Linux
UnixShell	This Execution Method runs a shell script on a Unix server.	Unix/Linux
Vbs	This Execution Method runs a VB script.	Windows
VMS	This Execution Method runs an OpenVMS DCL Command Procedure.	OpenVMS
VMSParsed	This Execution Method runs an OpenVMS DCL Command Parsed Procedure.	OpenVMS
WindowsDeploy	This Execution Method deploys a JAMS Agent to a Windows machine.	Windows
Workflow	This Execution Method runs a Windows Workflow Job.	Windows
z/OS	This Execution Method runs an IBM z/OS Job.	z/OS

Submitting Jobs Manually

You can manually submit Jobs from the Submit view, Definitions view, or the Search view. The Submit Jobs view is a listing of all current JAMS Jobs that are available to run on demand. This view uses a similar expanding folder hierarchy as displayed in the Definitions view. With the built-in security model, you can submit Jobs if you have the proper access.

When you submit a Job, you can edit and verify the Job's required parameters before the Job is submitted.

Submitting a Job using the Submit view

1. Click **Submit** from the Shortcuts menu.
2. Expand the Folder and select the Job you want to submit.
3. Right-click the **Job** and select **Submit**. You can also click the Submit button on the Control Bar or double-click to open the Submit dialog.
4. Define information as required in the Parameters, Reports, and Schedule tabs of the Submit dialog.
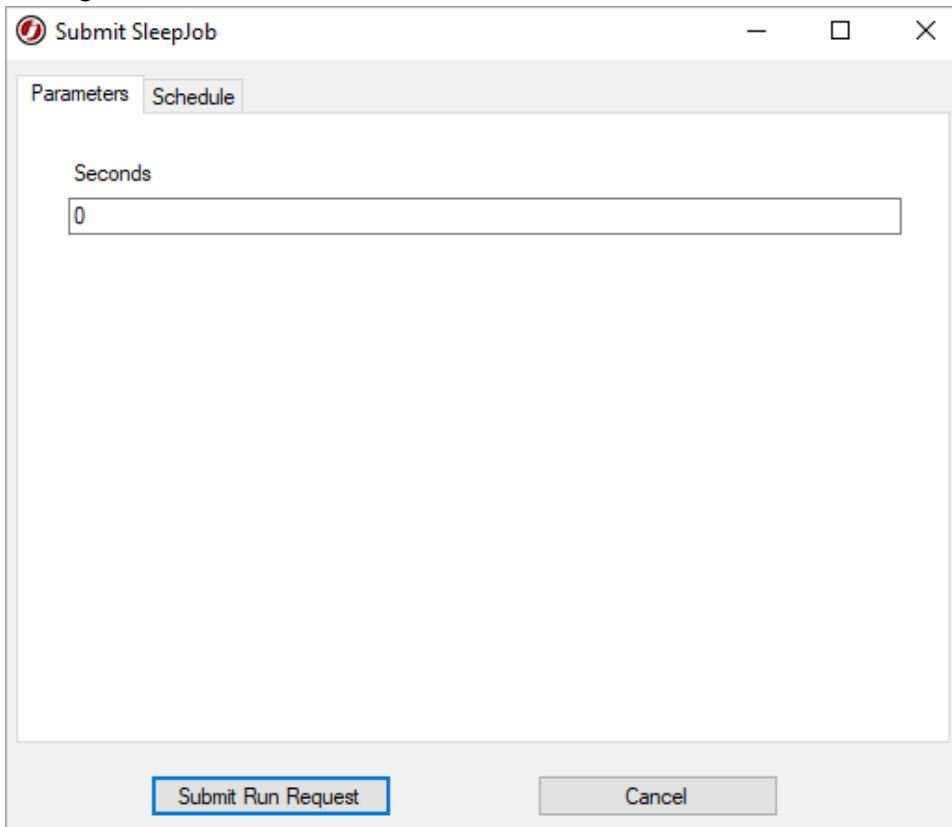

> **NOTE:** Depending on the Job Type, Schedule Items, and Parameters, there may only be one or two tabs visible.

5. With the Job information defined, click **Submit Run Request**.

6. Click **OK**.

Submitting a Job using the Definitions view

1. Click **Definitions** from the Shortcuts menu.

2. Expand the Folder and select the Job you want to submit.

3. Right-click the **Job** and select **Submit**. You can also click the **Submit** button on the Control Bar.

4. Define information as required in the Parameters and Schedule tabs of the Submit dialog.

5. Click **Submit Run Request**.

6. Click **OK**.

Submitting a Job from the Search View

You can submit a Job directly from the Search results page. You can select one or more Jobs from the search results to be submitted. The Jobs will be submitted in the order of the list from top to bottom.

1. Click **Search** from the Shortcuts menu.
2. From the Search Shortcut, enter your search term in the Search Query and click **Search**.
3. Do one of the following from the Results:
    1. Right-click the definition you want to submit, and select **Submit**.
    2. Select the definition and click **Submit** in the control bar.
4. Click **Submit Run Request** when prompted.

Modifying a Sequence Job (Ad-hoc Submission)

If needed, you can run a Sequence Job from one specific Task/step rather than running the Sequence from start to finish.

You can also remove tasks or steps to temporarily alter the Sequence Job for this run. The changes you make are not saved and the Sequence Job will function normally at the next run.

1. Click **Submit** or **Definitions** from the Shortcuts menu.
2. Go to the Sequence Job you want to submit.
3. Right-click the **Sequence Job** and select **Submit**.
4. Click the **Source** tab.
5. Make any changes as needed.
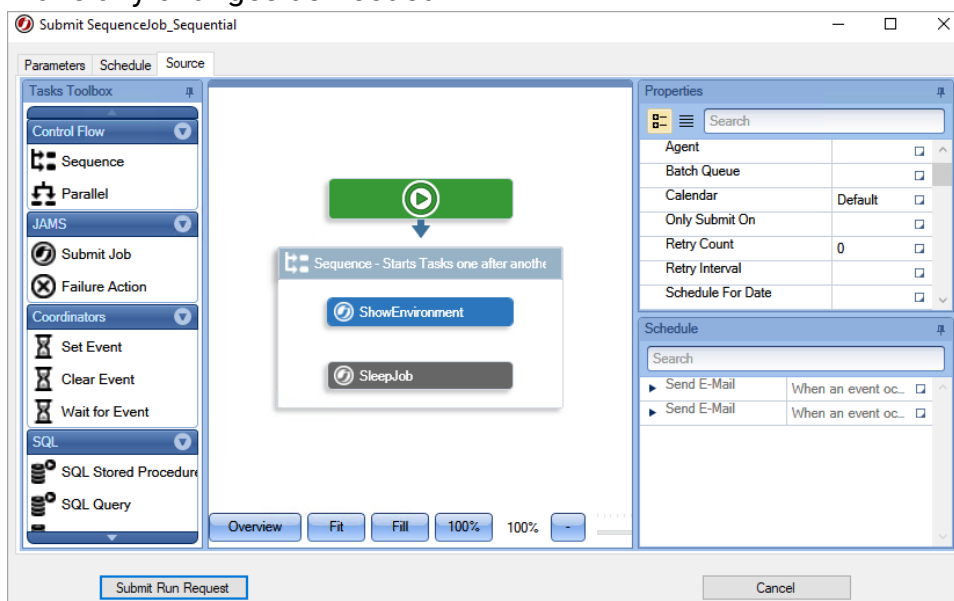
6. Click **Submit Run Request**.
7. Click **OK**.

Scheduling Recurring Jobs

Within JAMS, you can set a Job to repeat on a set schedule. Three options are available on the Schedule Tab for a Job Definition when setting up recurring Jobs. Each of these options are described in more detail in the sections below.

> **NOTE:** Recurrences would be used in addition to a Schedule Trigger, unless you submit a Job ad hoc.

- **Based on Recurrence (same Monitory Entry)** – Submit the same JAMS Entry after the first Entry is finished. You can set the recurrence to end at a specific time.
- **Based on Recurrence (new Monitor Entry)** – Submit a new JAMS Entry after the first Entry is finished. You can set the recurrence to end at a specific time.
- **Interval** – Submit a new Entry after the first Entry is finished when the Always Resubmit property is true. Otherwise, submit the same Entry after the first Entry is finished when the Always Resubmit property is false. An Interval Trigger does not have a specified end time. Interval Triggers should be used when you want a Job to execute non-stop. Otherwise, use a Recurrence with a Schedule Trigger.

Determining when Jobs will run

JAMS calculates and submits the next recurrence only after the first Job has finished. This prevents multiple Entries from occurring and staying in the Monitor if the first Job is delayed or failed.

> **NOTE:** If you enable recurrence for a Sequence, the entire Sequence must complete before recurrence can be determined.

Several values that are set on a Job are needed to complete this calculation. The important values are listed below:

Properties for Based on Recurrence Options (New and Same Monitor Entry)

Property	Description
Delay	The time/interval between each recurrence of the Job.
EndTime	The time of day when the recurrence is set to end.

Property	Description
BaseTime	The value that is used to determine the next recurrence of the Job, after the first Entry is finished. Select one of the following options. **EndTime** – The completion time of the Job. **ScheduledTime** – The time the Job is scheduled to start. **StartTime** – The actual start time of the Job.

Properties for an Interval Trigger

Property	Description
Schedule Interval	The time/interval between each recurrence of the Job.
Next Scheduled Time UTC	This field is updated by the JAMS Scheduler and does not require input.
BaseTime	The value that is used to determine the next recurrence of the Job, after the first Entry is finished. Select one of the following options. **EndTime** – The completion time of the Job. **ScheduledTime** – The time the Job is scheduled to start. **StartTime** – The actual start time of the Job.

The next recurrence time is determined by calculating the number of intervals that occurred between the Entry's completion time and the BaseTime and adding one more interval. This determines the amount of time until the next recurrence. For **Based on Recurrence** options, if the calculated recurrence time is beyond the EndTime, the reoccurrence ends and the Job will not run again.

Examples

The examples below show the differences in the recurrence time based on the different BaseTime options. Variations in the actual start time of the recurrence may happen when Jobs are delayed or finish early.

BaseTime Option: StartTime

- The Job typically runs for 30 seconds.
- The Delay option is set to 5 seconds.
- The Job starts at 1:00 pm.
- The Job completes at 1:00:30 pm.
- Next recurrence: 1:00:35 pm.

BaseTime Option: Scheduled time

- The Job typically runs for 30 seconds
- The Delay option is set to 5 seconds.
- The Job is scheduled to start at 1:00 pm.
- The Job starts at 1:05 pm.
- The Job completes at 1:05:30 pm.
- Next recurrence: 1:05:30 pm.

BaseTime Option: End Time

- The Job typically runs for 30 seconds
- The Delay option is set to 5 seconds.
- The Job starts at 1:00pm.
- The Job completes at 1:00:27 pm.
- Next recurrence: 1:00:32 pm.

Key Differences between the Interval Trigger and the Based on Recurrence options

The Interval Trigger has the following differences from the Based on Recurrence options:

- It has an **AlwaysResubmit** property. When this property is true, JAMS submits a new entry for each reoccurrence, like the **Based on Recurrence (same Monitory Entry)** option. When the property is false, the same Entry is restarted, like the **Based on Recurrence (same Monitory Entry)** option.
- It has a **Schedule Interval** property instead of a **Delay** property.
- It does not have an **EndTime** property because the Entry will continually recur.
- It has a **Next Scheduled Time UTC** property that is updated by the JAMS Scheduler. This is the UTC time when the Job is scheduled to run next.
- If the Entry is canceled, a new Entry is submitted.

- It has some override Properties:

Setting up Recurrence using the Based on Recurrence options

1. Open the Job Definition for the Job that you want to change.
2. Click the **Schedule** tab.
3. Click **Add Item**.
4. Select **Run this Job**.
5. Select **Based on Recurrence (same Monitory Entry)** or **Based on Recurrence (new Monitor Entry).**
6. In the Delay field, enter the time/interval between each recurrence of the Job.
7. In the EndTime field, enter the time of day when the recurrence is set to end. This value can be left blank to use the default of midnight.
8. In the BaseTime field, select the value that is used to determine the next recurrence of the Job.
   - **EndTime** – The completion time of the Entry.
   - **ScheduledTime** – The Scheduled time of the Job.
   - **StartTime** – The actual start time of the Job.
9. In the **Resubmit On Error/Repeat On Error** field, select the desired recurrence action if the Job fails.
10. Click **Finish**.
11. Click **Save and Close**.

> **NOTE:** If the Job is manually canceled, the recurrence is stopped regardless of the value of Resubmit On Error or Repeat on Error properties.

Setting up Recurrence using the Interval Trigger

1. Open the Job Definition for the Job that you want to change.
2. Click the **Schedule** tab.
3. Click **Add Item**.
4. Select **Run this Job.**
5. Select **on an interval**.
6. In the Schedule Interval field, enter the number of minutes or seconds for the interval.
7. Review the Next Scheduled Time UTC field. This field is updated by the JAMS Scheduler and does not require input.
8. In the Always Resubmit field, select the checkbox to submit a new Entry, after the first Entry is finished, for each reoccurrence. Clear the checkbox to restart the same Entry.
9. In the BaseTime field, select the value that is used to determine the next recurrence of the Job.
   - **EndTime** – The completion time of the Entry.
   - **ScheduledTime** – The Scheduled time of the Job.
   - **StartTime** – The actual start time of the Job.
10. Click **Finish**.
11. Click **Save and Close**.

Sequence Jobs

The Sequence Execution Method is available in all JAMS 7.X installations. Sequences are commonly used to schedule a stream of Jobs that automatically execute at regular intervals. JAMS V6.X users will recognize Sequences as the successor to and replacement for JAMS Setups.

Sequences consist of Logical Control Flows and Tasks. Tasks may include File Transfer actions, Failure actions, and Job Submissions. Tasks reside in and are directed by Control Flow containers. For instance, any Sequence Source with more than one Task will be wrapped in a master Sequence container.

Creating a Sequence Job

1. Click **Definitions** from the Shortcut bar.
2. Select the **Job Definitions** tab.
3. Click the **Add** button in the Control Bar to open the Add a New JAMS Job Definition dialog.
   (Alternatively, use the **Add a New JAMS Job Definition** button from the Welcome screen.)
4. In the dialog, select the Folder where the Job should be created.
5. In the Name field, define a name for the new Job.
6. In the Description field, enter a description for the Job, if necessary.
7. In the Execution Method field, select **Sequence Execution Method**.
8. Click **OK**. By default, the full Job Definition dialog opens the Source tab when the Job is initially saved.
9. Use the Sequence Designer, Task Toolbar, and Properties to define the Sequence. (Task Toolbar, Sequence Designer, and Properties sections are described below.)
10. Define Elements and Properties on the Sequence Job as desired to control how the Sequence will run.
11. **Save and Close** the Sequence.

Sequence Source Layout

The object-oriented Sequence Source is made up of three sections - the Task Toolbox, the Design Area, and the Properties Panel.

Task Toolbox

The **Task Toolbox** (pinned left by default) contains a list of Tasks and Flow Controls that act as the building blocks of a Sequence. These tasks are organized into groupings based on their type and purpose, such as JAMS, File Transfer, and Control Flow.

The **List View** is included as a tab at the bottom of the Task Toolbox. This view lets you see the display names and qualified names of all the Jobs that are defined in Submit Job Tasks within the Sequence Job. This can help you quickly find the Job to view and modify its properties. If the Submit Job Task is empty, Submit Job is displayed as the display name and the qualified name is empty.

The Jobs are listed in the order they appear in the Sequence Job. For Jobs in a Parallel Task, they are listed from left to right. Click a Job in the List View to see it selected in the Sequence Job in the Design Area. Only one Job can be selected at a time.

Design Area

The **Design** Area is where items from the Task Toolbox are assembled. Drag and drop tasks to the Design Area. Note that this Design Area will have a master Sequence container added automatically when multiple Tasks exist in the Design Area. All other tasks and conditional flows will be nested inside of this master Sequence container. The Tasks defined in the Sequence Source will run in sequential order from top to bottom by default. The Design Area has several options to let you modify the appearance of the Sequence Job.

Option	Description
Overview	Click Overview to see the full Sequence Job in a smaller window. This smaller window updates as you move your cursor within the Sequence Job. A box within the window shows the selected section of the Sequence, but selected Tasks will not be highlighted in the Overview window.
Fit	Click Fit to get the optimal view of all the Tasks in the Sequence Job. If a Task is selected, the Fit button will adjust to display only the selected Task.
Fill	Click Fill to have the view adjusted to display all Tasks in the Sequence Job.
+- (Scaling)	Click the + or − buttons to increase or decrease the scaling of the Sequence Job.

NOTE: Deleting a container will also delete any objects (Tasks or Control Flows) within that container.

Properties Panel

The **Properties** panel (pinned right by default) is used to populate or modify the tasks used in the Sequence. The Properties listed are responsive to the selected task or container inside of the Design Area.
For example, selecting a Submit Job task will display the information relevant only to that Submit Job task.
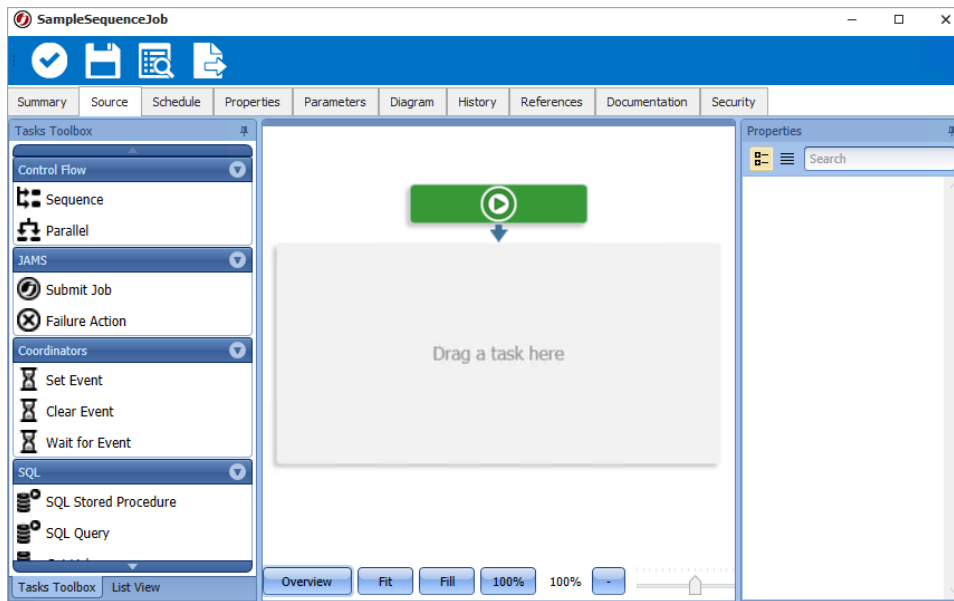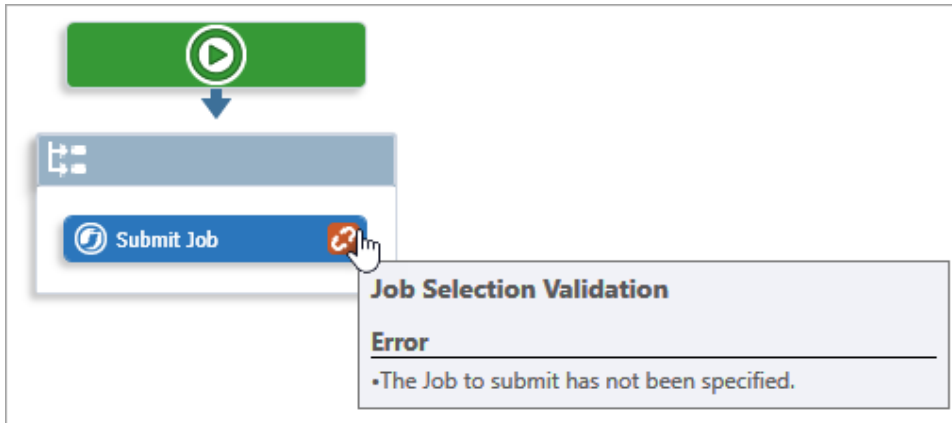
Adding Tasks and Containers to a Sequence

> **NOTE:** To add error handling to a Sequence Job, it is recommended to have the Sequence container rather than the Parallel container as the root/first item in the Sequence Job. Wrapping child Tasks inside a Sequence container allows the Sequence Job to become halted if a child Task fails. Once the Sequence Job is halted, the failed Task can be retried or skipped to resume the execution of the Sequence Job.

1. Identify the Task or Container that should be added to the Sequence Source. Drag and drop the object into the Design area of the Sequence Source. A Sequence may be saved with a single Task in the Source.
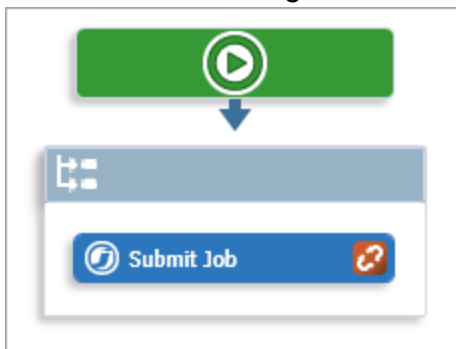
2. Resolve any Validation Errors with the new Task or Container. Hovering over the Task will display the relevant issue.

3. Add additional Tasks and Containers as desired, ensuring that no outstanding errors exist on any object.

> **NOTE:** By default, JAMS Sequences execute Tasks in order from top to bottom. Ensure Tasks are arranged accordingly.

4. If necessary, Tasks and Containers may be rearranged within the Design area using drag-and-drop functionality.

> **NOTE:** Containers have a Parent-Child relationship. Removing or rearranging a container will remove or rearrange any child tasks or child containers.

5. When the Sequence Source is configured as desired, **Save** the Job.

Using the Properties Panel

Select any Task or Control Flow from the Designer area to view its specific properties. Use the Properties panel to populate or modify individual property fields for that object.
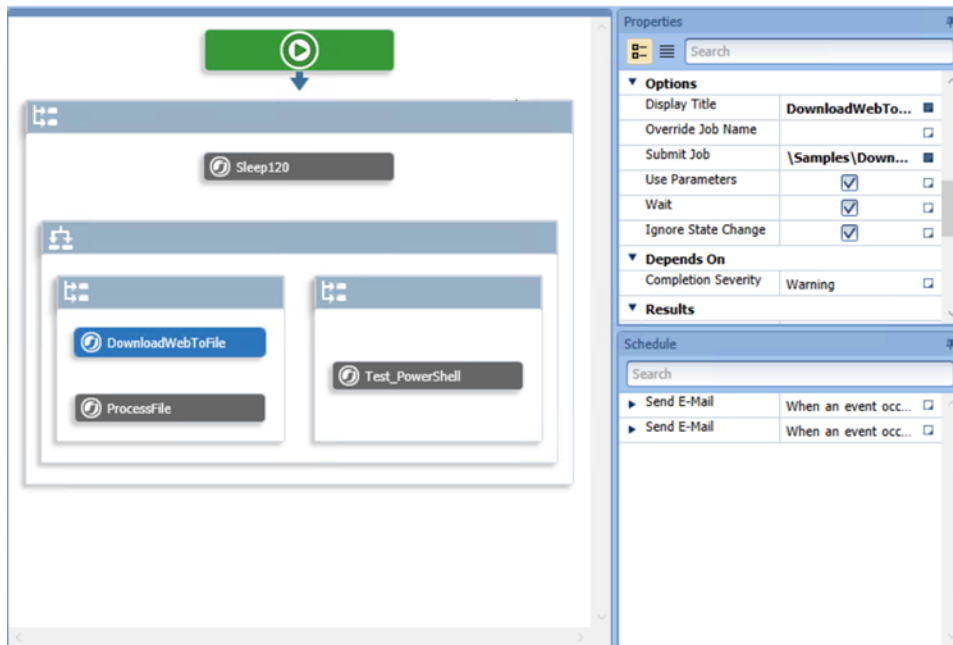
Resetting Values

If you specified an override value at the Task level and you want to revert the value back to the default, you can reset the value. Click the square next to the right of the value and select **Reset**. This works the same as resetting the property on the Job Properties tab.

Inherited Values

If you have values that are set within a Job and then add an override value within the Submit Job task for the Job, the Reset option uses the original value at the Job level and not the override value. Properties and Elements are inherited from the selected Job and are displayed in the **Properties** and **Schedule** sections when you select a Submit Job Task.

Managing Sequence Parameters

Parameters in a Sequence Job

One of the benefits of setting parameters at the Sequence level is that it is easier to achieve dynamic input for the Jobs being submitted. By default, parameters from the Sequence Job will override the parameters of the child Job selected in the Submit Job Task if the parameter names match. When using parameters from the Sequence Job, you have two options:

- **Use Parameters property**: If a Job in a Submit Job Task has parameters with the same names as the parameters on the Sequence Job, the Job will use those parameter values from the parent Sequence Job.
- **Parameter Binding**: For more granular control, use property binding, which lets you choose which individual properties should be used from another Sequence Task, Job parameter, or Job property.

Use Parameters Property

This option is applicable to only the Submit Job Task and it is selected by default. Only parameter inheritance is allowed. Properties such as Batch Queue or Agent values cannot be inherited.

The parameter names must exactly match in both the parent Sequence Job and child Job in the Submit Job Task. The data type must also be compatible. As a best practice, ensure the data types in both Jobs match. All child Job parameters that match this criteria in the parent Sequence are used.

Use Parameters from the Parent Sequence Job

By default, the parameters from the parent Sequence Job that have matching names and compatible data types in the child Job in the Submit Job Task will be used on the child Job if the Use Parameters checkbox is selected.

> **NOTE:** If the parameter names match but data types are incompatible, an error will occur.

1. Open the Submit Job Task.
2. In the Sequence Editor, click in the **Properties** panel.
3. Ensure the **Use Parameters** checkbox is selected. By default, this option is selected.
4. Click **Save and Close**.

Use Parameters from the Child Job

You can use the Parameter value set on the child Job. If the parent Sequence Job contains any matching parameters, they will not be used on the child Job. If a parameter value is not set on the Submit Job Task, the value from the original referenced Job is used.

> **NOTE:** It is recommended that you clear the Use Parameters option whenever the child Job Parameter value should be used, even if no matching Sequence Job Parameter names currently exist. This ensures the Job will work as intended if a matching Sequence Job Parameter is added in the future.

1. Open the Submit Job Task.
2. In the Sequence Editor, click in the **Properties** panel.
3. Clear the **Use Parameters** checkbox.
4. Click **Save and Close**.

Override both the Sequence and Child Job Parameter Values

You can override both the Parameter value on the Sequence Job and the child Job selected in the Submit Job Task, regardless of the Use Parameters field state.

1. Open the Submit Job Task.
2. In the Sequence Editor, click in the **Properties** panel.
3. Under the Misc section, click in the **Job Parameters** field to expand it.
4. Click the drop-down arrow. A screen is displayed.
5. Click the arrow next to a parameter.
6. In the Parameter Value field, enter the override value.

7. Click **Save and Close**.
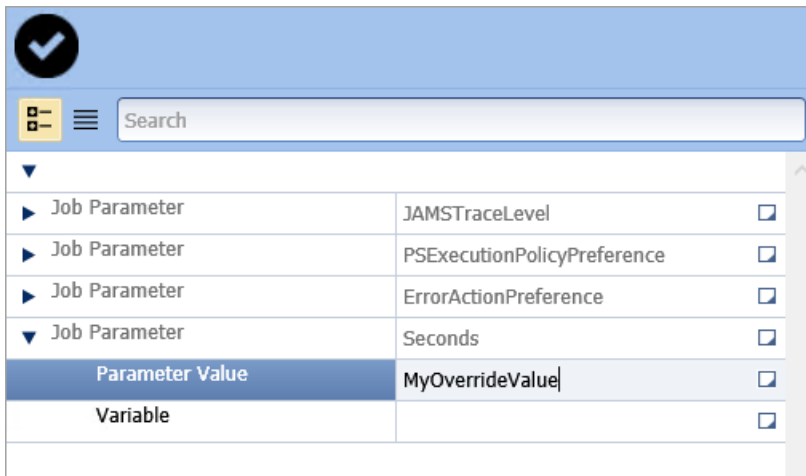
Parameter Binding

You can select which individual properties or parameters should be used from another Sequence Task or the parent Sequence Job. After you add a binding, you can hover your cursor over the field to see details about the binding. Binding will take priority over the Use Parameters option.

Adding a Binding

1. Click a Job in the Sequence Job.
2. In the Properties panel, click the square next to the parameter that you want to bind.
3. Select **Edit Binding**. The Add Binding dialog is displayed. Three options are available: binding to a property in a Sequence Task, to a parameter in the parent Sequence Job, or to a property in the parent Sequence Job.
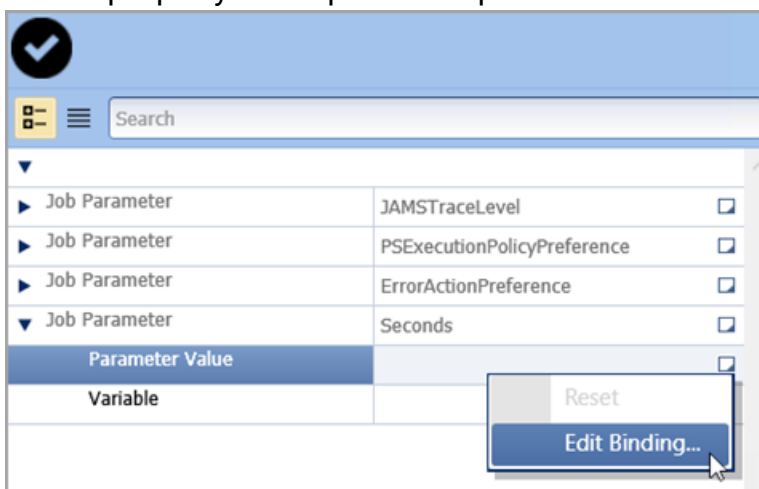
To bind a property from another Sequence Task:

1. Select **Sequence Task** for the Binding Type.
2. Under Source Task, select the Sequence Task containing the property.
3. Under Source Property, select the property.
4. Click **OK**. The field is now highlighted yellow and displays "Value Is Bound."

To bind to a parameter from the parent Sequence Job:

1. Select **Job Parameter** for the Binding Type.
2. Select the Parameter.
3. Click **OK**. The field is now highlighted yellow and displays "Value Is Bound."

To bind to a property from the parent Sequence Job:

1. Select **Job Property** for the Binding Type.
2. Select the Property.
3. Click **OK**. The field is now highlighted yellow and displays "Value Is Bound."

Editing a Binding

1. Click a Sequence Task in the Sequence Job.
2. In the Properties panel, click the square next to the parameter that you want to bind. You can also click the yellow field displaying "Value Is Bound."
3. Select **Edit Binding**.
4. On the Add Binding dialog, edit the binding as needed.

Clearing a Binding

1. Click a Sequence Task in the Sequence Job.
2. In the Properties panel, click the square next to the parameter that you want to bind.
3. Select **Edit Binding.**
4. On the Add Binding dialog, click **Clear Binding**.
5. Click **OK**.
6. Click **Save**.

Sequence Tasks

By default, JAMS has a variety of Sequence Tasks that you can use within a Sequence Job. The sections below describe the available tasks based on the groups within the Tasks Toolbox within the Sequence Editor.

All tasks have a Display Title property that allows you to enter text to identify the Task in the Design Area. Additional properties will be available based on the selected Task.

> **NOTE:** The following Sequence Tasks require the JAMS Client, JAMS Agent, and JAMS Scheduler to be updated to the same version: Automate, Command Script, Oracle, SAP, Banner, and Event Tasks. If an older JAMS Client or JAMS Agent is used with a newer JAMS Scheduler, you may see an error message and you may be unable to edit the Task. If this occurs, upgrade the JAMS Client or JAMS Agent.

Control Flow

Sequence

The Sequence Task is used to organize Jobs and tasks to run in a sequential order. You can have a Sequence within a Sequence.

Parallel

The Parallel Task is used to group Tasks to run at the same time and in parallel.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.

JAMS

Submit Job Task

The Submit Job Task is used to submit a Job that may or may not be in another Sequence. The properties listed below are the default properties. Additional properties may be available depending on the selected Job/Task. You can hover your cursor over a property to view a tooltip to see if the value is inherited from another property.

Properties

Property	Description
Only Submit On	Select the only dates that the Job will run. For example, if this value is set to Monday and the Job is submitted on Tuesday, the Job will not run. Examples include workdays, weekdays, daily, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, 1st Friday of the month, 1st day of the month, and last day of the month.
Schedule For Date	Select the dates that the Job will run. For example, if the Sequence runs every Monday and the value for this property is set to Tuesday, the Job will run on Tuesday. Examples include workdays, weekdays, daily, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, 1st Friday of the month, 1st day of the month, and last day of the month.
Scheduled Time	Enter the time of day that the Job should start, such as 5:00 PM.
Scheduling Priority	Enter the priority for the Job that is used when two Jobs are scheduled at the same time. The Job with the higher number has the higher priority and will run first. Values can be between 0 and 1000.
Submit On Hold	When this option is selected, the Job is put on a manual hold and will not run when the Job is submitted. The Job will need to be released in the Monitor view or from an API call. By default, this option is not selected.
Except For Date	Select the dates that the Job will not run. Examples include workdays, weekdays, daily, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, 1st Friday of the month, 1st day of the month, and last day of the month.
Display Title	Enter the text to identify the Task in the Design Area. **NOTE:** As a best practice, ensure that the Display Titles for Submit Job Tasks are unique. Otherwise, the parameters for Tasks with the same Display Titles will be grouped together in the Submit Job window.

Property	Description
Override Job Name	Enter the name to display for the Job in the Monitor view rather than the name in the Job Definition. This is useful if the same Job is submitted using different parameters and the Job needs to have a unique name in the Monitor.
Prompt for Parameter Values	When this option is selected, the parameters are displayed in the Submit dialog when the Sequence is manually submitted. By default, this option is disabled.
Submit Job	Select the Job that will be run for the Submit Job Task.
Use Parameters	When this option is selected, JAMS finds parameters on the Sequence Job that match the names of parameters on the Job being submitted and uses the values from the Sequence parameters.
Wait	When this option is selected, the Sequence will wait for this Job to complete before continuing to the next Job/Task. By default, this option is enabled. Review the following when using the Wait property: • If subsequent Jobs are dependent on prior Jobs completing first, the Wait property should be selected. • Sequences will continue to show "Executing" in the Monitor until all child Jobs complete. If you want to know when a Sequence is running longer than normal, set a runaway event with a notification on the Sequence. • To have a Sequence continue to subsequent steps if a step fails, wrap any Jobs in a failure action rather than clearing the Wait property. • Rather than clearing the Wait property, you can also remove the Job from the Sequence and run it separately.

Property	Description
Ignore State Change	When this option is enabled, any changes to the state of this Job are ignored and not displayed in the Monitor view. For example, if a Submit Job Task submits another Sequence entry, if the child Sequence is halted, the icon in the parent Sequence should reflect this. By default, this option is enabled.
Completion Severity	Select the severity that the Job must have for the Sequence to continue. If the Job does not have this severity, the Sequence will halt.
Final Severity	Review this read-only field that displays the severity of the completed Job. This value can be used in bindings if it is needed for other properties.
Final Status	Review this read-only field that displays the status of the completed Job. This value can be used in bindings if it is needed for other properties.
Final Status Code	Review this read-only field that displays the status code of the completed Job. This value can be used in bindings if it is needed for other properties.
JAMS Entry	Review this read-only field that displays the JAMS Entry number of the completed Job. This value can be used in bindings if it is needed for other properties.
Element Name	Review this read-only field that displays the element name.
Job Parameters	Review the collection of parameters that is used when the Job is submitted. These are the parameters in the Job Definition.
Log Filename	Enter the location where the submitted Jobs log file is saved. Changing this value lets you change the default location for this file. It has the same effect as using the LogFileName argument in the Submit-JAMEntry PowerShell cmdlet.

Failure Action

Select the preferred action for a Job/Task if it fails. You can include one or more Tasks within a Failure Action. After the Job is submitted, you can access right-click menu options for Skip and Hold. When one of these options is selected, JAMS will skip/hold all Tasks inside the container that can be moved to that new state. Set the properties listed below.

Properties

Property	Description
Failure Action	Set the desired behavior if a child Task within the Failure Action Task fails. You can select **Fail** to have the Sequence Job to fail or select **Continue** to have the Sequence Job continue.
Display Title	Enter the text to identify the Task in the Design Area.

Coordinators

Set Event

Enter a name to create an event that is used with the Wait for Event Task to allow custom branching within a Sequence, which is similar to the SetEvent Workflow activity. The name is not case-sensitive. The Wait for Event Task resumes execution as soon as the Set Event Task is completed in the Sequence.

Clear Event

Reset the event that is specified in the Set Event Task. This allows you to use the same event in multiple places in a Sequence.

Wait for Event

Enter the name of the event from the Set Event Task to set the Sequence to wait for that event to complete. The name is not case-sensitive. If the Set Event Task has already completed, the Wait for Event Task runs immediately and allows the next Task to run.

Properties

Property	Description
Event Name	Enter the name for the event.
Display Title	Enter the text to identify the Task in the Design Area.

SQL

SQL Stored Procedure

The SQL Stored Procedure Task is used to run a stored procedure that is in a SQL database. If the task has a DataSet property set on it, the stored procedure output DataSet will be stored in Sequence session storage. To use this Task, specify the **SQL Connection** and **Stored Procedure** properties as described below.

You can also select Parameters for this Sequence Task in the Parameters field. If needed, you can refresh the list of parameters by clicking the Refresh icon in the upper right corner of the Parameters editor.

SQL Query

The SQL Query Task is used to query a SQL database using native scripting. If the task has a DataSet property set on it, the query output DataSet will be stored in Sequence session storage. To use this Task, specify the **SQL Connection** and **Query** properties as described below.

Get Value

The Get Value Sequence Task is used to get a specific value from a SQL database. To use this Task, specify the **Table**, **Column**, **Row**, and **Output Key** properties as described below.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.
SQL Connection	Enter the JAMS Connection that points to the SQL Server.
Database (Optional)	Enter a database to override the initial catalog/database that is on the connection string in the SQL Connection.
Stored Procedure	Select the stored procedure in the SQL database.
Query	Enter the SQL query.
DataSet	Enter the dataset name to store either the SQL Stored Procedure or SQL Query dataset in the Sequence session storage. Any text value can be used.
Table	Select the table in the database that has the value that you want to find.

Property	Description
Column	Select the column in the table that has the value that you want to find.
Row	Select the row in the table that has the value that you want to find.
Output Key	Enter a name for the output key to store the relevant data into the sequence runspace. This value can be used in another activity, such as PowerShell. If the Output Key does not have a value, the Sequence Task will display an exception.

Windows

Command Script

The Command Script Sequence Task lets you execute Windows commands using the Command shell within a Sequence Job. This Task functions the same way as the Windows Command Job in JAMS. The output for the script is displayed on the Log Files tab for the Monitor Entry.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.
Script	Enter the script that will run.

PowerShell Script

The PowerShell Task is used to let you run a PowerShell script as a Job within a Sequence. Set the properties listed below.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.
Script	Enter the PowerShell script that will run.
Input Variable	Enter the PowerShell variable that will be the input to this command or script.

Property	Description
Output Variable	Enter the PowerShell variable that will be set to the pipeline output of this command or script.

File Transfer

File Transfer Download

The File Transfer Download Sequence Task lets you download a file from a remote location to a local path. To use this Task, specify the **Credentials**, **File Transfer Connection**, **File Not Found Severity**, **Local Path**, **Remote Path**, and **Recursive** properties as described below.

File Transfer Upload

The File Transfer Upload Sequence Task lets you upload a file from a local path to a remote location. To use this Task, specify the **Credentials**, **File Transfer Connection**, **File Not Found Severity**, **Local Path**, **Remote Path**, and **Recursive** properties as described below.

File Transfer Rename

The File Transfer Rename Sequence Task lets you specify a new path and name for a file or directory on the remote location. To use this Task, specify the **Credentials**, **File Transfer Connection**, **File Not Found Severity**, **New File Name**, and **Original File Path** properties as described below.

File Transfer Delete

The File Transfer Delete Sequence Task lets you delete a file in the remote location. To use this Task, specify the **Credentials**, **File To Delete**, **File Transfer Connection**, and **File Not Found Severity** properties as described below.

File Transfer Get File Last Modified

The File Transfer Get File Last Modified Sequence Task lets you get a file based on the last date that it was modified. To use this Task, specify the **Credentials**, **File Transfer Connection**, **File Not Found Severity**, **Last Modified Date**, and **Remote Path** properties as described below.

File Transfer Send Command

The File Transfer Send Command Sequence Task lets you send native FTP commands, such as dir and get, to an FTP site. To use this Task, specify the **Credentials**, **File Transfer Connection**, **Command**, and **File Not Found Severity** properties as described below.

File Transfer Set Permissions

The File Transfer Set Permissions Sequence Task lets you set the permissions for a file on an FTP site. To use this Task, set the **Credentials**, **File Transfer Connection**, **File Not Found Severity**, and **Remote Path** properties. You can also set one or more of the following properties: **User Read, User Write, User Execute, Group Read, Group Write, Group Execute, Other Read, Other Write, Other Execute**.

Properties

Property	Description
Credentials	Select FTP credentials that are saved as a JAMS Credential.
Display Title	Enter the text to identify the Task in the Design Area.
File Transfer Connection	Select the FTP Connection from the Connection Store to connect to the remote server.
File Not Found Severity	Select the completion severity for the Task if the selected file is not available.
Local Path	Enter the path on the local machine where the file is found or where it will be saved. It can be a local path or UNC path.
Remote Path	Enter the path to the file on the remote FTP server.
Recursive	Select the checkbox to perform the action recursively and look within any subfolders to find the specified file.
New File Name	Enter the new path and name for the file or directory on the remote FTP server.
Original File Path	Enter the path to the file on the remote FTP server.
File To Delete	Enter the path to the file that you want to delete on the remote FTP server.
Last Modified Date	Select the date that the file was last modified.
Command	Enter the native FTP commands, such as dir and get, to a remote FTP server.

Property	Description
User Read	Enable the file to be readable by the owning user.
User Write	Enable the file to be writable by the owning user.
User Execute	Enable the file to be executable by the owning user.
Group Read	Enable the file to be readable by users in the owning group.
Group Write	Enable the file to be writable by users in the owning group.
Group Execute	Enable the file to be executable by users in the owning group.
Other Read	Enable the file to be readable by users other than the owner or group.
Other Write	Enable the file to be writable by users other than the owner or group.
Other Execute	Enable the file to be executable by users other than the owner or group.

Integration Sequence Tasks

The following Sequence Tasks are available if the integration has been installed/added to JAMS.

> **NOTE:** The following Sequence Tasks require the JAMS Client, JAMS Agent, and JAMS Scheduler to be updated to the same version: Automate, Oracle, SAP, Banner, and Event Tasks. If an older JAMS Client or JAMS Agent is used with a newer JAMS Scheduler, you may see an error message and you may be unable to edit the Task. If this occurs, upgrade the JAMS Client or JAMS Agent.

Automate

The Automate Sequence Task lets you import an AML file and run it within the Sequence Job. Set the properties listed below.

Properties

Property	Description
Display Title	Enter a name for the Automate Task, if necessary. (This field is updated after the AML file is selected for the **Automate Task** field.) By default, it is the name of the Automate Task from within the AML file or it is the name of the AML file, without the file extension.
Automate Task	Click in the field to browse to the location of the AML file and then click **Open**. After the AML file is selected and imported into the Automate Sequence Task, its contents are saved within JAMS and the AML file is no longer needed.
Automate Variables	Verify the variables were correctly imported from the AML file. The variable names are read-only. You can edit the value for a variable only if the ISPARAMETER attribute in the AML file is set. This is displayed as the **Is Parameter** checkbox under the variable value. Ensure the variables in AML files are not named "path", which is a reserved term. Using this term may cause issues when running the Automate Task in JAMS. If a variable is named "path", update the variable name within Automate before creating the AML file.
Output Names	Enter a list of comma-separated names that will be used as variables to receive values from Automate Desktop, if the variable names match the names sent from Automate. Successor Tasks can use these values by using the specified name surrounded by brackets. For example, if you enter "output1" in the Output Names field, enter "{output1}" in a field in a successor Task to use that value. If a variable has the ISPARAMETER attribute set in the AML file, the variable cannot be used in the Output Names field. When this attribute is set, the variable value is not accessible to other Sequence Tasks in JAMS.

Banner

The Banner Procedure Sequence Task lets you run Banner Jobs within a Sequence Job in JAMS. Set the properties listed below.

You can also select Parameters for this Sequence Task in the Banner Parameters field. If needed, you can refresh the list of parameters by clicking the Refresh icon in the upper right corner of the Parameters editor.

> **NOTE:** These options are available only if the Banner Integration Pack has been installed.

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.
Banner Connection	Set the Connection Store for connecting to Banner.
Banner Job	Select the Banner Job to run.
Banner User	Set the JAMS Credential for the Banner user. This Credential is used to run Jobs.
Parameter Set	Select the Parameter Set for the Banner Job.
Printer Name	Set the name of the printer to use.
Form Name	Set the name of the Banner form.
Submit Time	Set the submit time for the Banner Job.
Include .log file	Include the contents of the .log file into the JAMS Entry Log. Multiple .log files can be included in the JAMS Log.
Include .lis file	Include the contents of the .lis file into the JAMS Entry Log. Multiple .lis files can be included in the JAMS Log.
Log File Polling Interval	Set the polling time for the Banner .log and .lis files. The default is 30 seconds. It is recommended that this value be set to a value that slightly exceeds the expected run time of the Job.
MIME Type	Set the type of file used to format reports/output files. Select PDF or Plain Text.
Special Print	Set the field that may be used to pass information to 3rd-party applications.
PDF Font	Set the type of font to use for PDF reports.
PDF Font Size	Set the size of the font to use for PDF reports.

Property	Description
Environment Type	Set the type of environment for the Banner instance to either Unix or Windows. By default, this option is set to **Unix**. If the Oracle database instance is running on Windows rather than Unix, set this option to **Windows**.

Oracle

> **NOTE:** These option are available only if the Oracle Integration has been installed. See [ConfiguringTheOracleStoredProcExecutionMethod](#) for more information.

Oracle Stored Procedure

You can connect to an Oracle database to run a stored procedure by running the Oracle Stored Procedure Sequence Task. The Task uses the stored procedure name, the stored procedure parameters with their values, and executes them all against the external Oracle Connection database. If the Task has a DataSet property set on it, the stored procedure output DataSet will be stored in Sequence session storage.

Set the **Oracle Connection** and **Stored Procedure** properties as described below.

You can also select Parameters for this Sequence Task in the Parameters field. If needed, you can refresh the list of parameters by clicking the Refresh icon in the upper right corner of the Parameters editor.

Oracle Query

You can run a query in an Oracle database by using the Oracle Query Sequence Task. The Task will use the provided query and execute it against the external Oracle Connection database. If the Task has a DataSet property set on it, the query output DataSet object will be stored in Sequence session storage.

Set the **Oracle Connection** and **Query properties** as described below.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.

Property	Description
Oracle Connection	Select the Oracle Connection to use to connect to the database.
Data Source	Optional. Enter a datasource to override the Data Source property on the Connection String of the Oracle Connection.
Stored Procedure	Select the stored procedure from the Oracle database. After the stored procedure is selected, the stored procedure parameters are loaded into the Parameters property on the Task.
Query	Enter the query that you want to run.
DataSet	Optional. Enter the dataset to store the DataSet output to Sequence session storage for use within the Sequence.

SAP

You can use a variety of Sequence Tasks with SAP. Ensure you have created a Credential and a Connection in the Connection Store before using these Sequence Tasks.

> **NOTE:** These options are available only if the SAP Integration Pack has been installed.

SAP Create Intercept Entry

You can create an Intercept entry within SAP by running the SAP Create Intercept Entry task. This will match Job names that should be intercepted by SAP. When a Job is intercepted it is prevented from starting, similar to putting a manual hold on a JAMS Job. Set the **SAP Connection**, **Client**, **Job Creator**, and **Job Name** properties as described below.

SAP Delete Job

You can delete an existing Job in SAP by running the Delete SAP Job task. Set the **SAP Connection**, **Job Name**, and **Job Number** properties as described below.

SAP Job

You can run an existing SAP background job by using the SAP Job Sequence Task. The Job Name and Job Number are both required to identify the Job in SAP. The Job will run using the same steps and settings that are on the existing Job in SAP. If the Job is in a pre-

execution state such as Intercepted, the existing Job will be released to run. If the Job has already started, the Sequence Task will copy the Job and start the copy.

After you set up this Task, ensure the Job is not deleted on the SAP server because JAMS will not be able to run the Job. Set the **SAP Connection**, **Job Name**, **Job Number**, **Execute Immediately**, and **Wait for Child Jobs** properties as described below.

SAP Log Intercepted Jobs

You can view all Jobs that are intercepted in SAP. After this task runs, the Sequence Job log will contain a list of all intercepted Jobs in SAP that matches the list of intercepted Jobs in the SAP client. Set the **SAP Connection** property as described below.

SAP Process Chain

Run an SAP Process Chain by selecting the SAP Connection from the Connection Store and the Process Chain ID. Set the **SAP Connection** and **Process Chain Id** properties as described below.

SAP Raise Event

If a Job is dependent on an SAP event before it can run, you can use this Sequence Task to indicate the dependency has been met. This will allow the dependent Job to run. Set the **SAP Connection**, **Event Name**, and **Parameter** properties as described below.

Properties

Property	Description
Display Title	Enter the text to identify the Task in the Design Area.
SAP Connection	Select the appropriate SAP Connection from the Connection Store.
Client	Enter the three-character ID for the SAP Client instance.
Job Creator	Enter the name of the person who created the Job that will be intercepted.
Job Name	Enter the name of the Job in SAP that will be intercepted/put on hold.
Job Number	Enter the number of the Job in SAP.

Property	Description
Execute Immediately	Select the checkbox to have the SAP Job run immediately, or clear the checkbox to have the Job run ASAP.
Wait for Child Jobs	Select the checkbox to force the parent Job to wait for the child Jobs to complete, or clear the checkbox to allow the parent Job to complete before the child Jobs have run (finished).
Process Chain Id	Enter the ID of the Process Chain that you want to run.
Event Name	Enter the Event Name that is defined in SAP. This is related to the Start Condition option in SAP.
Parameter	Enter a parameter for the event.

Workflow Jobs

JAMS Workflow Jobs use the Windows Workflow Foundation that provides an extensible collection of Activities using a rich interface for designing Job execution flows. JAMS extends the base set for these Workflow Activities with a collection of its own Activities for interacting and performing tasks directly within the JAMS Client.

The JAMS Workflow execution method is designed for Job scenarios using decision logic and branching that require different execution paths. Users seeking similar functions may want to try using the Sequence Execution Method. Workflows are created and edited using the Workflow Designer which includes a menu of building blocks (Activities) for submitting Jobs, updating JAMS Variables, and many more JAMS specific tasks. To view a listing and description for all Workflow Activities, select the link.
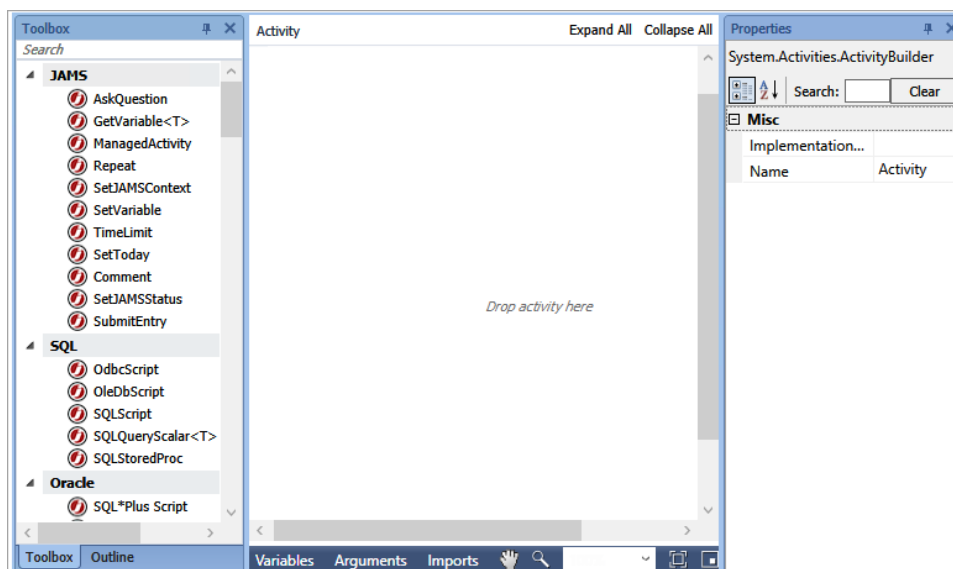
Setting up the Workflow

1. To create a new Job, open the **Definitions** view from the Shortcut bar, then select the **Job Definitions** tab.

2. Click the **Add** button in the Control Bar to open the Add a New JAMS Job Definition dialog.

3. In the dialog, select the Folder where the Job should be created.

4. Define a Name for the new Job.

5. If desired, give the Job a Description.

6. Select the Workflow Execution Method for this Job.

7. By default, the full Job Definition dialog will open when the Job is initially saved. Click **OK**.

8. The Job Definition dialog will open.

9. Click on the Source tab to open the Workflow Designer Panel, explained below.

The Workflow Designer

The object-oriented workflow interface is made up of three panels. The left **Toolbox** panel contains a list of Activities that can be used as building blocks to customize a JAMS Job to most any specification.

The **Design** panel is where the workflow building blocks are assembled by dragging and dropping selected Activities from the Toolbox.

Finally, the **Properties** panel is used to populate or modify individual property fields related to individual Activities.

Each Activity is organized into a grouping, such as JAMS, SQL, or PowerShell. If specific JAMS Add-ons have been installed, additional Activities/Grouping may also appear on the Toolbox panel.
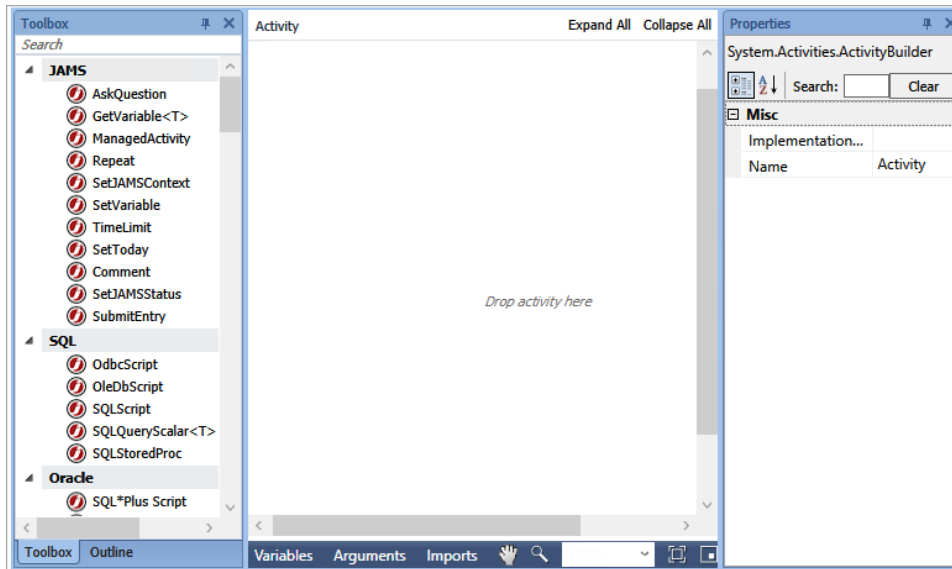
Defining a Workflow using a Sequence Container

Workflow jobs that contain more than one Activity must be nested within a parent activity or container such as a Sequence or Flowchart. A Sequence Container is an object that can help create a more intricate workflow. Workflow Sequences are powerful as they can contain any activity including Flowcharts and decision structures.

> **NOTE:** Workflow Sequence activities are not related to the Sequence Execution Method available in JAMS.

1. To include multiple Activities in a Job workflow, drag a Sequence Container to the Designer panel to configure the Workflow framework.

2. Drop other Activities from the Toolbar panel into that object. This action creates a parent-child relationship.
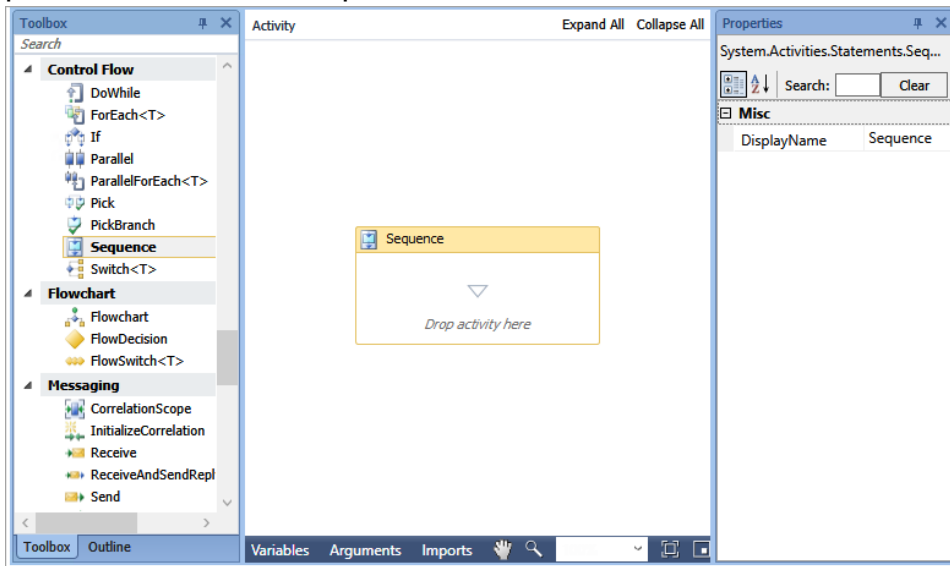
3. Drag and drop the next Activity to create a child activity within the parent Sequence.
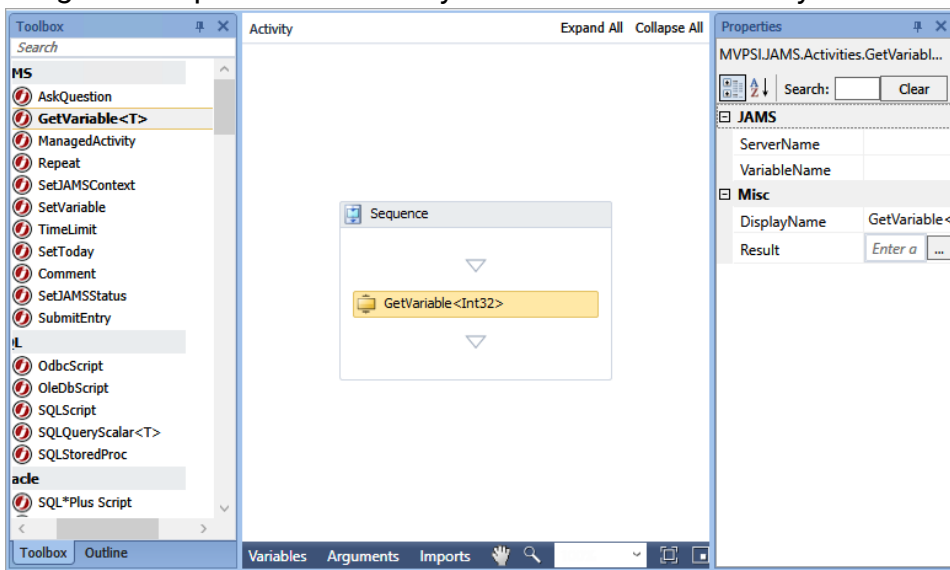

More complex Jobs, such as those requiring branching, can be designed using nested Sequences.

Flowchart Activity

A Flowchart object executes Activities one after another, but it also provides controls to loop back to previous steps or can skip a step entirely. A Sequence activity can only move forward.

Using the Properties Panel

Select any Activity from the Designer panel to view its specific properties. Use the Properties panel to populate or modify individual property fields for that object.
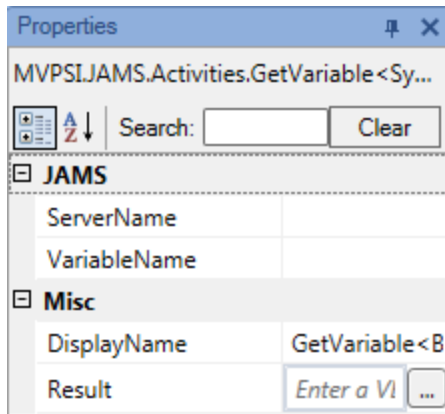
Please review any task messages appearing on the Activity object. To view the message content hover the mouse over the object in the Designer panel.

> **NOTE:** All errors must be resolved before a JAMS Job can be successfully submitted.
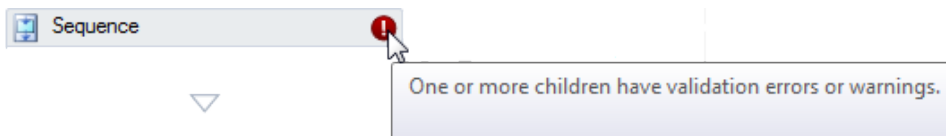
Select the **Save and Close** button to complete the JAMS Workflow job definition process.

> **NOTE:** Some JAMS Activities, such as AskQuestion and ManageActivity, allow for runtime interaction. For more information on Workflow interaction, select the link: [Runtime Workflow Interaction](#).

Workflow Activities

Workflows are created and edited using the Workflow Designer which includes many building blocks (Activities) for submitting Jobs, updating JAMS Variables, and many more JAMS specific tasks.

Below is a listing and a brief description of Activities available in JAMS Workflow Designer. Each Activity is organized by grouping, with some containing links to their corresponding class and property descriptions in the Developers Guide. Note that some tasks listed here require JAMS Integration Packs.

JAMS Grouping

AskQuestion	Used to halt an executing workflow until user input is provided. This Activity sends the question to the JAMS Scheduler and displays the question in the Monitor View. Users with Manage access for the Job can respond to the question using the Monitor View detail window.
GetVariable	Gets the value of a JAMS variable.
ManageActivity	Provides an execution scope in which Activities can be canceled or retried.
Repeat	Hosts one Activity that is repeated at an interval.
SetJAMSContext	This is necessary only if you are using JAMS Activities in a non-JAMS environment. When a JAMS workflow is executed, the JAMS Context is automatically established. If using Activities outside of JAMS, you can either set the JAMS Server in each Activity or add a SetJAMSContext activity to the workflow allowing all subsequent JAMS Activities to utilize the JAMS Server.
SetVariable	Sets the value of a JAMS variable.
TimeLimit	Executes it's child Activity until completed or if a set time limit is reached.
SetToday	Sets the value of "today" in the workflow.
Comment	Allows its child Activity to be enabled or disabled.

SubmitEntry	Submits another JAMS Job. The Activity can wait for the completion of the submitted Job and can take different actions depending on the success or failure of the entry. You can use the OverridePriority property to set the property of the submitted entry. If a number value is specified for the property, it will be set on the entry and override the value on the Job. The user that the Workflow runs as must have the Manage access to the Job being submitted.

SQL Grouping

OdbcScript	Runs SQL commands through an ODBC connection.
OleDbScript	Runs SQL commands through an OLEDB connection.
SQlScript	Runs SQL commands
SQLStoredProc	Executes a SQL stored procedure.
SQLQueryScalar<T>	Runs a query on a SQL Server database and outputs the first results into a Workflow variable of the specific Type.

Oracle Grouping

OracleQueryScalar<T>	Runs a query on a Oracle database and outputs the first results into a Workflow variable of the specific Type.
SQL*Plus Script	Runs a SQL*Plus script on an Oracle database.

Execution Grouping

CMDScript	Runs a command script.
ExecuteCMD	Executes a single command using CMD.EXE.

ExecuteProcess	Executes any process or executable.
Cancelable	Includes an option to send a cancellation request to its body Activity.

PowerShell Grouping

PSWrapper	Wrapper around a PowerShell function or command.
PSRunspace	Defines the scope of a PowerShell runspace.
PSScript	Runs a PowerShell script.

Communication Grouping

SendEmail	Sends email using SMTP.

Files Grouping

ForEachFile	Finds the designated files within a directory matching a wildcard pattern.
UnzipFiles	Unzips a .Zip file.
WaitforFile	Waits for events on a specified file.
ZipFiles	Creates a .Zip file.

Files Transfer Grouping

FtpDownload	Downloads a file using FTP or SecureFTP (SFTP)
FtpUpload	Uploads a file using FTP or SFTP
SftpDownload	Downloads a file using Secure FTP (SFTP)
SftpUpload	Uploads a file using Secure FTP (SFTP)
ScpDownload	Downloads a file using Secure Copy Protocol (SCP)

ScpUpload	Uploads a file using Secure Copy Protocol (SCP)
S3Download	Downloads a file using Amazon's Simple Storage Service (S3)
S3Upload	Uploads a file using Amazon's Simple Storage Service (S3)

File Transfer Session Grouping

SFTPSession	Hosts an SFTP connection for other FileTransferSession Activities.
FTPSession	Hosts an FTP connection for other FileTransferSession Activities.
ScpSession	Hosts an SCP connection for other FileTransferSession Activities.
S3Session	Hosts an Amazon S3 connection for other FileTransferSession Activities.
FileTransferSessionUpload	Uploads a file within the current file transfer session.
FileTransferSessionDownload	Downloads a file within the current file transfer session
FileTransferSessionDelete	Deletes a file within the current transfer session.
FileTransferSessionRename	Renames a file within the current transfer session.
FileTransferSessionChangeDirectory	Changes the working directory in the current file transfer session.
FileTransferSessionGetCurrentDirectory	Gets the working directory in the current file transfer session.
FileTransferSessionGetFileList	Gets the listing of files in a directory for the current file transfer session.
FileTransferSessionGetFileCreationDate	Gets the files creation date for the current file transfer session.
FileTransferSessionGetFileLength	Gets the files size for the current file transfer session.
FileTransferSessionSendCommand	Sends a command during the current file transfer session.

Mail Server Session Grouping

EWSSession	Creates an EWS Session that hosts a mail server connection. When using Microsoft Office 365 Modern Authentication, specify the EWS Connection Store object in the JAMSConnection field. The Connection should have the ClientId, TenantId, and ClientSecret. To specify the email address, add it to a Credential and select it in the JAMSUsername field or enter it in the Username field. **NOTE:** To use this updated EWSSession activity with Modern Authentication, update your JAMS Client and JAMS Scheduler.
IMAPSession	Creates an IMAP Session that host a mail server connection.
POPSession	Creates an POP Session that host a mail server connection.
DeleteMailMessage	Deletes a mail message on a mail server with a corresponding header.
GetMailHeaderList	Gets a collection of mail headers on a mail server that matches the specified mask. The returned collection is a list of JAMSMailMessageInfo objects.
GetMailMessage	Gets a JAMSMailMessage object for the specified header on a mail server.
GetMailServerFolder	Gets the current folder on a mail server.
ProcessEmails	Looks for one or more emails matching a specified mask and invokes the body Activity for all matching email.

SaveMessageAttachments	Saves attachments on a mail message to the file system.
SetMailServerFolder	Sets the current folder on the mail server.
ForEachMailMessage	Looks for one or email messages matching a mail specification and invokes the body Activity once for each matching message.
ForEachAttachment	Looks for one or more mail messages matching a mail specification, then downloads the attachments to the specified working directory and invokes the body Activity for each matching file.

Coordinators Grouping

ClearEvent	Sets the specified event to false.
SetEvent	Sets the event time.
WaitforEvent	Waits for the specified event to be set by a SetEvent Activity. If the event has already been set, the WaitForEvent Activity completes immediately.

Control Flow Grouping

DoWhile	Executes the Activity contained in its body at least once until a specified condition evaluates to false.
ForEach<T>	Executes an Activity action once for each value provided in the values collection.
If	Provides a conditional if-then-else condition.
Parallel	Is a container object that executes multiple child Activities at the same time. This class cannot be inherited.
ParallelForEach<T>	Enumerates a collection and executes an Activity for each element of the collection in parallel.

Pick	Contains a collection of PickBranch Activities where each PickBranch is a pairing between a Trigger and an Action Activity. At execution time the triggers for all branches are executed in parallel. When one trigger completes its corresponding action is executed and all other triggers are canceled.
PickBranch	Each PickBranch is contained within a branch of the Pick Activity and can be executed based on an incoming event that serves as a trigger.
Sequence	Is a container object that executes Activities one after another. Sequences can incorporate more than one child Activity. Sequences can only execute forward, not backward.
Switch<T>	Evaluates a specified expression and executes using a collection of Activities whose associated key matches the value obtained from the evaluation.

Flowchart Grouping

Flowchart	Is a container object that executes multiple child activities one after another. Similar to a Sequence, a Flowchart is more flexible allowing control to return to an earlier step. Sequences can only execute forward, not backward.
FlowDecision	Is a conditional node that provides a branch for the flow of control into one of two alternatives based on whether a specified condition is satisfied. If the flow requires more than two branches, use FlowSwitch instead.

FlowSwitch<T>	Is a conditional node that provides branching for the flow of control based on matching criterion when more than two alternative branches are required. If the flow branching requires only two paths, use the FlowDecision activity instead.

Messaging Grouping

CorrelationScope	Provides implicit CorrelationHandle management for child messaging Activities.
InitializeCorrelation	Initializes correlation without sending or receiving a message.
Receive	Receives a message.
ReceiveAndSendReply	Receives a message as part of a request/reply message exchange pattern.
Send	Sends a message to a service.
SendAndReceiveReply	Sends a message as part of a request/reply message exchange pattern.
TransactedReceiveScope	Scopes the lifetime of a transaction which is initiated by a received message. The transaction may be flowed into the workflow on the initiating message or created by the dispatcher when the message is received.

RunTime Grouping

Persist	Saves a workflow to disk, if possible. This Activity cannot be executed in a non-persistence zone, for example, within a TransactionScope Activity.
TerminateWorkflow	Terminates the execution of a workflow.

Primitives Grouping

Assign	Assigns a value to a variable at the current scope.
Delay	Puts one path of execution into an idle state, possibly allowing the workflow to be unloaded.
InvokeMethod	Executes a public method of a CLR object.
WriteLine	Writes a specified string to the console or a specified TextWriter object.

Transactions Grouping

CancellationScope	Specifies an Activity for execution and cancellation logic for that Activity.
CompensableActvity	Supports compensation of its child activities.
Compensate	Used to explicitly invoke the compensation handler of a CompensableActivity.
Confirm	Invokes the confirmation handler of a CompensableActivity.
TransactionScope	Demarcates a transaction boundary.

Collection Grouping

AddtoCollection<T>	Adds an item to a specified collection.
ClearCollection<T>	Clears a specified collection of all items.
ExistsInCollection<T>	Determines whether a specified item exists in a particular collection.
RemoveFromCollection<T>	Removes an item from a specified collection.

Error Handling Grouping

Rethrow	Throws a previously thrown exception. This Activity can only be used in a Catch handler in the TryCatch Activity.
Throw	Throws an exception
TryCatch	Contains Activities to be executed by the workflow runtime in an exception handling block.

SYM (Symitar) Grouping

DataFiletoPC	FTP download from the "DATAFILES" folder on the Symitar server.
DeleteLetterFile	Removes a letter file from the "LETTERSPECS" folder on the Symitar server.
EmailReports	Attaches one or more reports to an email message and sends it to the designated recipient(s).
FiletoPC	Generates an FTP download from any Symitar directory to a local PC.
LetterFiletoPC	FTP download from the "LETTERSPECS" folder on the Symitar server.
PCToDataFile	FTP upload to the "DATAFILES" folder on the Symitar server.
PCToEditFile	Initiates an FTP from a PC to the Symitar edit file.
PCToFile	Creates a generic upload to any directory on the Symitar system.
PCToLetterFile	FTP upload to the "LETTERSPECS" folder on the Symitar server.
ReportsFileToPC	FTP download from the "REPORT" folder on the Symitar server.
RunJobFile	Runs a job file in the specified SYM, such as Sym222.

SymConfig	The parent activity that allows users to set the configuration settings, such as Server Name, SymUserId, Symitar logon credentials, for all Symitar activities contained within it. Each child activity can override the settings in the SymConfig.

Migrating JAMS Objects

Exporting and Importing JAMS Objects

Many Definitions in JAMS may be exported or imported using JAMS PowerShell cmdlets (Export-JAMSXml and Import-JAMSXml), or from within the JAMS Client. See ***JAMS PowerShell Cmdlets* on page 333** for more information. These Definitions include:

- Agent Definitions
- Calendar Definitions
- Connection Store Definitions
- Credential Definitions
- Execution Methods
- Folder Definitions
- Job Definitions (Including Samples)
- Menu Definitions
- Named Time Definitions
- Queue Definitions
- Resource Definitions
- Search results

Exporting a Definition or an Object

1. Click one of the Shortcuts from the Shortcuts menu.
2. Select the Definition or Object.
3. Click **Export**.
4. Browse to the location where you want to save the .XML file.
5. Click **Save**.

Importing a Definition or an Object

1. Click one of the Shortcuts from the Shortcuts menu.

2. Click **Import**.

3. Browse to the location where you want to load the .XML file from.

4. Click **Import**.

Copying a Definition or an Object

The Copy To function allows you to rename and copy selected JAMS objects to another local or remote location. This feature is most often used when mirroring the Jobs within a folder on the same server or promoting Jobs from one server to another, such as from Development to QA.

To copy a Job that has an encrypted Parameter, ensure you have Change access on the Job.

> **NOTE:** Jobs cannot be copied from one major version of JAMS to another. For example, Jobs from JAMS V6 cannot be copied to JAMS V7.

Copy a Job or Variable to Another Location

1. Click **Definitions** from the Shortcuts menu.

2. Select the Job or Variable to copy.

> **NOTE:** You can select multiple objects by using **CTRL+A** to select all, **CTRL+Left-Click** to select multiple non-contiguous objects, or **SHIFT+Left-Click** to select contiguous objects.

3. Right-click the selected object and select **Copy To**.

4. Define the Destination Server, Folder, and Object Name. If you are copying an object to a different server, ensure you select the server as the first step. The selected folder will be reset when you select a different server.

> **NOTE:** When copying multiple Jobs, the copies will be created using the Source Job Names.

5. Click **OK** to start the copy function. Depending on the size of the copy, a progress dialog may appear.

Copy To Properties

Property	Description
Job/Variable Name	This property displays the original name of the selected Job or Variable to be copied.
Folder Name	To choose a destination folder location, click ... to select to a Folder within the chosen server.

Property	Description
Job/Variable Name	This property lets you enter a name for the copied Job or Variable. JAMS uses the original name of the selected object for the copy by default unless a new name is entered here. **NOTE:** This field is disabled if you select multiple objects to copy.
Server	Use the dropdown menu to select an available destination server for the object. **NOTE:** If you are copying an object to a different server, ensure you select the server as the first step. The selected folder will be reset when you select a different server.

File Transfer Features

JAMS provides built-in support for all standard file transfer protocols including:

- **FTP**: This is the classic (unencrypted) FTP support that conforms to RFC 959 and 1123.
- **FTPS**: This is used for FTP over TLS/SSL. This option provides encrypted password and data encryption. It is defined by RFC 959, 1123, 4217, and 2228.
- **SFTP**: This is used for SSH File Transfer and includes encrypted password and data encryption. Considered a more secure protocol over FTPS.
- **SCP**: This is used for Secure CP and is a variant of BSD rcp that transfers files over an SSH session.
- **Copy**: This is used for copying a file between folders on the same server or over the network with UNC paths.

The File Transfer Execution Method

The File Transfer Execution Method works with all the above protocols using a "fill-in-the-blanks" source. This method supports automatic retries and wildcards. You can use a JAMS Credential to authenticate with a remote server.

Since file transfers execute as standard JAMS Jobs, you have the following capabilities:

- Automatic notification for failed or stalled transfers or runaway processes.
- Dependency support before and after the file transfer.

- File event triggering for file transfers.
- Direct integration into a JAMS Sequence for process sequencing.

Creating a File Transfer Connection

You can create a File Transfer Connection in the Connection store to save the connection information. This Connection can be referenced in one or more Jobs. See *Connections to File Transfer Servers* on page 12 for more information.

Creating a File Transfer Job

1. Click **Definitions** from the Shortcuts menu.
2. Click the **Job Definitions** tab.
3. Click **Add**.
4. In the Folder field, select the Folder where the Job will be saved.
5. In the Name field, enter a name for the new Job.
6. In the Execution Method field, select the **File Transfer** Execution Method.

7. Click **OK**.
8. Click the **Source** tab.
9. In the File Transfer Connection, select the Connection from the Connection Store. Note that you can also enter the server and user information on the Job rather than

using a Connection. For the Copy type, a JAMS Connection (server information) is not necessary.

10. Select a **Transfer Type**.

11. Select Get local file(s) from remote server or Send local file(s) to remote server.

12. The File Transfer options reflect the selected File Transfer Type. Define additional information in the Files, Security, Zip, Retry, and Options tabs as desired.

13. Click the **Properties** tab.

14. In the Execute As field, select a JAMS Credential to run this Job.

15. Define additional Schedule Items, Parameters, Security, Properties, and Documentation on the Job as desired.

16. Click **Save and Close**.

Modifying a File Transfer Job

1. Click **Definitions** from the Shortcuts menu.
2. Click the **Job Definitions** tab.
3. Double-click the Job, or right-click the Job and select **Properties**.
4. Modify the Job Information, Source, Schedule, Parameters, Security, Properties, and Documentation as desired.
5. Click **Save and Close**.

File Transfer Source Options

The table below contains some of the options available on the Source sub-tabs for File Transfer Jobs in JAMS.

File tab

Option	Description
File Transfer Connection	Select the connection type from the Connection Store. You can configure a connection in the Connection Store and use the same credentials and information for multiple Jobs.
Transfer Type	Select the protocol/type of file transfer. Options include FTP, SFTP, FTPS, SCP, and Copy. You can also select options to get the files from a remote server or send files to a remote server.
Recursive	When this checkbox is selected, file transfers are performed recursively. If the checkbox is not selected, only the files in the specified folder are transferred.
Remote Server Name	Enter the DNS name or IP address of the remote server.
Remote Directory	Enter the default working directory on the selected remote server. This is optional if an absolute path is specified in the Remote File Specification.

Option	Description
Remote File Specification	Enter the remote file specification. When left blank, the filename and extension of the local file is substituted. This field also allows wildcards when Get local file(s) from remote server is selected.
Local File Specification	Enter or navigate to the file specification for the local file. This field also allows wildcards when Get local file(s) from remote server is selected.
Delete Source Files After Transfer	When this checkbox is selected, the source files will be deleted once transfer is complete.
File Not Found Severity	This property specifies the Final Severity to be set when the Job completes after finding no matching files to transfer. The default is Error.

Security

Option	Description
Credential	Select a predefined JAMS User Credential object to access the remote server. This is the recommended approach for specifying credentials to access the remote server. This property is not applicable when the "Copy" Transfer type is selected.
Username and Password	Enter a user name and password to access the remote server (instead of specifying) a predefined Credential. Note that this is less secure than selecting a predefined credential because the password is stored unencrypted within the Job Source. These properties are not applicable when the "Copy" Transfer Type is selected.

Zip

Option	Description
Zip Source Files	When this check box is selected, the source files will be zipped before upload.
Unzip After Download	When this check box is selected, JAMS will unzip the source files after download.
Delete Zip File after Extraction/Upload	When this check box is selected, JAMS will delete the zip files after transfer or extraction.
Zip File Directory	This property specifies the location of the zipped source files.
Zip File Name	This property specifies the name of the zipped source files.
Credential and Password for Archiver	This property specifies the credentials to use when zipping or unzipping the files.

Retry

Option	Description
Maximum Retries	Enter the maximum number of retry attempts if the transfer fails. This is separate from the retries that are set on the Job.
Retry Delay	This property defines the delay (in minutes) between retries.

Options

Option	Description
Port	Enter the TCP/IP port the selected server is using.
Timeout	Enter the maximum number of seconds to wait before timing out during a file transfer.

Option	Description
Passive	When this checkbox is selected, TCP/IP connections are always made from the client to the server, which makes it easier to support NAT and firewalls.
Binary	When this checkbox is selected, a binary transfer is performed.
Keep Alive	When this checkbox is selected JAMS continues to ping to maintain the connection.
Keep Alive Interval	This property defines the time between JAMS ping messaging.
Server Type	This property specifies the server type used for this file transfer.
Minimum Key Size	This property specifies the minimum key size for SSH negotiations (use 0 for default).
Require Secure Ciphers	When this checkbox is selected, a secure cipher is required.
Accept All Certificates	When this checkbox is selected, all certificates are accepted for the Job.
Client Certificate	This property specifies the client certificate to be used with the file transfer, defined as the location of the file that contains client certificate.
Use Implicit Security	When this checkbox is selected, implicit SSL is used.
Allow SSL 3.0	When this checkbox is selected, SSL 3.0 is allowed.
Allow TLS 1.0	When this checkbox is selected, Transport Layer Security (TLS) 1.0 is allowed.
Allow TLS 1.1	When this checkbox is selected, Transport Layer Security (TLS) 1.1 is allowed.
Allow TLS 1.2	When this checkbox is selected, Transport Layer Security (TLS) 1.2 is allowed.

Diagrams

The Diagram tab displays a graphical view of the selected Job, including its upstream and downstream Jobs/dependencies. An upstream reference is anything that causes or prevents the selected Job from running, and a downstream reference is anything the selected Job causes to happen or prevents from happening. The diagram also displays any preconditions for the selected Job.

You can use this tab with the Job Definition, Monitor, and History views to see the end-to-end process of the Job, including any other Jobs that may run because of this Job. You can use this tab for:

- Setting up Jobs - You can view all dependencies between multiple Jobs, which can help to ensure the Job is configured properly.
- Auditing Job failures - You can get a better understanding of why a dependent Job failed and the effect on other Jobs. This can be helpful for Sequence Jobs that have many child Jobs.
- Monitoring Critical Jobs - You can easily view a critical Job to see if any previous Jobs have an impact on its ability to run.

Accessing the Diagram

You can access the Diagram for a selected Job/Entry from several areas within JAMS. The options and display of the Diagram will vary based on where you open it. Do one of the following:

Access the Diagram from a Job Definition

When you open the Diagram tab from a Job Definition, the Jobs are displayed as gray and do not show the current status.

1. Click the **Definitions** view from the Shortcuts menu.
2. Right-click the Job and select **Diagram**, or double-click the Job and select the **Diagram** tab.

Access the Diagram from an Entry in the Monitor view

When you open the Diagram tab from the Monitor view, the Jobs are displayed in color and show the current status. You can also right-click a Job on the Diagram tab and have access to the same right-click menu options that are available in the Monitor view.

1. Click the **Monitor** view from the Shortcuts menu.

2. Right-click the Entry and select **Diagram**. The selected Job is highlighted on the Diagram.

Access the Diagram from an Entry in the History view

When you open the Diagram tab from the History view, the Jobs are displayed in color and show the final status. You can also right-click a Job on the Diagram tab and have access to the same right-click menu options that are available in the History view.

1. Click the **History** view from the Shortcuts menu.

2. Right-click the Entry and select **Diagram**.

Diagram Overview

The Diagram flows from top-to-bottom and dynamically updates as you click the blue/gray arrow buttons on the Job. By default, the Diagram is fully expanded so you can see all upstream and downstream Jobs for the selected Job. (You cannot hide the Job that was selected for the Diagram.) Each Job is displayed on the Diagram, and it is sized to fit the information on the screen. The Diagram displays Jobs, Sequence Jobs, and conditions.

> **NOTE:** You cannot move Jobs in the Diagram tab.

Jobs

Each Job is displayed as a square on the Diagram and has the information listed below. If you open the Diagram from the Monitor view, live status and statistics are also displayed.

Option	Description
Job Name	If the name is truncated, you can hover your cursor over the Job name to view the full name in a tooltip. If the Job has been deleted or a user account does not have Inquire access for a Job that is referenced on the Diagram view, the Job name displays "Unable to Load Job". The tooltip displays the reason the Job could not be loaded. Also, the Job cannot be expanded.

Option	Description
Number of Preconditions	This option displays any dependencies/prerequisites enabled from the Schedule tab in the Job Definition. To view the specific dependencies/prerequisites, click the arrow next to "Waits for x preconditions". (The text changes to "Waiting for x preconditions" when more than one of the prerequisites have completed.) A description of the item and its values are displayed. The following options from the This Job depends on a … menu in the Schedule tab can be displayed: Job, Job (date specific), Pre-Check Job, File, Variable, Resource, and Time Window.
Jobs to Execute	This option displays any Jobs that will be started because of the selected Job.
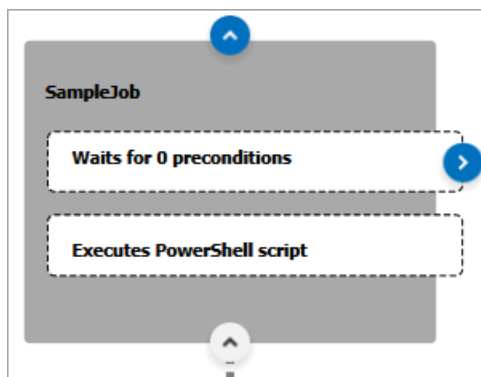
NOTE: If a Job is referenced multiple times on the Diagram tab, the Job will not be duplicated. An arrow and connector will point to one instance of the Job.

Sequence Jobs

A Sequence Job displays the same information as a Job, but it also includes any child Tasks. These are listed by the Task name within the main Sequence Job on the Diagram. If the Sequence Job contains another Job by using the Submit Job Task, the Task node displays the number of Preconditions that are set on the Submit Job Task. Expanding the Sequence Task node will add the Job that is displayed outside the Sequence Job.

If you open the Diagram from the Monitor view, live status and statistics are also displayed.

Sequence, Parallel, and Failure Action Tasks

The Sequence Task and Parallel Task are not displayed as containers on the Diagram. Any Tasks within them are still displayed. For example, the Parallel Task container is displayed by two Tasks that are side-by-side and connected by arrows.

A Failure Action Task is displayed as a Job node with a conditional If node under it that lists the action if the Job fails or completes. Each Job within the Failure Action Task has its own conditional If node. If the Failure Action Task is set to Fail or Not Specified, the node displays "Failure cancels parent Job". If the Failure Action Task is set to Continue, the node only displays the number of Jobs/items that will run.
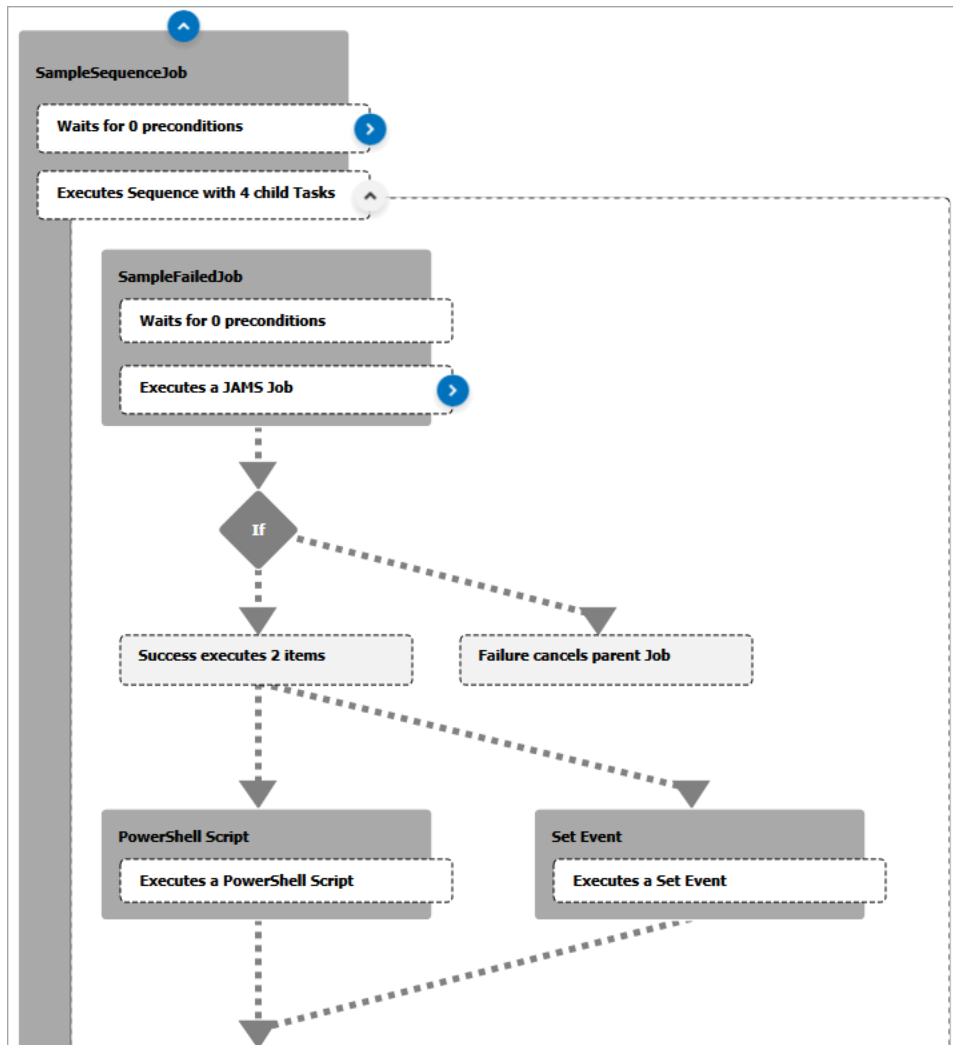
Conditions

Any conditions are displayed with an "If" node that details the actions that have multiple options. This allows you to see all possible outcomes for each option. For example, you may see conditions if the Job will behave differently based on the completion severity.

Viewing Upstream References

By default, all Jobs are displayed when you open the Diagram tab. This can include other Jobs that run before the selected Job or any schedule trigger items from the Run this Job menu on the Schedule tab. This also includes any schedule trigger set on an upstream Job. These Jobs are displayed above the original Job and have arrows that indicate any dependencies or relationships. If the text is truncated, you can hover your cursor over it to view the full text in a tooltip.

If an upstream reference is disabled, it will not be displayed as grayed out. Ensure you check the Job or schedule trigger item as needed.

1. Click the blue arrow on the top of the Job to display any upstream references.
2. Click the gray arrow on the top of the Job to hide any upstream references.
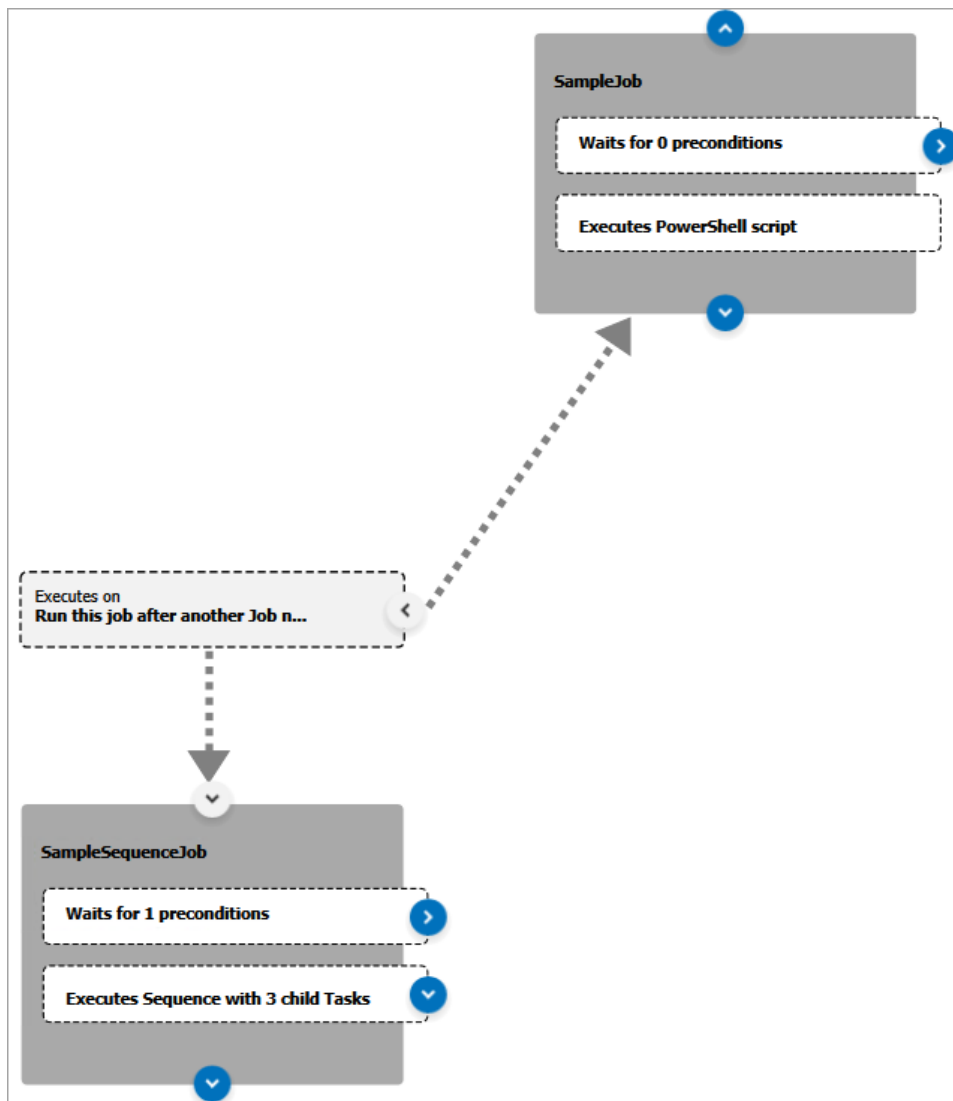
Viewing the Preconditions for a Job

Preconditions can include any prerequisites/dependencies that have been set on the Schedule tab of the Job. The following options from the This Job depends on a... menu in the Schedule tab can be displayed: Job, Job (date specific), Pre-Check Job, File, Variable, Resource, and Time Window.

1. Click the blue arrow pointing to the right. A tree view is displayed that lists the preconditions for the Job.

2. Click the gray arrow to hide any preconditions for the Job.
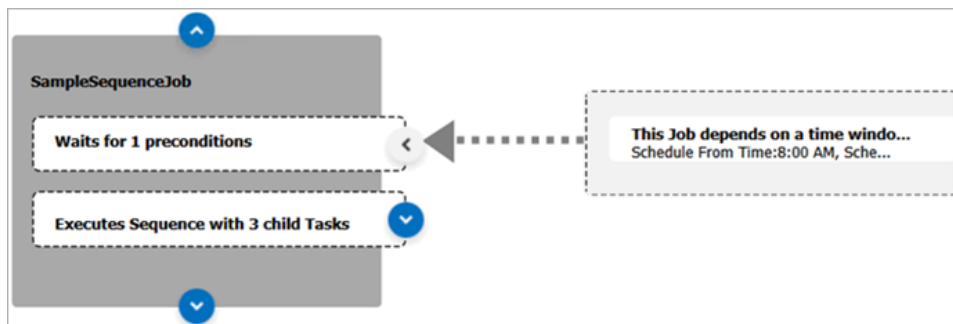
Viewing Downstream References

Downstream references can include other Jobs that are run after the selected Job has finished running on the Scheduler. This includes options from the When an event occurs menu and the Send a Report menu, such as emails, notification Jobs, recovery Jobs, or reports.

Downstream references are displayed as an aggregate. For example, if there are multiple reports and some have been disabled, the Report node will not be grayed out. The node is grayed out only if all reports have been disabled.

1. Click the blue arrow on the bottom of the Job to display any downstream references.

2. Click the gray arrow on the bottom of the Job to hide any downstream references.

Emails, Notification and Recovery Jobs

Event handler options in the When an event occurs menu on the Schedule tab are displayed on the Diagram. These options are grouped by event type, including Entry Success, Entry Informational, Entry Warning, Entry Error, Entry Fatal, Entry Started, Normal Event, Low Event, Moderate Event, High Event, Urgent Event, and Critical Event.

If you have multiple schedule events based on one event type, one box is displayed on the Diagram for those multiple schedule events. In the example below, multiple emails are defined for the Success and Warning event types. If multiple emails have been configured, the email subject is displayed on the Diagram.

Click the blue arrow to expand and view the Job.
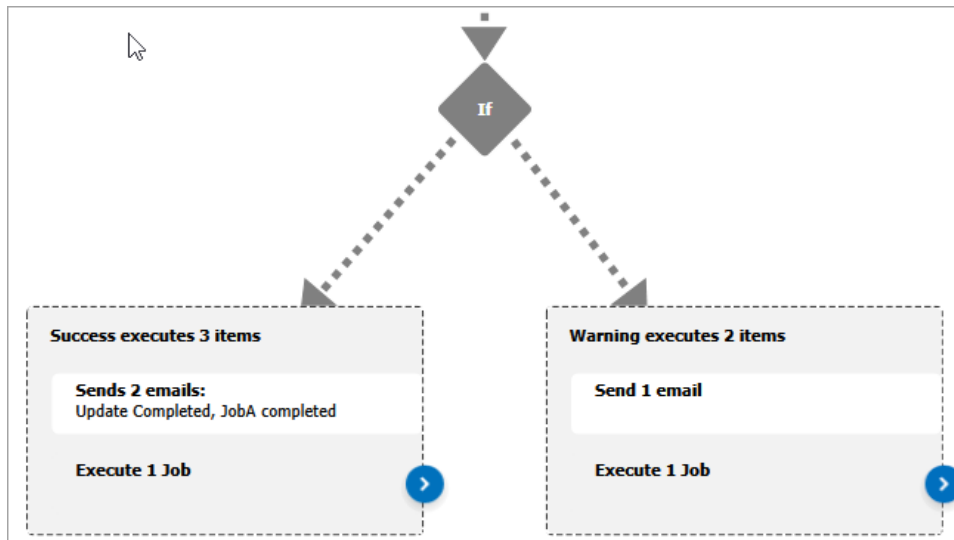
Reports

Report options in the Send a Report menu on the Schedule tab are displayed on the diagram directly under the Job. If you have multiple report options, one box is displayed on the Diagram for each of those options. If the text is truncated, you can hover your cursor over it to view the full text in a tooltip.
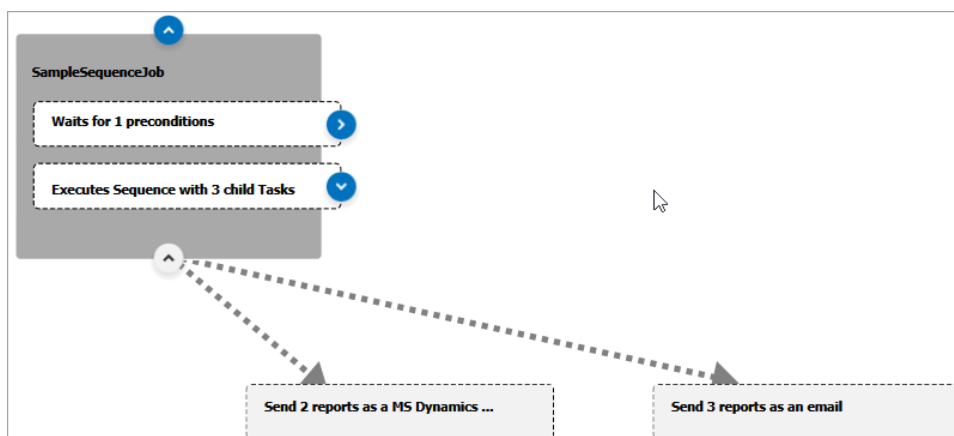
Modifying the Diagram View

The Diagram tab has several options to let you focus on specific parts of the diagram. The following options are displayed in the lower right corner of the screen.
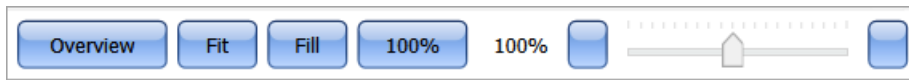
Toolbar Options

Option	Description
Overview	Click **Overview** to see the full Diagram in a smaller window. This smaller window will update as you move your cursor within the Diagram. A box within the window shows the selected section of the Diagram.
Fit	Click **Fit** to get the optimal view of all Jobs in the Diagram tab. If you selected any Jobs, they will have a purple border and will be included in the tab.
Fill	Click **Fill** to have the diagram adjust the view to display all Jobs in the Diagram tab.
100%	Click **100%** put the view back to the default view scaling state.
+ - (Scaling)	Click the + or − buttons to increase or decrease the scaling of the Diagram.

Modifying a Job

If you open the Diagram tab from the Job Definition, you can view and modify the properties and options for a Job that is referenced within the diagram. If you make any changes, the changes apply to all instances of the Job. For a Submit Job Task in a Sequence Job, click the blue arrow on the Task to expand the Job to access the Properties option on the right-click menu.

1. Access the Diagram tab from a Job Definition.
2. Right-click the Job and select Properties.
3. View the properties or make any modifications to this Job.
4. Save and close the dialog.
5. To view the changes on the Diagram tab, save the changes and reopen the Job Definition.

Viewing the Real-Time Status of an Entry

If you open the Diagram tab from the Monitor view, you can see the Entry Number next to the Job name and the real-time status in the right corner of the Entry. You can also see the status for any of the Entry's preconditions or child Tasks, if it is a Sequence Job. The color, icon, and text of the Entry changes based on its status. The same colors and icons are displayed in the Monitor view and the Diagram tab. See [Using the Monitor](#) for more

information. An additional icon ⊖ is available on the Diagram tab to show Jobs/Entries that did not run.

You can hover your cursor over a Job or a Job in a Submit Job Task to view a tooltip displaying key statistics for the Job, including average run time, current elapsed time, and the expected time to completion.
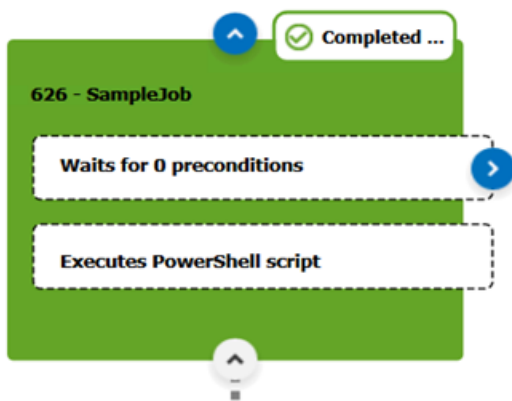
You can right-click a Job or a Sequence Task in the Diagram tab and access the same right-click menu options that are available in the Monitor view. This allows you to complete common actions such as canceling, releasing, holding, and rescheduling a Job.

Working with Variables

A Variable contains a single slice of data that can be globally defined for all JAMS Jobs. Variables are a powerful tool that can make batch processing easier and more effective. You can use them to easily change references in multiple places, such as server names or file path names.

Variables are also useful when working in multiple environments. For example, any environment-specific information can be put into Variables. The Jobs that use these Variables will then use the correct value based on the current environment.

Using Variables

- **As a default value for a Job parameter** - When working with multiple Jobs that require the same parameter value, creating a default value within a Variable can greatly increase efficiencies, allowing you to modify a value in one place to make changes to all Jobs that use the Variable.

  > **NOTE:** An encrypted Variable must be referenced by a Job Parameter. Job Parameter values can be linked to Variable values within the Parameter properties. Ensure the encrypted Variable is set as the Variable for the Parameter.

- **Directly within the Job Source** - Variables can be specified in the Job Source using **<<VariableName>>**. When the Job runs, it replaces **<<VariableName>>** with the value of the Variable. If you have Variables with the same names in different folders, use the fully qualified path to the appropriate Variable. It is recommended to map the Variable to a Parameter on the Job and reference the Parameter value in Job Source. This allows you to select the References tab on the Variable and see all the Jobs/Folders that use it.

  ```
  8   %JDEDRIVE%
  9   cd %JDEBIN32PATH%
  10  runube <<UBEUSERNAME>> <<UBEPASSWORD>> <<UBEENV>> <<ROLE>>
  ```

  > **NOTE:** When using a Parameter and a Variable that have the same name, the Parameter takes precedence. To use the Variable rather than the Parameter, enter the fully qualified path to the Variable within the <<>>.

- **As an undefined parameter in a parsed Job**. Parsed Jobs can use the value of a Variable. In fact, the Variable does not need to be associated with the Job, other than to include the Variable within the command file (source) where you need the Variable's value to appear.

- **In Job Dependencies**. One type of Job and Sequence Dependency relies on the value of a Variable. You can quickly define Dependencies that require a specific Variable condition to execute a Job.

- **In Triggers**. Triggers support both event and calendar scheduling simultaneously. You can design a Trigger to use the value of a Variable to fire Trigger actions.

- **In your application programs and/or DCL command procedures**. You can retrieve or set the value of Variables using command procedures. This can be very useful for Jobs that do not use a parsed execution method, but still need to use the value of the Variable for their process. Whether parsed or not, Jobs that have access to the JAMS command-line interface can set the value of Variables.

Variable Definitions Screen

The Variable Definitions screen lets you view, create, delete, and modify Variables. Each Variable displays the following:

- Variable Name – The name of Variable.
- Description – An optional description of the Variable to provide more information.
- Data Type – The type of data the Variable will store.
- Current Length – The character length of the Variable value.

You can add additional columns by using the Column Chooser. Right-click a column heading, and select **Column Chooser**.

Creating a New Variable

When you create a Variable, ensure it has the correct security options set. Variables do not inherit security settings from other JAMS objects, such as Folders. If you do not add other groups or users, only the JAMS administrators and the account that created the Variable will have access.

1. Click **Definitions** from the Shortcut menu.
2. Click the **Variable Definitions** tab.
3. Click **Add**. A dialog is displayed.
4. In the Folder field, select where the Variable will be saved.
5. In the Name field, enter a unique Name for the new Variable. Note that this name will be used when referencing the Variable elsewhere in JAMS.
6. If desired, give the Variable a description.
7. In the DataType field, select a data type for the Variable.
8. In the Value field, enter a default value for the Variable.
9. Click **OK**. By default, the Variable Definition dialog is displayed.
10. Click the **Value** tab.
11. If needed, select the **Encrypt** checkbox to encrypt the Variable. See the section below for more information.
12. Click the **Security** tab.
13. Click **+** to add additional Active Directory groups or users to have access to the variable.
14. Click **Save and Close**. The new Variable is displayed in the Variable Definitions list.

Modifying a Variable

1. Click **Definitions** from the Shortcut menu.
2. Click the **Variable Definitions** tab.
3. Double-click a Variable.
4. On the Variable tab, you can change the name.
5. On the Value tab, you can change the value.
6. Click **Save and Close**.

Encrypting a Variable Value

You can encrypt a Variable value. You can see and change the value of an encrypted Variable if you have the Decrypt permission on that Variable. To view the value, use the Display Value option on the Variable definition.

> **NOTE:** The Encrypted checkbox cannot be cleared after you select it.

See the Using Variables section for details on using an encrypted Variable in the Job source.

1. Click **Definitions** from the Shortcut menu.
2. Click the **Variable Definitions** tab.
3. Double-click a Variable.
4. Click the **Value** tab.
5. Select the **Encrypt** checkbox.
6. Click **Save and Close**.

Deleting a Variable

Before deleting a Variable, ensure all Jobs or Folders that currently use it have been updated to remove references to it. To view where it is referenced, double-click the Variable and select the **References** tab.

1. Click **Definitions** from the Shortcut menu.
2. Click the **Variable Definitions** tab.
3. Right-click a Variable, and select **Delete**.
4. When prompted to confirm the deletion, click **Yes**.

Copying a Variable

1. Click **Definitions** from the Shortcut menu.
2. Click the **Variable Definitions** tab.
3. Right-click a Variable, and select **Copy To**.
4. Under Destination Folder, click **…** to go to the Folder where the Variable will be saved.
5. Double-click the Folder.
6. In the Variable Name field, you can rename the Variable, if needed.
7. Click **Ok**.

Variable Data Types

- Text
- Integer
- Date
- Time
- DateTime (a date and time of day, such as 12/31/2015 2:00:00 PM)
- Float (a floating point number, such as 3.0, -122.5)
- Unknown (any data type)
- Boolean

Variable Definition Dialog

You can modify an existing Variable by opening its Variable Definition dialog. Double-click an item in the Variable Definitions view to open the dialog. The following tabs are available:

Variable Tab

Option	Description
Variable Name	This property is the unique name for the Variable.
Description	This optional property can provide a more complete explanation of the Variable.
Last Changed	Includes the username who last modified this Variable and the date and time when this change occurred.

Value Tab

Option	Description
Data Type	Each Variable must be assigned a Data Type as described in the previous section. Use the dropdown list to make a selection.
Value	Enter the value of the Variable that corresponds with the selected Data Type.
Encrypt	Encrypt the Variable value. After a value has been encrypted, it cannot be decrypted
Display Value	View the value of an encrypted Variable. This option is available only if the user has the Decrypt and Inquire ACEs.

Security Tab

Option	Description
Access Control Entries	The ACE(s) set on the Variable. Each ACE is configured with a set of rights, specified below.

Option	Description
Security Rights	• **Change**: Allows you to modify the Variable definition, if you also have Change access to Variable definitions.
	• **Control**: Allows you to modify the Variable's Access Control List.
	• **Decrypt**: Allows you to view the value of an encrypted Variable. If this option is selected, you can use the Display Value checkbox on the Variable definition. It also enables you to use an encrypted Variable as a parameter value.
	• **Delete**: Allows you to delete the Variable definition, if you also have Delete access to Variable Definitions.
	• **Inquire**: Allows you to inquire into the Variable definition, if you have Inquire access to Variable definitions.

References Tab

Option	Description
References	The References tab lets you view where the Variable is referenced in JAMS.

Schedules

The Schedule tab on a Job or Folder is used to set the conditions when a Job will automatically run or the actions that occur after a Job has run. Each condition is called a Schedule Item, and they can include Triggers, Dependencies, Job Status, Reports, or Events and Notifications.

Types of Schedule Items

JAMS has five types of Schedule Items that let you schedule Jobs and control their behavior. The Schedule Items are organized using Natural Language to make them task-based. The table below provides an overview of each option.

Schedule Type Item	Description	Schedule Tab + Menu
Triggers	Triggers are used to define schedules and submit Jobs based on changes or events in the JAMS environment.	Run this job...
Dependencies	Dependencies let you control when a scheduled Job starts executing based on a prerequisite condition.	This Job depends on a ...
Job Status	Job status let you set a Job to a runaway, short, or stalled status based on its expected runtime.	Set this Job's status to...
Events and Notifications	Events and Notifications are used to respond to executing or completed JAMS Jobs. Events may be configured to send notifications when Jobs fail or complete with any severity.	When an event occurs...
Reports	Reports let you send a type of report based on the Execution Method that created it.	Send a report...

> **NOTE:** These items are similar to using "Elements" within PowerShell cmdlets. Schedule Items and Elements are the same, but programmatically they are Elements.

Folder and Job Schedules

Some Schedule Items are available only at the Job-level. If you want to have a Job run on an interval (Interval or Recurrence Triggers) or schedule reports to be sent after a Job has completed, set these on the specific Job. Folders do not have these Schedule Items.

Schedule Tab

The Schedule tab lists all Schedule Items that have been configured for a Job or Folder. By default, there are two Event Handler Schedule Items specified for the root folder.

The Schedule tab displays the following:

- Enabled – This property specifies if the Schedule Item is active or inactive.
- Description – This property displays a brief summary of the Schedule Item.
- State – This property specifies if the state of the Trigger. It can display Fired when the Trigger is satisfied.
- Name – This property displays the name of the Schedule Item.
- Type – This property displays the type of the Schedule Item.
- Category – This property displays the category of the Schedule Item.

Each type of Schedule Item has a heading that corresponds to its menu item. You can expand or collapse this menu. In the example below, the "When an event occurs" heading can be expanded or collapsed to hide the two default Schedule Items.

Adding a Schedule Item

You can add Schedule Items from the + menu on the Schedule tab.

See the sections below for more information on each type of Schedule Item.

Modifying a Schedule Item

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Double-click the row on the Schedule that corresponds to the Schedule Item you want to change.
5. Modify the properties as needed.
6. Click **Save**.
7. Click **Save and Close**.

Removing a Schedule Item

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click the row on the Schedule that you want to remove.
5. Click **X**.
6. When prompted to confirm the deletion, click **Yes**.
7. Click **Save and Close**.

Triggers

Triggers are used to define schedules and submit Jobs based on changes or events in the JAMS environment. After a Trigger is added, JAMS will continuously watch for the specified Trigger condition and then submit the Job. After the Job has completed, the Trigger is reset and JAMS watches for the next occurrence. The Job will not be submitted until the Trigger

condition has been met. You can add Triggers, other than Interval or Recurrence Triggers, to a Job or Folder. Any Triggers set on a Folder will be inherited by that Folder's child Jobs.

You can add multiple Trigger conditions to a Job by specifying the same name in the And Group property that is described below. JAMS will look for all the specified Triggers in the same And Group to be met before the Job is scheduled.

> **NOTE:** If you leave the **And Group** empty, it creates a group with a blank name. All Triggers that have an empty **And Group** are put into this group and the Job will not run until all Triggers in this group are satisfied.

Triggers are used to automatically schedule Jobs. They can be automatically scheduled to run at specific dates and times, at regular intervals, or in response to dynamic events such as a file arriving on a file system or email arriving in a mailbox. The following types of triggers are available:

- Schedule Trigger
- Job Completion Trigger
- Interval Trigger
- File Trigger
- Variable Trigger
- Email Trigger
- Recurrence (Same Monitor Entry)
- Recurrence (New Monitor Entry)

> **NOTE:** Triggers will continue to be active until you disable them from their properties on the Schedule tab. See the tables below for the Enabled option. Cancelling a Watch Job in the Monitor view does not disable a Trigger.

Running a Job on a Schedule

You can add a Schedule Trigger to a Job or a Folder to set it to automatically run at a set date and time. If you set the Trigger on a Folder, all Jobs in the Folder will inherit the Trigger.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **on a schedule**.
6. In the Scheduled Date field, enter a date or expression when the Job should run.

7. In the Schedule Time field, enter a time when the Job should run.

8. In the Time Zone field, select the appropriate time zone.

9. Set any additional Exceptions or Override properties to control the Job as needed. See the table below.

10. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.

11. Click **Save and Close**.

Schedule Trigger Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the Trigger. When this option is disabled, this Trigger will not cause the Job to run.
Schedule	**Description**
Scheduled Date	This property is a natural language date specification for selecting the date the Job should run. You can select a value from the drop-down menu or enter values such as 1st Friday of Month. A comma separated list may be used. For more information, see *Specifying Dates Using Natural Language on page 215*.
Scheduled Time	This property is the time of day when the Job should start.
Time Zone	This property is the time zone used for this item.
Exceptions	**Description**
Except For Date	This property lists the dates or date specifications when this Job will not run.
Start Date	If this option is defined, the Job will not be scheduled to run until this date.
End Date	If this option is defined, the Job will not be scheduled to run after this date.
Non Workday Scheduling	This property determines if this Job should be scheduled on non-workdays. The following options are available: • Schedule – Schedule the Job even though it is a non-workday. • Ignore – Ignore the Job and do not schedule it. • Defer – Defer the Job until the next specified workday.

Override	Description
Calendar	This property specifies the Calendar to use for scheduling. When a Calendar is listed, the Job will have access to the Date Types, such as holidays, in the Calendar.
Execute As	This property specifies the set of Credentials the Job will execute as when submitted by this Trigger.
Agent	This property specifies the Agent where the Job will execute when the Job is submitted by this Trigger.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled by this Trigger.
Submit On Hold	Select or clear this checkbox to submit the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Comment	This property specifies a comment that will be added to the entry when it is submitted by this Trigger.

Running a Job after Another Job

You can add a Job Completion Trigger to a Job or a Folder to set it to automatically run if the monitored Job completes or fails. If you set the Trigger on a Folder, all Jobs in the Folder will inherit the Trigger.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **after another Job**.
6. In the Schedule For Date field, enter a date when the Job should run.
7. In the Scheduled Time field, enter a time when the Job should run.
8. In the Trigger Job field, click … to browse to the Job that will act as the Trigger.
9. In the Success or Failure field, select Success, Failure, or Any to set the status for the Job that acts as the Trigger.
10. Set any additional Override properties to control the Job as needed. See the table below.
11. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
12. Click **Save and Close**.

Job Completion Trigger Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Schedule	Description
Schedule For Date	This property specifies the date the Job is scheduled to run. If you do not specify a date, the Job will run today at the time specified in the Scheduled Time property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.
Scheduled Time	This property specifies the time of day when the Job is scheduled to run. If you do not specify a time, the Job will run at the current time and on the day specified in the Schedule For Date property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.

Trigger	Description
Trigger Job	This property specifies the Job which the trigger should watch for.
Success or Failure	This property specifies if the Trigger will watch for a successful or failed completion of the Trigger Job. If Success and Failure conditions have not been set on the Trigger Job, Success will be satisfied by Informational or better completion status, and Failure will be satisfied by Warning or worse completion status. You can also select Any to have JAMS trigger the Job regardless of the final status.
And Group	All the Triggers in the same "And Group" must fire before the Job is triggered. If you leave the And Group empty, it creates a group with a blank name. All Triggers that have an empty And Group are put into this group and the Job will not run until all Triggers in this group are satisfied.

Override	Description
Execute As	This property specifies the set of credentials the Job will execute as when submitted by this Trigger.
Agent	This property specifies the Agent where the Job will execute when the Job is submitted by this Trigger.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled by this Trigger.
Submit On Hold	Select or clear this checkbox to submits the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Comment	This property specifies a comment that will be added to the entry when it is submitted by this Trigger.

Running a Job on an Interval

You can add an Interval Trigger to a Job to set it to automatically run on a set period of time, such as every 15 minutes. Interval Triggers should only be used for Jobs that will run all day, every day. If you need more control on the times that the Job will run, it is recommended to use a recurrence.

> **NOTE:** This option cannot be set at the Folder-level.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **on an interval**.
6. In the Schedule Interval field, enter the time between each run of the Job.
7. In the Next Scheduled Time UTC, enter the date and time the Job should run again.
8. In the Always Resubmit field, select to create a new entry in the Monitor view for each run of the Job. It is recommended that this option is used by default.
9. In the Base Time field, select EndTime, ScheduledTime, or StartTime to set what time should be used to calculate the next repetition when the Job resubmits.
10. Set any additional Override properties to control the Job as needed. See the table below.
11. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
12. Click **Save and Close**.

Interval Trigger Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Interval	Description
Schedule interval	This property specifies when the Job will be scheduled on this interval.
Next Scheduled Time UTC	This property specifies the date and time when this Job is next scheduled to run using UTC. This property is updated after one Job submission if the Always Resubmit option is selected.
Always Resubmit?	Select or clear the checkbox to create a new entry for each Job. When this option is selected, a new entry is submitted for each interval. When this option is cleared, the existing entry is repeated if the interval is shorter than the retain time.
Base Time	This property specifies what time should be used to calculate the next repetition when the Job resubmits. Options include: • EndTime – The completion time of the entry in the Monitor. • ScheduledTime – The time the Job is scheduled to run. • StartTime - The actual start time of the Job.

Override	Description
Execute As	This property specifies the set of credentials the Job will execute as when submitted by this Trigger.
Agent	This property specifies the Agent where the Job will execute when the Job is submitted by this Trigger.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled by this Trigger.
Submit On Hold	Select or clear this checkbox to submits the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Comment	This property specifies a comment that will be added to the entry when it is submitted by this Trigger.

Running a Job based on a File

You can add a File Trigger to a Job or a Folder to set it to automatically run if the monitored file is present, available, or absent. If you set the Trigger on a Folder, all Jobs in the Folder will inherit the Trigger.

You will need to create a Credential in JAMS that has access to the location of the file that will be monitored.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **based on a file**.
6. In the Schedule For Date field, enter a date when the Job should run.
7. In the Scheduled Time field, enter the time when the Job should run.
8. In the Credentials field, select the Credentials that have access to the file location.
9. In the File Name field, enter the file path and the name of the file that will be monitored.
10. In the File Presence Option field, select Present, Available, or Absent.
11. In the Recursive field, select or clear the checkbox to have JAMS look in any subfolders for the file.
12. In the Agent field, select the Agent where the file watch will occur.
13. Set any additional Override properties to control the Job as needed. See the table below.
14. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
15. Click **Save and Close**.

File Trigger Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a, Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Schedule	Description
Schedule For Date	This property specifies the date the Job is scheduled to run. If you do not specify a date, the Job will run today at the time specified in the Scheduled Time property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.
Scheduled Time	This property specifies the time of day when the Job is scheduled to run. If you do not specify a time, the Job will run at the current time and on the day specified in the Schedule For Date property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.

Trigger	Description
And Group	All the Triggers in the same "And Group" must fire before the Job is triggered. If you leave the And Group empty, it creates a group with a blank name. All Triggers that have an empty And Group are put into this group and the Job will not run until all Triggers in this group are satisfied.

File Watch	Description
Credentials	Select a set of Credentials for this Trigger. The credentials must have access to the file location.
File Name	This property specifies the file specification to that will be monitored. You can enter the path and file name, such as \\Server\Share*.txt or C:\WatchFiles\Job1.trg" Wildcards are allowed.
File Presence Option	This property specifies if the file must be present, absent, or available.
Minimum Size	This property specifies a minimum acceptable size for the file. This is useful if the is being written by multiple processes.
Recursive	This property specifies whether to perform this action recursively (used for directories).
Agent	This property specifies the Agent where the file watch will be performed.

Override	Description
Execute As	This property specifies the set of credentials the Job will execute as when submitted by this Trigger.
Agent	This property specifies the Agent where the Job will execute when the Job is submitted by this Trigger.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled by this Trigger.
Submit On Hold	Select or clear this checkbox to submit the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Comment	This property specifies a comment that will be added to the entry when it is submitted by this Trigger.

Running a Job based on a Variable

You can add a Variable Trigger to a Job or a Folder to set it to automatically run when the value of the Variable changes. If you set the Trigger on a Folder, all Jobs in the Folder will inherit the Trigger.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **based on a Variable**.
6. In the Schedule For Date field, enter a date when the Job should run.
7. In the Scheduled Time field, enter a time when the Job should run.
8. In the Compare Condition field, select an option to set how the Variable will be compared with the changed value.
9. In the Compare Value field, enter a value that will be used to compare the existing value of the Variable.
10. In the Variable field, select the Variable that will be monitored.
11. Set any additional Override properties to control the Job as needed. See the table below.
12. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
13. Click **Save and Close**.

Variable Trigger Properties

> **NOTE:** A Variable Trigger is evaluated and can run only when the value of the variable has changed, even if the Trigger conditions are currently true. Changing the Job will not cause a Trigger to be evaluated.

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Schedule	Description
Schedule For Date	The date the Job is scheduled to run. If you do not specify a date, the Job will run today at the time specified in the Scheduled Time property. > **NOTE:** If neither property is set, the Job will run immediately if not set in either place.
Scheduled Time	The time of day when the Job is scheduled to run. If you do not specify a time, the Job will run at the current time and on the day specified in the Schedule For Date property. > **NOTE:** If neither property is set, the Job will run immediately if not set in either place.

Trigger	Description
And Group	All the Triggers in the same "And Group" must fire before the Job is triggered. If you leave the And Group empty, it creates a group with a blank name. All Triggers that have an empty And Group are put into this group and the Job will not run until all Triggers in this group are satisfied.

Completion	Description
Compare Condition	This property specifies the type of comparison that should be performed. The available options include changed, equal, less than, greater than, less than equal, greater than equal, not equal, false, or true.
Compare Value	This property specifies the value used in the condition comparison.

Value	Description
Variable	This property specifies the JAMS Variable that contains the default value.

Override	Description
Submit On Hold	Submits the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.

Running a Job Based on an Email

You can add an email Trigger to a Job or a Folder to set it to automatically run based on a monitored email. If you set the Trigger on a Folder, all Jobs in the Folder will inherit the Trigger.

If you are using Microsoft Office 365 Modern Authentication, ensure you have created an EWS Connection Store object and a new Credential in JAMS for the email address/mailbox. Only EWS Connections Store objects can be used for Modern Authentication. See ***Connections to Mail Servers* on page 22** for more information.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **based on an email**.
6. In the Schedule For Date field, enter a date when the Job should run.
7. In the Mail Server field, enter the server name of the mail server.
8. In the Mail Credentials field, enter the Credentials that are used to access the mail server.
9. In the Subject field, enter the text in the subject line that will be used as part of the mail watch Job.
10. In the From Address field, enter the email address that the mail watch Job will watch for.
11. In the To Address field, enter the email address that the mail watch Job will watch for.
12. Set any additional Override properties to control the Job as needed. See the table below.
13. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
14. Click **Save and Close**.

Mail Trigger Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Schedule	Description
Schedule For Date	This property specifies the date the Job is scheduled to run. If you do not specify a date, the Job will run today at the time specified in the Scheduled Time property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.
Scheduled Time	This property specifies the time of day when the Job is scheduled to run. If you do not specify a time, the Job will run at the current time and on the day specified in the Schedule For Date property. **NOTE:** If neither property is set, the Job will run immediately if not set in either place.

Trigger	Description
And Group	All the Triggers in the same "And Group" must fire before the Job is triggered. If you leave the And Group empty, it creates a group with a blank name. All Triggers that have an empty And Group are put into this group and the Job will not run until all Triggers in this group are satisfied.

Mail Server	Description
Mail Server	This property sets the Connection Store object that specifies the mail server to use when sending e-mail. For Modern Authentication, select the EWS Connection Store object.
Mail Credentials	This property specifies the Credentials used to access the mail server and the email account that will be monitored. These mail Credentials override the mail Credentials on the Connection Store object. Otherwise, the mail Credentials on the Connection Store object are used.

Disposition	Description
Mark as Read	When this option is set to true, the e-mail will be marked as read when the trigger runs.
Delete E-Mail	When this option is set to true, the e-mail will be deleted from the mail server when the trigger runs.

Mail Selection	Description
Subject	This property specifies the subject of the e-mail that JAMS will watch for to trigger the Job. If the Subject contains the specified text regardless of the capitalization, the criteria for this trigger will be met.
From Address	This property specifies the from address for the email that JAMS will watch for to trigger the Job.
To Address	This property specifies an address to look for in the To: field of the email that JAMS will watch for to trigger the Job.

Override	Description
Execute As	This property specifies the set of credentials the Job will execute as when submitted by this Trigger.
Agent	This property specifies the Agent where the Job will execute when the Job is submitted by this Trigger.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled by this Trigger.
Submit On Hold	Select or clear this checkbox to submits the Job on Hold when it is scheduled by this Trigger. The Job will require manual intervention before it is allowed to run.
Comment	This property specifies a comment that will be added to the entry when it is submitted by this Trigger.

Running a Job Based on a Recurrence (Same Monitor Entry)

You can add a Recurrence option to a Job to set it to run repeatedly. A recurrence gives you more granular control than an Interval Trigger. For example, you can set a Recurrence option to run the Job every hour from 8am to 5pm. You can also set this to run daily or only on weekdays/workdays.

The same Monitor Entry will be resubmitted, so the number will not change. This is useful to keep the list of Entries in the Monitor view smaller because the same Entry/number is reused.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **based on a recurrence (same Monitor Entry)**.
6. In the Delay field, enter the time/interval between each recurrence of the Job.
7. In the EndTime field, enter the time of day when the recurrence is set to end. This value can be left blank to use the default of midnight.
8. In the BaseTime field, select the value that is used to determine the next recurrence of the Job.
   - EndTime – The completion time of the Entry.
   - ScheduledTime – The Scheduled time of the Job.
   - StartTime – The actual start time of the Job.
9. In the Repeat On Error field, select the desired recurrence action if the Job fails.
10. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
11. Click **Save and Close**.

Recurrence (Same Monitor Entry) Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.
Started	This property is a read-only field that displays when the recurrence has started. It is updated in the Monitor Entry view only after the Job has been submitted.
Will Stop Repeating	This property is a read-only field that displays when the recurrence will stop. It is updated in the Monitor Entry view only after the Job has been submitted.
Repeat	**Description**
Delay	Enter the time/interval between each recurrence of the Job.
End Time	Enter the time of day when the recurrence is set to end. This value can be left blank to use the default of midnight.
Base Time	Select the value that is used to determine the next recurrence of the Job. • EndTime – The completion time of the Entry. • ScheduledTime – The Scheduled time of the Job. • StartTime – The actual start time of the Job.

Repeat	Description
Resubmit on Error	Select or clear the checkbox to set if the Job should continue to resubmit after a Job failure.

Running a Job Based on a Recurrence (New Monitor Entry)

You can add a Recurrence option to a Job to set it to run repeatedly. A recurrence gives you more granular control than an Interval Trigger. For example, you can set a Recurrence option to run the Job every hour from 8am to 5pm. You can also set this to run daily or only on weekdays/workdays.

A new Monitor Entry will be submitted, so the number will change. This is useful because the Entries may be easier to track because each one has a unique Entry number for each Job execution.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Run this job** | **based on a recurrence (new Monitor Entry)**.
6. In the Delay field, enter the time/interval between each recurrence of the Job.
7. In the EndTime field, enter the time of day when the recurrence is set to end. This value can be left blank to use the default of midnight.
8. In the BaseTime field, select the value that is used to determine the next recurrence of the Job.
   - EndTime – The completion time of the Entry.
   - ScheduledTime – The Scheduled time of the Job.
   - StartTime – The actual start time of the Job.
9. In the Resubmit On Error field, select the desired recurrence action if the Job fails.
10. Click **Finish**. The Trigger is listed under the **Run this job** section on the Schedule tab.
11. Click **Save and Close**.

Recurrence (New Monitor Entry) Properties

Status	Description
Enabled	Select or clear this checkbox to enable or disable a Trigger. When this option is disabled, this Trigger will not cause the Job to run.

Status	Description
Started	This property is a read-only field that displays when the recurrence has started. It is updated in the Monitor Entry view only after the Job has been submitted.
Will Stop Repeating	This property is a read-only field that displays when the recurrence will stop. It is updated in the Monitor Entry view only after the Job has been submitted.

Repeat	Description
Delay	Enter the time/interval between each recurrence of the Job.
End Time	Enter the time of day when the recurrence is set to end. This value can be left blank to use the default of midnight.
Base Time	Select the value that is used to determine the next recurrence of the Job. • EndTime – The completion time of the Entry. • ScheduledTime – The Scheduled time of the Job. • StartTime – The actual start time of the Job.
Repeat on Error	Select or clear the checkbox to set if the Job should continue to repeat after a Job failure.

Dependencies

Dependencies let you control when a scheduled Job starts executing based on a prerequisite condition. A Job or Folder can have an unlimited number of Dependencies.

Dependencies require the Job to be submitted to the Monitor view (either manually or via a Trigger) before they are evaluated. A Dependency is a condition that needs to be satisfied before an Entry is released to start executing. When the Job with a Dependency reaches its Hold Time in the Monitor view, it will have a state of Waiting for Prerequisites until all Dependency conditions are met.

You may also create your own user-defined Dependencies through Precheck Jobs, which can be used to ensure a specific condition has been met before allowing the Job to run. These let you add the ability to handle any type of pre-processing needs.

Set a Dependency on a Job

You can add a Dependency on another Job to have completed. The Job will remain in a Waiting for Prerequisites state until the Dependency has been met. You can also specify the required completion severity to ensure it completed as expected.

A Depends on Job is required. A Since Job or Within Time is optional. If no Since Job or Since Severity is specified, the JAMS Scheduler will look forward in time for a new completion of the Depends on Job that meets the specified Completion Severity. If a Since Job is provided, the JAMS Scheduler will also look back in time as far as the last completion of the Since Job that meets the Since Severity. If a Within Time is provided, the JAMS Scheduler will also look back in time as far as the specified period.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **Job**.
6. In the Depends on Job field, click **...** to select the Job that will be monitored.
7. In the Wait for All field, optionally select the checkbox to wait for all instances of this dependency to complete before satisfying the dependency.
8. In the Completion Severity field, select the minimum severity for the Job selected in the Depends on Job field. The Job must meet or exceed this severity.
9. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
10. Click **Save and Close**.

Job Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Since	Description
Since Job	This property specifies the Job to use to define how far back we look for the completion of the Depends On Job. Specifying this property is optional.
Since Severity	This property specifies completion severity the Job specified in the Since Job field must have to satisfy the dependency. The Job must meet or exceed this set severity. Specifying this property is optional.

Since	Description
Within Time	This property specifies a delta time to define how recently the Depends On Job must have completed to satisfy the dependency. Specifying this property is optional.

Depends On	Description
Depends on Job	This property specifies the Job that will be monitored for the dependency. The parent Job will wait for this Job to complete before it will run.
Wait For All	This checkbox is used if there is more than one instance of the Depends on Job. Select the checkbox to wait for all of them to complete before satisfying the dependency. Clear the checkbox to allow the dependency to be satisfied if only one instance of the Depends on Job completes, if there are multiple instances.
Completion Severity	This property specifies the completion severity the Depends on Job must meet or exceed to satisfy the dependency.

Set a Dependency on a Job (date specific)

You can add a Dependency on another Job to have completed on a certain date/day. The Job will remain in a Waiting for Prerequisites state until the Dependency has been met on the specified day. You can also specify the required completion severity to ensure it completed as expected.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **Job (date specific)**.
6. In the Depends on Job field, click **…** to browse to the Job that will be monitored as a dependency.
7. In the Wait For All field, optionally select the checkbox wait for all instances of the Job defined in this Dependency to complete before satisfying the dependency, if there are multiple instances of this Dependency.
8. In the Completion Severity field, set the completion severity the Depends on Job must meet or exceed to satisfy the Dependency.
9. In the Depend on Date field, select the date that the Depends on Job must have been completed according to the Completion Severity property that was specified.

10. Set any additional Override properties to control the Job as needed. See the table below.

11. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.

12. Click **Save and Close**.

Date Specific Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Override	Description
Calendar	When a Calendar is listed, the Job will have access to the Date Types, such as holidays, in the Calendar.

Depends On	Description
Depends on Job	This property specifies the Job that will be monitored for the dependency. The parent Job will wait for this Job to complete before it will run.
Wait For All	This checkbox is used if there is more than one instance of the Depends on Job. Select the checkbox to wait for all of them to complete before satisfying the dependency. Clear the checkbox to allow the dependency to be satisfied if only one instance of the Depends on Job completes, if there are multiple instances.
Completion Severity	This property specifies the completion severity the Depends on Job must meet or exceed to satisfy the dependency.
Depend on Date	This property specifies a natural language date specification for the date that the Depends On Job must have completed on. It is the date used to evaluate this dependency. You can select a date from the drop-down menu or enter a value such as "First Monday of Month".

Set a Dependency on a Precheck Job

You can set a Dependency on a Precheck Job, which lets you define any type of condition that a Job can be built to look for. A Precheck Job will be run automatically before the parent Job. This gives you additional flexibility beyond the built-in Dependency options. Any Job Definition can be specified. For example, you can have a Precheck Job to watch for a

value in a database to change. Precheck Jobs can be written to loop internally until a condition is met. This avoids creating a new Entry each time the logical check is performed.

If the Precheck Job is successful, this Job will run. If the Precheck Job fails, it is submitted again based on the specified interval. This will continue until the Precheck Job is successful.

You can also use exit codes to control the response of the parent Job to the Precheck Job. See Precheck Job Exit Handling Methods for PowerShell for more information. In addition to these options, you can use the following exit codes with Jobs running on an SSHAgentX Agent:

- 0 = Continue executing
- 101 = Cancel the parent Job with a final severity of Success.
- 102 = Cancel the parent Job with a final severity of Info.
- 103 = Cancel the parent Job with a final severity of Warning.
- 104 = Cancel the parent Job with a final severity of Error.
- 105 = Try again

You can also use predefined Parameters with a Precheck Job that can be parsed within a Precheck Job. The Parameters can be used for retrieving details from the Parent Job. See Precheck Job Parameters for more information.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **Precheck Job**.
6. In the Precheck Job field, click **...** to browse to the Precheck Job.
7. Double-click the Precheck Job.
8. Click **Ok**.
9. In the Precheck Interval field, enter the interval for running the Precheck Job.
10. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
11. Click **Save and Close**.

Precheck Job Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Prerequisite	Description
Precheck Job	This property specifies a Job that must successfully executes before this Job is allowed to start.
Precheck Interval	This property specifies the delay between executions of the Precheck Job if the Precheck Job fails. If the Job already has an internal loop, this option may not be used.

Set a Dependency on a File

You can set a File Dependency on a Job. This will prevent a Job from running until the specified file is present, absent, or available. Before you set the File Dependency, create a Credential that has access to the file. See Working with User Credential Definitions for more information.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **file**.
6. In the Credentials field, select the Credential that has access to the file.
7. In the File Name field, enter the name of the file.
8. In the File Presence Option field, select the state of the file. You can select Present, Available, or Absent.
9. In the Minimum Size field, enter the minimum size in bytes that is allowed for the file.
10. In the Agent field, select that Agent that will be used to run the File Watch Job.
11. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
12. Click **Save and Close**.

File Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

File Watch	Description
Credentials	Select a Credential for this dependency. The Credentials must have access to the file location.
File Name	This property specifies the file to watch for. Wildcards are allowed.
File Presence Option	This property specifies if the file must be present, absent, or available to satisfy the dependency.
Minimum Size	This property specifies a minimum acceptable size for the file.
Agent	This property specifies the Agent where the file watch will be performed.

Set a Dependency on a Variable

You can add a Dependency on a Variable. This is useful to ensure a Variable value is set properly before allowing a Job to run. A Job or process can set the value of the Variable for a downstream Job to evaluate based on a defined condition.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **Variable**.
6. In the Compare Condition field, select the type of comparison that will be used on the Variable.
7. In the Compare Value field, enter a default value that will be used for the comparison.
8. In the Variable field, select the Variable that will be monitored.
9. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
10. Click **Save and Close**.

Variable Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Condition	Description
Compare Condition	This property specifies the type of comparison that should be performed. The available options include less than, greater than, less than equal, greater than equal, false, or true.
Compare Value	This property specifies the value used in the condition comparison.

Value	Description
Variable	This property specifies JAMS Variable that contains the default value.

Set a Dependency on a Resource

You can add a Resource Dependency to a Job to prevent it from running until enough Resources from the Resource Pool in JAMS are available. This is used when setting up a maintenance window.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **Resource**.
6. In the Resource field, select the Resource for the dependency.
7. In the Quantity Required field, enter a quantity that is required to satisfy the Resource Dependency.
8. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
9. Click **Save and Close**.

Resource Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Resource	Description
Resource	This property specifies the Resource that will be used for this dependency.

Resource	Description
Quantity Required	This property specifies the resource quantity that is required to satisfy the dependency.

Set a Dependency on a Time Window

You can set a Dependency on a time window. This will allow a Job to run only within a specified range of time.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click the desired Job or Folder and select **Properties**.
3. Select the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **time window**.
6. In the Missed Window Action field, select an action for the Job when the time window is closed.
7. In the Schedule Window field, select the Named Time or specify a Schedule From Time and a Schedule To Time.

   > **NOTE:** When using a Named Time on a time window, leave Schedule From Time and Schedule To Time blank.

8. Click **Finish**. The Dependency is listed under the **This Job depends on a** section on the Schedule tab.
9. Click **Save and Close**.

Time Window Dependency Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this dependency.

Window	Description
Missed Window Action	The action taken when the Schedule Window is missed. The following options are available: • **No Action**: If you manually or automatically submit a Job that has **No Action** selected, the Job will start based on the submitted time. If a Schedule window has been set and you manually submit the Job, a message will be displayed on the Submit dialog to display the current Schedule window time range. A No Action Job will run to completion, even if the Schedule window closes. • **Continue**: The Job does not start until the Schedule window opens and continues running to completion, even if the Schedule window closes. There is no rescheduling option. • **Abort or Delete**: The Job does not start until the Schedule window opens and is deleted or aborted if the window closes before the Job is completed. • **Reschedule or Continue**: The Job does not start until the Schedule window opens. If the Job does not start by the time the window closes, it is rescheduled for the next time the window opens. If the Job does start, this action allows the Job to continue to completion even if the window closes. • **Restart and Reschedule**: The Job does not start until the Schedule window opens. If the Job has not completed by the time the window closes, the Job is forced to abort, and is rescheduled to run the next time the window opens.
Schedule From Time	This property specifies the start of the scheduled time window for the Job. **NOTE:** When using a Named Time on a time window, leave Schedule From Time and Schedule To Time blank.
Schedule To Time	This property specifies the end of the scheduled time window for the Job. **NOTE:** When using a Named Time on a time window, leave Schedule From Time and Schedule To Time blank.

Window	Description
Schedule Window	This property specifies the Named Time that is a flexible window of time where Jobs may be scheduled to run.

Notify	Description
Notify Event Class	Select the event class that this event will generate when it occurs. You can select None, Normal, Low, Moderate, High, Urgent, or Critical.
Notify of Missed Window	Select the checkbox to generate an event of the specified Notify Event Class if the Job has not started when the time window closes. Clear the checkbox to have the event generated if the Job has not completed when the time window closes.
Notify Only If Not Started	Select the checkbox to set the Notify Event Class option if the Job has not started when the time window closes. Clear the checkbox to not set the Notify Event Class option if the Job has not completed when the time window closes.
Level	This property specifies the level to be used by event handlers to classify events.
Message	Enter a message that will be passed to event handlers when this event is generated.

Job Status

JAMS can trigger an event based on the execution status of a Job. The following options are available:

- Runaway: The Job ran longer than expected.
- Short: The Job ran too quickly.
- Stalled: The Job is waiting on a prerequisite, such as a Dependency or a Resource.

That event can then be used to send an email notification or execute another Job. See **_Events and Notifications_ on page 167** for more information.

Adding a Runaway Event

The Runaway event tracks how long a Job has been running. If the Job exceeds the specified time, the Runaway event is triggered, raising the specified event class flag. In the Monitor view, the Tag column will display "Runaway" if the Job runs longer than expected.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.

3. Click the **Schedule** tab.

4. Click **+**.

5. Select **Set this Job's status to** | **runaway**.

6. In the Runaway Elapsed field, enter the amount of time the Job can execute before it is considered a Runaway Job.

7. In the Runaway Elapsed Percent field, enter a percentage of elapsed time before the Job is considered a Runaway Job. This value is based on the previous run history for the Job in JAMS.

8. In the Runaway Action field, select the action to occur when the Job becomes a Runaway Job. You can cancel the Job with a variety of statuses or select **NoAction** to keep the Job running.

9. In the Notify Event Class field, select which event flag is raised, so JAMS will send an email notification or run a notification Job.

10. In the Message field, enter any specific details for this event to be passed to the body of an email. Use this field if the information you enter differs from what is specified within the body on the Send an Email option applied to this event, or to fine-tune your notifications.

11. Click **Finish**. The Event is listed under the **Set this Job's status to** section on the Schedule tab.

12. Add an email or Notification Job Event for the **Notify Event Class**. See *Events and Notifications* on page 167 for more information.

13. Click **Save and Close**.

Runaway Event Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this event.

Runaway	Description
Force to Abort	This property determines if the entry should be forced to abort with the severity specified in the Runaway Action field. When the checkbox is selected, the behavior is the same as when you cancel a Job from the Monitor view with the **Force job to abort** option. If you select **No Action** for the Runaway Action, this option has no effect.
Runaway Elapsed	This property sets, in Delta Time, how long the Job can run before it is considered a runaway Job. This is the total amount of time the Job has been executing.

Runaway	Description
Runaway Elapsed Percent	This property sets how long the Job can run before it is considered a runaway Job, set as a percentage of the Job's average elapsed time.
Runaway Action	This property determines the action to be taken on the Job if it becomes a runaway Job.

Notify	Description
Notify Event Class	Select the event class flag that this event will raise when it occurs.
Level	This property can be used by event handlers to classify events.
Message	This property specifies a message that will be passed to event handlers when this event is generated.

Adding a Short Event

The Short event is used if the Job has completed too quickly within the specified time. This is useful to identify a Job that may not have properly run, even if it completed and reported Success to JAMS.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.
5. Select **Set this Job's status to** | **short**.
6. In the Short Elapsed field, enter the minimum elapsed time for successful completion of the Job.
7. In the Short Elapsed Percent field, enter a percentage of elapsed time for successful completion of the Job.
8. In the Short Severity field, enter the Job completion severity to be set when the event is triggered.
9. In the Notify Event Class field, select which event flag is raised, so JAMS will send an email notification or run a notification Job.
10. In the Message field, enter any specific details for this event to be passed to the body of an email. Use this field if the information you enter differs from what is specified within the body on the Send an Email option applied to this event, or to fine-tune your notifications.

11. Click **Finish**. The Event is listed under the **Set this Job's status to** section on the Schedule tab.

12. Add an email or Notification Job Event for the **Notify Event Class**. See ***Events and Notifications* on page 167** for more information.

13. Click **Save and Close**.

Short Event Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this event.
Short	**Description**
Short Elapsed	This property sets the minimum elapsed time for successful completion of the Job. If the Job completes successfully without exceeding the short time, configured notifications and completion severity changes will execute.
Short Elapsed Percent	This property sets the minimum elapsed time for a successful completion of the Job, set as a percentage of the Job's average elapsed time. If the Job completes successfully without exceeding the short elapsed percent, configured notifications and completion severity changes will execute.
Short Severity	This property sets the completion severity if the Job meets Short Job criteria.
Notify	**Description**
Notify Event Class	Select the event class flag that this event will raise when it occurs.
Level	This property can be used by event handlers to classify events.
Message	This property specifies a message that will be passed to event handlers when this event is generated.

Adding a Stalled Event

The Stalled event tracks the amount of time a Job has been waiting for a prerequisite like a Dependency or Resource. This enables alerts to be sent if the Job has been waiting for longer than the specified time.

1. Click **Definitions** from the Shortcuts menu.

2. Right-click a Job or Folder and select **Properties**.

3. Click the **Schedule** tab.

4. Click **+** .

5. Select **Set this Job's status to** | **stalled**.

6. In the Stalled Time field, enter the amount of time the Job can wait before it is considered stalled.

7. In the Notify Event Class field, select which event flag is raised, so JAMS will send an email notification or run a notification Job.

8. In the Message field, enter any specific details for this event to be passed to the body of an email. Use this field if the information you enter differs from what is specified within the body on the Send an Email option applied to this event, or to fine-tune your notifications.

9. Click **Finish**. The Event is listed under the **Set this Job's status to** section on the Schedule tab.

10. Add an email notification for the **Notify Event Class**. See ***Events and Notifications on page 167*** for more information.

11. Click **Save and Close**.

Stalled Event Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable this event.
Stalled	**Description**
Stalled Time	The maximum elapsed time for a Job to be waiting on prerequisites before it is considered 'Stalled'. An entry that exceeds the stalled time in a waiting for prerequisites state is considered stalled and will cause any configured notifications to be sent.
Notify	**Description**
Notify Event Class	Select the event class flag that this event will raise when it occurs.
Level	This property can be used by event handlers to classify events.
Message	This property specifies a message that will be passed to event handlers when this event is generated.

Events and Notifications

Events and notifications are used to respond to executing or completed JAMS Jobs. Events may be configured to send notifications when Jobs fail or complete with any severity. Events and notifications can be used to handle standard and specific events in a variety of ways, including sending email notifications or running recovery processes/Jobs. These events and notifications rely on an event class to be set in a Schedule Item for a Job or Folder. For example, you can set use the Job Status option (**Set this Job's status to** | **runaway**) to set the Notify Event Class property to Urgent. You can then configure one or more of the events/notifications listed in this article to watch for this Urgent event.

You can configure multiple event handlers, or notifications, for a single Job. You can add events and notifications to a Folder and they will be inherited by that Folder's child objects.

Send an Email after an Event

You can have an email sent to an address if a specified event occurs. For example, if a Job is set to a Runaway status and it has an event flag or finishes in failure, you can have an email sent to alert someone to review the Job in the Monitor. The email event/notification will watch for the matching event or the entry status, which are defined in the table below. For example, if a Stalled Job has an event class of Urgent selected, an email will be sent when the Urgent event occurs. See *Job Status* **on page 163** for more information on these events.

The Send Email item can be used to generate an email notification for any Schedule Item that sets an event flag. It can also be used to send email notifications when Jobs start, or complete with any specified Final Severity.

Depending on the type of mail server you are using, ensure one the following is set up:

- An SMTP Connection Store item and a Credential to use with the SMTP Connection.
- A Graph API Connection Store item and a Credential to use with the Graph API Connection.

See *Connections to Mail Servers* **on page 22** and *Working with User Credential Definitions* **on page 293** for more information.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+** .
5. Select **When an event occurs** | **send an e-mail**.
6. In the Events section, select one or more statuses for the completed Entry in the Monitor or the Event that will trigger the email to be sent.
7. In the Mail Server field, select the Connection Store item for the mail server.

8. In the To Address field, enter the email address where the email will be sent.

9. In the Subject field, add a subject line for the email.

10. In the Message Body field, click in the field to add the email message and click **OK**.

11. Click **Finish**. The Event is listed under the **When an event occurs** section on the Schedule tab.

12. Click **Save and Close**.

E-Mail Event Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the Event.

Events	Description
Entry Success	This property specifies if the email/event should be triggered after a successful completion status.
Entry Informational	This property specifies if the email/event should be triggered after an information completion status.
Entry Warning	This property specifies if the email/event should be triggered after a warning completion status.
Entry Error	This property specifies if the email/event should be triggered after an error completion status.
Entry Fatal	This property specifies if the email/event should be triggered after a fatal completion status.
Entry Started	This property specifies if the email/event should be triggered after a Job has started to run.
Normal Event	This property specifies if the email/event should be triggered after an event with the event class Normal occurs.
Low Event	This property specifies if the email/event should be triggered after an event with the event class Low occurs.
Moderate Event	This property specifies if the email/event should be triggered after an event with the event class Moderate occurs.
High Event	This property specifies if the email/event should be triggered after an event with the event class High occurs.
Urgent Event	This property specifies if the email/event should be triggered after an event with the event class Urgent occurs.
Critical Event	This property specifies if the email/event should be triggered after an event with the event class Critical occurs.

E-Mail	Description
Mail Server	Select the Connection from the Connection Store for the mail server to check for e-mail.
To Address	Enter a comma-separated list of email addresses that the email will be sent to. You can remove inherited addresses by prefixing the address with a minus sign (-). You can remove all inherited addresses by entering -*.
Subject	This property specifies the subject of the email.
Message Body	This property specifies the body of the email message. Users may enter Markdown language in the Message Body.
CC Address	Enter a comma-separated list of email addresses that will be cc'd on the email. You can remove inherited addresses by prefixing the address with a minus sign (-). You can remove all inherited addresses by entering -*.
Send Plain Text	Select the checkbox to send the email using only plain text. If the checkbox is cleared, html formatting is used. Note that if Send Plain Text is true, Markdown Language in the Message Body will not format properly.
Message Priority	This property specifies the priority to use when the email is sent. You can select Normal, Low, or High.

Run a Notification Job after an Event

You can add a Schedule Item to run a Notification Job after a Job completes with a specified status, or after any events configured on the Job. This is useful to send a notification that contains more information than an email and a log file, as described in the Email Notification section above. It can also be used to automatically create tickets in 3rd party ITSM tools on Job failure. Any type of Job can be run as part of this notification.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+** .
5. Select **When an event occurs** | **run a Notification Job**.
6. In the Notification Job field, click … to select the Job to be used as the Notification Job.
7. Click **Ok**.
8. In the Events section, select one or more types of events that will trigger the Notification Job to run.

9. Click **Finish**. The Event is listed under the **When an event occurs** section on the Schedule tab.

10. Click **Save and Close**.

Notification Job Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the Event.
Execute	**Description**
Notification Job	This property specifies the JAMS Job that runs when notification is required.
Events	**Description**
Entry Success	This property specifies if the event should be triggered after a successful completion status.
Entry Informational	This property specifies if the event should be triggered after an information completion status.
Entry Warning	This property specifies if the event should be triggered after a warning completion status.
Entry Error	This property specifies if the event should be triggered after an error completion status.
Entry Fatal	This property specifies if the event should be triggered after a fatal completion status.
Entry Started	This property specifies if the event should be triggered after a Job has started to run.
Normal Event	This property specifies if the event should be triggered after an event with the event class Normal occurs.
Low Event	This property specifies if the event should be triggered after an event with the event class Low occurs.
Moderate Event	This property specifies if the event should be triggered after an event with the event class Moderate occurs.
High Event	This property specifies if the event should be triggered after an event with the event class High occurs.
Urgent Event	This property specifies if the event should be triggered after an event with the event class Urgent occurs.
Critical Event	This property specifies if the event should be triggered after an event with the event class Critical occurs.

Run a Recovery Job after an Event

You can add a Schedule Item to run a Recovery Job after a Job completes with a specified status. This is useful if you have Job that may occasionally fail for a predictable reason. This allows you to configure the Recovery Job to run a script and make the necessary updates or corrections. Recovery Jobs can only be triggered by the completion severity of the Job it is configured on.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+** .
5. Select **When an event occurs** | **run a Recovery Job**.
6. In the Recovery Job field, click **…** to select the Job to run as the Recovery Job.
7. Click **Ok**.
8. In the Recovery Severity field, select the severity that will trigger the Recovery Job to run.
9. Click **Finish**. The Event is listed under the **When an event occurs** section on the Schedule tab.
10. Click **Save and Close**.

Recovery Job Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the Event.
Execute	**Description**
Recovery Job	This property specifies the JAMS Job that should run when the current Job does not exceed the configured Recovery Severity.
Trigger	**Description**
Recovery Severity	This property specifies the maximum completion severity required to trigger the Recovery Job.

Reports

You can schedule reports to be sent from JAMS Jobs or JAMS Integration Pack applications. Use the Schedule tab on a Job to create several types of reports. The

Execution Method that these Jobs are based on will create the related reports. The Reports Schedule Items (Send a Report) will send the report to the appropriate place.

Send a Report as an Email

You can use JAMS to create and send a report as an email. Use the JAMS Reports Execution Method to create a Job that creates a Report. You can then add the Schedule Item below to have the report sent as an email.

Depending on the type of mail server you are using, ensure an SMTP or a Graph API Connection Store item has been configured. See **Connections to Mail Servers on page 22** for more information.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click the **+** button.
5. Select **Send a report** | **as an e-mail**.
6. In the Mail Server field, select the Connection Store item for the mail server.
7. In the To Address field, enter the email address where the email will be sent.
8. In the Subject field, add a subject line for the email.
9. In the Message Body field, click in the field to add the email message and click **OK**.
10. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.
11. Click **Save and Close**.

Email Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being generated.

E-Mail	Description
Mail Server	This property specifies the server to check for e-mail. Use the drop-down menu to select a Mail Server Connection from the Connection Store.
To Address	This property specifies one or more email addresses that the email will be sent to. You can enter a comma-separated list of e-mail addresses.

E-Mail	Description
Subject	This property specifies the subject of the e-mail.
Message Body	This property specifies the body of the e-mail message. You can enter Markdown language in the message body.
Cc Address	This property specifies one more email address that the email will be sent to. You can enter a comma-separated list of e-mail addresses.

Send a Report as a JD Edwards Report

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click the **+** button.
5. Select **Send a report** | **as a JDE Report**.
6. In the Printer Name field, enter the name of the printer to be used.
7. In the Copies field, enter the number of copies to be printed.
8. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.
9. Click **Save and Close**.

JD Edwards Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being generated.

Execute	Description
Conversion Filter	This property specifies the name of the conversion filter that should be applied to the report before it is sent to the printer.
Printer Name	This property specifies the name of the printer to use.
Copies	This property specifies the number of copies to be printed.

Send a Report as a Microsoft Dynamics Email Report

You can use JAMS to create and send a report as a Microsoft Dynamics email report. Use the MSDAX2012Job Execution Method to create a Job that creates a Report. You can then add the Schedule Item below to have the report sent as an email.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click the **+** button.
5. Select **Send a report** | **as an MS Dynamics Email**.
6. In the Start Page field, enter the first page of the report.
7. In the End Page field, enter the last page of the report.
8. In the To Address field, enter the email address where the email will be sent.
9. In the Subject field, add a subject line for the email.
10. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.
11. Click **Save and Close**.

Microsoft Dynamics Email Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being emailed.
Execute	**Description**
Start Page	This property specifies the first page of the report.
End Page	This property specifies the last page of the report.
E-Mail	**Description**
To Address	This property specifies one or more email addresses that the email will be sent to. You can enter a comma-separated list of e-mail addresses.
Subject	This property specifies the subject of the e-mail.
Cc Address	This property specifies one more email address that the email will be sent to. You can enter a comma-separated list of e-mail addresses.

Send a Report as a Microsoft Dynamics File Report

You can use JAMS to create and send a report as a Microsoft Dynamics File report. Use the MSDAX2012Job Execution Method to create a Job that creates a Report. You can then add the Schedule Item below to have the report sent as a file report.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.
3. Click the **Schedule** tab.
4. Click the **+** button.
5. Select **Send a report** | **as an MS Dynamics File Report**.
6. In the File Format field, enter the extension of the file.
7. In the Start Page field, enter the starting page of the file that will be sent.
8. In the End Page field, enter the ending page of the file that will be sent.
9. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.
10. Click **Save and Close**.

Microsoft Dynamics File Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being emailed.
Execute	**Description**
File Format	This property specifies the file extension of the file.
Start Page	This property specifies the starting page of the report.
End Page	This property specifies the ending page of the report.
File Watch	**Description**
File Name	This property specifies the name of the file that will be saved.

Send a Report as a Microsoft Dynamics Print Report

You can use JAMS to create and send a report as a Microsoft Dynamics File Print report. Use the JAMS MSDAX2012Job Execution Method to create a Job that creates a Report. You can then add the Schedule Item below to have the report sent to a printer.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job and select **Properties**.

3. Click the **Schedule** tab.

4. Click the **+** button.

5. Select **Send a report** | **as an MS Dynamics Print Report**.

6. In the Printer Name field, enter the name of the printer that will be used.

7. In the Copies field, enter the number of copies that will be printed.

8. In the Start Page field, enter the starting page of the file that will be sent.

9. In the End Page field, enter the ending page of the file that will be sent.

10. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.

11. Click **Save and Close**.

Microsoft Dynamics Print Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being saved as a file.
Execute	**Description**
Printer Name	This property specifies the name of the printer to use.
Copies	This property specifies the number of copies to be printed.
Start Page	This property specifies the first page of the report.
End Page	This property specifies the last page of the report.

Send a Report as an SSRS Print Report

You can use JAMS to create and send a report as an SSRS report. Use the SSRS Execution Method to create a Job that creates a Report. You can then add the Schedule Item below to have the report sent to a printer.

1. Click **Definitions** from the Shortcuts menu.

2. Right-click a Job and select **Properties**.

3. Click the **Schedule** tab.

4. Click the **+** button.

5. Select **Send a report** | **as an SSRS Print Report**.

6. In the Printer field, enter the name of the printer that will be used.

7. In the Start Page field, enter the first page of the report that will be printed.

8. In the End Page field, enter the last page of the report that will be printed.

9. Click **Finish**. The Report is listed under the **Send a report** section on the Schedule tab.
10. Click **Save and Close**.

SSRS Print Report Properties

Status	Description
Enabled	Select or clear the checkbox to enable or disable the report from being printed.
Execute	**Description**
Printer Name	This property specifies the name of the printer used.
Start Page	This property specifies the first page of the report.
End Page	This property specifies the last page of the report.
Page Width	This property specifies the width of the printed page.
Page Height	This property specifies the height of the printed page.
Print DPI X	This property specifies the horizontal resolution of the printout in dots per inch.
Print DPI Y	This property specifies the vertical resolution of the printout in dots per inch.

Documentation Items

Documentation Items are user-defined sections of content included in a Job's notification or in the Documentation tab of a Job or Folder. Documentation Items let you include important information for a Job and format it as needed. You can also add a link to websites, such as an internal Wiki, or the contact information for the team to call if there is an issue with the Job. You can add multiple Documentation Items to a Job or Folder to keep records of any new or updated text.

If you add a Documentation Item in the parent Folder, any Jobs within that Folder will inherit the same Documentation Item. You can view which Items are inherited by hovering over each Item in the Documentation Entries and Links section on the Documentation tab. A tooltip displays if the Item is inherited.

Two options are available when adding a Documentation Item:

- A Documentation Entry - You can enter notes and information about a Job and format it using Markdown or HTML tags.
- A Link – You can enter a link to a website.

The Documentation tab displays the Documentation items assembled from the Job and any parent Folders. Job Documentation may be edited from the Job or Folder where the Documentation is inherited from.

Adding a Documentation Entry Item to a Job or Folder

1. Click **Definitions** from the Shortcuts menu.

2. Right-click a Job or Folder and select **Properties**.

3. Click the **Documentation** tab.

4. Click **+**.

5. Select **Add** | **a documentation entry**.

6. In the Documentation Type field, select an option. See the table below for more information.

7. In the Section field, enter a number to identify the section for the next. For example, you can enter a multiple of 10 so you can insert information between sections without editing all section numbers.

8. In the Content field, enter the text for the Documentation Entry after {InheritedValue} and click **OK**. You can format this text as needed using Markdown or HTML.

9. Click **Finish**. The Documentation Entries and Links section on the Documentation tab displays the new item.

10. Click **Save and Close**.

Adding a Documentation Link to a Job or Folder

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Documentation** tab.
4. Click **+**.
5. Select **Add** | **a link**.
6. In the Documentation Type field, select an option. See the table below for more information.
7. In the Section field, enter a number to identify the section for the next. For example, you can enter a multiple of 10 so you can insert information between sections without editing all section numbers.
8. In the Link Target field, enter the URL for the link.
9. In the Link Text field, enter the text to display for the link.
10. In the Link Template field, enter the format for displaying the link.
11. Click **Finish**. The Documentation Entries and Links section on the Documentation tab displays the new item.
12. Click **Save and Close**.

Modifying a Documentation Item on a Job or Folder

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Documentation** tab.
4. In the Documentation Entries and Links section, double-click a Documentation Item.
5. Make the desired changes.
6. Click **Save and Close**.

Removing a Documentation Item from a Job or Folder

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Documentation** tab.
4. In the Documentation Entries and Links section, click a Documentation Item.
5. Click **X**.
6. When you are prompted to confirm the deletion, click **Yes**.
7. Click **Save and Close**.

Documentation Properties

Each documentation item has a list of associated properties used to define how the documentation is handled. Reference the tables below for a description of the properties available on each documentation element.

Documentation Entry

Documentation	Description
Documentation Type	Select one of the following options: • None – The Documentation Item will be displayed on only the Documentation tab of the Job or Folder. • Notification – The Documentation Item will be included in email notifications that include {JAMS.Notification}. You can create an email notification and add {JAMS.Notification} to a property, such as Subject or Message Body. See **Events and Notifications on page 167** for more information. • Documentation – The Documentation Item will be displayed on the Documentation tab of the entry in the Monitor and History views. • All – The Documentation Item will be displayed in both email notifications that include {JAMS.Notification} and the Documentation tab of the entry in the Monitor and History views.
Section	Enter a number to identify the section for the information. You can use multiples of 10 to allow you to add more information at a later time. For example, you can have information in section 10 and 20 and later add content in section 15. When documentation is assembled from Jobs and Folders, the parts of each section are merged in order.
Content	Enter the actual Documentation content. You can use Markdown or HTML to add formatting to the text.

Documentation Link

Documentation	Description
Documentation Type	Select one of the following options: • None – The Documentation Item will be displayed on only the Documentation tab of the Job or Folder. • Notification – The Documentation Item will be included in email notifications that include {JAMS.Notification}. You can create an email notification and add {JAMS.Notification} to a property, such as Subject or Message Body. See ***Events and Notifications* on page 167** for more information. • Documentation – The Documentation Item will be displayed on the Documentation tab of the entry in the Monitor and History views. • All – The Documentation Item will be displayed in both email notifications that include {JAMS.Notification} and the Documentation tab of the entry in the Monitor and History views.
Section	Enter a number to identify the section for the information. You can use multiples of 10 to allow you to add more information at a later time. For example, you can have information in section 10 and 20 and later add content in section 15. When documentation is assembled from Jobs and Folders, the parts of each section are merged in order.
Link Target	Enter the URL of the hyperlink.
Link Text	Enter the text to display for the hyperlink.
Link Template	Enter the template for used for displaying the link. By default, {0} will be replaced with the defined link target and {1} will be replaced by the defined Link Text.

Working with Folders

A JAMS Folder contains a group of Jobs. Folders can be defined to organize Jobs by department (Accounting, IS, Sales), by function (EDI, Web, Security, Audit), or any other way that is meaningful to your organization. The Folders can also be used to set default properties that will be inherited by Jobs below that point in the Folder hierarchy, unless overridden at a lower level. Security ACLs can also be defined and inherited in a similar way.

Folder Navigator screen

Within the Definitions shortcut, you can use the Folder Navigator to view, create, modify, or delete Folders in JAMS. Each Folder has a right-click menu that allows you to perform tasks.

Viewing All Folders

1. Click **Definitions** from the Shortcuts menu.
2. Under Folder Navigator, view the existing Folders.

Adding a Folder

1. Click **Definitions** from the Shortcuts menu.
2. In the Folder Navigator, right-click the parent Folder and select **Add Folder**.
3. Enter a name for the Folder.
4. Select the **Edit the new Folder's properties after adding** checkbox.
5. Click **Ok**.
6. Click the **Schedule** tab to add/review any Schedule Items.
7. Click the **Properties** tab to modify any Properties.
8. Click the **Parameter** tab to add a Parameter.
9. Click the **Security** tab to adjust the user accounts or groups that have access to the Folder.
10. Click **Save and Close**.

Modifying a Folder

1. Click **Definitions** from the Shortcuts menu.
2. In the Folder Navigator, right-click the Folder and select **Properties**.
3. Click the **Schedule** tab to add/review any Schedule Items.
4. Click the **Properties** tab to modify any Properties.
5. Click the **Parameter** tab to add a Parameter.
6. Click the **Security** tab to adjust the user accounts or groups that have access to the Folder.
7. Click **Save and Close**.

Deleting a Folder

You can delete an empty Folder if it is no longer being used. Any objects, including Jobs or other Folders, within the Folder must be removed before you can delete it.

1. Click **Definitions** from the Shortcuts menu.
2. In the Folder Navigator, right-click the Folder and select **Delete Folder**.
3. When you are prompted to confirm the deletion, click **Yes**.

Resetting a Trigger

You can use the Reset Trigger option when the Folder has a Trigger with a Fired state. This is useful if the Trigger has been disabled due to reaching the Fast Fire Limit, which is the number of times a Trigger can fire. For example, you can select the **Run this job based** | **on a file** option from the Schedule tab, and the Job will run and will be set to the Fired state.

1. Click **Definitions** from the Shortcuts menu.
2. In the Folder Navigator, do one of the following:
    1. Right-click the Folder and select **Reset Trigger**.
    2. Double-click a Job and select the Schedule tab. Right-click the Trigger and select **Reset Trigger**.

Folder Definition Tabs

Folder

This tab contains basic Folder Information:

- **Folder Name** - This property is the unique identifier for the Folder.
- **Description** - The Description property can provide a more detailed explanation for the Folder. The Description property appears in menus, lists and reports.
- **Last Changed** - The Last Changed property displays the user who last modified this Folder, including the date and time of the modification.
- **Reset Statistics** - When a Job executes, it creates statistics based on the most recent run as well as the average of previous runs. The Reset Statistics button can be used when moving from a development to a production cycle to clear erroneous Job and Sequence statistics and begin with a clean slate.

Schedule

You can set several types of Schedule Items on a Folder. Any Jobs within the Folder will inherit these Schedule Items. However, you can override them at the Job-level. The

Schedule tab has a natural language format to let you specify the options below. The **+** button lets you configure each option. See for more information.

Option	Schedule Menu
Triggers	Run this job
Dependencies	This Job depends on a
Job Status	Set this Job's status to
Events and Notifications	When an event occurs

Properties

The Soft Properties listed below are available for any JAMS Folder (or Job).

Until a value is set for a property, it will not display in the Properties tab. To display a soft property, use the **+** button in the Properties tab, select the desired Property, and then click **OK** in the Add Property dialog.

Status	Description
Enabled	Select or clear the checkbox to enable or disable the property.

Schedule	Description
Agent	This property specifies the Agent where the Job will execute when the Job is submitted.
Batch Queue	This property specifies the Batch Queue that will be used when this Job is scheduled.
Calendar	This property specifies the Calendar to use for scheduling. When a Calendar is listed, the Job will have access to the Date Types, such as holidays, in the Calendar.
Retry Count	This property specifies the maximum number of retry attempts if the Job fails.
Retry Interval	This property specifies the time interval, in Delta Time, between automatic retry attempts.
Scheduling Priority	This property specifies the priority the Scheduler uses in determining when to start executing Jobs that are waiting on prerequisites. The first number indicates the inherited value from the parent object. (The default is 0.)

Schedule	Description
SLA Time	This property specifies the time of day a Job must complete by to meet a Service Level Agreement.
Submit on Hold	Select or clear this checkbox to submit the Job on Hold when it is scheduled. The Job will require manual intervention before it is allowed to run.
Suppress Menu Display	This property defines if this Job should be omitted from the Submit menus. Clear the checkbox to display this Job on the Submit Menus.

Execute	Description
Execute As	This property specifies the set of Credentials the Job will execute as when it is submitted.
Home Directory	This property specifies the full path to the initial current directory for the Job.
Debug	This property specifies if a Job will run in Debug Mode. When a Job runs in Debug Mode, it will not satisfy Dependencies or Triggers.
JDE Credential	This property specifies the Credentials provided for JD Edwards Jobs within the Job or Folder. If this is not a JD Edwards Job, these credentials are not required.
Add-In Credential	This property specifies the Credentials for third party add-ins, such as Banner, Oracle, or Peoplesoft.
Alternate Credential	This property specifies the alternate Credentials for a Job.
Crystal Reports Credential	This property specifies the Credentials that are used for Crystal Reports.
Force 32 bit	When set to true, this Job will run as a 32-bit process, even on 64-bit machines. This option was included for backwards compatibility following JAMS V6 to V7 migrations and it should not be adjusted on a V7 Execution Method.
Force V2	When set to true, this Job will run using V2.0 of the .NET Framework. This option was included for backwards compatibility following JAMS V6 to V7 migrations and it should not be adjusted on a V7 Execution Method. For more information, see Resolving Mixed Mode Assembly error message in PowerShell.

Execute	Description
Host As	This property specifies the Host As Credentials for some Execution Methods that start a host process. The Credentials connect to the Agent server using the Execute As Credentials.
Informatica Credential	This property specifies the Informatica User to run the Job.
Informatica Polling Interval	This property specifies the time interval, in Delta Time, between the automatic retry attempts for the Informatica Cloud Activity Log Status update REST call.
Informatica Retry Count	This property specifies the maximum number of automatic retry attempts for the Informatica Cloud REST calls.
Informatica Retry Interval	This property specifies the time interval, in Delta Time, between automatic retry attempts for Informatica Cloud REST calls.
Netezza Credential	This property specifies the Credential to use to log in to Netezza.
No BOM	Select or clear the checkbox to enable or disable the Job's source file from having a Unicode byte order mark.
OS Prompt Pattern	This property specifies the regular expression that will match the operating system command when using the SSHPrompt Execution Method. This property sets the format of the prompt that JAMS is looking for, so it can recognize it and send the commands.
Oracle DB Credential	This property specifies the Credential for connecting to an Oracle database.
Oracle EBS Credential	This property specifies the Credential to use when running an Oracle EBS Job.
People Soft Credential	This property specifies the Credential to use when connecting to PeopleSoft.
Run Priority	This property specifies the execution priority for the Job. The priority is the sum of the Job's priority and any priority value on the parent Folder.
SQL Agent Credential	This property specifies the Credential for running SQL Agent Jobs.

Execute	Description
SQL Stored Procedure Credential	This property specifies the Credential for running SQL Stored Procedure Jobs.
SSIS Credential	This property specifies the Credential for running SSIS Jobs.
SSRS Credentials	This property specifies the Credentials that are passed to the SSRS server when the Job is executing.
Search Path	This property specifies a comma-separated list of paths that are searched when trying to resolve references.
Z/OS Ftp Retry Interval	This property specifies the FTP retry interval between 500 and 5000 milliseconds.
Z/OS Max Ftp Retry	This property specifies the maximum number of retries between 1 and 100 for FTP exceptions while connected.
Z/OS Max Status Retry	This property specifies the maximum number of retries between 1 and 1000 to wait for the z/OS status response.
Z/OS Status Retry Interval	This property specifies the z/OS retry interval between 500 and 60000 milliseconds.
Job Concurrent Limit	This property specifies the maximum number of instances of this Job that may execute concurrently.
Single Instance Action	Select an option to define the action to be taken if a Job retries to start while an instance of that Job is currently running. Options include Allow Multiple, Cancel Executing, Cancel Pending, and Wait.

Execute	Description
Host Key Checking	This property specifies the action JAMS should take if the SSH fingerprint does not match when connecting to an SSH server. You can enter the following options: • AcceptHostKey - Accepts the host key and adds the fingerprint to the cache of acceptable fingerprints. (This is not secure. Only use if you are sure of the identity of the server.) • CheckParameter - Checks for a boolean parameter named AcceptHostKey and accepts the key if the parameter value is true. • FailFirstJob - Fails the first Job and adds the fingerprint to the cache of acceptable fingerprints. (Default setting).
Accept Host Key	Select or clear the checkbox to accept or deny the Host Key.

Completion	Description
Notify E-Mail	Select the email addresses that are combined with the addresses in any email notification event. Email addresses from the Default Notify Email Address option in Configuration shortcut, the property on the Job, and the property on the Schedule Item are added if they are defined.
Bad Regex Pattern	This property specifies a regular expression pattern that indicates a failed execution.
Compare Condition	Select the type of comparison that will be performed.
Compare Value	This property sets the value that will be used in the comparison.
Completion Bearing	This property specifies the acceptable Completion Severity for a Job.
Exit Code Handling	Select the method for how JAMS should evaluate a Job's exit code. Available options include ZeroIsGood, OneIsGood, PositiveIsGood, OddIsGood, EvenIsGood, SpecificGood, and SpecificBad.
Good Regex Pattern	This property specifies a regular expression pattern that indicates a successful execution for this Job.

Completion	Description
Minimum Severity	Select the minimum acceptable completion severity. Available options include Success, Info, Warning, Error, and Fatal.
Notify User	Select or clear the checkbox or enable or disable including the user that submitted the Job when sending notifications.
Report Location	This property specifies the location for OpenVMS reports.
Retain Option	This property specifies how the Job will be displayed in the Monitor after it completes. If set to Always, completed Jobs will never leave the Monitor.
Retain Time	Select the method for displaying the Job in the Monitor when it completes. Available options include Default, Timed, Error, and Always. When the Retain Option is set to Timed, this property is used to specify (in minutes) the amount of time to display the completed Job in the Monitor.
Specific Informational	This property specifies a comma-separated list of integer values for Informational Job completion exit codes.
Specific Values	This property specifies a comma-separated list of integers for the Job completion exit codes.
Specific Warning	This property specifies a comma-separated list of integers for Warning Job completion exit codes.
Log	**Description**
Log Location	This property specifies the default location for a log file.
Include MS Dynamics Log	Select the checkbox to include MS Dynamics Job Logs. Clear the checkbox to exclude the MS Dynamics Job Logs.
Keep Logs	Select the checkbox to keep the batch log files when the Job completes on OpenVMS. Clear the checkbox to exclude the log files.
Timestamp Logs	Select the checkbox to add a timestamp to batch log files with the extension format "yyyyMMdd_ HHmmssfff.log". Clear the checkbox to not add the timestamp.

MicroFocus	Description
MicroFocus Server	This property specifies the name of the MicroFocus Server.
MicroFocus Fin Port	This property specifies the port for the MicroFocus bin.
MicroFocus Submit Type	This property specifies the submit type for MicroFocus. The available options JES2, JES3, or VSE.

Source	Description
Template Library	This property specifies the full file specification that contains the JAMS templates that are used when parsing the Job.

Encoding	Description
Input Encoding	This property specifies the input encoding for the Job. You can enter character types, such as UTF-8 or ASCII.
Output Encoding	This property specifies the output encoding for the Job. You can enter character types, such as UTF-8 or ASCII.

Notify	Description
Halted Level	This property specifies the level that can be used by event handlers to classify events.
Halted Message	This property specifies the notification message when a Sequence is halted.
Halted Notify Event Class	Select the event class that this event will generate when it occurs. Available options include None, Normal, Low, Moderate, High, Urgent, and Critical.
Notify Other	This property specifies a comma-separated list of usernames and is merged with the list from the Folder Definition.
Notify User	This property specifies a comma-separated list of usernames in Active Directory. This list is merged with the list from the Folder Definition and used to find the email associated with the username.
Print Location	This property specifies the device and directory for reports that are produced by Jobs in this Folder.
Print Queue	The property specifies the default print queue for Jobs in this Folder.

SQL	Description
SQL Connection	This property specifies the Agent Definition that points to the SQL Server.

Automate	Description
Credentials	This property specifies the Credentials that are used to access the Automate server.

Banner	Description
Banner Connection	This property specifies the Banner Connection from the Connection Store.
Banner User	This property specifies the Credential for connecting to Banner.
Printer Name	This property specifies the name of the printer to use.
Banner Job Type	This property specifies the type of Banner Job to run.
Form Name	This property specifies the name of the Banner form to use.
Submit Time	This property specifies the submit time for the Banner Job.
Include .log File	Select the checkbox to include the Banner .log file in the JAMS Job Log. Clear the checkbox to exclude the .log file.
Banner Script Name	This property specifies that name of the Banner script to run.
Include .lis File	Select the checkbox to include the Banner .log file in the JAMS Job Log. Clear the checkbox to exclude the .log file.
Log File Polling Interval	This property sets the polling time for the Banner .log and .lis files. The default is 30 seconds. It is recommended that this value be set to a value that slightly exceeds the expected runtime of the Job.
MIME Type	This property specifies the type of file used to format reports/output files. Select PDF or Plain Text.
Special Print	This property specifies the field that may be used to pass information to 3rd-party applications.
PDF Font	This property specifies the type of font to use for PDF reports.

Banner	Description
PDF Font Size	This property specifies the size of the font to use for PDF reports.
Environment Type	This property specifies the type of environment for the Banner instance to either Unix or Windows. By default, this option is set to Unix. If the Oracle database instance is running on Windows rather than Unix, set this option to Windows.

File Transfer	Description
Archiver Credentials	This property specifies the Credential to use when performing a zip operation on a file.
FTP Credentials	This property specifies the Credential for the FTP Job.
File Transfer Connection	This property specifies the Connection that JAMS will use for this Job.
SFTP User	This property specifies the Credential for an SFTP Job.

GoAnywhere	Description
GoAnywhere Credential	This property specifies the Credential that is used for connecting to GoAnywhere.

SAP	Description
SAP Connection	This property specifies the Connection that is used for connecting to SAP.

Parameters

A JAMS Parameter contains a single slice of data that, unlike a Variable, remains exclusive to the associated Job or Folder. Parameters defined on a Folder are inherited by all objects in that Folder.

When submitting a Job with Parameters, you will see a fill-in-the-blank form to define values for these Parameters. The Parameters are placed in the order in which they are defined, unless the Parameters were given Sequence numbers.

If a Job uses a parsed Execution Method, you can embed Parameter names into the Job's Source using the <<ParameterName>> specification. When the Job runs, it uses the value of the Parameter in place of this specification.

A JAMS Folder may contain zero or more Parameters.

Add a Parameter

1. Right-click a Folder and select **Properties**.

2. Click the **Parameters** tab.

3. Click **+**.

4. Select **Add Parameter**.

5. In the dialog, define the Parameter Name, Data Type, and Default Value of the Parameter.

6. Click **OK**.

7. Define additional Parameter Properties as desired.

8. Click **Save and Close**.

9. Click **Save and Close** on the Folder Definition dialog.

Parameter Properties

Name	Description
ParamName	This property defines the name of the Parameter. Each Parameter name must be unique within a particular Job.

Data Type	Description
DataType	Use the dropdown to specify a data type for the Parameter. • Text • Integer • Date • Time • DateTime • Float • Unknown • Boolean
Length	If the Parameter's data type is set to Text or Integer, specify the maximum length within this property.

User Interface	Description
Allow Entry	When this attribute is enabled, the user can enter this Parameter when submitting the Job.
HelpText	The entered text displays when a user hovers over the Parameter entry field on manual submissions.
Hide	This attribute determines if the Parameter is displayed when this Job is submitted. If you have "Manage" access to the current Job, hold down the ALT key when submitting the Job and all hidden Parameters will be displayed.
Must Fill	When enabled, this attribute requires the user to completely fill this Parameter to its Maximum Length as set on the **Data Type** tab.
Prompt	When a Job is interactively submitted, a form is created which is used to prompt the user for the Job's Parameter values. The entered text represents the prompt to the user submitting the Job.
Required	When checked, this attribute requires users to enter a value for this Parameter.
Sequence	An integer is used to sort the Parameters when presented to end-users.
Uppercase	When checked, this attribute converts all entered data to uppercase.

User Interface	Description
ValidationData	This value is used when attempting to validate the Parameter value.
ValidationType	This property allows you to select the type of validation JAMS can perform on the Parameter value. The validation types are: • **None**: No validation is performed. • **Directory**: This validation is used on text parameters. A button is placed next to the parameter's text box that opens a dialog allowing the user to browse the file system for a directory. • **SaveFile**: This is used on text parameters. A button is placed next to the parameter's textbox that opens a dialog allowing the user to browse for a file, which may or may not exist. • **OpenFile**: This is used on text parameters. A button is placed next to the parameter's textbox that opens a dialog allowing the user to browse the file system for a file, which must exist. • **MaskedEdit**: This validation type uses a mask to distinguish between proper and improper user input. The mask is set in the **Validation Data** property.

Value	Description
Default Format	This property is a format string that defines how the Parameter will be formatted. Default formats vary depending on the Parameter's Data Type.
Default Value	The property specifies the default value for this Parameter. The default value for dates may be entered as a specific date or you can use JAMS English language date text such as Today, Last Monday, or First Monday of Month.
Encrypt	Select the checkbox to encrypt the Parameter value.

Value	Description
Variable	Optionally, you can acquire the Default Value for the Parameter using a JAMS Variable. Use the File Browser button to search for and select an existing variable.

References

The References tab lets you view which Jobs are referencing the Folder as well as where the Job is located.

Documentation

The Documentation tab lets you add more information to a Job. You can add an entry for a description or instructions or a link to an existing file. See ***Documentation Items* on page 178** for more information.

Security

The Security tab displays Properties that act as an access control list with one-to-many Access Control Entries (ACE) for the current Folder as well as for any Job contained within the Folder.

> **NOTE:** Removing all ACEs on a JAMS object behaves the same as Windows would. When all ACEs are removed from an object, only the GrantAdministratorsBypass group will have access to the object. Previously, removing all ACEs from an object would give all Authenticated Users access to that object.

Each ACE can specify the following rights:

- **Abort** allows the user to access the JAMS Job Monitor to abort or restart an occurrence of a Job within the Folder.
- **Add Jobs** allows the addition of new Job definitions to this Folder.
- **Change** permits modification of the Folder definition provided the user also has Change access to Folder definitions.
- **Change Jobs** allows the modification of existing Job definitions in this Folder.
- **Control** permits modification of the current Folder's Access Control List.
- **Debug** allows submission of Jobs within this Folder, but only if the /DEBUG qualifier is used on the JAMS SUBMIT command. This qualifier submits the Job under the submitter's username rather than the username specified in the Folder Definition.

- **Delete** permits deletion of the current Folder definition provided the user also has DELETE access to Folder definitions.
- **Delete Jobs** allows the deletion of existing Job definitions within the Folder.
- **Inquire** permits inquiry into the current Folder definition provided that the user also has INQUIRE access to Folder definitions.
- **Inquire Jobs** permits inquiry into the current Folder definition as well as all contained Jobs.
- **Manage** allows the user to control the JAMS Job Monitor to hold, reschedule, release or delete an occurrence of a Job in this folder.
- **Monitor** allows Jobs to appear in the Job Monitor.
- **Submit** grants the right to submit a Job within the Folder.

Enable Inheritance

This dropdown property controls how the Folder inherits settings from its subfolders and Jobs. The inheritance options include:

- This folder only
- This folder, subfolders and jobs
- This folder and subfolders
- This folder and jobs
- Subfolders and jobs only
- Subfolders only
- Jobs only

Audit Trail

The Audit Trail feature from the JAMS Shortcuts menu lets you review all changes that were made within your system. This is useful for reporting purposes. You can see changes for all JAMS objects, including the JAMS Jobs, Execution Methods, Credentials, and Agents. You can view the details of the changes and revert changes to a previous version for Jobs and Folders. You can also restore deleted Jobs and Folders by using the Revert option.

The Audit Trail records are kept indefinitely by default, but they can be pruned automatically by enabling the JAMSPurgeJobAT Job. You can use the following Jobs from the JAMS Folder in the Definitions Shortcut to control the amount of Audit Trail data:

- JAMSPurgeJobAT – This Job removes the records for changes to JAMS objects and previous versions of Job objects.
- JAMSPurgeJobAuditTrail – This Job removes records for Trigger resets.

Accessing the Audit Trail

You can access the Audit Trail from a Job, Folder, or the Shortcuts menu. An Audit Trail is also available from the Monitor and History options in the Shortcuts menu. The Audit Trail tab in the History and Monitor views shows the actions and changes for an entry, such as a release, cancel, or hold option. See ***Using the Monitor* on page 250** for more information.

To access the Audit Trail from a Job or Folder:

1. Click **Definitions** from the JAMS Shortcuts menu.
2. Right-click a Job or Folder and select **Properties**.
3. Click the **Audit Trail** button.

To access the Audit Trail from the Shortcuts menu:

1. Click **Audit Trail** from the JAMS Shortcuts menu.
2. Click the **Refresh** button to view the latest information.

Audit Trail screen

The Audit Trail screen displays the list of all changes logged within the JAMS system. It is updated whenever you refresh the screen or create a new filter to view the changes.

The Audit Trail screen has the following columns:

- Message – This is a brief summary of the change that was made.
- Audit Time – This is the time the change occurred.
- User Name – This is the name of the user who made the change.
- Object Type – This lists the type of items within JAMS that was changed, such as an Execution Method, Job, or Credential.
- Object ID - This is the unique ID assigned to the JAMS object.

Querying the Audit Trail

1. Click the **Query** button.
2. On the JAMS Audit Trail Query dialog, enter values for one or more of the following:
   1. In the User Name field, enter a user name that made the changes.
   2. In the Object Type field, select the type of JAMS object that you want to see.
   3. In the Between fields, select a date range for when the change occurred.
3. Click **Ok**.

Sorting the Audit Trail Results

You can sort any column in the Audit Trail.

To sort a column, click the column name. The Audit Trail is ordered in ascending or descending order.

Searching the Audit Trail Results

You have two options for searching within the Audit Trail: using the Search bar or a filter. The Audit Trail screen has its own search option that is separate from the Search at the top of the JAMS window.

To search the Audit Trail, do the following:

1. Click the **Refresh** button to ensure the latest entries are displayed.
2. Click the magnifying glass icon above the column headings.
3. Enter your search term.
4. Click **Find**.

To filter the Audit Trail, do the following:

1. Click the column name.
2. Click the funnel icon on the column.
3. Select one or more checkboxes to filter on those values.
4. Click **Close** or **Clear Filter**.

Comparing Versions of a Job or Folder

The Audit Trail lets you compare two versions of a Job or Folder and see the differences.

1. Right-click an item in the Audit Trail list and select **Revisions**. A dialog box is displayed.

2. Hold the Shift key or the Ctrl key and click two versions of the item.

3. Click **Compare**. A screen displays the versions side by side. The changes are displayed in red. The Parameters section is also displayed in red.

Reverting to a Specific Revision of a Job or Folder

You can revert a Job or Folder to a previous revision. You can also use the Revert option to restore a deleted Job or Folder.

1. Right-click an item in the Audit Trail list and select **Revisions**. A dialog box is displayed.

2. Click the version you want to revert back to.

3. Click **Revert To**.

4. Click **Yes** when prompted.

5. Close the Revision History dialog box.

Dates and Times

The articles in this section will help you set up dates and times for running Jobs in JAMS. This includes creating a Calendar, Date Types, and Dates as well as using named times.

Calendars

Calendars give you another level to control when Jobs will run or when they are skipped. You can set Calendar Scope on the Folder and Job level with the Calendar Property. When a Job references a specific Calendar, it can use the Date Types in that Calendar for scheduling or exceptions. There are three main components in the hierarchy to organize dates:

- Calendars
  - Date Types
    - Date Definitions

Calendars

Calendars are the highest level, and they contain Date Types. You can create any number of Calendars, if the Calendars are given unique names. Each Calendar can have its own color, which is defined in the Calendar properties.

Date Types

Date Types are the middle level, and they represent a type of date like "Holidays" or "fiscal quarters". Date Types can contain any number of Date Definitions. You can nest any number of Date Types in each Calendar. The name of the Date Type will be used in the Schedule Date or Except For Date field to tell JAMS whether to run the Job on the specific Date Definitions in that Date Type.

> **NOTE:** A Date Type must have at least one Date that is in the past and one Date that is in the future for JAMS to evaluate it. For example, evaluating a July 4th holiday would be satisfied if a May 31st holiday and December 25th holiday are also defined.

- **Noncontinuous or Continuous**: Date Types are defined as either Noncontinuous (Holidays, Birthdays) or Continuous (Fiscal_Quarters). See Managing Dates for more information.
- **Date Type Reference**s: Date Types can contain any number of Date Type References. See Managing Date Types for more information.
- **Specific Date Names**: Specific Date Names are generally used for continuous dates, such as fiscal quarters (Q1, Q2, Q3, Q4). You can reference Specific Date Names within Schedules. They can also be used to label dates, such as "public holidays". See Managing Date Types for more information.

Date Definitions

Date Definitions are the lowest level, and they are the defined days within a Date Type. You can add any number of Date Definitions to a Date Type. You may define Dates as Workdays or Non-Workdays, which will comply with workday and non-workday scheduling that may be set on Jobs and Folders.

Example

WidgetCo is a company that needs some Jobs to not run on US Holidays and other Jobs to not run on UK Holidays.

First, they create a "Company Holidays" Calendar. This is the parent Calendar that contains the following Date Types for the holidays their different offices observe:

- "USHolidays" - Contains Date Definitions for each US Holiday
- "UKHolidays" - Contains Date Definitions for each UK Holiday

WidgetCo can add the Calendar property on the desired Job or Folder, and then set the Calendar value to the "Company Holidays" Calendar. WidgetCo can set their Job's Schedule

Except for Date field value to reference the USHolidays or UKHolidays Date Types to ensure their Job won't be automatically scheduled on the given holidays.

Calendar Definitions screen

The Calendar Definitions screen contains three sections: Calendar Navigator, Date List, and Dates (Visual Calendar).
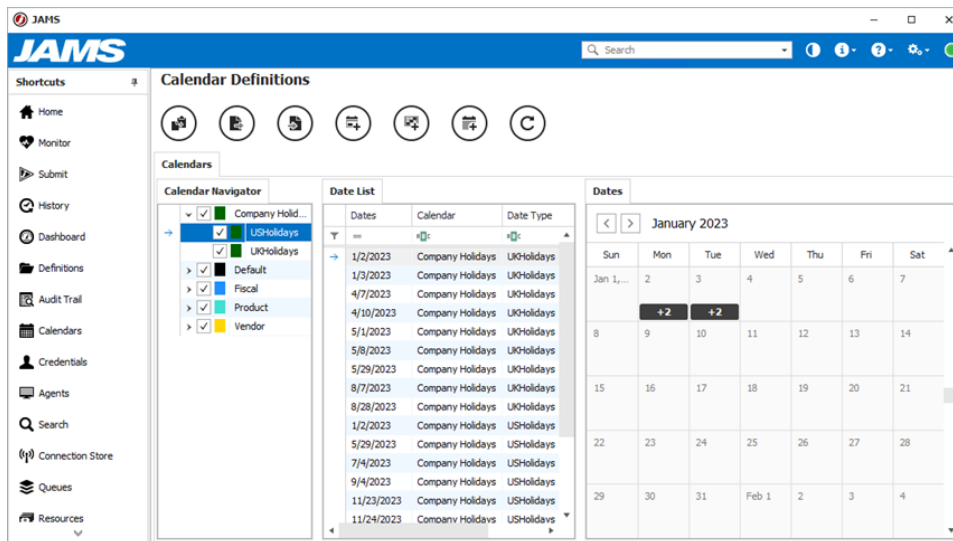
Calendar Navigator

The Calendar Navigator is the control for the Date List and Visual Calendar sections. Selected (checked) Calendars and Date Types are displayed in the Date List section and the Visual Calendar.

The Calendar Navigator has a right-click menu to let you work with the Calendar.

Date List

The Date List is a grid-style display of the Dates within any Date Types selected in the Calendar Navigator. The same sorting, grouping, and filtering options available on all other JAMS grid views are available in the Date List.

The Date List has a right-click menu to let you work with the Date List.

Dates - Visual Calendar

The Visual Calendar displays Date names and colors represented on the days where the Dates are defined. You can move through the Calendar by doing the following:

- Using the scroll bar
- Using the arrow buttons

You can also adjust the scale of the Calendar with "Ctrl+Scroll". The Visual Calendar has a right-click menu to let you work with the Calendar.

Setting up a Calendar

Adding a Calendar

1. Click **Calendars** from the Shortcuts menu.
2. Click **Add Calendar**.
3. In the Calendar Name field, enter a name.
4. In the Color field, select a color from the Custom, Web, or System tab.
5. Click **Ok**.
6. Click the **Security** tab.
7. Add any user accounts that should have access to the Calendar.
8. Click **Save and Close**.

Adding a Date Type

1. Click **Calendars** from the Shortcuts menu.
2. Right-click a Calendar, and select **Add Date Type**.
3. In the Date Type Name field, enter a name for the Date Type.
4. In the Continuous field, select the checkbox to set it as continuous or leave it unchecked for noncontinuous.
5. Click **Ok**.
6. Optional - Click the **Referenced Date Types** tab. Click **Add** to browse to another Date Type.
7. Optional - Click the **Specific Date Names** tab. Click **New** to add a Specific Type.
8. Click **Save and Close**.

Adding a Date

> **NOTE:** A Date Type must have at least one Date that is in the past and one Date that is in the future for JAMS to evaluate it. For example, evaluating a July 4th holiday would be satisfied if a May 31st holiday and December 25th holiday are also defined.

1. Click **Calendars** from the Shortcuts menu.

2. Under the Calendar Navigator, select a Date Type in a Calendar. This will associate the Date with the Date Type.

3. Under the Dates tab, right-click a date on the Calendar, and select **Add Date**.

Adding a Calendar to a Job or Folder

When you add a Calendar to a Job or Folder, the Job/Folder has access to view its Date Types only after it has been saved. You should save the Job/Folder definition after changing the Calendar and re-open it before referencing Date Types from the new Calendar.

1. Click **Definitions** from the Shortcuts menu.

2. Select a Job or Folder.

3. Right-click the Job or Folder, and select **Properties**.

4. Click the **Properties** tab.

5. Under Schedule, click the **Calendar** field.

6. Select a Calendar from the list.

7. Click **Save and Close**.

8. Add a Schedule Trigger. See the ***Triggers on page 137*** article for more information.

Managing Calendars

Modifying a Calendar

You can modify the Calendar name, description, display color, or the user accounts that have access to the Calendar.

1. Click **Calendars** from the Shortcuts menu.

2. Under the Calendar Navigator, right-click a Calendar, and select **Edit Calendar**.

3. On the Calendar tab, edit the Calendar name, description, or display color.

4. Click the **Security** tab.

5. Add, edit, or remove a user account for the Calendar.

6. Click **Save and Close**.

Deleting a Calendar

You can remove a Calendar if it is no longer being used. Make sure you update any Jobs that reference the Calendar before attempting to delete it.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Calendar, and select **Remove Calendar**.
3. When you are prompted to confirm the deletion, click **Yes**.

Copying a Calendar

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Calendar, and select **Copy Calendar To**.
3. Under Destination, set the Destination **Calendar Name** and **Destination Server.**
4. Click on the Server field to see a drop-down list of available selections.
5. Click **Ok**. The Calendar and all its Date Types and Dates will be copied over.

Managing Date Types

From the Calendar Navigator, you can view all the Date Types that are in a Calendar. The Date Types are displayed in the same color as the corresponding Calendar.

> **NOTE:** A Date Type must have at least one Date that is in the past and one Date that is in the future for JAMS to evaluate it. For example, evaluating a July 4th holiday would be satisfied if a May 31st holiday and December 25th holiday are also defined.

Naming Date Types

When choosing Date Types and Specific Date Name identifiers for your organization, ensure they are readable names as they will be used in JAMS natural language specifications.

JAMS recognizes month names before checking for Date Types, so it is best to avoid using Date Type definitions to override calendar months. See *Specifying Dates Using Natural Language* for more information on avoiding using reserved words. For example, JAMS converts "FIRST DAY OF APRIL" to April 1st for the current calendar year. If your accounting department prefers to tag another date/year for the first day of April, you can use Date Types and Dates for a workaround. The Date Type can be named "Quarters" and a Specific Date Name can be named "Q2_2023". The details are described in the Specific Date Names section below. Accountants can use "FIRST DAY OF Quarters Q2_2023" to specify the first day of April's fiscal period.

Modifying a Date Type

You can modify the name or description of a Date Type. You can also change it from continuous to noncontinuous.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Date Type, and select **Edit Date Type**.
3. On the Date Type tab, edit the name or description.
4. Select or clear the Continuous Date Type checkbox to set it to continuous or noncontinuous.
5. Click **Save and Close**.

Deleting a Date Type

You can remove a Date Type if it is no longer being used.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Date Type, and select **Remove Date Type**.
3. When you are prompted to confirm the deletion, click **Yes**.

Copying a Date Type

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Calendar, and select **Copy Date Type To**.
3. Under Destination, select the destination **Calendar**.
4. Optional – In the Date Type Name field, enter a name for the Date Type.
5. Click on the Server field to see a drop-down list of available selections.
6. Click **Ok**. The Date Type and its Dates are copied over.

Date Type References

Date Type References are one-way relations from one Date Type to another. If dates are added to a referenced Date Type, the changes are seen on the Date Type that contains the reference. JAMS will continue to respect configured Security on referenced Date Types.

Date Type References are useful when a Date Type should contain:

- Its own defined dates AND another set of predefined or separately managed dates.
- Multiple sets of predefined dates.

For example, a company tracks office birthdays for each office inside different Date Types in JAMS. Inside the company-wide calendar, they create a Company_ Birthdays Date Type. They create references to the existing Japan_Office_Birthdays, US_Office_Birthdays, and UK_Office_Birthdays Date Types.

Company_Birthdays

- Japan_Office_Birthdays
- US_Office_Birthdays
- UK_Office_Birthdays

Creating a Date Type Reference

> **NOTE:** The referenced Date Types must exist on the same JAMS Server.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Calendar Navigator, right-click a Date Type, and select **Edit Date Type**.
3. Click the **Referenced Date Types** tab.
4. Click **Add**.
5. Double-click the Date Type that will be referenced.
6. Click **Save and Close**.

Specific Date Names

Specific Date Names are named collections of dates within a Date Type. They are generally used for continuous dates, such as fiscal quarters (Quarter1, Quarter2, Quarter3, Quarter4). You can reference Specific Date Names within Schedules.

Creating a Specific Date Name

1. Click **Calendars** from the Shortcuts menu.
2. Right-click a Calendar, and select **Add Date Type**.
3. In the Date Type Name field, enter a name for the Date Type.
4. In the Continuous field, select the checkbox to set it as continuous.
5. Click **Ok**.
6. Click the **Specific Date Names** tab.
7. Click **New** to add a Specific Type.
8. Enter a name for the Specific Type, such as Quarter1.
9. Click **Save and Close**.

Adding a Date to a Specific Date Name

1. On the Calendar Definitions screen, ensure the new date type is selected in the Calendar Navigator.
2. On the Date List tab, double-click the Date.

3. In the Specific Type field, select the Specific Date Name from Specific Type field.

4. Click **Save and Close**.

Date Type Tabs

When you create or edit a Date Type, several tabs are available to view and modify the properties.

Data Type Tab

Property	Description
Date Type Name	This property is the unique identifier for the Date Type. Every Date Definition must be associated with a Date Type. The same Date Definition can be associated with more than one Date Type.
Calendar Location	The property identifies which Calendar the Date Type is in.

Property	Description
Description	This optional property is used in menus, lists and reports to provide a more detailed Date Type description.
Continuous Date Type?	Selecting this checkbox indicates if this Date Type is continuously occurring. A continuous Date Type spans several consecutive dates, such as a fiscal period. See Managing Dates for more information. Clearing the checkbox defines a noncontinuous Date Type, which often includes holidays. Another example is your organization takes physical inventories on a scheduled basis. If you have batch process that runs on a day when a physical inventory is taken, you could create a Date Type called PHYSICAL and define a Job that is scheduled to run on PHYSICAL. When a physical inventory is scheduled, add the specific dates to the Date Type to correctly schedule the Jobs.
Last Changed	This property indicates the date and time the Date Type definition was last modified.

Referenced Date Type Tab

Property	Description
Date Type	This field lists the Date Type that has been referenced.
Originating Calendar	This field lists the name of the Calendar where the referenced Date Type is located.

Specific Date Names

Property	Description
Specific Type	This property lists the Specific Date Names that have been created. The order of these names does not matter except for the first name. The first Specific Type must identify the date or period that occurs first in any year. The concept of "Year" is user defined. You can specify the first date/period to occur in a calendar year or a fiscal year.

Managing Dates

You can create individual dates on a Calendar that can be used for scheduling. Dates can be managed programmatically to allow you to automatically import third-party Calendar data.

In the Definitions shortcut, there is an example Job named AddHolidays in the Samples folder.

Modifying a Date

You can modify the description for the date as well as set it as a workday.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Date List, right-click a Date, and select **Edit**.
3. Edit the description as needed.
4. Select or check the **Workday** checkbox.
5. Click **Save**.

Deleting a Date

You can remove a Date if it is no longer being used.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Date List, right-click a Date, and select **Delete**.
3. When you are prompted to confirm the deletion, click **Yes**.

Copying a Date

You can copy a Date to another Date Type in the same or a different Calendar.

1. Click **Calendars** from the Shortcuts menu.
2. Under the Date List, right-click a Date, and select **Copy To**.
3. In the Date Type field, click **…**
4. Browse to the Date Type where you want to copy the Date.
5. Click **Ok**.

Creating a Continuous Date

You can create a continuous date on a Calendar. A continuous date can be used to identify all dates in each fiscal quarter for a year. When you create a continuous date for each fiscal quarter, you need to specify only the first date of the quarter. The quarter ends the day before the next quarter begins.

You can use the ConvertTo-Date cmdlet to get the first day or last day of the quarter when you need these values for scripts.

1. Click **Calendars** from the Shortcuts menu.

2. Right-click Calendar and select **Add Date Type**.

3. In the Date Type Name field, enter a name, such as Quarters.

4. In the Continuous field, select the checkbox.

5. Click **Ok**.

6. Click the **Specific Date Names** tab.

7. Click the **New** icon.

8. Enter a name for the Specific Date Name in the row, and press **Enter**. For example, you can enter QuarterQ1. Repeat this step until all quarters have been added.
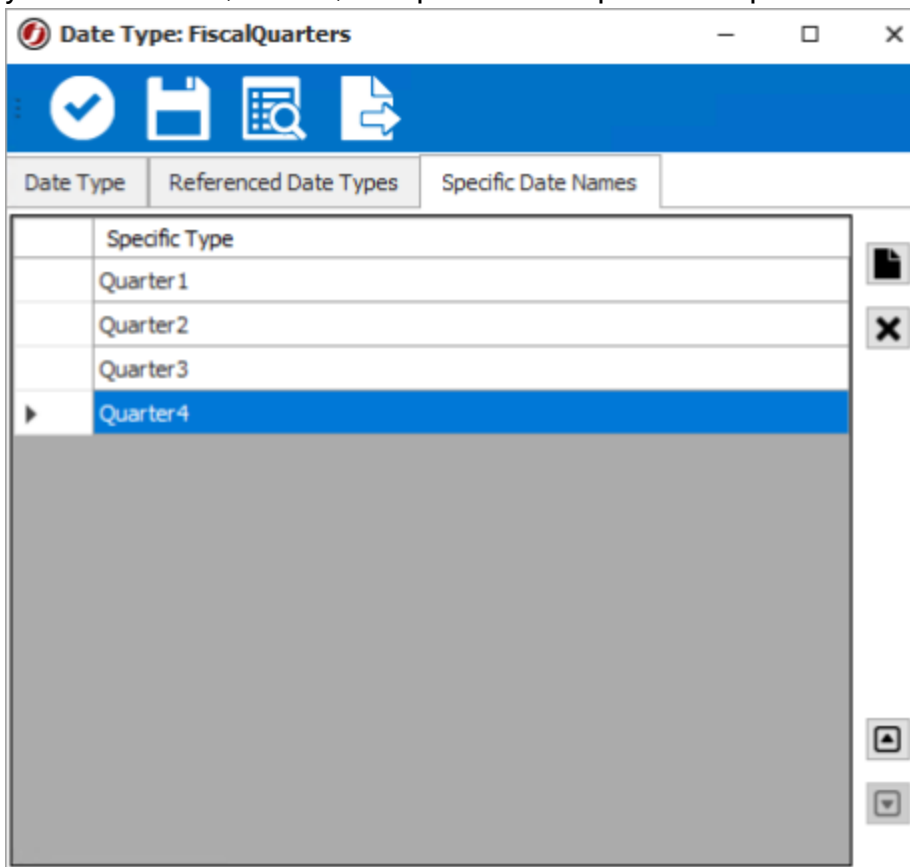
9. Click **Save and Close**.

10. On the Calendar Definitions screen, ensure the new date type is selected in the Calendar Navigator.

11. Right-click the first day of the quarter 1 (January 1) on the Dates tab and select **Add Date**.

12. On the Date List tab, double-click the date.

13. In the Specific Type field, select the quarter 1 name "Quarter1".

14. Click **Save and Close**.

15. Repeat steps 11-14 for each of the four quarters.

Date Tab

When you edit a Date, several options are available to view and modify the properties.

Property	Description
Specific Type	The Specific Type property lets you select a Specific Named Type that was defined in a Date Type.
Description	The description is an optional summary of the date.
Workday?	Select the checkbox to make the date a workday for scheduling. Clear the checkbox to make the date a non-working day.

Property	Description
Date Type	The Date Type is a read-only field that displays the selected Date Type for the Date.
Last Changed	The Last Changed property displays the day and time the Date was last modified.

Specifying Dates Using Natural Language

As a scheduling application, JAMS uses date specifications for many of its features and functions. Sometimes using an exact date specification is sufficient for scheduling a Job. However, a generic term or phrase, such as using Workdays or First Friday of Month, can provide additional flexibility. JAMS supports natural language for generic date entries throughout the client interface.

Uses for Natural Language in JAMS

There are three key scenarios for JAMS to accept generic date specifications:

Scheduling Jobs to Run

Generic dates can be used when scheduling a Job in JAMS to allow for more flexibility. You can also use generic dates to prevent a Job from running on a date by specifying an exception. See Triggers for more information.

Default Parameters

If a Job parameter's data type is DATE, you can specify a default value using generic date specifications. This can be useful if you need to pass this date value to another script or application.

When you select a Job, you will see a form to set values for the Job's parameters. Parameters with a data type of DATE are presented using the standard MM/DD/YYYY date field, but JAMS uses the generic date specification to dynamically determine the default date.

When JAMS automatically submits Jobs, prompting for the parameter values is not possible. Instead, the generic date specification is evaluated to obtain the value for the parameter.

Scripting

You can use the ConvertTo-Date PowerShell cmdlet for scripting in your Jobs. You can also use it to validate that a generic date will evaluate to the expected date. For more information on its parameters, see ***JAMS PowerShell Cmdlets* on page 333**.

How JAMS Interprets Natural Language

When using a modifier, such as LAST, JAMS interprets this to mean " the last occurrence of the specified object." If you specify "Last Monday", the Job cannot be scheduled because JAMS evaluates this as a date in the past. If today is a Monday, "Last Monday" will give you the date from Monday of last week, and if today is a Tuesday, it will give you yesterday's date. However, this specification may work as expected if you are using it for scripting or a parameter.

Using PowerShell or Projected Schedules to Validate a Natural Language Specification

To help you validate your natural language specification will work as expected, you can use the ConvertTo-Date PowerShell cmdlet or a Projected Schedule to see the expected date value.

For example, you can enter the following code into PowerShell to see how it will evaluate. This will show you how JAMS will use the date. Because this will always evaluate to a date in the future, JAMS cannot use "1st Workday of Next Month" for scheduling a Job.

```
ConvertTo-Date "1st Workday of Next Month" -server localhost
```

To use a date other than the current date as a reference, you can use the option below.

```
ConvertTo-Date "1st Workday of Next Month" -server localhost –Today "February 1, 2023"
```

You can also use a Projected Schedule to see if your defined Job is expected to run on the days you expect. The Projected Schedule displays a graphical view of future JAMS Jobs and Sequences based on defined schedules. Users can view all scheduled Jobs or filter a subset of Jobs over a specified time range. See ***Working with Projected Schedules* on page 255** for more information.

Natural Language Options

JAMS can evaluate date specifications that are relative to the current date or a generic date. See the tables below for information on the options for specifying a date.

Daily or Today

Description	Enter "Today" to specify the current date. "Daily" is synonymous with Today and is used primarily for readability.
Examples for Scheduling	"Daily", "Today"
Examples for Scripting/Parameters	"Today"

Day of the Week

Description	Enter the full name of a weekday or the first three letters of a weekday name. When specifying a day of the week, such as MONDAY, JAMS interprets this as "Monday of this week." In this context, a week begins on Monday and ends on Sunday. The days of the week can be preceded by a modifier such as LAST, THIS, or NEXT. **THIS** is the default, so explicitly adding it as a modifier has no effect on the evaluation and is used only for readability.
Examples for Scheduling	"Mondays", "This Monday"
Examples for Scripting/Parameters	"This Monday", "Next Monday", "Last Monday"

Day of the Month

Description	Enter a specific date using the format of month/day for sites in the United States. You can use the day/month format for other locations.
Examples for Scheduling	"1/1", "4/1", "7/1", "10/1"
Examples for Scripting/Parameters	"1/1", "4/1", "7/1", "10/1"

Weekdays

Description	Enter "Weekdays" to default to Mondays through Fridays as Workdays for scheduling. This can also specify the current date, if it is a weekday.
Examples for Scheduling	"Weekdays"
Examples for Scripting/Parameters	"Weekdays"

Workdays

Description	Enter "Workdays" to default to Mondays through Fridays as Workdays for scheduling.
	If your site uses different Workdays, you can define them system-wide in the Configuration shortcut menu or override them by using a Date Type in a JAMS Calendar. When you define a Date within a Date Type, you can set the Date to be a workday or a non-Workday. See the Calendars section for more information.
	If you specify "Workday" or "Workdays", JAMS determines if a day is a workday by checking the Workdays specified in the Configuration Shortcuts menu and in the Calendar. For the date in question, JAMS checks the following in the Date Definition in the Calendar.
	• If the Workday check box is enabled, the date is a workday.
	• If the Workday box is unchecked, the date is not a workday. However, if the check box is filled, it indicates that the special date should have no effect on the workday status.
Examples for Scheduling	"Workday", "Workdays"
Examples for Scripting/Parameters	"Workday", "Workdays"

Tomorrow

Description	Enter "Tomorrow" to display the current date plus one day.

Examples for Scheduling	None. This will not schedule a Job because the date will always evaluate to a future date. For example, if the specification is evaluated on a Monday, it will evaluate to Tuesday. The next day, it will evaluate to Wednesday rather than Tuesday, so the Job will not run.
Examples for Scripting/Parameters	"Tomorrow"

Yesterday

Description	Enter "Yesterday" to display the current date minus one day.
Examples for Scheduling	None. This will not schedule a Job because the date will always evaluate to a past date.
Examples for Scripting/Parameters	"Yesterday"

Holidays

Description	This is used to add days to the specified date. This is used to identify holidays from a JAMS Calendar. You can create holidays by creating a Holiday Date Type and adding specific dates to it. Dates in the DateType need to manually added and updated.
Examples for Scheduling	You can specify "Holidays" as a ScheduledDate to have a Job run on any specified holiday. You would need to specify the JAMS Calendar that contains the Holidays Date Type. "Last Monday of May", "4th day of July", "first Monday in September", "4th Thursday of November", "25th day of December".

Examples for Scripting/Parameters	The AddHolidays Sample Job in the Samples Folder has several examples for adding Holidays.
	"Last Monday of May", "4th day of July", "first Monday in September", "4th Thursday of November", "25th day of December"

Every Other Day

Description	Enter "Every Other Day" to skip one or more days. JAMS will use the next available occurrence of the specified date type, repeating on each alternate available date. Days can be set using Day-of-Week specifications, Weekday, or Workday.
	To determine the next scheduled date for Job, JAMS uses two fields:
	- The Scheduled Date - View the Scheduled Date from the Schedule tab in the Job Definition - The Last Autosubmit Dates - View the Last Autosubmit Date from the Definitions screen, if you add the column from the Column Chooser. (Right-click any column heading and select **Column Chooser**.)
	If the Last Autosubmit Date is after the Scheduled Date, the Autosubmit Date is used to calculate the next execution of the Job. If neither date has a value, the current date is used as the start date. The Last Autosubmit Date is used rather than the "Scheduled Start Date", so you can have Jobs that are constantly shifting.

Examples for Scheduling	Example A: You could have a Job scheduled for "First Monday of Month, Every other Monday" and it would run on the following Dates: • January 2, 2023 • January 16, 2023 • January 30, 2023 • February 6, 2023 (There is only a one-week gap due to the "First Monday of Month" option.) • February 20, 2023 (This is from the "Every other Monday" option, but it shifted due to the previous short gap.) Example B: Job A is created on Saturday and scheduled to run "Every Other Workday". The Job will run on Monday, Wednesday, and Friday the first week, and then Tuesday and Thursday the second week, and so on.
Examples for Scripting/Parameters	"Every Other Monday"

Date + Number of Days

Description	Enter a date and the number of days to add days to the specified date.
Examples for Scheduling	"Last Sunday+1 Workday" will run a Job on Mondays, unless the Monday is a non-workday. The Job will then run on the following Tuesday. > **NOTE:** When JAMS evaluates "Weekdays+1" or "Workdays+1", the scheduled date will always be in the future, so the Job will never run. When evaluated on a Tuesday, the result is Wednesday and so on. The "Last" modifier should be used in conjunction with the base date for this approach to be useful for scheduling.
Examples for Scripting/Parameters	"Weekdays+1", "Workdays+1"

Date - Number of Days

Description	Enter a date and the number of days to subtract days from the specified date.
Examples for Scheduling	"Tuesday -1 Workday" to run a Job on Mondays, unless the Monday is a non-Workday, in which case you want the Job to run on the preceding Friday.
	NOTE: "Weekdays-1" or "Workdays-1" will run a Job on Sundays rather than Sunday, Monday, Tuesday, Wednesday, and Thursday.
	When JAMS evaluates the specification on a weekday, the resulting day will always be in the past and the Jobs are not scheduled. When the specification is evaluated on a Tuesday, the result is Monday because Tuesday is the next weekday.
	On a Sunday, the next weekday is Monday, so it evaluates to Sunday. As an alternative, set the Scheduled Date property to Daily and the Except For Date property to specific days such as Friday or Saturday.
Examples for Scripting/Parameters	"Weekdays-1", "Workdays-1"

Date Specification + Period Specification

Description	Enter a date and period to identify a date relative to an arbitrary period of time, such as describing a month or fiscal period. A complex date specification may be thought of as two components: The day specification and the period specification.
	For example, in the text "1st Workday of Next Month," the day specification is 1st WORKDAY and the period specification is Next Month. Two different options can be used for structuring this specification. If you do not specify the day of period, the default becomes the current day.
	- Day Specification values: "First, Last, 1st, 2nd, 3rd, Integer (st, nd, th)" **+** "Day-of-week, Workday, Weekday, Day, Month" - Period Specification values: "This, Next, Last" **+** "Year, Month, Month-name, Specific Date, Date-Type Specific-Date-Type"
	NOTE: When used in the context of a time period, a week is defined as starting on the first day of the period and continuing for seven days.
Examples for Scheduling	"1st Workday of Month", "2nd Day of this Week", "2nd Monday of this Month", "3rd Day of Week", "4th Day of Month"
Examples for Scripting/Parameters	"1st Workday of Next Month", "Last Day of Last Month", "First Monday of Next Month", "First Monday of Last January", "6th Weekday of Next Month"

Date Specification + Period Specification + Number of Days

Description	Enter a day, period, and number of days to identify a date relative to an arbitrary period of time, such as describing a month or fiscal period and adding one or more days.
Examples for Scheduling	"First day of month + 1 workday"
Examples for Scripting/Parameters	"Last day of last month + 1 workday"

Date Specification + Period Specification - Number of Days

Description	Enter a day, period, and number of days to identify a date relative to an arbitrary period of time, such as describing a month or fiscal period and subtracting one or more days.
Examples for Scheduling	"16th Day of Month -1 Workday"
Examples for Scripting/Parameters	"16th Day of Month -1 Workday"

Named Times in JAMS

With Named Times, you can define flexible windows of time when Jobs are allowed to run. The Named Time can be referenced in the Schedule for one or more Jobs to give you more control over when Jobs can run. You can also configure the Schedule to send an alert if the Job runs outside the specified window.

- Names Times let you do the following:
- Prevent Jobs from executing until their scheduled window is enabled and open.
- Take various actions when a Job's window closes before the Job completes. These are specified as Missed Actions.
- Limit when manually submitted Jobs are allowed to run.
- Prevent manual Job submissions from running during periods when other Jobs use significant system resources.

Named Time Definitions screen

The Named Time Definitions screen displays all Named Times that have been configured. Each Named Time displays the following:

- Time Name - The name of the Named Time.
- Enabled – The status of the Named Time. If it is enabled, the time window is open for the Schedule to use it. If the Named Time is referenced in multiple Jobs, the window is open for all of them.
- Start Time – The starting time for the Named Time.
- End Time – The end time for the Named Time.
- Description - Optional. A brief description of the Named Time.

You can add additional columns by using the Column Chooser. Right-click a column heading, and select **Column Chooser**.

Viewing All Named Times

1. Click **Times** from the Shortcuts menu.
2. Click a column header to sort the list of Named Times.

Adding a Named Time Definition

1. Click **Times** from the Shortcuts menu.
2. Click **+**.
3. In the Named Time Name field, enter a name.
4. In the Start Time field, enter the time the Named Time window will open.
5. In the Automatically Enable field, select or clear the checkbox to allow the Named Time to be enabled at the specified start time.
6. In the End time field, select the time the Named Time window will close.
7. In the Automatically Disable field, select or clear the checkbox to allow the Named Time to be disabled at the specified end time.
8. Click **Ok**.
9. Click **Save and Close**.

Adding a Time Window to a Job or Folder

After you add a Named Time, you can add a time window to a Job or Folder and reference the Named Time to control when Jobs can run.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click the desired Job or Folder, and select **Properties**.
3. Select the **Schedule** tab.
4. Click **+**.
5. Select **This Job depends on a** | **time window**.
6. In the Missed Window Action field, select an action for the Job when the time window is closed.
7. In the Schedule Window field, select the Named Time.

> **NOTE:** When using a Named Time on a time window, leave Schedule From Time and Schedule to Time blank.

8. Click **Finish**.
9. Click **Save and Close**.

Missed Window Actions

To understand how Jobs will behave when using a time window, review each Missed Window Action below.

- **No Action**: If you manually or automatically submit a Job that has No Action selected, the Job will start based on the submitted time. If a Schedule window has been set and you manually submit the Job, a message will be displayed on the Submit dialog to display the current Schedule window time range. A No Action Job will run to completion, even if the Schedule window closes.

- **Continue**: The Job does not start until the Schedule window opens and continues running to completion, even if the Schedule window closes. There is no rescheduling option.

- **Abort or Delete**: The Job does not start until the Schedule window opens and is deleted or aborted if the window closes before the Job is completed.

- **Reschedule or Continue**: The Job does not start until the Schedule window opens. If the Job does not start by the time the window closes, it is rescheduled for the next time the window opens. If the Job does start, this action allows the Job to continue to completion even if the window closes.

- **Restart or Reschedule**: The Job does not start until the Schedule window opens. If the Job has not completed by the time the window closes, the Job is forced to abort, and is rescheduled to run the next time the window opens.

Modifying a Named Time

You can modify the properties of a Named Time, including its name, description, and start/end time. You can also set it to be automatically enabled or disabled at the designated start and end times.

1. Click **Times** from the Shortcuts menu.
2. Right-click a Named Time, and select **Properties**.
3. Click the **Named Time** tab to do the following:
   1. Change the name.
   2. Change the description.
4. Click the **Times** tab to do the following:
   1. Change the start time for the time window.
   2. Automatically enable the time window.
   3. Change the end time.

4. Automatically disable the time window.

5. Manually enable or disable the time window.

5. Click **Save and Close**.

Deleting a Named Time

You can delete a Named Time if it is no longer being used. Before deleting a Named Time, ensure all Jobs and Folders that currently use it have been updated to remove references to it. To view where the Named Time is referenced, double-click the Named Time and select the References tab.

1. Click **Times** from the Shortcuts menu.

2. Right-click the Named Time, and select **Delete**.

3. When you are prompted to confirm the deletion, click **Yes**.

Manually Enabling or Disabling a Named Time

When you add a Named Time, you can specify in the properties if it will be automatically enabled or disabled at the specified time. For more control, you can manually enable or disable a Named Time.

If the Named Time is enabled and is then manually disabled, Jobs will behave according to their Missed Window Action. If the Named Time is disabled and then manually enabled, Jobs waiting for it to be enabled will be allowed to execute.

1. Click **Times** from the Shortcuts menu.

2. Right-click the Named Time, and select **Enable** or **Disable**.

3. When prompted, click **OK**.

4. Click the **Refresh** button to view the updated state in the Enabled column.

Named Time Definition Properties

The Named Time Properties are divided into three tabs.

Named Time Tab	Description
Name	This property is the unique identifier for the Named Time.
Description	This optional property appears in menus, lists, and reports and provides a more detailed explanation for the Named Time.

Named Time Tab	Description
Last Changed	This property displays the user (username) who last modified the Named Time along with the date and time of the modification.

Times Tab	Description
Start Time	Enter the time of day the Named Time is scheduled to begin.
Automatically Enable	If this checkbox is selected, JAMS automatically enables the Named Time at its specified Start Time. When this checkbox is cleared, the Named Time remains disabled until it is manually enabled.
End Time	Enter the time of day the Named Time is scheduled to end.
Automatically Disable	If this checkbox is selected, JAMS automatically disables the Named Time at its specified End Time. When this checkbox is cleared, the Named Time remains enabled until it is manually disabled.
Last Time Window was Automatically Enabled or Disabled	This property displays the last date and time when the Named Time was automatically enabled or disabled.
Currently Enabled?	If the Named Time is enabled, use the Disable button to manually disable it. If the Named Time is disabled, use the Enable button to manually enable it.

References Tab	Description
References	The References tab lets you view where the Named Time is referenced in JAMS.

Dashboards and Reports

The articles in this section will help you to use dashboards and reports within JAMS. This manually generating reports, using custom dashboards, customizing templates and existing reports, and integrating reports with automated JAMS Jobs.

Custom Dashboards

JAMS includes a variety of preinstalled Dashboards that are intended meet most user needs. Users are recommended to use preinstalled Dashboards before attempting to create custom dashboards, in order to gain an understanding of what kinds of data are important and what could potentially be added to enhance a dashboard for the given organization.

JAMS comes with powerful design features to modify or completely alter a Dashboard to fit the way you use JAMS. Custom Dashboards can incorporate a variety of data sources including: JAMS specific data, PowerShell scripts, and data stored in external databases - such as Microsoft SQL Server, MySQL, and Microsoft Access.

There are three key steps to building a custom Dashboard:

1. Defining a Data Source (using JAMS or external data sources).
2. Setting up a Dashboard Item (determining the Dashboard's functionality and formatting.
3. Adding or modifying Parameters, setting up drill downs, filtering functionality.

Follow the steps below to build your own custom Dashboard using JAMS' powerful Dashboard Designer feature.

Defining a Data Source

The process of setting up a custom Dashboard begins by opening the Dashboard Designer and locating and defining a Data Source. Custom Dashboards can incorporate a variety of data sources that can be used to build simple or complex Dashboards.

1. Select the **Dashboard Designer** shortcut from the menu. The Dashboard Designer window will open.
2. Select the **Data Source** tab, then select **New JAMS Data Source**. The Save Dashboard File dialog will open.
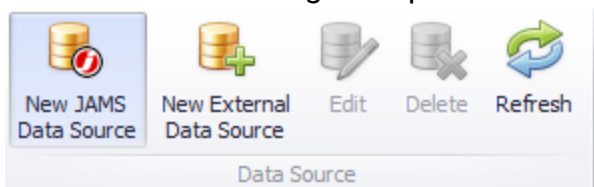
3. Enter a name for the Dashboard file (.jdb) and click **Save**. The Add a Dashboard Data Source Wizard will open.

4. Enter a Data Source Name and use the dropdown to select a Data Source Type.

Data Source	Description
History	Provides JAMS history query that returns all JAMS Job Properties matching a specific criteria and time frame.
Completions by Severity	Includes an optimized version of the History data source that only returns completion count data. This is the preferred choice when retrieving historical data for a large number of jobs.
Queue Name	Contains all the properties from defined JAMS Queues.
Resource Name	Incorporates comprehensive information about each JAMS resource, including usage data.
Agent Name	Provides comprehensive information for all installed JAMS Agents.
PowerShell	Runs a PowerShell script. The returned PowerShell objects are accessible to all Dashboard items.

5. Click **Next**. The Parameters Wizard opens.

6. Enter parameters as desired. Note that parameter options are dependent upon the data source selected. Wildcards may be used in the parameter options.

7. With the parameters defined as desired, click the **Finish** button.

Using External Data Sources

Users may use non-JAMS data sources for dashboards, such as a database or XML files. To add an external data source, follow these steps:

1. On the Dashboard Designer, select the **Data Source** tab.

2. Select the **New External Data Source**.

> **NOTE:** is different than the New JAMS Data Source button used in the previous section.

3. The Create Data Source Wizard opens.

4. Select a Data Source Type from the available options, then click Next. (Database, Olap, CSV, Data extract)

5. Based on the Data Source Type, either **Define the Database Connection**, **Define the OLAP cube connection**, **Select the CSV file**, or **Select the Data Extract**, then click **Next**.

Provider:	Microsoft SQL Server ▼
Server name:	localhost
Authentication type:	Windows authentication ▼
User name:	
Password:	
Database:	▼
Connection name:	localhost_Connection

> **NOTE:** Additional configuration settings may be required, based on the Data Source Type.

6. With all settings configured, click **Finish** to display the external data source in the dashboard designer.

Setting up a Dashboard Item

Once a Data Source has been defined, the next step is to set up the Dashboard item(s).

1. Begin this step by opening the Designer's **Home** tab and select a Dashboard Item type on the Ribbon.
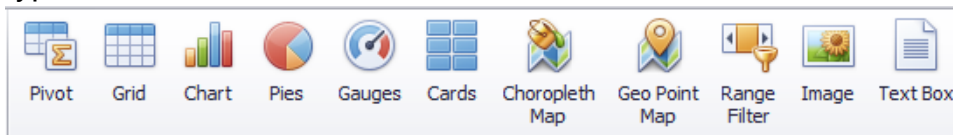
2. This action opens the Dashboard Elements page made up of three contiguous sections: Data Source Browser, Data Items Pane and Preview Pane. This is the display where you link (or bind) the data source created in the first step with the new Dashboard Item.

3. On the top of the Data Source Browser select an existing Data Source from the drop down menu.

4. As shown below, the selected Data Source opens displaying all associated Data Fields.

5. Drag the desired Data Field from the Data Source Browser and drop it onto the appropriate container field on the Data Items pane.
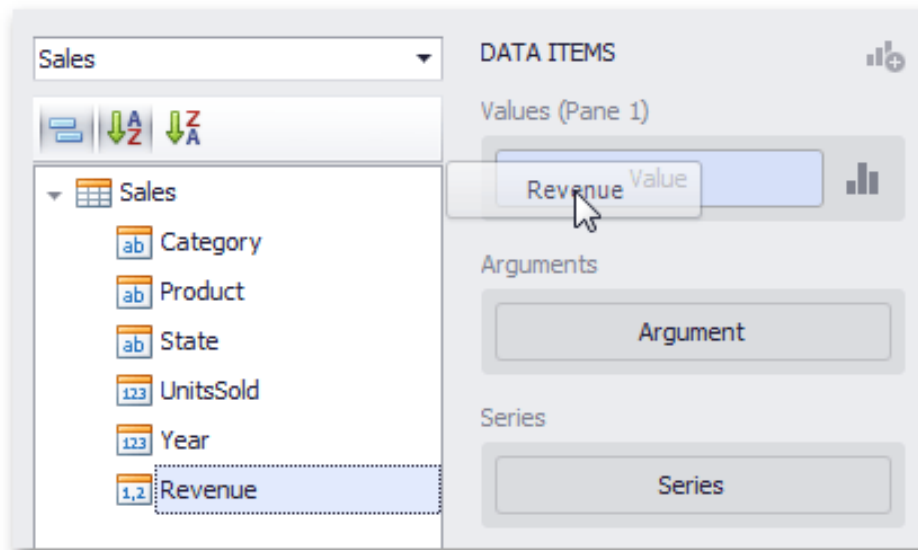
> **NOTE:** You can also remove the data item by dragging it outside the Data Items pane.

6. Use the Preview Pane to confirm each selection.
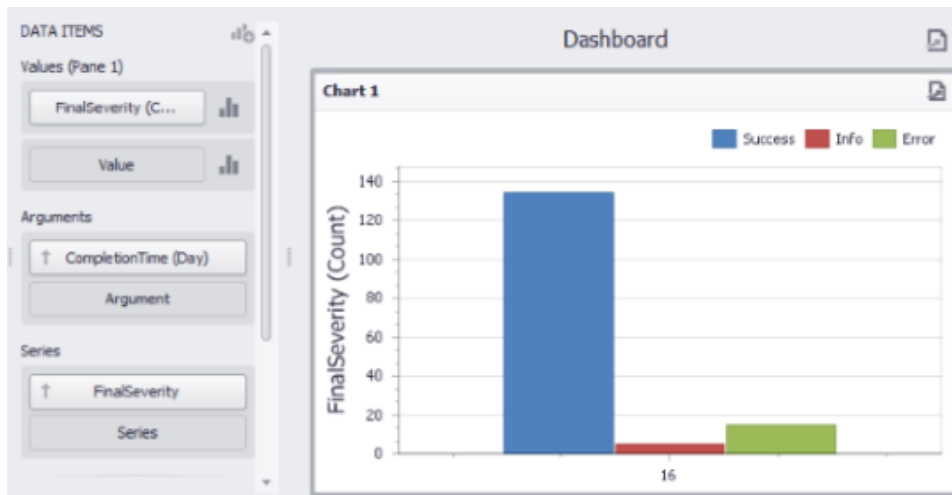
> **NOTE:** You can quickly change the Dashboard type by right-clicking in the Preview pane. This action opens the Dashboard context menu. Select the **Convert To** command submenu to view a listing of Dashboard types, such as Pivot, Grid, Chart, or Pies.

7. You can insert additional Dashboard items by selecting another Dashboard type on the Designer's **Home** tab ribbon.

   > **NOTE:** You can only use one Data Source per Dashboard Item.

8. As shown in step 3, open an existing Data Source from the Data Source Dropdown menu and drag and drop the desired Data Fields to the appropriate section on the Data Item Pane.

9. From the Design tab, use the available tools to customize the new Dashboard item.
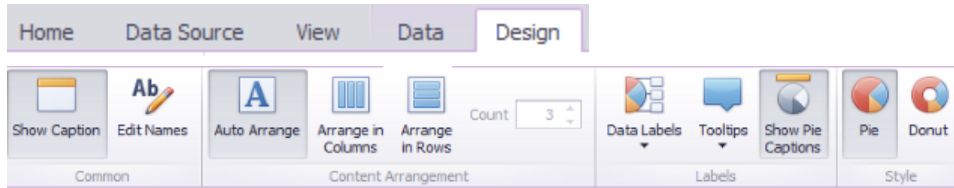
10. Click **Save** to complete the design process.

Modifying Parameters

Parameters pass information to Dashboard Items, allowing you to alter what is displayed.

Changing an Existing Parameter

To access the parameters settings click the **Parameters** button (icon with document and gears located on the top right portion of the Dashboard Design pane). This action opens the Parameters dialog.

Creating New Parameters

You can define new parameters within a Dashboard to further customize its display.

To add a parameter(s) to a Dashboard, open the Dashboard Designer.

1. On the Dashboard Designer's Home tab click **Open** and navigate to the desired Dashboard (.jdb) file, typically located in the JAMS Installation directory (MVPSI/JAMS/Client).

2. On the Home tab, click the **Parameters** button. (located in the Dashboard section of the ribbon bar).
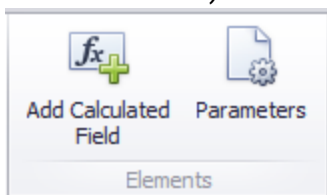
3. The Parameters Properties dialog opens. On the left panel select an existing parameter to modify its properties, or click the **Add** button to define a new parameter.

4. In the right panel, define the properties for the selected parameter.

5. Click the **OK** button when completed.

Using the New Parameter

The value of Dashboard parameters can be used for any JAMS Data Source Parameter. This is done using the syntax **$parameterName**. For example, if you had a parameter called OffsetTime you would reference the Dashboard parameter in a JAMS Completion by Severity data source by entering **$OffsetTime** into the wizard instead of hard coding a number into the Time Offset field.

Setting up a Drill-Down Display

The Dashboard Designer includes a drill down function to help you create a more dynamic display with multiple levels of information.

The example below shows how selecting a single node on 24 hour line graph zooms the information view to a particular hour.
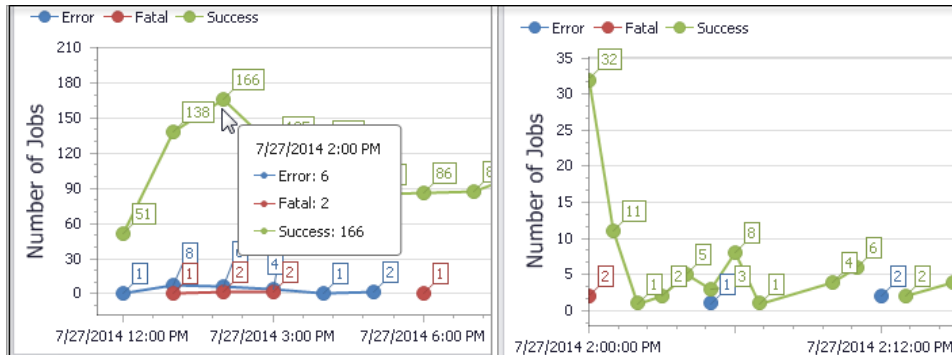
To create a drill down effect you must define multiple related data sets in the Arguments container field located on the Data Items pane. The Dashboard's highest level data is entered on the first Data Item Container field and the "drill down" data is defined on the second.

> **NOTE:** If three or more drill-down levels are needed, additional containers fields will appear on the Data Items pane.

A Drill Down Example in 3 Steps

Use the following example to create a pie chart that displays JAMS Jobs that have executed over the past 24 hours by severity levels, such as Success, Warning, Error, Fatal and Informational.

Step 1: Set up the Custom Dashboard Item

To get started with this example, first create a Data Source.

1. From the Menu, open the Dashboard Designer.
2. On the Data Source tab select the **New JAMS Data Source** button located on the left end of the Ribbon.
3. The Add Dashboard File dialog opens.
4. On the first wizard page enter a Data Source Name. For this example, name it **JAMS History** and use the pull down menu to select a Data Source Type. Choose the **History** option, which tells JAMS to provide information on previously run Jobs.

Select the **Next** button.

5. On the Parameters page, keep the default settings and click the **Finish** button.

Step 2: Add a Custom Dashboard Item

1. From the Dashboard Designer, select the **Home** tab. On the Ribbon, choose the **Pies** option.
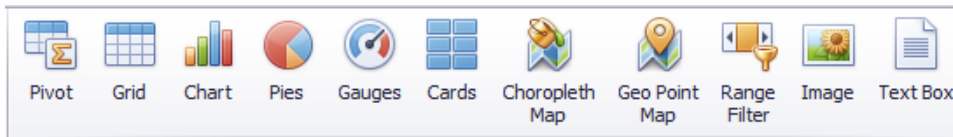
2. This action opens the Dashboard Elements page. This is where you bind specific Data Items to create the pie chart.

3. From the Data Source Browser, use the pull-down menu to select the **JAMS History** Data Source you defined in step 4. This action displays all Data Fields associated with the data source.
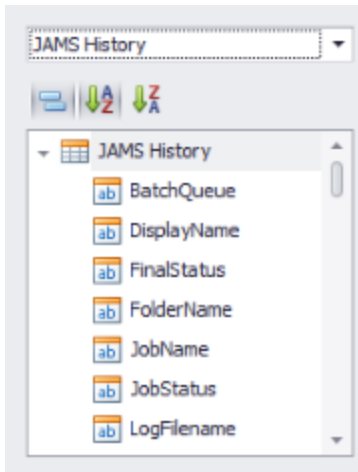
4. On the Data Source Browser drag and drop the specific Data Fields to the appropriate Data Item Containers on the Data Items pane, as described below.

- Find and then drag the FinalSeverity Data Field to the first Values Data Item Container.

- Second, drag the same FinalSeverity item again, this time to the first Arguments container field. These data items will appear in the top level display as shown in the preview window below.

- To add the data item for the drill down view, drag the JobName data item to the second Argument container.
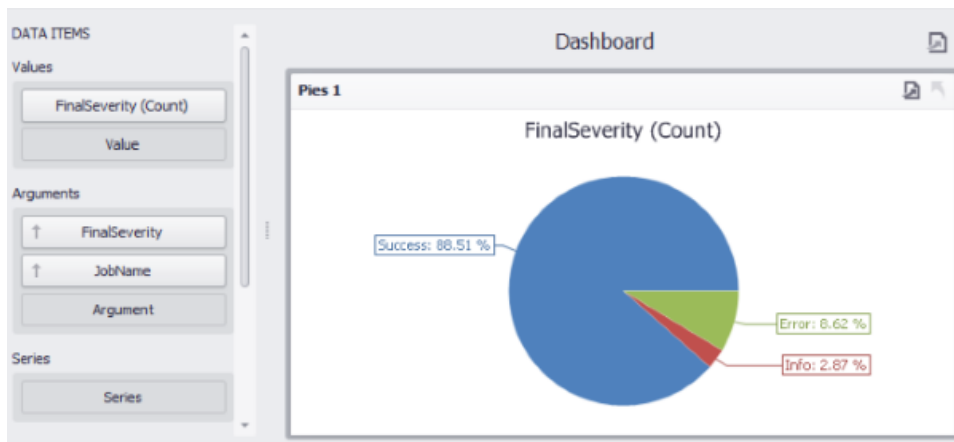
Step 3: Define and configure the Drill down Property

1. On the Dashboard Designer, select the **Data** tab.
2. Activate the **Arguments** button. By enabling the Arguments option the Dashboard item treats the two arguments as distinct, but related data sets.
3. Click to activate (highlight) the Drill Down button. This allow the Dashboard Designer to interpret different sets of data between the two Arguments data item containers.
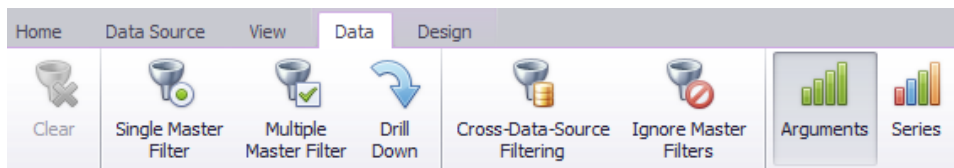
4. On the Preview pane, test the drill down by clicking on the Success portion of the pie chart. This actions should now detail all successful Jobs executed during the past 24 hours.
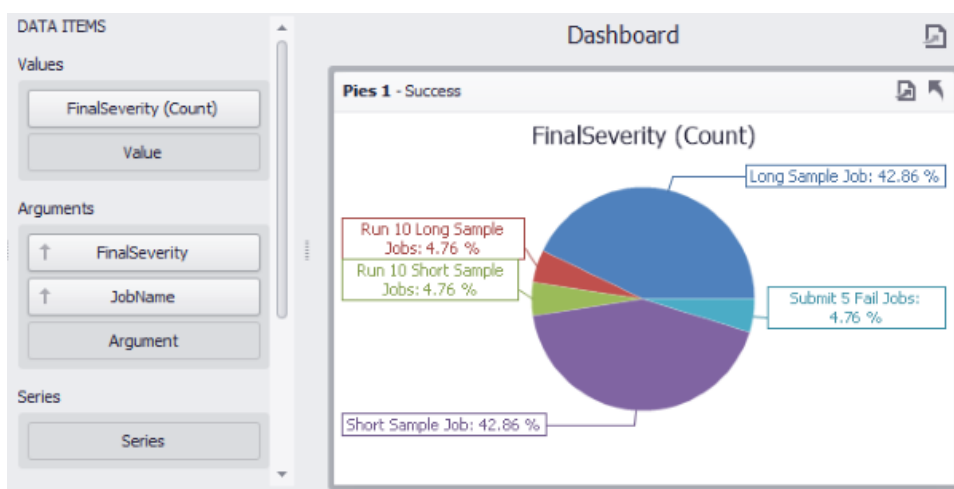
5. To move back to the first level pie chart display, right-click on the chart to display the Drill up context menu or alternatively choose the curved arrow **Drill up** icon.

6. Select the other elements of the pie chart to test the drill down function.

7. Optionally, open the Design tab to take advantage of the built-in formatting tools.

8. Choose the **Save** button to save the designed custom Dashboard.

Using the Master Filter

The Master Filter is a Dashboard Designer feature that allows you to choose what data is displayed on a Dashboard Item. For example, when Master Filtering is enabled you can click a specific Dashboard Item to trigger updates to other items, such as chart, pies, or gauges.

The Dashboard example below uses the Master Filter to control what data is displayed in the donut graph in the Preview panel. In this case, the donut graph is linked to the Agent Selection and Date Range items. Making changes to either element, by highlighting one or more agents or changing the date range slider, immediately updates the graph to reflect the changing input data.
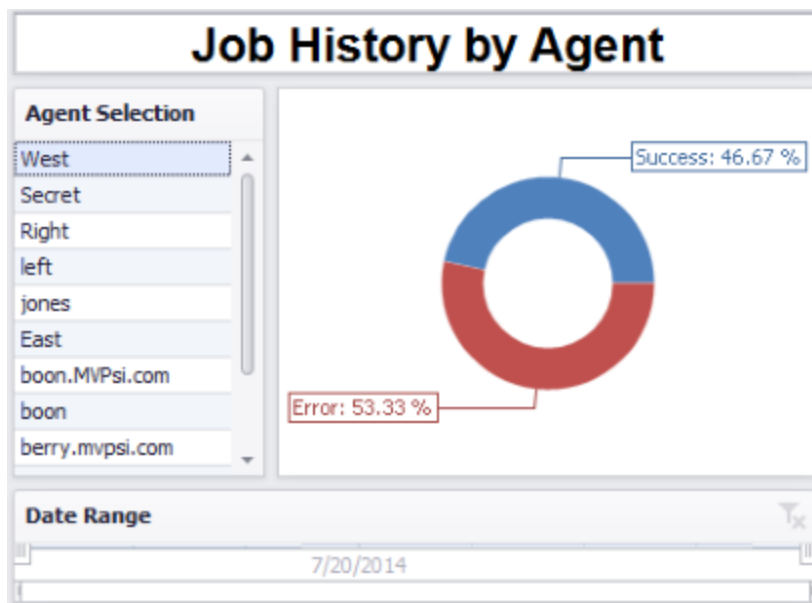
Using Master Filter Modes

For each Dashboard Item, the Master Filter supports two selection modes: Multiple and Single.

Multiple Master Filter Mode

This mode allows you to select multiple elements within a Dashboard subpanel. For example, when choosing the Agent Selection subpanel with the Multiple Master Filter enabled you can **Control + click** to highlight multiple agents as shown in the two screenshots below.
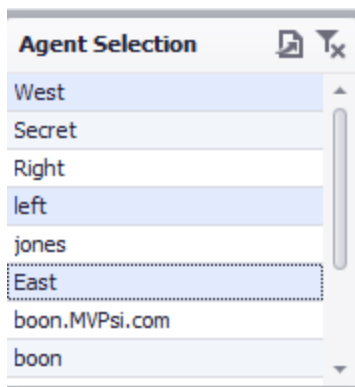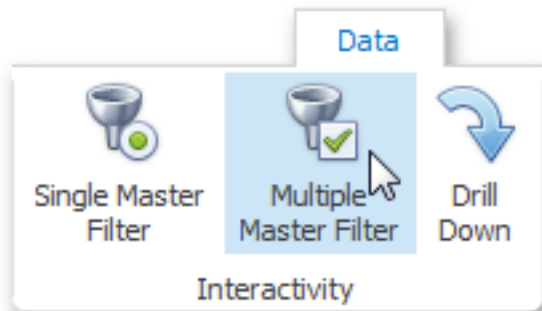
Single Master Filter Mode

Unlike the Multiple Master Filter, the Single Master Filter mode only allows you to select one element at a time within a selected Dashboard subpanel.

Ignoring the Master Filter

Dashboard items can be set to ignore the Master Filter entirely. To do this, choose a Dashboard Item and select the **Ignore Master Filters** button located on the Dashboard Designer's Data tab.

For example, the Agent Selection sub panel, shown above, is set to ignore the master filter because it is the primary setting for that subpanel. In other words, you input an agent selection in order to update the donut graph, not the other way around.

Enabling the Master Filter

As described above, there are several Master Filter modes and settings, but there is no one place where you can actually view all these settings. Instead, each individual Dashboard Item must be selected within the Designer to view the Master Filter settings.

However, you can view the Master Filter state by hovering over the filter icon adjacent to the Dashboard title. This filter icon only appears when there is more than one criteria affecting the filter.
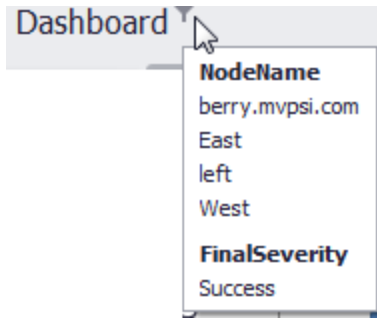
The Dashboard Title is turned off by default on the primary Dashboard. To change this settings open the Designer and select the **Home** tab. On the far right side of the Ribbon select the **Title** button. On the Dashboard Title dialog, activate the **Visible** and **Show Master Filter state** checkboxes.
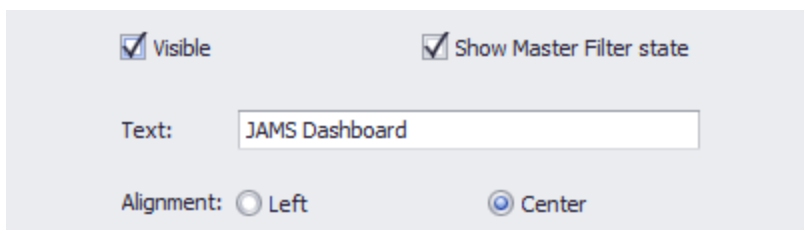
Finally, to make changes to a Dashboard's Master Filter settings, open the Dashboard Designer.

1. On the Designer's Home tab click the **Open** button.
2. Navigate to and select the desired Dashboard (.jdb) file.
3. This opens the multi-panel Dashboard Elements page.
4. Select the **Data** tab to view what, if any, Master Filter buttons are activated.
5. On the Preview pane, select a subpanel. Notice how the Data Item Container fields are updated to reflect the subpanel's settings. This is where you define or modify how each Dashboard Item affects the Master Filter.
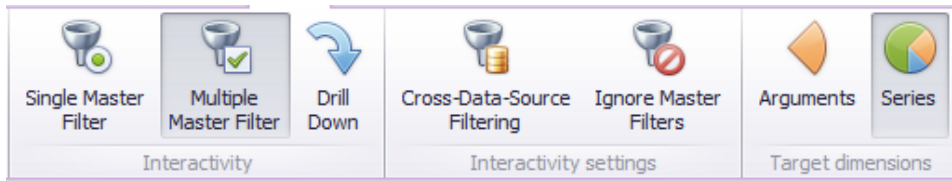
Creating New Report Templates and Customizing Existing Reports

You can modify existing reports or build reports from scratch using the report designer. Both options are described in more detail in the following subsections.

Once a new or customized report is created you can save the report definition to the JAMS system or your local machine. Either way, the report can be loaded later or viewed manually or automatically as part of any JAMS Job.

Creating a New Report Template from Scratch

1. From the JAMS Shortcuts menu, click **Report Designer**.
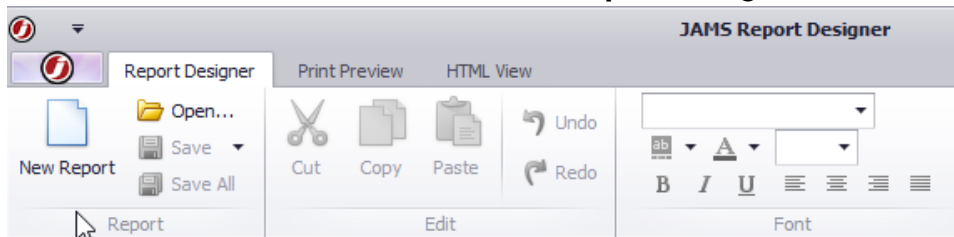
2. Click **New Report** from the Report Designer tab.
3. From the Select Report DataSource dialog, select a data source.
4. Click **OK**. Each data source comes with pre-defined parameters with values that can be changed to produce a different report output.
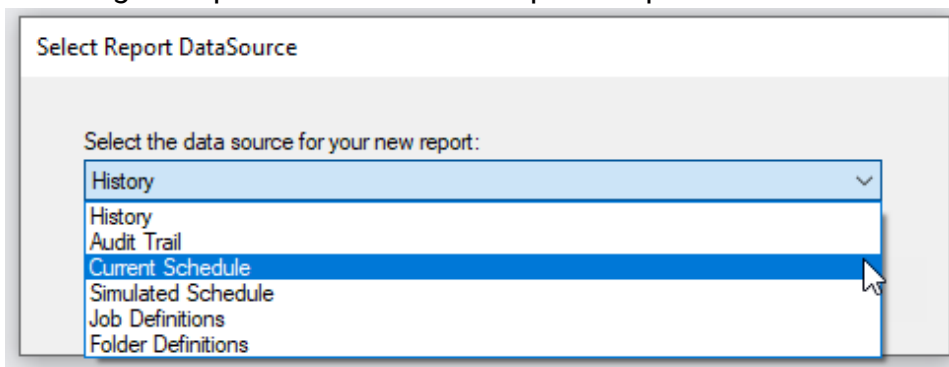
5. Drag and drop control objects, such as a field, label, table and shape, from the Tool Box to one of the Report Layout "bands" (top margin, detail and bottom margin).

6. Right-click a "band" to view its context menu. The context menu lets you modify, reorder, and define each "band" from its Properties panel.
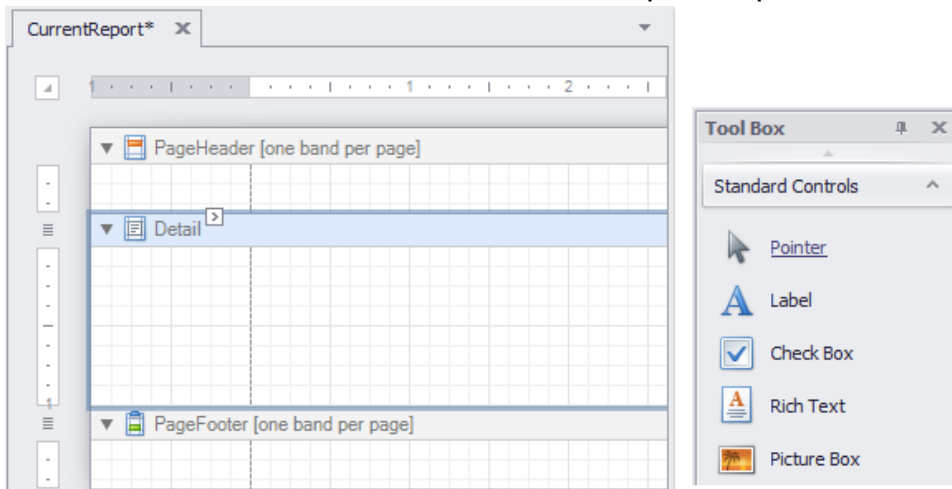
7. The Report Explorer panel displays the current report structure using a tree format.
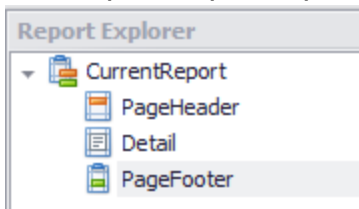
8. Use the following sections to make additional updates to the report:

   • The Field List panel displays a listing of the report's data sources, allowing you to add new bound controls and binding existing controls. To add a new bound report control, click on the desired item in the Field List window and then drag and drop the item onto a report band on the report layout panel.

   > **NOTE:** You can also right-click a Field List item and drag and drop it onto the report's Layout Panel. This action opens its context menu. From the menu list, select the field type desired.

   • The Property Grid panel provides a variety of options for formatting existing field controls.

   • The Group and Sort panel lets you create and define grouping fields instead of manually inserting Group Header and Footer bands.

   • Additional formatting tools are available on the Report Designer Ribbon Bar.

9. To output a partial or complete report, click the **Print Preview** or the **HTML View** tabs.

10. From the Ribbon Bar click **Save** or **Save As** to create a standalone report (.pmx) onto your local hard drive. All standalone report files can be accessed by clicking **Open** and selecting **File** from the Open JAMS Report dialog.

Customizing an Existing Report

The Report Designer also provides tools for modifying existing reports.
To access these tools:

1. In the Report Designer, click **Open**.

2. From the Open JAMS Report dialog, expand a category and select an existing report to modify.

3. Click **OK**. The Report Designer Window opens with the report's layout displayed in the report layout panel.

4. Drag and drop a control object, such as a field, label, table, and shape, from the Tool Box to one of the Report Layout pane's component "bands".

5. Refer to steps 4 - 10 in the previous subsection to complete the existing report design.

Manually Generating Reports

JAMS makes it easy to add reporting capabilities for either existing or new Jobs. The following topic summarizes how to create and generate Reports both manually and automatically.

Users may view all existing Reports from the JAMS Client by selecting the **Report Viewer** shortcut from the menu.

To generate a JAMS Report:

1. From the JAMS Shortcuts menu, click **Report Viewer**.

2. In the Report Viewer, click **Open** to view any existing Reports. The Open JAMS Report window appears with a listing of categories containing Reports already built into JAMS.
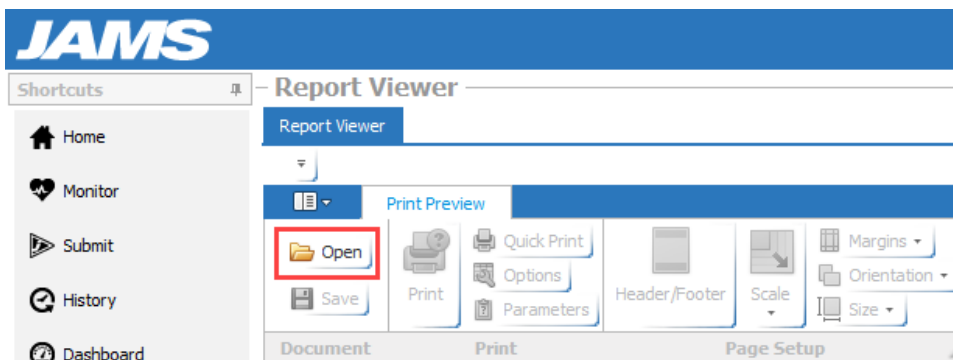
3. Expand a category, and highlight one of the Reports.

4. Click **OK**. You may also open any stand-alone Reports by clicking the **File** button.
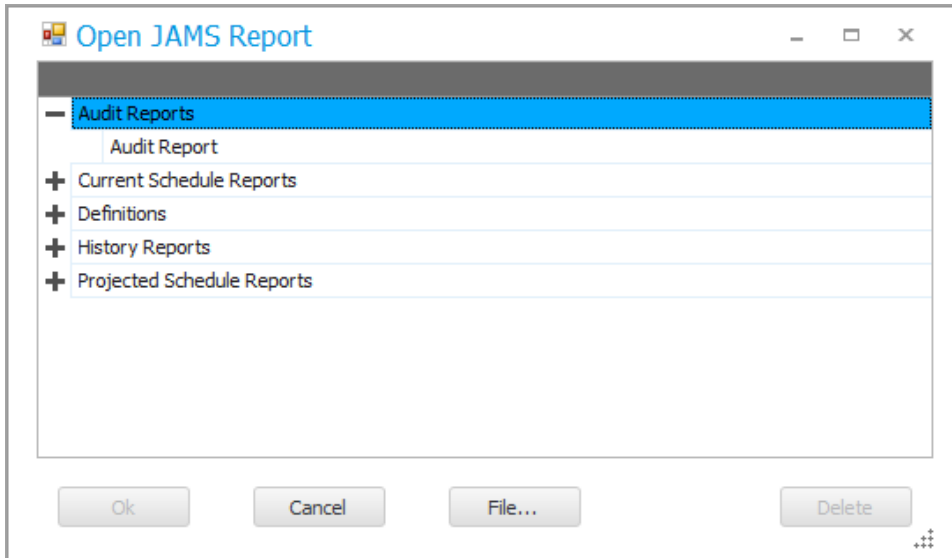
5. On the Parameters dialog, enter the properties for the specific Report type.

6. Click **Submit** to query the JAMS system and create the Report based on the entered parameters in the previous step.

7. After running the Report, you can export the Report in a variety of file formats. Click the **Export/Export To** command located on the right of the Report Viewer Ribbon Bar.

Using the Report Viewer is an easy way to manually run reports against the JAMS system. It is also possible to run the same Reports automatically. See the topic: Integrating Reports with Automated JAMS Jobs for additional details.

Integrating Reports with Automated JAMS Jobs

JAMS includes a JAMSReport Execution Method to streamline reporting by allowing users to create scheduled Jobs to send out their reports.

Setting Up a JAMS Report Job

To get started, select a default Report Job and open and modify its properties.

1. Select the Definitions shortcut from the menu and select the folder where the new Report Job should reside.
2. Click the **Add** button from the Control Bar to open the Add a New JAMS Job Definition dialog.
3. In the dialog, give the new Job a Name, Description (optional), and Execution Method.
   In this case, select **JAMSReport** to create a JAMS Report Job.
4. By default, the full Job Definition dialog will open when the Job is initially saved. Click **OK**.
5. The Job Definition dialog will open.
6. Select the **Source** tab. The source tab for JAMSReport Jobs contains a variety of configurable properties to control the Report Output. Define the report properties as desired for the report this Job should generate.

Report Job Property	Description
Report Name	Select a predefined JAMS Report.
Export Path	Enter the location where the report should be saved. If the print queue property is defined as an email address, an export path is not required.
File Name	Enter the name for the report file.
Print Queue	Enter either a printer name to output the report, or a list of email addresses to send the report. Use commas or semi-colons to separate multiple email recipients.
Export Format	Use the dropdown to define a file format for the report. The supported formats include: PDF, HTML, CSV, RTF, Text, XLSX (Excel) or Print. Note that using the Print option will send the report output directly to the default printer.
Number of Copies	Set the number of copies to print.

Report Job Property	Description
Margins	Defines the margins of a report page (measured in hundredths of an inch). When setting this property, the value should be entered as "Left,Right,Top,Bottom". For example, a 1" top and bottom with .75" side margins would be entered as "75,75,100,100".
Paper Height	Define the height of the report page, measured in hundredths of an inch. This property can be enabled only if Paper Kind is set to Custom.
Paper Width	Define the width of the report page, measured in hundredths of an inch. This property can be enabled only if Paper Kind is set to Custom.
Orientation	Sets a value for the page orientation - landscape or portrait.
Paper Kind	Determines the type of paper for the report. If this is set to Custom, the printer paper is selected according to the property's value, and its size is set to the Page Height and Page Width Paper Name property values.
Paper Name	Sets the name of the custom paper which is used in the output printer. This can only be set if the Paper Kind is set to Custom.
Printer Name	Defines the printer to use for outputting the report.

7. Define additional Schedule Items, Parameters, Security, Properties, and Documentation as desired.

> **NOTE:** To schedule the report job, add a Schedule Trigger to the Job.

8. **Save and Close** the Job Definition.

> **NOTE:** If both the File Name and Print Queue properties are populated, the generated report is saved and forwarded to the designated recipient or group of recipients. However, if either field is left blank the default printer is used.

> **NOTE:** A Report Job may also be manually submitted at any time.

SQL Server Reporting Services (SSRS)

SQL Server Reporting Services (SSRS) is Microsoft's server-based reporting platform that includes a variety of tools to help you create, manage, and deliver reports throughout your organization. With Reporting Services, you can define interactive, tabular, or free-form reports from relational, multidimensional, or XML-based data sources. In addition, you can publish, access, and schedule reports on-demand.

Reporting Services tools work within the Microsoft Visual Studio environment and are fully integrated with SQL Server tools.

These reporting services also enable developers to integrate or to extend data and report processing using custom applications, such as JAMS.

Scheduling SSRS within JAMS

SQL Server Reporting Services can be natively scheduled within JAMS by using the built-in SSRS Execution Method.

> **NOTE:** When using the SSRS Execution Method, the **Source** of the Job is used to save reports to a physical location. The **Send a report as an e-mail** Schedule Item may be used to email the saved report. To email the report, you must have an SMTP Server configured, and the user running the SSRS Job must have access to the network location where they want to save the report.

Creating a JAMS Job using the SSRS Execution Method

You must first define a Job that can work with SSRS. This is done by creating a JAMS Job using the SSRS Execution Method and then setting up a JAMS Report for that Job.

1. Click **Definitions** from the Shortcuts menu.
2. Select the desired folder for the SSRS Job, and then ensure the Job Definitions tab is selected.
3. Click **Add**.
4. In the Name field, enter a name for the new Job.
5. In the Execution Method field, select **SSRS**.
6. Ensure the **Edit this job definition after adding checkbox** is selected.
7. Click **Ok**.
8. Select the **Source** tab.
9. In the Report Server field, enter the address for the SQL reporting server . Once the Report Server is properly specified, all accessible reports will display in the Report Path drop-down property. Select the desired report from the drop-down list.

10. Set the Authentication Method JAMS will use when logging onto the server and, if applicable, the logon Credential.

11. In the Report Format field, select a format from the drop-down list.

12. In the Report Location field, specify where a copy of the report will be saved.

13. In the Report Title field, enter the title for the saved report.

14. Configure additional Schedule, Security, Properties, and Documentation as desired.

15. If the saved SSRS report should be e-mailed, see the **Send a Report as an Email** section in ***Reports* on page 172**.

> **NOTE:** Only SMTP is supported when sending emails with SSRS Jobs. See ***Connections to Mail Servers* on page 22** for more information.

16. Click **Save and Close**.

Using the Monitor

The Monitor enables you to view current Jobs in the Scheduler and provides access to comprehensive Job management tools. Use the following steps to open and manage current Jobs.

Accessing the Monitor

Click **Monitor** from the Shortcuts menu to open the Monitor Current Jobs view.
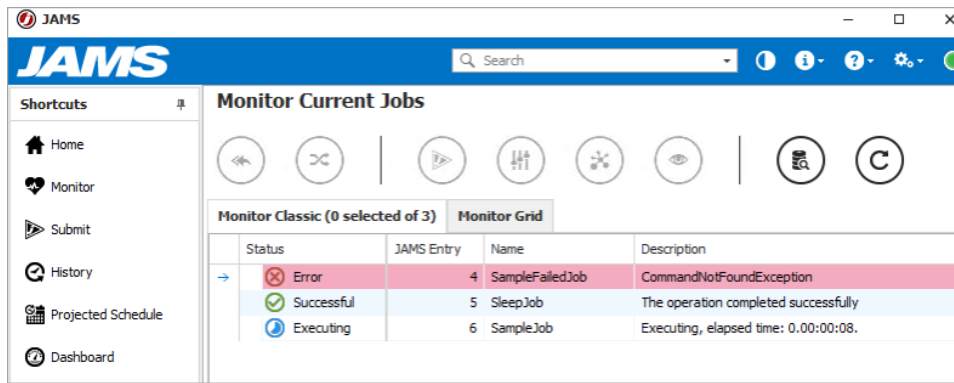
Customizing the Monitor View Using the Column Chooser

With the Column Chooser tool, you can add, remove, and move columns in the Monitor View, as well as the History and Folder Views. To use this tool, follow the steps below:

1. Right-click on any column header and select the **Column Chooser**. The available columns are displayed in the Customization window.
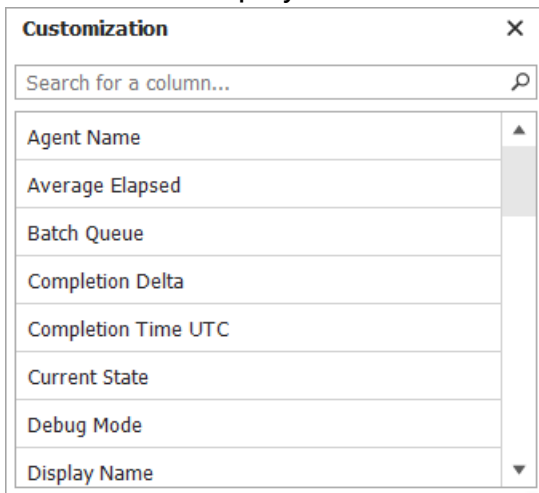
2. To add a column to the current View, drag and drop a column title to the left or right of an existing column.

   > **NOTE:** Double-clicking a column title appends the new column to the right within the current View.

3. To remove an existing column, drag-and-drop its header out of position until an "X" appears and then release the mouse button.

4. To move any column, drag-and-drop the column header into the desired position within the current View.

Monitor View Options

With the Monitor view, you can view and manage Jobs, Sequences, and Workflows. The Monitor view provides buttons in the Control Bar at the top of the screen to do the following:

- Cancel - Cancel the selected Entry.
- Release - Release an Entry from one or more requirements that are preventing it from running.
- Hold - Put a manual hold on an Entry. The Entry will not start until the hold is manually released.
- Reschedule - Specify a new date and time to submit the selected Entry.
- Submit - Submit the selected Entry.
- Properties - View the Properties for the selected Entry.
- Show Detail - View the Monitor Detail dialog.
- Query - Select options to update the type of Entries that are displayed in the Monitor.
- Refresh - Update the list of entries that are displayed.

You can also right-click a Job, Sequence, or Workflow to access a menu that displays similar options as the buttons at the top of the screen. The displayed options will vary based on the type of Entry selected. For example, Sequences and Workflows have additional options for **Show Sequence** or **Show Workflow** to let you view the Sequence or Workflow tab within the Monitor Detail dialog. This allows you to easily view the selected Sequence or Workflow.

Querying the Monitor

Within the Monitor View, you can query and filter the Entries that are displayed, allowing you to customize the view.

1. Open the Monitor view.
2. Click the **Query** Button.
3. On the Filters tab, select one or more of the following options:
    - Automatically Add/Remove Entries
    - Show Related Entries
    - Show Executing
    - Show Completed
    - Show Pending

- Show Timed
- Show Only My Entries

4. Click **OK**. The Monitor view is updated.

> **NOTE:** If you clear the "Show Only My Entries" option, you will see all Entries in the Monitor. An error message will be displayed if you try to view an Entry that you cannot access.

Monitor View Icons

Every Job contained in the Monitor view includes an icon showing the current state of each entry as listed in the table below.

Icon	Description
✓	The Job completed with an Informational or Successful completion status.
⏸	The Job is waiting on a dependency or the Job is held. If it is a Workflow or Sequence Job, the icon indicates user input is required before it can continue.
!	The Job completed with a Warning completion status.
✗	The Job failed with a Stalled, Error, or Fatal completion status.
◴	The Job is currently running, or it is a File Watch Job that executes indefinitely to poll for files that are used for triggers or dependencies.
ⓘ	The Job completed with an Informational completion status.
○	The Job is pending or it is waiting for its designated start time.

Monitoring a Job

To monitor a Job currently in the Schedule, open the Monitor Detail dialog. To open this dialog, you can do one of the following:

- Right-click on a Job from the Monitor Current Jobs view and select **Show Detail**.
- Double-click the Job name.
- Select the Job and then click the **Show Detail** button in the Control Bar.
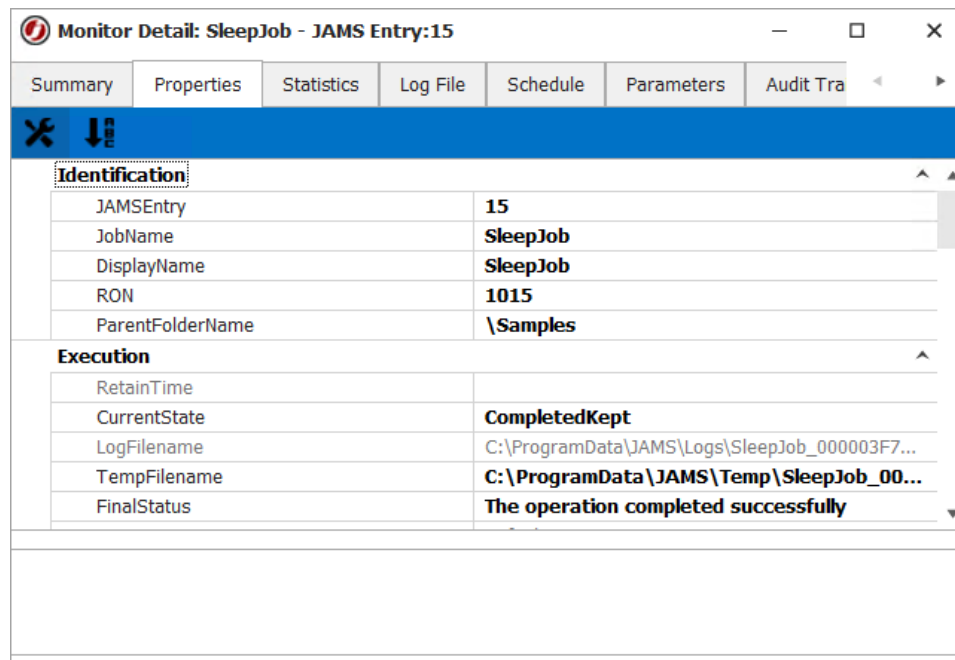
Each Job listed in the Scheduler displays the Properties as shown in the above screenshot.

Monitor Detail Tabs

The table below displays a description of the available tabs.

Job Properties	Description
Summary	Displays Folder, Submit, and Job status information.
Properties	The Properties of the executing Job.
Statistics	Shows times, execution statistics, and related charts.
Log File	Lists all OS generated logs.
Schedule	The configured Items of the Executing Jobs. This tab also displays a Triggered By section to show the items that triggered this Job. This includes any option that is set in the **Run this Job** menu from the Schedule tab in a Job Definition.
Parameters	Details parameter names and values associated with the Job.

Job Properties	Description
Audit Trail	Lists audit trail items for the Job, including message, comment, user name, local and UTC audit times. The Audit Trail shows changes to the state of the Job from the Monitor view, such as moving from Hold to Release. If the entry sends any notifications, they are listed in this Audit Trail.
History	Displays historical Job Execution information for the selected Job.
Documentation	The assembled documentation for the given Job and any Documentation inherited from parent folders.
Diagram	Displays a real-time diagram of the selected Entry that shows any upstream references, downstream references, and preconditions. The diagram displays the status of each Job/Entry. Only enabled Schedule Items are displayed. See Diagrams for more information.
Impacted Jobs	Displays the list of Jobs that are waiting for the selected File Watch or Mail Watch Job to complete. These are created with a file trigger, mail trigger, or file dependency. Double-click a Job to view/modify its Schedule tab. This tab is displayed for only File Watch or Mail Watch Jobs.

Working with Projected Schedules

The Projected Schedule displays a graphical view of pending JAMS Jobs. You can view all scheduled Jobs or filter a subset of Jobs over a specified time range. You can also use Projected Schedules to determine if Schedule Items, such as Schedule Triggers, are set up properly and will run on the correct dates.

Projected Schedule Screen

The Projected Schedule screen lets you view the Jobs that are scheduled or projected to run in the future. By default, the screen uses a calendar format to display each hour of the day. This is called the Timeline View. Use the left and right arrows to move around within the projected date range.

You can also change the format of the Projected Schedule screen using one of the available time options. See *Modifying the Timeframe Display* on page 256 for more information.

Creating a Projected Schedule

The first time you open the Projected Scheduled menu option, a dialog is displayed that prompts you to create a filter.

After the results from this filter have been displayed, use the Query button to make any additional changes.

1. Click **Projected Schedule** from the Shortcuts menu.
2. On the JAMS Projected Schedule dialog, select one or more of the following to filter the results.
   1. In the Folder Name field, click **...** to go to a Folder containing the Jobs.
   2. In the Job Name field, enter the name of the Job. You can also use * to select all Jobs.
   3. In the Time Range section, select a start and an end date. You can also set a start time and end time.
   4. Select the Use Current Schedule option to pull in the current schedule from the Monitor View.
   5. Select the Include Planned option to filter all scheduled Jobs, including those with the "Automatically Submit?" option unchecked.
   6. Select the Include Repeated option to include all Job repetitions (Recurrences) in the schedule.
3. Click **Ok**.

Creating a New Filter for the Projected Schedule Results

1. In the Projected Schedule screen, click the **Query** button from the Control Bar.
2. On the JAMS Projected Schedule Query dialog, select the desired filter options.

   > **NOTE**: Entering multiple values is not allowed, but you may use wildcards.

3. When the query criteria are defined as desired, click **Ok** to rebuild the projected schedule based on the query.

Modifying the Timeframe Display

After generating a Projected Schedule, you can modify the results by selecting different views.

1. Right-click a date on the Projected Schedule and select **Change View To**.

2. Select one of the following options:

   - Day View
   - Work Week View
   - Week View
   - Month View
   - Timeline View (default view)

     > **NOTE:** If you select the Timeline view, the right-click menu has options to adjust the time scales you will see. If your Jobs have a short average run time, you may need to adjust the time scale to ensure they are visible on the Projected Schedule.

   - Agenda View
   - Year View

> **NOTE:** To zoom in and out of the Timeline View, Day View, Work Week View, and Month View, hold down the **Ctrl** key while scrolling the mouse wheel.

Moving to a Specific Date on a Projected Schedule

The Projected Schedule screen lets you move to a specific date in the view. This can be useful if you selected a time display that shows many dates, or you want to get back to a date.

1. To go to today's date, right-click a date on the Projected Schedule and select **Go to Today**.

2. To go to a specific date, right-click a date on the Projected Schedule and select **Go to Date**.

3. In the Date field, click the drop-down arrow to open a calendar view and select a date.

4. (Optional) In the Show In field, select the View format.

5. Click **OK**.

Resources and Queues

The articles in this section will help you set up resources and queues. This includes managing resources, viewing resource properties, and managing queues.

Resource Properties

JAMS Resources are powerful tools that can help you allocate how batch Jobs are run. Resources let you define the necessary requirements (weight) for all Jobs, allowing JAMS to determine which Jobs can or cannot run concurrently. You can also use Resources to create maintenance windows that will prevent Jobs from running for a specified time. This is helpful during upgrades or maintenance activities, such as moving the JAMS Scheduler or backing up the database.

Existing Resources contain several properties that can be modified when necessary. Resource properties are organized in four tabs: **Resource**, **Available**, **Security**, and **References**. These are detailed in the sections below.

To access a Resource definition:

1. Click **Resources** from the Shortcuts menu.
2. Double-click a Resource to open its definition window.

Resource Properties

Resource Tab

Option	Description
Resource Name	This property is the unique identifier for the Resource.
Description	The Description property can provide a more detailed explanation for the Resource.
Last Changed	The Last Change property displays the date and time the Resource was last modified.

Available Tab

Option	Description
Quantity Available	This property shows the available quantity for the current Resource.

Option	Description
Agent Specific?	If this checkbox is selected, this property measures the Resource by Agent. If this checkbox is cleared, the Resource is defined by the original quantity available.
Agent Name	This property displays the name of the Agent or Agents.
Quantity Available	This property displays the available Resource quantity for the specific Agent.

Security Tab

Option	Description
Access Control Entries	The Security tab defines the level of access for this Resource. This is an Access Control List with one-to-many Access Control Entries (ACE). Each ACE can specify the following rights: • **Acquire**: users can obtain a portion or all the Resource's quantity allocation. • **Change**: users can modify this Resource if they have Change access in Resource Definitions. • **Control**: users can modify the Resource's Access Control List. • **Delete**: users can delete the Resource if they have Delete access for Resource Definitions. • **Inquire**: users can inquire into the Resource if they have Inquire access to Resource Definitions.

References Tab

Option	Description
References	The Reference tab lets you view where the Resource is referenced within JAMS.

Using Resources

JAMS Resources are powerful tools that can help you allocate how batch Jobs are run. Resources let you define the necessary requirements (weight) for all Jobs, allowing JAMS to determine which Jobs can or cannot run concurrently. You can also use Resources to create maintenance windows that will prevent Jobs from running for a specified time. This is helpful during upgrades or maintenance activities, such as moving the JAMS Scheduler or backing up the database.

Resources can be assigned to Folders and Jobs. The Resource is defined by setting a specific quantity. Jobs will then use a portion of this quantity when they run. If you assign the Resource at the Folder level, all Jobs within the Folder will inherit the Resource setting.

Determining the Resource Quantity to Assign

When manually modifying Resources, how do you know how much or how little to assign to a particular Job? JAMS provides several ways to determine if a Resource is working above or below its effective allocation.

Insert the Quantity Available and Quantity in Use Columns

To see what Resources are currently active, use the Column Chooser to insert the Quantity Available and Quantity in Use columns in the Resource Definitions View.

Access the Monitor

Open the Monitor to view the status of all Jobs. If a Job has stalled or displays a 'Waiting for Resources' description, consider adjusting the Resource allocation.

Run a Script

You can run the following PowerShell script to return the quantity of Resources that are currently in use.

```
#### Report Resource Usage
```

```powershell
Import-Module JAMS

$JAMSServer = "localhost"

$JAMSDefaultServer = $JAMSServer

New-PSDrive JD JAMS $JAMSServer -ErrorAction SilentlyContinue


$jamsentries = get-jamsentry -server $JAMSServer

$EntryReport= @()

$ResourceReport= @()


foreach ($jamsentry in $jamsentries){

    $entry=get-jamsentry $jamsentry.jamsentry

    $resourcerequirements = $entry.Elements | where-object {($_ -is
[MVPSI.JAMS.ResourceRequirement])}

     foreach ($resourcerequirement in $resourcerequirements){

        write-output "$($entry.jamsentry) $($entry.Name) $($entry.CurrentState)
$($ResourceRequirement.ResourceName) $($ResourceRequirement.QuantityRequired)
$($ResourceRequirement.ElementState)"

        $out = New-Object psobject

        $out | Add-Member noteproperty Entry-Entry $($entry.jamsentry)

        $out | Add-Member noteproperty Entry-Name $($entry.Name)

        $out | Add-Member noteproperty Entry-ResourceName $($ResourceRequirement.ResourceName)

        $out | Add-Member noteproperty Entry-QuantityRequired
$($ResourceRequirement.QuantityRequired)

        $out | Add-Member noteproperty Entry-ElementState $($ResourceRequirement.ElementState)

        $EntryReport += $out

    }

}


$EntryReport | ft


write-output "`n*** Resources ***"

$resources = Get-Childitem -Path JD:\Resources

foreach ($resource in $resources) {

        $out = New-Object psobject

        $out | Add-Member noteproperty Resource-Name $($resource.Name)

        $out | Add-Member noteproperty Resource-QuantityAvailable
$($resource.QuantityAvailable)

        $out | Add-Member noteproperty Resource-QuantityInUse $($resource.QuantityInUse)

        $ResourceReport += $out
```

```
    }


    $ResourceReport | ft
```

Resource Allocation

JAMS will automatically control how each Job acquires and releases the Resources assigned to them. Before a Job runs, JAMS compares the available Resource pool with the quantity required by the Job. If the available Resources exceed the required amount by the Job, the Job will execute. When the Job is completed, the Resources are released and added back to the available Resource pool.

The Resource quantity available can be manually increased or decreased at any time. You can make the modifications in one place, the Resource Definition, and it is available to all Jobs that need it.

As your batch processes move from one operating system to another, JAMS continues to enforce the assigned Resources requirements.

Resource Behavior

Resources have some unique characteristics that are listed below:

- Jobs inherit the Resources that have been defined in their respective Folders.
- Jobs can reduce or increase the inherited Resource requirements.
- Jobs can add their own Resource requirements.
- Sufficient Resources must be available for a Job to run.
- Resources can be specific to an Agent or server.
- Resources can be used on any operating system that is supported by JAMS.
- The available Resource quantity can be increased or decreased at any time.
- Requirements for different Resources can be added to the same Folder or Job.

Resource Definitions View

The Resource Definitions screen lets you view all existing Resources, create new Resources, and modify existing Resources. Each Resource displays the following:

- Resource Name – The name to identify a Resource.
- Description – The description to provide more information about the Resource.

You can add additional columns by using the Column Chooser. Right-click a column heading, and select **Column Chooser**.

Adding a Resource Definition

You can create a Resource definition to use with your Jobs. When you create the Resource, you have full access to it. If you want others to be able to modify or create a Job with that resource requirement, ensure the Security settings are configured properly for that user. However, users do not need permissions on a Resource to create/update a Job in a Folder that inherits the Resource requirement from a parent Folder.

1. Click **Resources** from the Shortcuts menu.
2. Click **+**.
3. In the Name field, enter a name for the Resource.
4. In the QtyAvailable field, enter a quantity for the Resource.
5. Click **Ok**.
6. Click the **Available** tab.
7. To set the Resource to be used with only a specific Agent, do the following:
    1. Select the **Agent Specific** checkbox.
    2. To add the Agent, click in the field under Agent Name and select the Agent.
    3. In the Quantity Available field, enter the Resource quantity for the Agent.
8. Click the **Security** tab to select the access level for the Resource for any other users who will modify the Resource or reference the Resource in their Jobs.
9. Click **Save and Close**.

Inheriting a Resource Definition from a Folder

Jobs can inherit the Resources defined within their Folder. This inheritance feature simplifies the assignment of Resources to any Job. If you set a Resource on a Job, that setting will override the inheritance from the Folder.

Follow the steps described in the section: Adding a Resource to a Job or Folder.

Adding a Resource to a Job or Folder

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or Folder, and select **Properties**.
3. Click the **Schedule** tab.
4. Click **+**.

5. Select **This Job depends on a** | **Resource**.

6. In the Resource field, select the name of the Resource you want to add.

7. In the Quantity Required field, select the number of Resources this Job or Folder requires to run. You can also enter a negative number to reduce the required Resources. This allows inherited Resource requirements to be overridden.

8. Click **Finish**.

9. Click **Save and Close**.

Modifying a Resource Definition

You can modify a Resource by changing its name, description, quantity available, and security settings. You can also add or remove Resource requirements from an Agent.

1. Click **Resources** from the Shortcuts menu.

2. Double-click a Resource to open its definitions window.

3. Click the **Resource** tab to change the name or description of the Resource.

4. Click the **Available** tab to do the following:

    1. Modify the Quantity Available for the Resource.

    2. Add, delete, or modify the Agent names that will have Resource requirements. See the section below for details.

5. Click the **Security** tab to select the access level for the Resource for any other users who will modify the Resource or reference the Resource in their Jobs.

6. Click **Save and Close**.

For a complete listing and description of each Resource property, refer to the Resource Properties topic.

Deleting a Resource Definition

Before deleting a Resource, ensure all Job and Folders that currently use it have been updated to remove references to it. To view where it is referenced, double-click the Resource and select the **References** tab.

1. Click **Resources** from the Shortcuts menu.

2. Click the Resource you want to delete.

3. Right-click the Resource, and select **Delete**.

4. Click **Yes**.

> **NOTE:** You must have the proper level of access to the Resource Definition to add or delete a Resource.

Resource Requirements for Agents

Adding a Resource requirement to an Agent is optional. When you add a Resource requirement to an Agent, a set number of Resources from the Resource pool is available for Jobs that run on the Agent. This is useful when you want to restrict the number of Jobs that will run on one Agent as compared to another Agent. If an Agent has a lower load capacity than another Agent, enter a lower quantity on that Agent and a higher quantity on the Agent with a greater load capacity. JAMS will check the available Resources on the Agent before the Job runs.

If no Resource requirement has been added to an Agent, Jobs will use the Resources that have been allocated to the Resource pool.

Adding a Resource Requirement to an Agent

1. Click **Resources** from the Shortcuts menu.
2. Double-click the Resource that you want to edit.
3. Click the **Available** tab.
4. Under Agent Details, ensure the **Agent Specific** checkbox is selected.
5. Under Agent Name, click the row to select an Agent.
6. Under Quantity Available, enter the quantity of Resources that are available to that Agent.
7. Click **Save and Close**.

Deleting a Resource Requirement from an Agent

1. Click **Resources** from the Shortcuts menu.
2. Double-click the Resource that you want to edit.
3. Click the **Available** tab.
4. Under Agent Name, click in the row to select an Agent to remove.
5. Press the **Delete** key.
6. Click **OK**.
7. Click **Save and Close**.

Using Queues

A JAMS Queue provides the ability to control the number of Jobs allowed to start at any given time as well as the ability to distribute (load balance) Jobs across zero or more Agents.

Queues can be assigned to Jobs and Folders. They can be stopped and then started to temporarily pause execution of Jobs that have not already started. When a Queue is started, Jobs waiting for it to become available will be started in the order of their scheduling priorities.

> **NOTE:** Defining and using Queues in JAMS is optional.

Load Balancing

When multiple Agent names are assigned to a Queue, the JAMS Scheduler starts the next Job on the Agent with the fewest number of currently executing Jobs. JAMS V7 Windows Outgoing Agents that do not have the Connect On Demand Agent property checked are automatically removed from the load balanced pool of servers when the JAMS Scheduler detects they are unavailable. The Agents are automatically returned to the pool of servers when they become available again.

Queues and Resources

While Batch Queues and Resources are similar, there are significant differences listed below.

- A Batch Queue is defined by the number of concurrent Job executions and/or different Agents that associated Jobs can be executed on.
- When you submit a Job, a Batch Queue can be adjusted but a Resource cannot.
- A Resource definition is based on the total number of unit quantities available. As these Jobs run, they consume the available units and they are released upon completion. Queues are defined by the maximum number of Jobs that they can run.
- Unlike Queues, Resource requirements can be subtracted on specific Jobs to allow them to run as exceptions, even if no quantity of a Resource is available.
- Unlike Queues, Resource requirements can be weighted to allow for throttling based on the different relative impact of Jobs on a system.
- Resource requirements can be defined at the Folder and the Job level. These values are then added together to define the total units required for the Job to begin executing.
- A Job can reference many different Resources, but only one Queue.
- Jobs will always count as 1 against the Queue Job limit, regardless of the Job type.

Batch Queue Screen

The Batch Queue screen lets you view, create, modify, or delete Queues. Each Queue displays the following:

- Batch Queue Name – The name of Batch Queue.
- Started – A check mark indicates the Batch Queue has started and any Jobs that are submitted to the Queue are available to run.
- Job Limit – The maximum number of Jobs that will run concurrently. A Sequence Job is treated as one Job. For Sequence Jobs, the child Jobs can run on the same Queue or a different Queue.
- Description – An optional description of the Queue.

The current Job Count can also be added as a column using the Column Chooser tool. Right-click any column heading, and select **Column Chooser**.

Viewing all Queues

1. Click **Queues** from the Shortcuts menu.
2. Click a column heading to sort the list.

Creating a Queue

1. Click **Queues** from the Shortcuts menu.
2. Click **Add**.
3. In the Name field, enter a name for the Queue.
4. In the Job Limit field, enter the maximum number of Jobs that can run concurrently.
5. Click **Ok**.
6. Click the **Status** tab.
7. In the Started On section, click the row to add Agent names (optional). If no Agent name is specified and the Job Definition does not have/inherit an Agent, Jobs execute locally on the JAMS Scheduler. If multiple Agent Names are specified, Jobs are distributed (load balanced) between the available Agent Names.
8. Click **Save and Close**.

Applying a Queue to a Job or Folder

You can apply a Queue to a Job or a Folder. If you apply the Queue at the Folder, all Jobs within the Folder will have the same Queue applied.

1. Click **Definitions** from the Shortcuts menu.
2. Right-click a Job or a Folder, and select **Properties**.

3. Click the **Properties** tab.

4. In the Batch Queue field, select the name of the Batch Queue.

5. Click **Save and Close**.

Removing a Queue from a Job or Folder

You can remove a Queue from a Job or a Folder.

1. Click **Definitions** from the Shortcuts menu.

2. Right-click a Job or a Folder, and select **Properties**.

3. Click the **Properties** tab.

4. Right-click the Batch Queue field, and select **Reset**.

5. Click **Save and Close**.

Modifying a Queue

You can modify the properties of the Queue as well as its status, the maximum number of Jobs it can run, and the Agent it runs on.

1. Click **Queues** from the Shortcuts menu.

2. Double-click the Queue that you want to edit.

3. Click the **Name** tab to modify the following:

    1. Name

    2. Description.

4. Click the **Status** tab to modify the following:

    1. Under Status, select the checkbox to start or stop the Queue. If the checkbox is selected, Jobs submitted to the Queue are available to run.

    2. In the Job Limit field, enter the maximum number of Jobs that can run concurrently.

    3. In the Started On section, add, delete or modify the Agent names which Jobs will be start on. See the section below for details.

5. Click **Save and Close**.

Deleting a Queue

You can delete a Queue if it is no longer used. Before deleting a Queue, ensure all Jobs and Folders that currently use it have been updated to remove references to it. To view where it is referenced, double-click the Queue and select the **References** tab.

1. Click **Queues** from the Shortcuts menu.

2. Right-click a Queue, and select **Delete**.

3. When you are prompted to confirm the deletion, click **Yes**.

Agents in Batch Queues

Selecting an Agent in a Batch Queue is optional. If no Agent is specified in the Batch Queue and the Job definition does not have/inherit an Agent, the Job executes locally on the JAMS Scheduler. If multiple Agent names are specified, Jobs are distributed (load balanced) between the available Agent names.

An Agent name in a Job definition overrides an Agent name in a Queue definition. However, the Job still runs on the assigned Queue and adheres to any Job Limit settings defined within the Queue.

Adding an Agent to a Queue

You can add more than one Agent to a Batch Queue.

1. Click **Queues** from the Shortcuts menu.

2. Double-click the Queue that you want to edit.

3. Click the **Status** tab.

4. Under Started On, click in the row to select an Agent.

5. Click **Save and Close**.

Deleting an Agent from a Queue

1. Click **Queues** from the Shortcuts menu.

2. Double-click the Queue that you want to edit.

3. Click the **Status** tab.

4. Under Started On, click in the row to select an Agent to remove.

5. Press the **Delete** key.

6. Click **OK**.

7. Click Save and Close.

Manually Stopping and Starting a Queue

You can manually start or stop a Queue to prevent or allow Jobs to run. This is useful when you are performing maintenance on Agents that may cause Jobs to not perform as expected.

1. Click **Queues** from the Shortcuts menu.
2. Click the Queue that you want to start or stop.
3. Click **Start** or **Stop**. The Started column is updated.

Stopping or Starting a Queue using PowerShell

If you are using a Queue rather than a Resource to create a maintenance window in JAMS, you can start or stop the Queue by creating a PowerShell Job.

1. Click **Definitions** from the Shortcuts menu.
2. Select a Folder to save the Job.
3. Click **+**.
4. In the Name field, enter a name for the Job.
5. In the Execution Method field, select **PowerShell**.
6. Click **Ok**.
7. In the Source tab, enter the text below and replace "Q0001" with the name of the Queue.

```
$QueueName = "Q0001"
$JAMSDefaultServer = "localhost"
Stop-JAMSQueue $QueueName
#
Start-JAMSQueue $QueueName
```

8. Click the **Properties** tab.
9. In the Execute As field, select a Credential to run the Job.
10. Click **Save and Close**.

Batch Queue Properties

Name Tab

Option	Description
Batch Queue Name	This property is the name for the Batch Queue that is displayed in JAMS objects, such as Jobs or Agents.
Description	This property is an optional summary of the Batch Queue.

Option	Description
Last Change	This property is the date and time the Batch Queue was added or changed.

Status Tab

Option	Description
Started	The Started checkbox lets you start or stop a Batch Queue from being used.
Job Limit	This property lets you set the maximum number of Jobs that will run concurrently.
Started On	This section lets you add one or more Agents to the Batch Queue.

Security Tab

Option	Description
Security	The Security tab defines the level of access for this Batch Queue. This is an Access Control List with one-to-many Access Control Entries (ACE). You can add or delete an ACE. Each ACE can specify the following rights: **Change**: users can modify this Queue (including Start/Stop) if they have Change access in Queue Definitions. **Control**: users can modify the Queue's Access Control List. **Delete**: users can delete the Queue if they have Delete access for Queue Definitions. **Inquire**: users can inquire into the Queue if they have Inquire access to Queue Definitions. **Manage**: not used. **Submit**: users can associate the Queue with Folder/Job Definitions.

References Tab

Option	Description
References	The References tab lets you view where the Batch Queue is used within JAMS.

Search

The JAMS Client has Search functionality to allow you to quickly find where definitions are stored in JAMS. A search bar is displayed at the top of the screen to allow you to enter your search criteria. The Search bar is displayed only if the JAMS Server is running version 7.5 or higher. There is also a Search option in the Shortcuts menu. You can use partial words as search terms. Search is not case-sensitive.

The Search option lets you use filters to search for one or more of the definitions listed below. Each item is searched by its name and description.

- Agents
- Connection Store Objects
- Credentials
    - You can also search by the Logon As account, but the result is not highlighted in the search results.
- Execution Methods
- Folders
    - When you search by folder, the search results return any folders in the qualified path that match the term entered search. You can also search by a parent folder.
- Jobs
- Queues
- Variables

Special Characters

Both the Search bar and the Search option in the Shortcuts menu supports wildcard searches (* or %). However, you cannot use * or \%. Words like And or Not are not given special treatment and do not affect the search results.

You can use quotation marks ("search term") to search for words or phrases in a specific order. Also, use quotation marks if you want to search for a phrase containing a space. If you use a wildcard character within quotation marks, they will not function as wildcard characters. To search for a term that includes quotation marks, surround the term with "".

For example, to search for a Job description that contains **Job for "Accounting1" system**, enter "Job for ""Accounting1"" system". If only a single quotation mark (') is used, you do not need to surround the quote with "".

Search Bar

The JAMS Client has a Search bar at the top of the screen so you can search for definitions while you are on other screens within JAMS. You can search by name or description for the definition types listed above. The Search bar displays the top five results based on the text you enter and you can open the definition by clicking on the result. The Search view from the Shortcut menu is opened when you press Enter.

> **NOTE:** You must enter at least three characters as a search term in the Search bar.
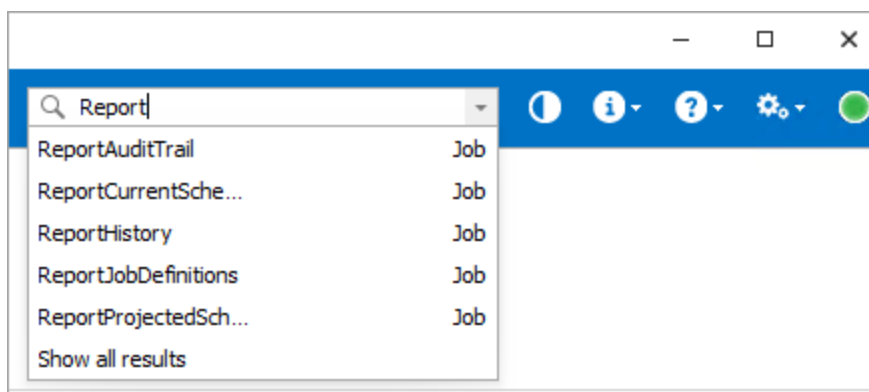
For additional search filtering options, click Advanced Search to open the Search view from the Shortcuts menu. This option is displayed if you click the drop-down arrow in the Search bar.
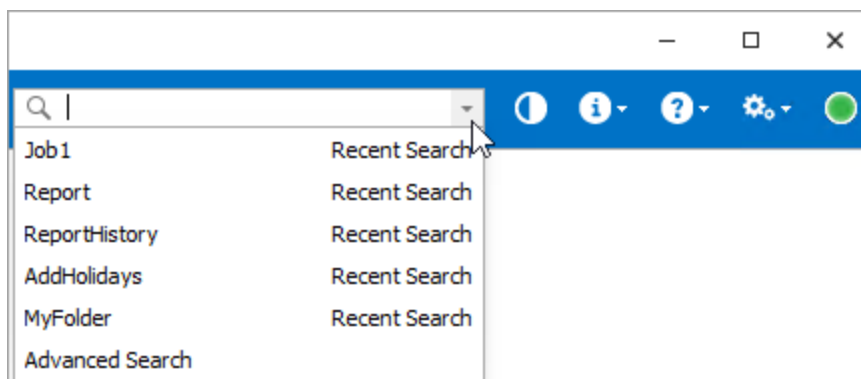
Search View

The Search option in the Shortcuts menu provides filtering when searching for definitions. This allows you more control over the search scope.

Searching by Type of Definition

1. If you want to search by one or more specific types of definitions, you can select one or more definitions types to limit the scope of the search.

2. From the Search Shortcut, select the drop-down menu in the Search Query.

3. Select one or more types of definitions to include in the search. By default, all definitions are selected.
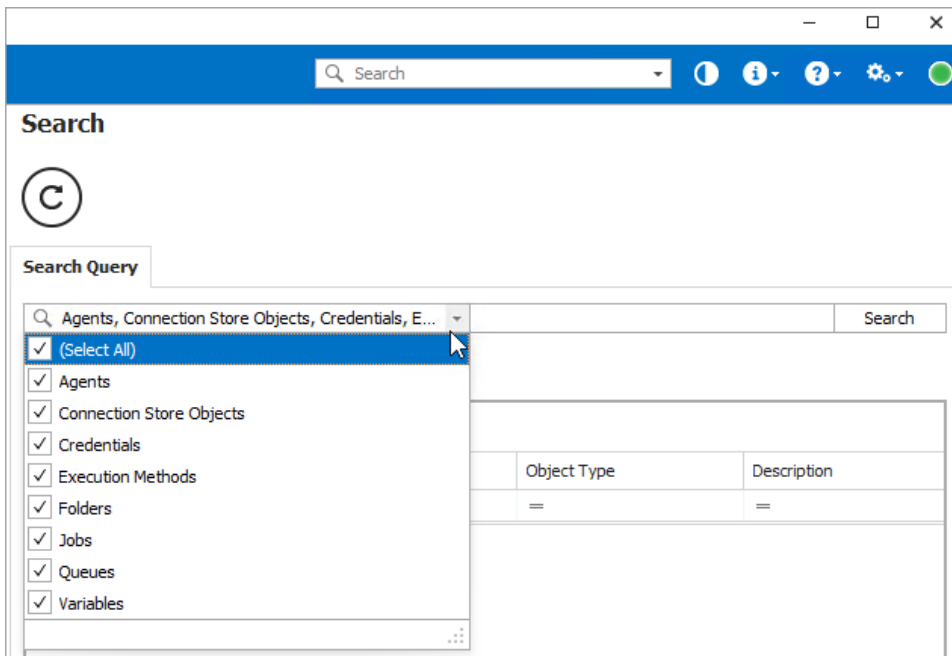
4. Enter your search term in the search field in the Search Query.

5. Click **Search**.

Search Results

The Results section on the Search view displays the search results. The results are displayed by the Name, Object Type (such as folder or job), and Description.

You can update the search results by using the Refresh button to get the latest information for the search term. If you change the search term and do not click the **Search** button, the Refresh button will revert to the original search term.

Submitting a Job from Search Results

You can submit a Job directly from the Search results page. You can select one or more Jobs from the search results to be submitted. The Jobs will be submitted in the order of the list from top to bottom.

1. From the Search Shortcut, enter your search term in the Search Query and click **Search**.
2. Do one of the following from the Results:
    1. Right-click the definition you want to submit, and select **Submit**.
    2. Select the definition and click **Submit** in the control bar.
3. Click **Submit Run Request** when prompted.

Deleting a Definition from the Search Results

You can delete a definition from a search result from the Search Shortcut. This is useful when you need to delete a definition, but you are unsure where it is stored within JAMS. You may be prevented from deleting the definition if it is referenced in other definitions. To delete a definition, ensure you have Delete permission.

1. From the Search Shortcut, enter your search term in the Search Query and click **Search**.
2. Do one of the following from the Results:
    1. Right-click the definition you want to delete, and select **Delete**. Click **Yes** when prompted.
    2. Select the definition and click **Delete** in the control bar. Click **Yes** when prompted.

Editing a Definition from the Search Results

You can edit a definition from a search result from the Search Shortcut. This is useful when you need to edit a definition, but you are unsure where it is stored within JAMS. To edit a definition, ensure you have Inquire and Change permissions.

1. From the Search Shortcut, enter your search term in the Search Query and click **Search**.
2. Do one of the following:
    1. Right-click the definition you want to edit, and select **Properties**.
    2. Select the definition and click **Properties** in the control bar.
3. Edit the properties as needed.
4. Click **Save and Close**.

Exporting a Definition from the Search Results

You can export a definition from a search result from the Search Shortcut. The selected definition is exported to a .xml file. To export a definition, ensure you have Inquire permission.

1. From the Search Shortcut, enter your search term in the Search Query and click **Search**.
2. Do one of the following:
   1. Right-click the definition you want to edit, and select **Export**.
   2. Select the definition and click **Export** in the control bar.
3. Select the location where the file will be saved.
4. Click **Save**.

JAMS Scheduler

The articles in this section will help you work with the JAMS Scheduler. This includes understanding the JAMS Scheduler Services, configuring the JAMS Scheduler, and logging on as batch.

JAMS Scheduler Services

The JAMS Scheduler is essentially the heart of the JAMS system and is responsible for keeping track of the status of all Jobs, firing triggers, checking dependencies, and communicating that status back to the JAMS Client.

While you interact with the JAMS Scheduler through the JAMS Client, the JAMS Scheduler can be configured to operate in a centralized or decentralized fashion. In other words, you can choose to run a JAMS Scheduler on many different machines to spread the management tasks and eliminate single points of failure.

When first installing JAMS, the Scheduler creates three Windows Services that are detailed below.

- JAMS Scheduler Service
- JAMS Executor Service (JAMS Agent Service)
- JAMS Server Service

JAMS Scheduler Service

This key component provides background Services to allow for scheduling, maintaining and executing JAMS Jobs, Sequences, Tasks and Scripts on all types of systems available on your network.

The Scheduler Service prepares Scripts to run, takes action if required during Job execution or when a Job completes. A more detailed explanation of the Scheduler Service is described below.

Before a Job can run, the Scheduler Service determines if . . .

- A Job's Dependencies are satisfied.
- It can execute the Job's Pre-Check Job, if one is specified.
- The Job's Queue is started and there is a slot available.
- The Job's Resources are available.

- The Job's Scheduling Window is open.
- The Job requires parsing (based on its Execution Method). If so, then the Job's source is parsed and substitutions occurs for Parameter and Variable values.

While a Job is running, the Scheduler Service. . . .

- Reports the Job's execution details to all JAMS Clients monitoring the Schedule.
- Performs notification if the Job runs longer than its set max limit.
- Uses the Job's defined action if the Scheduling Window closes during execution.

Once a Job completes, the Scheduler Service . . .

- Reports the Job's completion to all JAMS Clients monitoring the schedule.
- Records the Job's run instance in JAMS History, which is available for query from the JAMS Client.
- Performs notification, if required.
- Sends reports, if required.
- Determines if the Job's completion satisfies Dependencies for other Jobs in the schedule.
- Determines if the Job's completion satisfies Trigger Elements so that Triggers can fire.
- Makes sure the Job's Resources are released.

Executor Service

As its name implies, the JAMS Executor Service is responsible for the actual execution of any given Job.

Jobs are prepared to run by the JAMS Scheduler. Once the Scheduler Service determines the Job is ready to run, the Executor . . .

1. Is notified and begins executing the Job.
2. Then writes output generated from the Script to the Job's log file.
3. And notifies the Scheduler when the Job has completed.

If the Job is set to run on a different machine, JAMS Agent Services (an extension of the Executor Service) contacts the Agent on the remote machine and directs it to run the Job.

The JAMS Scheduler cannot function without access to the JAMS Database. However, JAMS is designed to be resilient. All Job execution functions are handled by the JAMS

Executor Service; so if the JAMS Scheduler Service fails, all Job execution information remains secure.

Server Service

The JAMS Server Service provides middle-tier services to the JAMS Client. This includes all client components including: GUI, Powershell, .NET Class Library, and Web Services.

The JAMS Server Service is primarily responsible for maintaining database access for one to many JAMS Clients.

While the Server Service is not involved in the execution of Jobs, many Jobs may utilize the JAMS Powershell client, which requires this Service.

Troubleshooting JAMS Services

Reviewing the Event Log and .log Files

All the described JAMS Services creates a log file in the JAMS installation directory (Program Files/MVPSI/JAMS). This log file is named ServiceName.log (JAMSScheduler.log) and is reset every Sunday. The previous week's log files are then renamed to ServiceNameArchive.log (JAMSSchedulerArchive.log).

Each Service writes serious errors to the Windows Event log. When troubleshooting JAMS, you should check both the event log and the aforementioned .log files.

Stopping and Restarting a Service

If you suspect there is a problem with JAMS and want to restart the JAMS Services, begin with the JAMS Scheduler Service. The JAMS Scheduler Service does the most work and restarting it is the least disruptive to the system.

Restarting the JAMS Scheduler Service will not cause any Jobs to fail or any Job completion information to be lost. However, when the JAMS Scheduler Service is stopped, new Jobs cannot execute.

As a next step, you can stop the JAMS Server Service. This can be done without losing any Job execution information. However, JAMS Clients cannot function while the JAMS Server Service is down.

As a last resort, users can try stopping the JAMS Executor Service. Stopping the Executor Service is not recommended, as it doesn't usually resolve most problems. When putting this

Service on hold, all completion information for executing Jobs will be lost, likely causing some Jobs to fail.

When doing SQL Service maintenance, there is no need to stop the JAMS Executor Service, since it does not access the JAMS Database.

Service Accounts

JAMS Services are set to run using the LocalSystem account. However, if this needs to change this to a Windows Domain based account, JAMS Support recommends leaving the Executor and JAMS Agent Services running under LocalSystem as these Services do not need to access the database or network, but they do require privileges associated with the LocalSystem account.

You can use the Service Control application to change the account that the JAMS Scheduler and JAMS Server services run under as this could be important when controlling network and database access.

When changing the account, you may also need to adjust the security settings on:

- C:\Program Files\MVPSI\JAMS\Scheduler folder
- C:\Program Files\MVPSI\JAMS\Scheduler\JAMSScheduler.log
- MSMQ jamsrequests and jamsrequestssubmitcancel private queues
- SQL Server
- JAMS Database

For the MSMQ jamsrequests and jamsrequestssubmitcancel private queues, you must make sure to modify the security on the queue to grant the domain account full access to the queue. This may require you to "Take Ownership" of the MSMQ queue.

The following Local Security access should also be granted for the domain based account:

- Log on as a Batch job.
- Log on as a Service.
- Adjust memory quotas for a process.
- Bypass traverse checking.
- Replace a process level token.

If the domain based user account is not in the administrators group, create an Active Directory Group and add the user to the group, and then include the following:

```
<add key="AuthorizedGroup" value="Domain\YourGroup" />
```

in the Common.config file located in the Program Files\MVPSI\JAMS\Scheduler directory.

Configuring the JAMS Scheduler

There are two ways to configure the JAMS Scheduler. The first is to modify the Configuration Settings using the JAMS Client. The other is to edit the .exe.config file. Both methods are described below.

Configuration Setting on the JAMS Client

Configuration Settings define and maintain many of JAMS' system-wide options. Generally, users define these options after installing JAMS, but usually don't update them on a frequent basis after that.

JAMS comes installed with several Scheduler-specific configuration settings. These allow users to define how far a schedule can extend into the future or the Schedulers maximum downtime hours. Other installed Configuration Settings include specific organizational scheduling definitions, such as "Is Monday usually a workday?".

To view, create or modify these settings select the **Configuration** Shortcut. The Configuration Settings View opens listing the available Configurations.

Modifying a Configuration Setting

1. To modify a Configuration Setting, double-click an item from the Configuration Settings View.
2. The Setting properties Name tab window opens, which includes three parameters: Name, Description and Last Changed. On this tab, only the Description parameter can be modified.

   > **NOTE:** Only on the Name tab can the Description parameter can be modified. To modify these parameters you must define a new Configuration Setting, as described in the previous subsection.

3. The Value tab allows users to change the Configuration's Value settings. In this example ("Is Monday usually a holiday?"), users with the proper security access can modify the value from "True" to "False". This modifies Monday's typical status to a non-workday. The Data Type parameter, located just above, cannot be modified

except during the definition process, as described in the previous section.

> **NOTE:** When a Configuration setting is modified it usually take affect immediately. However, in some cases you may need to restart the JAMS Scheduler Service before the change takes effect.

Editing .exe config

Configuration settings are also found in one of several .config files located in the JAMS installation directory, Program Files\MVPSI\JAMS\Scheduler. The filename of each configuration file is:

- Common.config
- JAMScheduler.exe.config
- JAMSExecutor.exe.config
- JAMSServer.exe.config

Common.config is shared by the other .config files and contains all user-specific settings.

> **NOTE:** You should only change one of the other .config files under the direction of JAMS Technical Support unless you understand the implications of altering these files.

The Common.config file is preserved when upgrading JAMS; the other files are overwritten each time JAMS is upgraded to a new version.

You can change settings in these configuration files at any time; however, in most cases, these settings are only loaded when the service starts.

Logon as Batch

JAMS Jobs run as batch processes using Windows. As a requirement, these batch jobs must have the Log on as Batch user rights for the Windows account that runs them. If running the Job on an agent, users must also have Log on as Batch privileges within the local security of the agent machine.

Keep in mind that the agent Job must have appropriate access to perform whatever operation the particular Job is doing; for example, if a copy process to a specific folder is included, you must have access to that folder.

Granting Rights

You can grant the Log on as a Batch Job rights at the domain or the local level. To manage rights, use the Local Security Policy or Domain Security Policy Administrator utilities.

Managing Rights on Member Servers and Workstations

To manage user rights on member servers and workstations, choose the **Select Domain...** option from the User menu. Enter \\machinename in the Domain field and click **OK** to be connected to the specific machine. From here you can manage user rights on that machine.

JAMS Security

The articles in this section will help you set up some security-related options within JAMS. This includes access control lists, credentials, encryption keys, and options for SSH and SSL connections.

Setting Access Control Lists

Access Control Lists (ACLs) allow different users or groups from Active Directory to have different permissions to the functionality in JAMS. For example, you may assign full permissions to create, modify, and run Jobs for your Development group, but you may want to limit the permissions to Jobs for your Operations team, so they can only run Jobs. This helps to ensure your users can perform only the actions that are necessary for their roles. The table below shows a common set of permissions based on roles.

An ACL is a list of Access Control Entries (ACEs). Each ACE includes one identifier along with the type of user access. For example, when a user attempts to perform a function, JAMS starts at the top of the ACL listing to determine if the user can perform that particular function by checking the identifiers specified in each ACE against those held by the user. When a match is found, the user is granted the access specified on the ACE. If the end of the ACL is reached without a match, no access is granted.

> **NOTE:** By default, new installations will have NT AUTHORITY\Authenticated Users set on the root folder in JAMS with full access to objects.

> **NOTE:** Removing all ACEs on a JAMS object behaves the same as in Windows. When all ACEs are removed from an object, only the GrantAdministratorsByPass group will have access to the object. Previously, removing all ACEs from an object would give all Authenticated Users access to that object.

Access Control Screen

The Access Control screen lets you add, modify, or remove ACEs in JAMS. These ACEs can then be used or modified on JAMS objects, such as Folders and Jobs, for a more granular level of control. The Security tab on each JAMS object displays the ACE with additional options.

The Access Control panel lists the various areas in JAMS that can have an ACL, including Agent Definitions, Calendar Definitions, and Configuration. The permission options will vary based on the selected ACE, but most include Add, Change, Delete and Inquire.

Adding an Access Control Entry

1. Click **Access Control** from the Shortcuts menu.
2. On the Access Control tab, select an option.
3. Click **New Access Control Entry**▉ .
4. Enter the identifier for the ACE or click … to browse to it.
5. Click **Ok**.
6. Select the appropriate permissions, such as Add, Change, and Delete.
7. Click **Save**.

Modifying an Access Control Entry

1. Click **Access Control** from the Shortcuts menu.
2. On the Access Control tab, select an option.
3. Click an ACE.
4. Select the appropriate permissions, such as Add, Change, and Delete.
5. Click **Save**.

Deleting an Access Control Entry

You can delete an ACE if it is no longer being used. Note that when you click the Delete Access Control button, you will not be prompted to confirm the deletion.

1. Click **Access Control** from the Shortcuts menu.
2. On the Access Control tab, select an option.
3. Click an ACE.
4. Click **Delete Access Control Entry** ✖ .

Configuring Access Control

Typical implementations of JAMS Security Settings have four AD/LDAP groups: admin, developers, submitters, and inquirers. The table below outlines best practice permissions given to each group.

Admins are not listed because they are selected with the Grant Administrators Bypass option or the GrantBypassGroup in the Configuration shortcut. By default, local administrators have full-access to JAMS. If local administrators should not have this level

of access, clear the Grant Administrators Bypass option and enter another group in the Grant Bypass Group field.

A Job called SetJAMSAccessControl is available in the JAMS Folder. This Job configures JAMS Access Control on all JAMS objects in the Access Control shortcut, to match the best practices outlined below. You can select an Active Directory Group for each of the four categories.

Access Control Line Item	DEV	SUB	INQ
Agent Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Calendar Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Certificates			
Manage			
Configuration			
Execute			
Inquire			
Credential Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Folder Definitions			
Add	X		
Change	X		
Control			

Access Control Line Item	DEV	SUB	INQ
Delete	X		
Inquire	X	X	X
History Inquiry			
Execute	X	X	X
Job Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Menu Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Monitor			
Abort	X	X	
Execute	X	X	
Manage	X	X	
See All Jobs	X	X	X
See Own Jobs	X	X	X
Named Time Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Manage	X		
Queue Definitions			
Add	X		
Change	X		

Access Control Line Item	DEV	SUB	INQ
Delete	X		
Inquire	X	X	X
Reporting			
Add	X		
Change	X		
Delete	X		
Execute	X	X	X
Inquire	X	X	X
Resource Definitions			
Add	X		
Change	X		
Delete	X		
Inquire	X	X	X
Manage	X		
Security			
Execute			
Inquire			
Server			
Execute	X	X	X
Variable Definitions			
Add	X		
Change	X		
Control			
Delete	X		
Inquire	X	X	X

The access capabilities (access types) for each security function are detailed in the following sections.

Agent Definitions

- **Add**: allows the addition of new Agent Definitions.
- **Change**: allows the modification of existing Agent Definitions.
- **Delete**: allows the deletion of Agent Definitions.
- **Inquire**: permits inquiry into Agent Definitions.

Calendar Definitions

- **Add**: permits the addition of new Calendars.
- **Change**: allows the modification of existing Calendars.
- **Delete**: allows the deletion of Calendars.
- **Inquire**: permits inquiry into Calendars.

Certificates

- **Manage**: manages and allows access to service-level certificates.

Configuration

- **Execute**: grants or denies access to the Configuration options.
- **Inquire**: allows viewing status to the Configuration options.

Credential Definitions

- **Add**: permits the addition of new user Credential Definitions.
- **Change**: permits the modification of existing user Credential Definitions.
- **Delete**: allows the deletion of user Credential Definitions.
- **Inquire**: allows the inquiry into user Credential Definitions.

Folder Definitions

Each Folder Definition has its own access control information. This ACL can be viewed and/or modified from the Security tab in a Folder Definition.

To modify, delete, or view a Folder Definition, you must have Change, Delete, or Inquire access to the specific Folder Definition which you want to modify.

- **Add**: allows the addition of new Folder Definitions.
- **Change**: permits modifications to existing Folder Definitions.

- **Control**: permits modification of an individual Folder ACL. This allows you to change the security/permission options for Folder Definitions.
- **Delete**. permits the deletion of Folder Definitions.
- **Inquire**: allows inquiry into Folder Definitions.

History Inquiry

History Inquiry has only one security option: Execute. You can either grant or deny access to view History entries.

Job Definitions

Job Definitions can also be controlled by the Access Control List within each Folder or individual Job Definition. To create a Job, you must have Add access to Job Definitions plus Job Add access to the Folder to which the Job belongs. To modify, delete, or inquire into a Job Definition, you must have the corresponding Job Change, Job Delete, or Job Inquire access rights for the Folder to which the Job belongs.

- **Add**: allows the addition of new Job Definitions.
- **Change**: permits modification of existing Job Definitions.
- **Delete**: allows the deletion of Job Definitions.
- **Inquire**: permits user inquiry into Job Definitions.

Menu Definitions

- **Add**: permits the addition of new Menu Definitions.
- **Change**: allows the modification of existing Menu Definitions.
- **Delete**: allows the deletion of Menu Definitions.
- **Inquire**: permits user inquiry into Menu Definitions.

Monitor

Monitor capabilities are also controlled using Folder and Job Definitions. For example, you could grant someone See All Jobs access to the Job Monitor giving them the ability to monitor all JAMS Jobs. Then each Folder Definition could define if the user can manage or abort any Jobs located within that Folder. Additionally, you can get even more granular and set additional allowances on individual Jobs.

- **Abort Jobs**: permits a person to abort and restart any Job appearing on their display.

- **Execute**: permits access to the Job Monitor. Only Jobs which the user has Monitor access can be displayed.
- **Manage**: allows a person to reschedule, hold, release and delete any Job appearing on their display.
- **See All Jobs**: allows access to the Job Monitor and includes the ability to monitor Jobs submitted by anyone.
- **See Own Jobs**: allows access to the Job Monitor but only displays Jobs submitted by the user running the monitor.

Named Time Definitions

- **Add**: permits the addition of new Named Time Definitions.
- **Change**: allows the modification of existing Named Time Definitions.
- **Delete**: allows the deletion of Named Time Definitions.
- **Inquire**: permits the inquiry into Named Time Definitions.
- **Manage**: allows access to the Enable Time and Disable Time commands.

Queue Definitions

- **Add**: permits the addition of new Queue Definitions.
- **Change**: allows the modification of existing Queue Definitions.
- **Delete**: permits the deletion of Queue Definitions.
- **Inquire**: allows the inquiry into Queue Definitions.

Reporting

- **Add**: allows the addition of new Report Definitions.
- **Change**: allows the modification of existing Report Definitions.
- **Delete**: allows the deletion of Report Definitions.
- **Execute**: allows the execution of Report Definitions.
- **Inquire**: permits the inquiry into Report Definitions.

Resource Definitions

- **Add**: permits the addition of new Resource Definitions.
- **Change**: allows the modification of existing Resource Definitions.
- **Delete**: permits the deletion of Resource Definitions.

- **Inquire**: allows inquiry into existing Resource Definitions.
- **Manage**: allows the Jobs submitted by the user to acquire units of a Resource.

Security

- **Execute**: grants the user the ability to modify the Access Control List for all security options.
- **Inquire**: provides the user view access to the Access Control Lists for all security options.

Server

The Server ACL contains only one security option.

- **Execute:** grants or denies access to the Server. This affects if a user can login to JAMS.

Variable Definitions

Each Variable has an individual ACL that is used to protect only that Variable. Variables do not inherit security settings from other JAMS objects, such as Folders. If you do not add other groups or users on a Variable, only the JAMS administrators and the account that created the Variable will have access.

- **Add**: allows addition of new Variable Definitions.
- **Change**: allows modification of existing Variable Definitions.
- **Control**: permits the modification of an individual Variable ACLs.
- **Delete**: allows the deletion of Variable Definitions.
- **Inquire**: permits the inquiry into Variable Definitions.

Working with User Credential Definitions

You can define a Credential and use it to determine who the Job will run as. A Credential has a Display Name, Logon As name, and a password or a key. You can assign a Credential to a Job or a Folder. If you want to control a group of Jobs, you can assign a Credential at the Folder level to control all Jobs within the Folder. You can override the Credential on a Job within a Folder by setting a Credential on the specific Job.

Credentials can also be used for authenticating connections to remote services, including mail servers, FTP/SFTP servers, and SQL/Oracle databases. They can also be dynamically retrieved during a script execution.

The Execute As user for a Job is a property on the Job itself (or inherited from a parent Folder). The ACL on the Credential determines which users can link a Job to use a Credential, update/delete the Credential or retrieve its password. When a Job is submitted, it will run under the username of the Credential specified in this property.

> **NOTE:** For Sequence and Workflow Jobs, ensure the parent Job has a Credential with the appropriate permissions to run the Jobs within it.

> **NOTE:** To modify a JAMS Credential definition, you must have the appropriate level of permissions in the ACL to assign or change a Credential's properties.

Credentials screen

The Credentials screen lets you view all existing Credentials, create new Credentials, and modify existing Credentials. Each Credential displays the following:

- Display name – The name for the Credential that is displayed within JAMS objects, such as Jobs or folders. This does not need to match the Logon Username.
- Description – An optional summary of the Credential.
- Logon Username - The actual username that is used for logging in.

Viewing all Credentials

1. Click **Credentials** in the Shortcuts menu. All Credentials are listed.
2. Click a column heading to sort the list.

Adding a Credential

As a prerequisite, all JAMS Credentials must be recognized by the JAMS system before they can be assigned an access level if a domain is included in the Logon As account.

For information on public keys, see [Public Key Authentication](#).

1. Click **Credentials** in the Shortcuts menu.
2. Click **Add**.

3. In the Credential Name field, enter a Credential Name. This may be the name used when logging on with these Credentials.

4. In the Logon As field, enter a Logon As name if the name used when logging on is different than the Credential Name.

5. In the Enter Password and Re-Enter password fields, enter a password.

6. Click **Ok**.

7. If desired, enter a Description.

8. Click **Key Management** to manage public and private keys for the JAMS Credential Security object that provides access to the remote server.

    > **NOTE:** JAMS supports SSH public/private key pairs directly within the GUI. You can load any existing private key by selecting the **Load Key** button. Only private keys can be loaded. JAMS then prompts for a Privacy Enhanced Mail Certificate (.pem) file.

9. Click **Set Password** to manage the Credential Definition's password.

10. Click the **Security** tab.

11. Click + to create an ACE.

12. Click **New Access Control Entry**.

13. Highlight the desired ACE (Access Control Entry) and use the checkboxes to select the appropriate access types. See the ***Credential Properties* on page 296** section below for more information.

14. When you are finished, click **Save and Close**.

Applying a Credential to a Job or Folder

1. Click **Definitions** in the Shortcuts menu.

2. Right-click a Job or a Folder, and select **Properties**.

3. Click the **Properties** tab.

4. In the Execute As field, select the Credential to run the Job.

5. Click **Save and Close**.

Modifying a Credential

> **NOTE:** To modify a JAMS Credential definition, you must have the appropriate level of permissions in the ACL to assign or change a Credential's properties.

You can modify the Display Name, Logon As, and Credential Description.

1. Click **Credentials** in the Shortcuts menu.
2. Right-click the name of the Credential you want to edit, and select **Properties**.
3. Edit the Display Name, Logon As, or Description fields.
4. Click **Save and Close**.

Changing the Password for a Credential

1. Click **Credentials** in the Shortcuts menu.
2. Right-click the name of the Credential you want to edit, and select **Properties**.
3. Click **Set Password**.
4. In the New Password and Confirm Password fields, enter the new password.
5. Click **OK**.
6. Click **Save and Close**.

Deleting a Credential

Before you can delete a Credential, ensure there are no object referencing it. You can check this from the References tab on the Credential.

1. Click **Credentials** in the Shortcuts menu.
2. Click the Credential you want to delete.
3. Click **Delete**.
4. When prompted, click **Yes** to confirm.

Credential Properties

Username Tab

Option	Description
Display Name	This property is the name for the Credential displayed in JAMS objects, such as Jobs or Folders. This does not need to match the Logon Username.
Logon As	This property is the actual username that is used for logging in.
Description	This property is an optional summary of the Credential.
Key Management	This button lets you manage public and private keys for the JAMS Credential.

Option	Description
Password	This button lets you set the password for the Credential. You can change this password as needed.
Last Changed	This property is the date and time the Credential was added or changed.

Security Tab

Option	Description
Security	The Security tab defines the level of access for this Credential. This is an Access Control List with one-to-many Access Control Entries (ACE). Each ACE can specify the following rights: • **Change**: users can modify the Credential if they have Change access in Credential Definitions. • **Control**: users can modify the Credential's Access Control List. • **Submit**: users can associate the Credential with Folder/Job Definitions. • **Get Password**: users can retrieve the password from the Credential Definition.

References Tab

Option	Description
References	The References tab lets you view where the Credential is used within JAMS.

Managing Encryption Keys

JAMS encrypts password and private key information when it is stored in the database. The standard JAMS installation uses a predefined encryption key, which is adequate for many sites. For additional protection you can generate a unique encryption key but must ensure that it is properly backed up and secured.

When generating a unique encryption key, JAMS uses the AES encryption algorithm to re-encrypt all password and private key information within the database. The generated key is

then encrypted and stored using the Windows Data Protection API (DPAPI). The protected key is then linked to user account associated with the JAMS Server and Scheduler services.

Use the following commands available in the JAMSDBA utility to manage encryption keys:

GENERATE KEY - Generates a new 256 bit encryption key, decrypts the password with the old key then encrypts it with the new key. The new encryption key is then stored using DPAPI.

EXPORT KEY - Pulls the encryption key from DPAPI and writes it to a text file.

> **IMPORTANT:** It is critical that you protect the EXPORT file since the key is not encrypted.

IMPORT KEY – this is similar to the GENERATE KEY. But in this case the new key is pulled from a text file instead of being generated. If recovering from backup or configuring the secondary server in a failover configuration, you should use the **/NOENCRYPT** qualifier to skip the decryption and re-encryption of the current data.

Protecting a Standalone JAMS Server

To protect a standalone JAMS Server, follow the steps below:

1. Log on to the server as a user with "Execute" access to JAMS configuration settings.
2. Set your default directory to the JAMS Scheduler installation directory. The default is: C:\Program Files\MVPSI\JAMS\Scheduler
3. Execute **JAMSDBA.EXE** to open a JAMSDBA> prompt.
4. Enter **GENERATE KEY** and press **Return**.
5. Enter **EXPORT KEY** YourFileName.txt and press **Return**.
6. Enter **EXIT** and press **Return**.
7. Then move the exported text file to a safe location.

Restoring a Standalone JAMS Server

When restoring a backup of the JAMS database to different server, the encrypted passwords cannot be decrypted because of the encryption key DPAPI protection associated with the original machine/user. To restore the encryption key from a backup follow these steps:

1. Log on to the server as a user with "Execute" access to the JAMS configuration settings.

2. Set the default directory to the JAMS Scheduler installation directory. The default is: C:\Program Files\MVPSI\JAMS\Scheduler

3. Copy the exported text file (YourFileName.txt) from your safe location to the current directory.

4. Execute **JAMSDBA.EXE** to open a JAMSDBA> prompt.

5. Enter **IMPORT KEY/NOENCRYPT** and press **Return**.

6. Enter **EXIT** and press **Return**.

Failover Environments
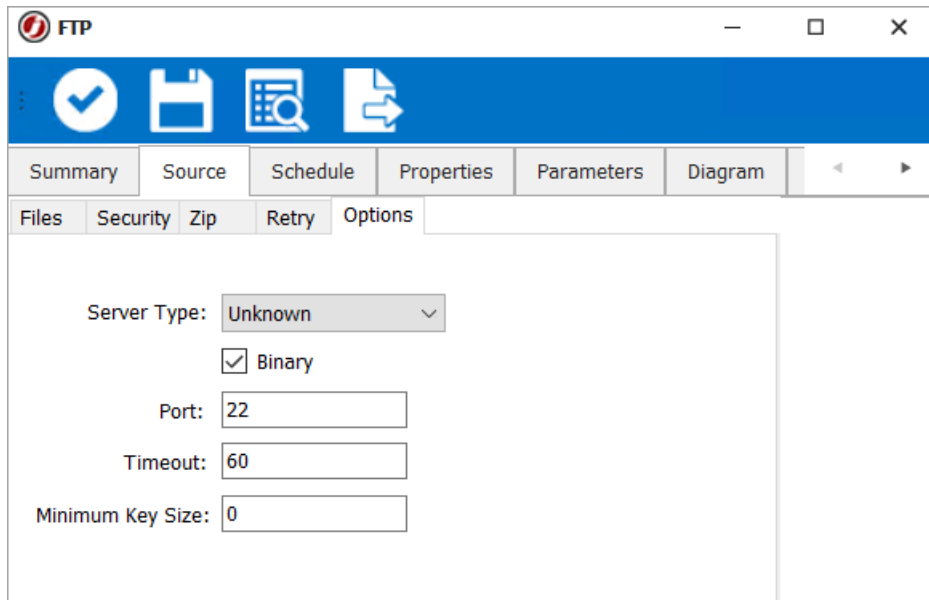
To protect the servers in a failover environment please follow the steps listed below:

1. Make sure that your primary JAMS Server is in the running state.

2. Log on to the primary server as a user with "Execute" access to the JAMS configuration settings.

3. Execute **JAMSDBA.EXE** to open a JAMSDBA> prompt.

4. Enter **GENERATE KEY** and press **Return**.

5. Enter **EXPORT KEY** YourFileName.txt and press **Return**.

6. Enter **EXIT** and press **Return**.

7. Move the exported text file to a safe location.

8. Log on to the secondary server as a user with "Execute" access to the JAMS configuration settings.

9. Set your default directory to the JAMS Scheduler installation directory. The default is: C:\Program Files\MVPSI\JAMS\Scheduler

10. Copy the exported text file (YourFileName.txt) from your safe location to the current directory.

11. Execute **JAMSDBA.EXE** to open a JAMSDBA> prompt.

12. Enter **IMPORT KEY/NOENCRYPT** and press **Return**.

13. Enter **EXIT** and press **Return**.

Changes to Security Options for SSH & SSL Connections in JAMS

File Transfer using the SFTP File Type

When using the SFTP Transfer type in a File Transfer Job, the Options tab will correspond with the screenshot below.

> **IMPORTANT:** The key size 1024 has been shown to be insecure. A minimum of 2048 is recommended.

File Transfer using the SCP File Type

When using the SCP Transfer type in a File Transfer Job, the Options tab will look like the screenshot below.

In this case the Minimum Key Size property functions the same as described in the previous section.

File Transfer using the FTPS File Type

In the File Transfer Job definition using the FTPS Transfer Type, the Options changes significantly from the previous two examples.

Similarly, the Minimum Key Size property functions in the same way as described in the above two sections.

The Allow TLS 1.1 and Allow TLS 1.2 options are also available. These, along with the Allow SSL 3.0 and Allow TLS 1.0 options, provide a fine-grained selection of the SSL algorithm used to authenticate with a remote machine. SSL 3.0 is now considered obsolete and should not be used unless absolutely necessary.

Ideally, TLS 1.2 should be used, but it may not be available on all servers. However, if none of these options are selected, the connection will attempt to negotiate the best available protocol on the particular server.

> **NOTE:** TLS 1.2 was not available before JAMS version 6.4 and it may cause problems when connecting to earlier versions of JAMS servers that use TLS 1.1 or lower.

File Transfer from Workflow Jobs

When setting up a Workflow Job, the File Transfer, File Transfer Session, and Mail Server Sessions groups have been also been updated with additional properties for FtpDownload, FtpUpload, and FTPSession shown in the example below:

Connection security properties are grouped within the Security section. These options are the same as the previous descriptions for FileTransfer jobs. For FtpDownload specifically, the UseSSL property toggles the SSL connection security on or off.

> **NOTE:** Selecting **Unsecure** indicates it is using plain FTP without any SSL socket security layer.

For SftpDownload, SftpUpload, ScpDownload, ScpUpload, SFTPSession, and SCPSession activities, JAMS uses a new security property called MinimumDiffieHellmanKeySize, (or Minimum Key Size) as described in the previous sections.
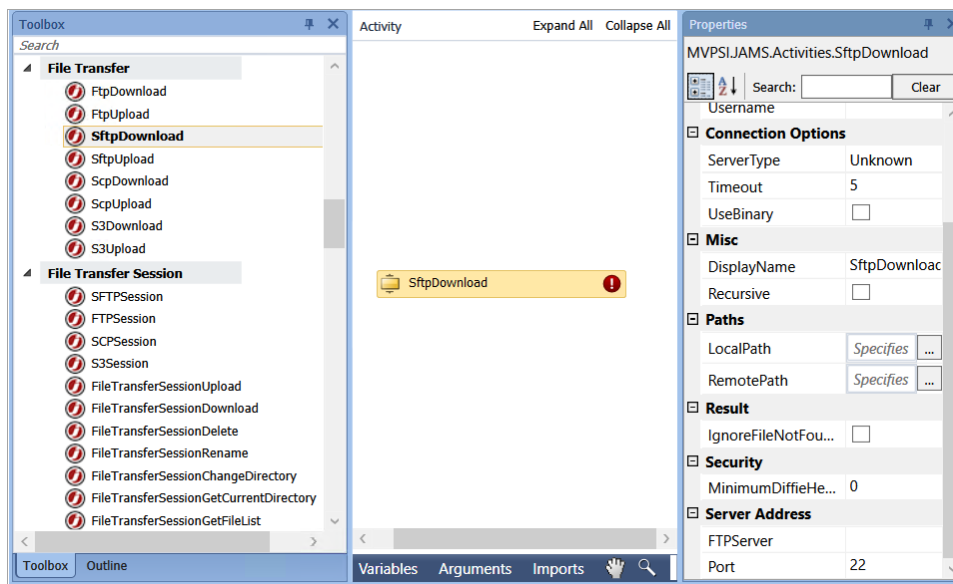
For SSH-style connections using large key sizes will automatically disable insecure key algorithms that do not have high enough bit counts.

The IMAPSession, POPSession, ForEachMailMessage, and ForEachAttachment activities also incorporate the same security options from FTPS uploads and downloads.
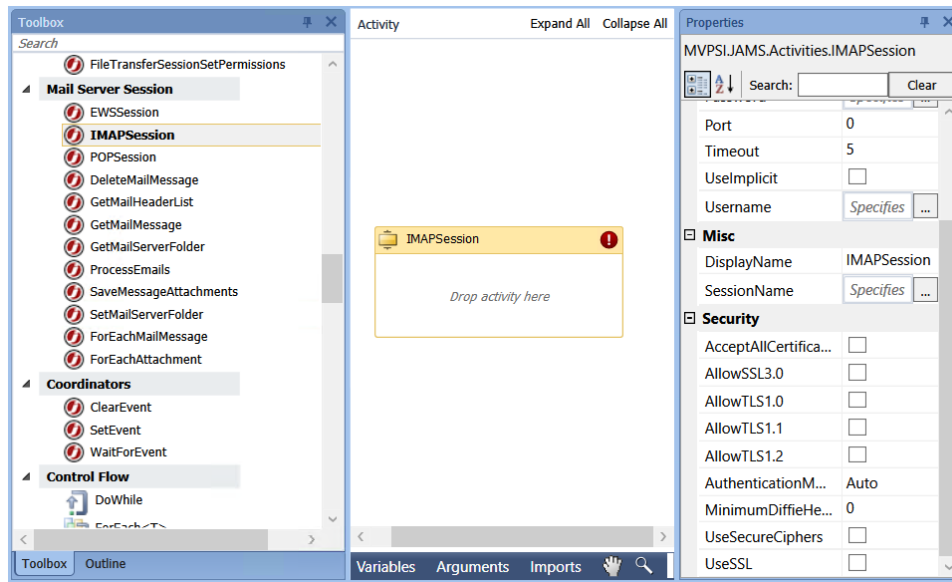
JAMS PowerShell Plugin Updates for Connect-JFTPS, Connect-JIMAP, Connect-JPOP, and Connect-JSFTP Activities

The JAMS PowerShell also exposes similar parameters for Connect-JFTPS, Connect-JIMAP, Connect-JPOP, and Connect-JSFTP as shown in the series of screenshots below.

SSH Parameters for SSH Activities

SSH-based FileTransfer (SCP, SFTP) Jobs and WorkFlow Jobs that use SSH activities (ScpDownload, ScpUpload, SftpDownload, SftpUpload, SCPSession, SFTPSession) also add the SSH parameters listed below.

JAMSSshMinimumKeySize - Decimal minimum Diffie-Hellman key size. The default is 1024.

JAMSRsaMinimumSize - Decimal minimum RSA key size. The default is 1023.

JAMSSshCompression - To use compression, select true or false. The default is false.

JAMSSshCompressionLevel - To set the compression level to use, select 0 to 9. The default is 5.

JAMSSshEncryption - Comma separated list of Encryption Algorithms. Select one or more from the list:

- RC4
- TripleDES
- AES
- Blowfish
- Twofish
- ChaCha20Poly1305

JAMSSshHostKey - SSH Host Key Algorithm. Select one or more from the list:

- RSA
- DSS
- Certificate
- ED25519
- ECDsaNistP256
- ECDsaNistP384
- ECDsaNistP521

JAMSSshKeyExchange- SSH Key Exchange Algorithm. Select one or more from the list:

- DiffieHellmanGroup1SHA1
- DiffieHellmanGroup14SHA1
- DiffieHellmanGroupExchangeSHA1
- DiffieHellmanGroupExchangeSHA25
- ECDiffieHellmanNistP256
- ECDiffieHellmanNistP384
- ECDiffieHellmanNistP521
- Curve25519
- DiffieHellmanOakleyGroupSHA256
- DiffieHellmanOakleyGroupSHA512

JAMSSshMacAlgorithm- SSH Mac Algorithm. Select one or more from the list:

- MD5
- SHA1
- SHA256
- SHA512

SSL Parameters for SSL/TLS Activities

SSL-based File Transfer (FTPS) Jobs and Workflow Jobs that use SSL/TLS activities (FtpDownload, FtpUpload, FTPSession, IMAPSession, POPSession, ForEachAttachment, ForEachMailMessage) add the SSL parameters listed below:

JAMSSslMinimumKeySize- Decimal minimum Diffie-Hellman key size. The default is 1024.

> **NOTE:** The same functionality as JAMSSshMinimumKeySize is used for SSH connections.

JAMSSslCipherSuite - Comma separated list of Ssl Cipher Suites.

- DHE_DSS_EXPORT1024_WITH_DES_CBC_SHA [Vulnerable]
- DHE_DSS_EXPORT1024_WITH_RC4_56_SHA [Vulnerable]
- DHE_DSS_EXPORT_WITH_DES40_CBC_SHA [Vulnerable]
- DHE_DSS_WITH_3DES_EDE_CBC_SHA [Weak]
- DHE_DSS_WITH_AES_128_CBC_SHA [Weak]
- DHE_DSS_WITH_AES_128_CBC_SHA256 [Weak]
- DHE_DSS_WITH_AES_128_GCM_SHA256 [Weak]
- DHE_DSS_WITH_AES_256_CBC_SHA [Weak]
- DHE_DSS_WITH_AES_256_CBC_SHA256 [Weak]
- DHE_DSS_WITH_AES_256_GCM_SHA384 [Weak]
- DHE_DSS_WITH_DES_CBC_SHA [Vulnerable]
- DHE_DSS_WITH_RC4_128_SHA [Vulnerable]
- DHE_RSA_EXPORT_WITH_DES40_CBC_SHA [Vulnerable]
- DHE_RSA_WITH_3DES_EDE_CBC_SHA [Weak]
- DHE_RSA_WITH_AES_128_CBC_SHA [Weak]
- DHE_RSA_WITH_AES_128_CBC_SHA256 [Secure]
- DHE_RSA_WITH_AES_128_GCM_SHA256 [Secure]
- DHE_RSA_WITH_AES_256_CBC_SHA [Weak]
- DHE_RSA_WITH_AES_256_CBC_SHA256 [Secure]
- DHE_RSA_WITH_AES_256_GCM_SHA384 [Secure]
- DHE_RSA_WITH_CHACHA20_POLY1305_SHA256 [Secure]
- DHE_RSA_WITH_DES_CBC_SHA [Vulnerable]
- DH_anon_WITH_3DES_EDE_CBC_SHA [Anonymous]
- DH_anon_WITH_AES_128_CBC_SHA [Anonymous]
- DH_anon_WITH_AES_128_CBC_SHA256 [Anonymous]

- DH_anon_WITH_AES_256_CBC_SHA [Anonymous]
- DH_anon_WITH_AES_256_CBC_SHA256 [Anonymous]
- DH_anon_WITH_DES_CBC_SHA [Anonymous]
- DH_anon_WITH_RC4_128_MD5 [Anonymous]
- ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA [Weak]
- ECDHE_ECDSA_WITH_AES_128_CBC_SHA [Weak]
- ECDHE_ECDSA_WITH_AES_128_CBC_SHA256 [Fast Secure]
- ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 [Fast Secure]
- ECDHE_ECDSA_WITH_AES_256_CBC_SHA [Weak]
- ECDHE_ECDSA_WITH_AES_256_CBC_SHA384 [Fast Secure]
- ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 [Fast Secure]
- ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256 [Secure]
- ECDHE_ECDSA_WITH_RC4_128_SHA [Vulnerable]
- ECDHE_RSA_WITH_3DES_EDE_CBC_SHA [Weak]
- ECDHE_RSA_WITH_AES_128_CBC_SHA [Weak]
- ECDHE_RSA_WITH_AES_128_CBC_SHA256 [Fast Secure]
- ECDHE_RSA_WITH_AES_128_GCM_SHA256 [Fast Secure]
- ECDHE_RSA_WITH_AES_256_CBC_SHA [Weak]
- ECDHE_RSA_WITH_AES_256_CBC_SHA384 [Fast Secure]
- ECDHE_RSA_WITH_AES_256_GCM_SHA384 [Fast Secure]
- ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 [Secure]
- ECDHE_RSA_WITH_RC4_128_SHA [Vulnerable]
- RSA_EXPORT1024_WITH_DES_CBC_SHA [Vulnerable]
- RSA_EXPORT1024_WITH_RC4_56_SHA [Vulnerable]
- RSA_EXPORT_WITH_DES40_CBC_SHA [Vulnerable]
- RSA_EXPORT_WITH_RC2_CBC_40_MD5 [Vulnerable]
- RSA_EXPORT_WITH_RC4_40_MD5 [Vulnerable]
- RSA_WITH_3DES_EDE_CBC_SHA [Weak]
- RSA_WITH_AES_128_CBC_SHA [Weak]
- RSA_WITH_AES_128_CBC_SHA256 [Fast Secure]
- RSA_WITH_AES_128_GCM_SHA256 [Fast Secure]
- RSA_WITH_AES_256_CBC_SHA [Weak]
- RSA_WITH_AES_256_CBC_SHA256 [Fast Secure]
- RSA_WITH_AES_256_GCM_SHA384 [Fast Secure]
- RSA_WITH_DES_CBC_SHA [Vulnerable]

- RSA_WITH_RC4_128_MD5 [Vulnerable]
- RSA_WITH_RC4_128_SHA [Vulnerable]

JAMSSslEllipticCurve - Comma separated list of TLS Elliptic Curves.

- NistP256
- NistP384
- NistP521
- BrainpoolP256R1
- BrainpoolP384R1
- BrainpoolP512R1
- Curve25519

JAMSSslVersion- Comma separated list of SSL Versions.

- SSL30
- TLS10 [Any]
- TLS11 [Any]
- TLS12 [Any]

> **NOTE:** Only TLS 1.2 and TLS 1.3 are considered secure.

Registering and Configuring JAMS for Microsoft Office 365 Modern Authentication

Overview

JAMS supports Microsoft Office 365 Modern Authentication for the EWS protocol in the EWS Connection Store object, Connect-JEWS PowerShell cmdlet, the EWSSession Activity in Workflow Jobs, and EWS Mail Triggers. You need to register and configure JAMS as an application within the Azure Portal before you can configure JAMS.

> **NOTE:** Modern Authentication is supported for only EWS within JAMS. IMAP and POP3 are not supported.

Configuring JAMS as an Application in the Azure Portal

To use Modern Authentication in JAMS, get the Azure Directory (Tenant) ID, Azure Application (Client) ID, and Azure Client Secret Value from the Azure Portal. The Client Secret can expire, so configure this as appropriate for your security preferences. When it expires, generate a new Client Secret and update the JAMS Credential.

To register and configure JAMS as an application in the Azure Portal, do the following:

1. Complete the steps in Register your application to create the **Application (Client) ID** and the **Directory (Tenant) ID**.
2. Complete the steps in Configure for app-only authentication to allow the use of application permissions and to create the **Client Secret (Value)**. These changes may require several hours to take effect.

> **NOTE:** To restrict access to the mailboxes, follow the instructions for Limiting application permissions to specific Exchange Online mailboxes.

Configuring JAMS for Modern Authentication

To configure JAMS, you need the Azure Tenant ID, Azure Client ID, and Azure Client Secret Value.

Adding a JAMS Credential for the Azure Credentials

1. Click **Credentials** from the Shortcuts menu.
2. Click **+**.
3. In the Credential Name field, enter a name for the Credential, such as EWSCredential.
4. In the Logon As field, enter the Client ID.
5. In the Enter Password and Re-Enter Password fields, enter the Client Secret Value.
6. In the Edit Credential after adding field, clear the check box.
7. Click **Ok**.

Adding a JAMS Credential for the Mailbox

1. Click **Credentials** from the Shortcuts menu.
2. Click **+**.
3. In the Credential Name field, enter a name for the Credential, such as EWSMailCredential.
4. In the Logon As field, enter the email address of the mailbox to monitor.
5. In the Edit Credential after adding field, clear the check box.
6. Click **Ok**.

> **NOTE:** If you are already using Basic Authentication, you should have a JAMS Credential for the mailbox username and password. You will need to reference this in the EWS Connection Store object.

Adding an EWS Connection Store

You can create an EWS Connection for Workflow Jobs, PowerShell cmdlets, or EWS Mail Triggers. This Connection Store will reference both JAMS Credentials.

1. Click **Connection Store** from the Shortcuts menu.
2. Click **+**.
3. On the Add a Connection Definition dialog, enter the Name (EWSConnection), Description (Connection for EWS Server), and Type of Connection (EWS).

   > **NOTE:** You can also change the Type of Connection on the Properties tab. If you change it, the Property values are maintained if they exist in the new Connection Type.

4. Click **OK**. The Properties dialog is displayed.
5. Click the **Properties** tab.
6. In the Address field, enter the address of the EWS server (outlook.office365.com).
7. In the Port field, enter the incoming port number for the EWS server.
8. In the Client Credential, select the EWS Credential previously saved within the JAMS Credential shortcut via the drop-down. This should contain the Client ID and Client Secret Value from the Azure Portal.
9. In the Tenant Id field, enter the Tenant ID from the Azure Portal.
10. In the Mail Credentials field, select the Credential previously saved within the JAMS Credential shortcut via the drop-down. This should contain the email address.
11. Optional - In the Mail Check Interval field, specify a value for Mail Watch Jobs.

12. In the SSL Heading field, select any SSL Setting for the EWS server, if needed.

13. On the Security tab, review the permissions for this Connection.

   NOTE: Ensure the Submit permission is selected for user accounts that will use this Connection.

14. Click **Save and Close**.

Updating Mail Triggers

If you use Mail Watch Jobs, you can update them to use the new properties and the EWS Connection Store object.

1. Click **Definitions** from the Shortcuts menu.
2. Create or open a Job.
3. Click the **Schedule** tab.

4. Click **+** and select **Run this job** | **based on an email**, or double-click an existing Mail Trigger.

5. In the Mail Server field, select the EWS Connection Store object.

6. In the Mail Credentials field, you can override the target email address in the Connection Store object by selecting a new credential in this field. Otherwise, keep this field empty to use the credential in the Connection Store object.

7. Make any updates as needed in the Mail Selection section.

8. Click **Save and Close**.

Updating PowerShell Scripts

If you use the JAMS Connect-JEWS PowerShell cmdlet, you can update it use the new required properties. The PowerShell cmdlet has a **JAMSConnection** argument that should be updated to use the EWS Connection Store object. See JAMS PowerShell cmdlets for more information.

Updating Workflow Jobs

If you use EWSSession Workflow activity in a Workflow Job, you can update them to use the new required properties. Specify the EWS Connection Store object in the JAMSConnection field in the EWSSession Activity. To specify the email address, add it to a Credential and select it in the JAMSUsername field or enter it in the Username field. See Workflow Activities for more information.

> **NOTE:** To use this updated EWSSession activity with Modern Authentication, update your JAMS Client and JAMS Scheduler.

Upgrading JAMS

Upgrading JAMS Using a Primary-Failover Environment

Before You Begin

- Review the ***Upgrading from JAMS 7.x to 7.x on page 317*** for notes and additional requirements.
- Note the Log On As account that your JAMS Scheduler and JAMS Server services are running under, if they are not using LocalSystem. The upgrade sets the user for these services to LocalSystem.
- Create a maintenance window and allow currently running Jobs to complete. The maintenance window prevents future Jobs from executing during the upgrade. See Creating a Maintenance Window in JAMS.
- Create backups or snapshots of the following:
  - The JAMS Database.
  - The JAMS Scheduler Server, if it is running on a VM.
  - JAMS config files, such as JAMSHost.exe.config or JAMSScheduler.exe.config, that have been customized in C:\Program Files\MVPSI\JAMS\Scheduler. These changes will need to be reapplied after the upgrade.

> **NOTE:** When upgrading from JAMS V7.x to a version after V7.3.338, review your Message Queue permissions as described in this article.

Stop the JAMS Services on the Primary and Secondary Schedulers

1. On the Primary Scheduler, open the Windows Services application.
2. Complete the steps below for the three JAMS Services.

   1. Click the **JAMS Executor** service and select **Stop**. This will also stop the JAMS Scheduler service.
   2. Verify the service has stopped.
   3. Repeat these steps for the JAMS Server service and JAMS Scheduler service.
3. Repeat these steps on the Secondary Scheduler.

Upgrade the Primary Scheduler

1. Right-click the **JAMS installer** and select **Run As Administrator**.
2. Follow the prompts in the installer until the upgrade is complete.

    > **NOTE:** If you clear any of the checkboxes in the JAMS installer, those components will be removed. It is recommended to not clear any checkboxes for the JAMS components.

3. Stop the three JAMS Services on the primary JAMS Scheduler.
4. Update the Log On As account that your JAMS Scheduler and JAMS Server services are running under, if they are not using LocalSystem.
5. On the primary JAMS Scheduler, go to \Program Files\MVPSI\JAMS\Scheduler.
6. Right-click **JAMSRegister.exe** and select **Run as administrator**. A command prompt window opens.
7. Run the command shown below to export the certificate. You need to copy this to the Secondary JAMS Scheduler.
    ```
    Export root ca /filename="C:\root.pfx" /prompt
    ```
8. Enter a password to store the private key, which is referred to as the root key password and will be used in another step.
9. Enter the password again when prompted to verify it.
10. Copy the root.pfx file to the Secondary JAMS Scheduler to C:\.

Upgrade the Secondary Scheduler

1. Right-click the **JAMS installer** and select **Run As Administrator**.
2. Follow the prompts in the installer until the upgrade is complete.

    > **NOTE:** If you clear any of the checkboxes in the JAMS installer, those components will be removed. It is recommended to not clear any checkboxes for the JAMS components.

3. Stop the three JAMS Services on the secondary JAMS Scheduler.
4. Update the Log On As account that your JAMS Scheduler and JAMS Server services are running under, if they are not using LocalSystem.
5. On the secondary JAMS Scheduler, go to \Program Files\MVPSI\JAMS\Scheduler.
6. Right-click **JAMSRegister.exe** and select **Run as administrator**. A command prompt window opens.

7. Run the command shown below to import the certificate. Ensure you update the /filename command to specify the location where the file is saved.

   ```
   Import root ca /filename=root.pfx /prompt /storekey
   ```

8. Enter the root key password.

9. Run the command shown below:

   ```
   Add scheduler listener /newcert
   ```

Restart the JAMS Services and Upgrade the Agents and Clients

1. Apply any JAMS config files, such as JAMSHost.exe.config or JAMSScheduler.exe.config, that have been customized. The files are located in C:\Program Files\MVPSI\JAMS\Scheduler.

2. Start the JAMS Services on the primary JAMS Scheduler to allow it to become the active JAMS Scheduler.

3. Start the three JAMS Services on the secondary JAMS Scheduler.

4. Verify the primary JAMS Scheduler is now active and the secondary JAMS Scheduler is now passive by doing the following:

   1. From the JAMS Client, click the **About** icon and select **JAMS Servers**.
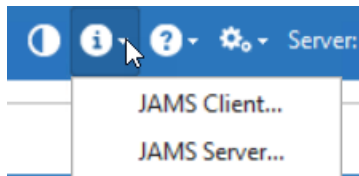
   2. Click the **Status** tab.

   3. Ensure the server is listed in the correct mode (Running or Backup Mode). You may need to scroll down to see all of the information.

5. Run the installer on any remote Agents or Desktop Client to upgrade them.

6. Disable the maintenance window to resume normal operation. See Creating a Maintenance Window in JAMS.

Upgrading from JAMS 7.x to 7.x

JAMS can be upgraded directly over an existing installation of an earlier 7.X JAMS Client and/or JAMS Scheduler. You can run a new 7.X installation executable to update JAMS 7.X using the current database without disturbing existing Properties, Configuration settings, or Jobs. Run the new installation executable and JAMS will upgrade any requisite components - including the database.

As a best practice, the JAMS Clients and JAMS Scheduler should be updated at the same time to help ensure the full functionality of the new version is available. The JAMS Agents can be updated as the final step, unless you have JAMS Windows Agents older than V7.0.1441. In that case, those Agents should be upgraded before upgrading the JAMS Scheduler.

Best Practices for Upgrades

The following items are recommended to help ensure a successful upgrade:

- Upgrade a lower test environment where proper testing can be done to simulate the conditions and load of your production environment. Contact your JAMS account manager for details on purchasing a temporary license or license for development or testing.

- Test similar conditions and load to ensure the new version continues to meet your needs and does not suffer from any unexpected behaviors that may impact the execution of the production environment after the upgrade.

- Verify all critical functionalities. You can select examples of production Jobs that are critical to the organization to ensure these Jobs are working after the upgrade.

- Upgrade the JAMS Scheduler, JAMS Client, and JAMS Windows Agents to the same version to ensure the latest features are fully supported.

- The UNIX/Linux, iSeries, and OpenVMS Agents have separate versions and release schedules from the JAMS Scheduler and JAMS Client, so they can be upgraded independently of the other JAMS components.

Preparing for the JAMS Upgrade

- Ensure the JAMS Client, JAMS Scheduler, and JAMS Agent meet the minimum requirements. See ***System Requirements*** for more information.

- JAMS Services rely on a connection to SQL to start properly, and they will fail to start if a SQL connection to a valid JAMS database cannot be made. When installing or updating your SQL Instance, review the startup sequence of the MSSQL Services and ensure they are set to an appropriate startup type, such as **Automatic**.

- For Windows Integrated authentication, ensure the user that you are logged in as on the JAMS Scheduler machine has full admin (or a minimum of db_owner) access rights to the JAMS SQL database. This is important to allow the database schema to be properly updated.

- Schedule a Maintenance Window and wait for any executing Jobs to finish before starting an upgrade. No Jobs, other than File Watch Jobs, should be running when

the upgrade process starts. File Watch Jobs will automatically resubmit after the upgrade has completed.

- Take backups before starting the upgrade.
    - Backup the JAMS SQL database. Typically, there should be no issues with the upgrade, but reverting to the previous version may require the database to be restored.
    - Make backup copies of any JAMS configuration files that have been customized. Customizations will need to be re-applied after the upgrade. This can include the JAMSHost.exe.config and the JAMSScheduler.exe.config, as well as the JAMS Web Client Common.config and Web.config if Windows Authentication has been enabled.
    - Take a snapshot of the JAMS Scheduler virtual machine, if possible.
- Note the "Log on as" account that your JAMS Scheduler and JAMS Server services are running under, if not LocalSystem.
- If you are using the JAMS Web Client, note the identity the JAMSSite Application Pool is running under.
- Download the latest JAMS release from [Product Download Links](#) page. To access the Product Download Links page, you must register for a JAMS account and log in to JAMS Support.
- Ensure you are familiar with the HA Failover upgrade process if you are running an HA Failover JAMS environment. See ***Upgrading JAMS Using a Primary-Failover Environment* on page 315**.

Upgrading the JAMS Scheduler

During the upgrade, the JAMS installer stops the appropriate JAMS services and then restarts them after the upgrade is complete.

> **NOTE:** If your system is missing the prerequisite software, the JAMS installer will display a message and the installation will stop. See ***System Requirements*** for more information.

1. Right-click the JAMS installer that you downloaded and select **Run as administrator**.
2. On the Welcome page, click **Next**.

> **NOTE:** You may see an error message on the Welcome screen of the JAMS installer that the certificate chain was issued by an authority that is not trusted. If this message appears, see ***Managing the JAMS Database*** for more information before continuing with the upgrade.
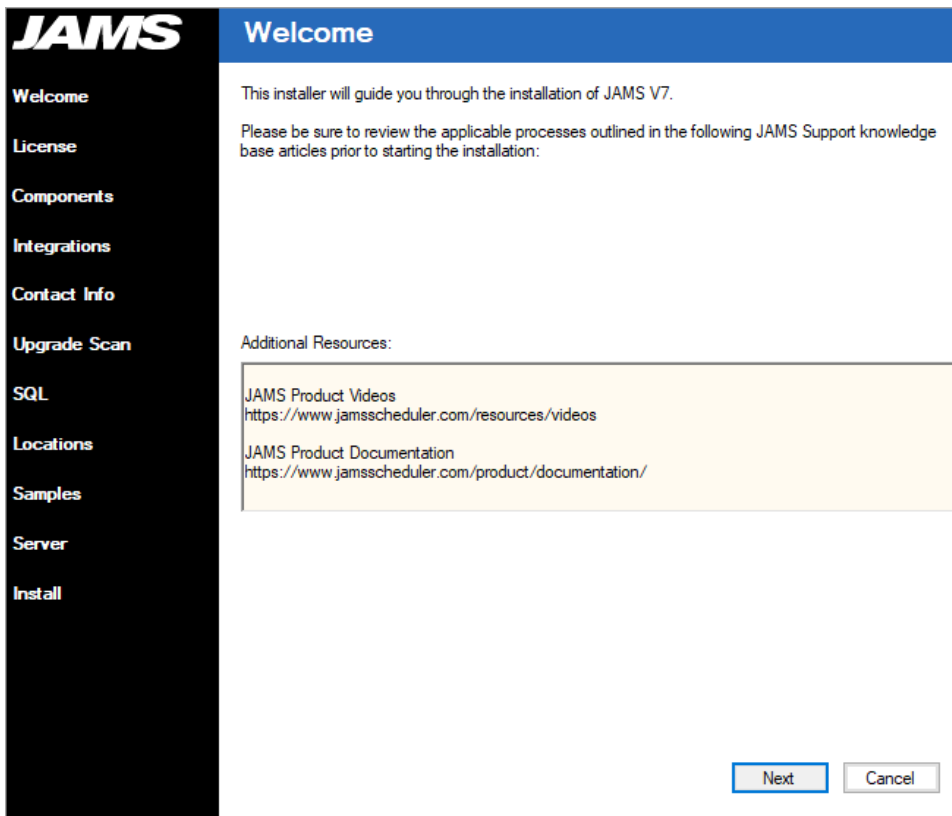
3. On the License Agreement page, review the license agreement.

4. Select the checkbox next to **I accept this license agreement**.

5. Click **Next**.

6. On the Core Components page, keep the items that are already selected. **Clearing any of these items will uninstall them.** You can also select any additional Components that are needed.

7. Click **Next**.

8. On the Integration Packs page, keep any Integration Packs that are already selected. **Clearing any of these items will uninstall them**. You can also select any additional Integrations that are needed.

9. Click **Next**.

10. If WebView2 is not installed and you are installing the JAMS Client, select the checkbox on the WebView2 Runtime page. See WebView2 Runtime for more information.

11. Click **Next**.
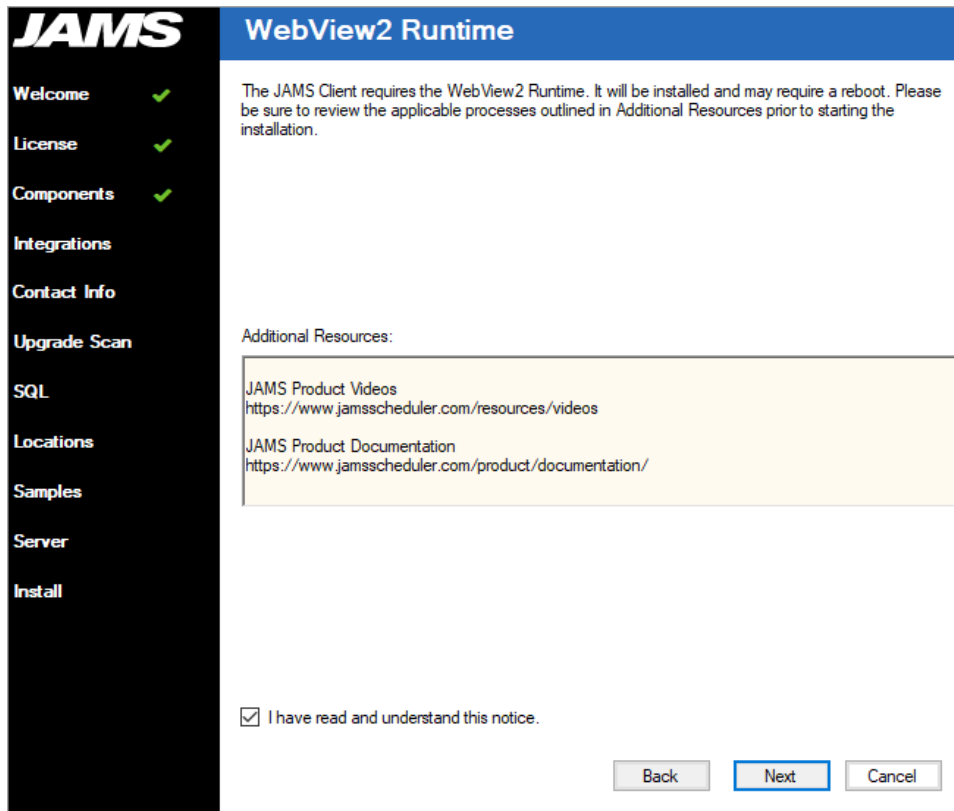
12. If displayed, review the values on the Web Client Details page. This screen is displayed only if the Web Client is being upgraded.

13. Click **Next**.

14. On the Install page, review the summary of what will be installed.

15. Click **Install**.
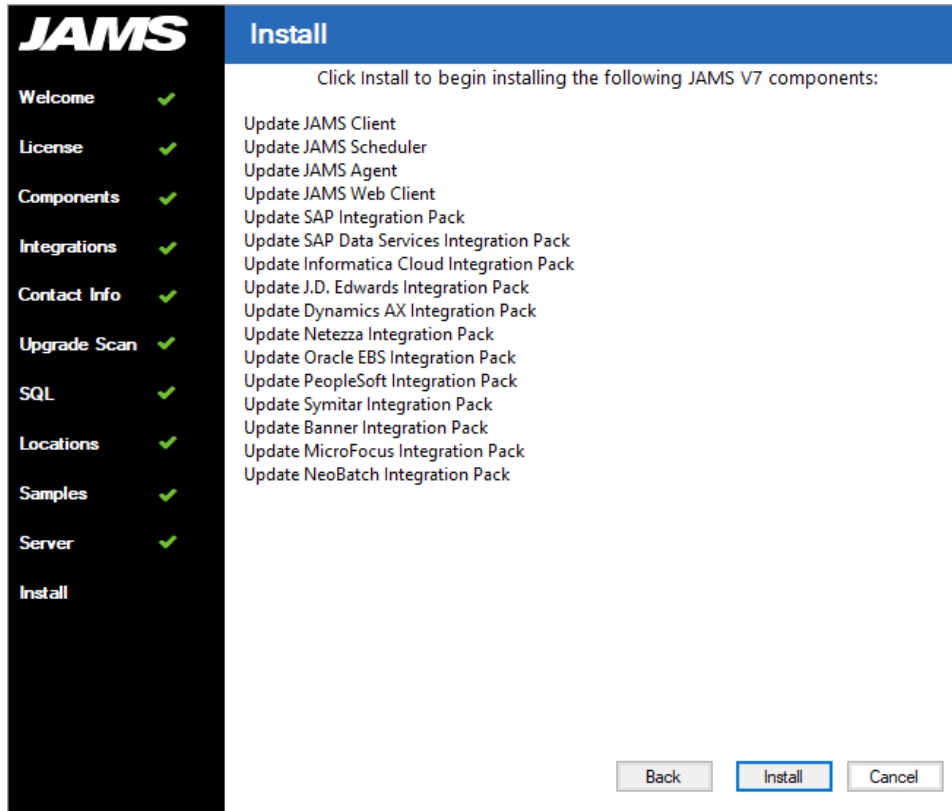
16. Click **Close** when the Installation Complete message is displayed.
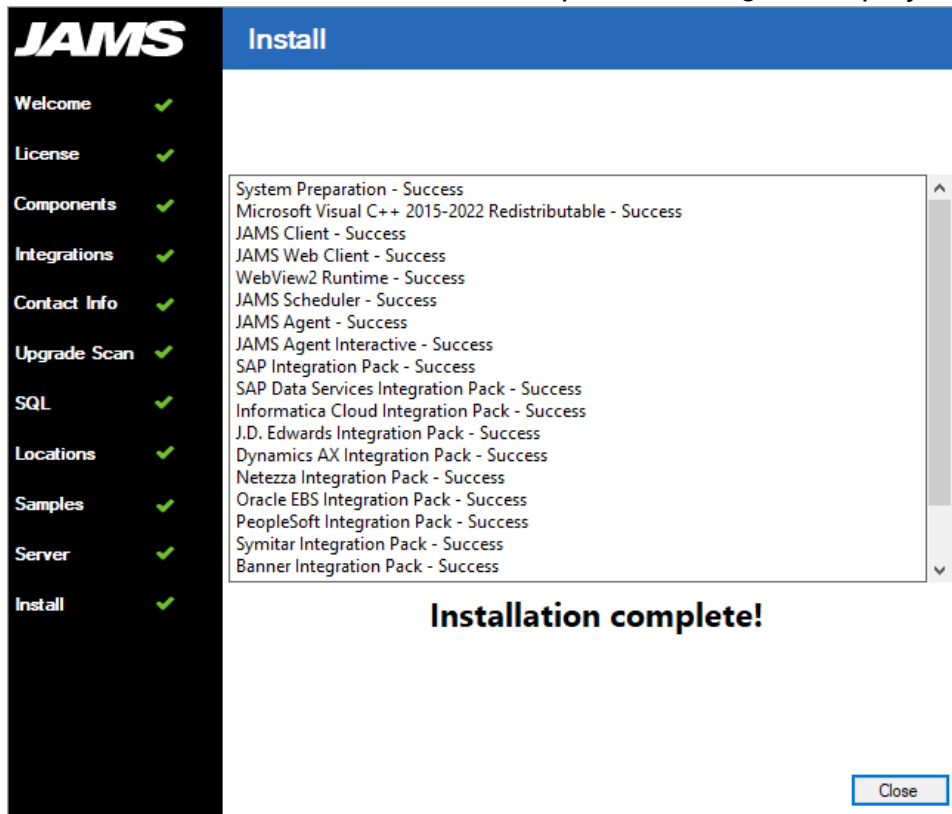
17. Wait until the installation has finished and the finalization step is complete.

Manually re-apply the required customizations to JAMS configuration files using the backups taken before the upgrade as a template. Do not replace the new versions of the configuration files with the old ones. JAMS Services need to be restarted to pick up any new configuration file customizations. The JAMSSite Application Pool needs to be recycled to pick up changes to the JAMS Web Client Common.config and Web.config.

Running JAMS Services as a Domain Account

If the JAMS Services were configured to run as a Domain account before the upgrade, the JAMS Server and JAMS Scheduler service must be set back to run as the domain account. Windows will reset the JAMS Services to run as Local System when the services are updated.

If the JAMS Server service is unable to start and run under LocalSystem because it has not been granted the required database login permissions, you will see errors at the end of C:\Program Files\MVPSI\JAMS\Scheduler\DBUpdate.log. You should run C:\Program Files\MVPSI\JAMS\Scheduler\JAMSDBA as an administrator and enter the command "install" to complete the JAMS installation after changing the run as account back to the domain account and starting the JAMSServer service.

If you are using the JAMS Web Client with the JAMSSite Application Pool running under a domain account rather than LocalSystem, re-apply that identity within IIS and recycle the application pool.

Upgrading the JAMS Client

After the JAMS Scheduler Server has been upgraded, the same installation executable can be used to upgrade any remote JAMS Client installation. Alternatively, the smaller SetupClientx64.msi can be downloaded from the [JAMS Support Site](#) instead of using the full JAMS installer.

To upgrade the JAMS Client using the JAMS installer, select only the JAMS Client option on the Core Components page of the installer. Note that having only the JAMS Client option selected while upgrading a remote client will not uninstall other options listed on the Core Components page from the Schedule Server.
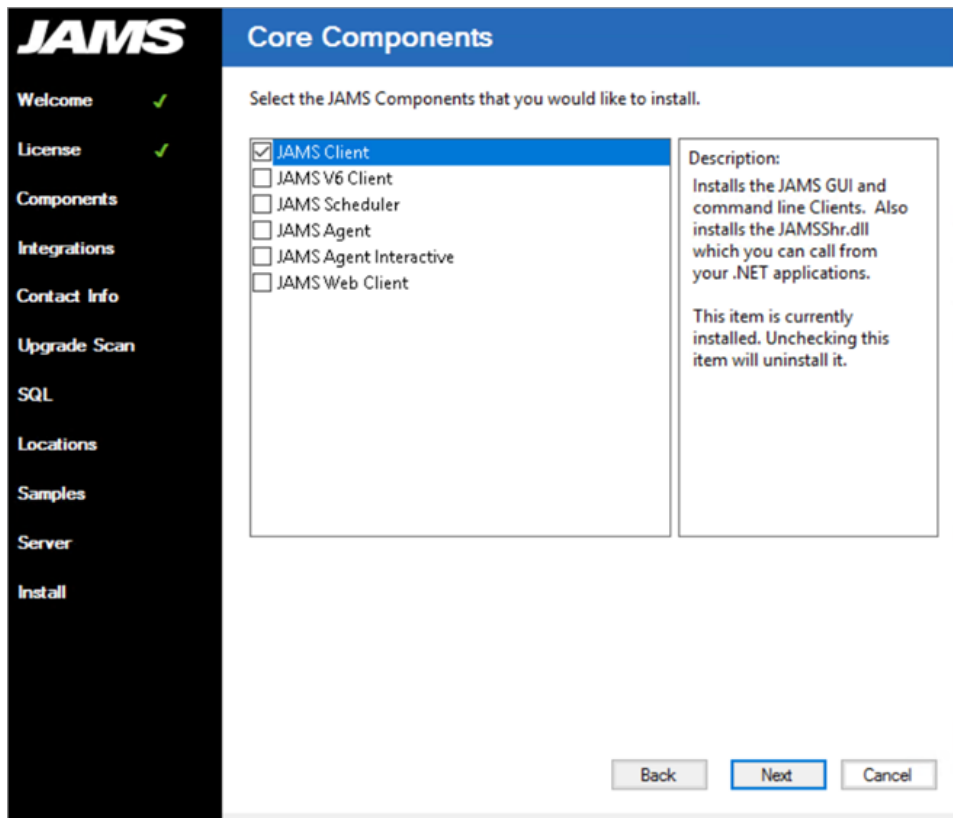
If you are using only the JAMS Web Client, you are not required to perform any installation or upgrade after a server upgrade unless you applied customizations to *.config files in the JAMS Web Client, such as to enable Windows Integrated Authentication. The JAMS Web Client view will update if the Web Client was previously installed or selected in step 6.

Upgrading JAMS Windows Agents

If you are using JAMS Windows (Outgoing) Agents and they were originally installed by deploying them from the JAMS Client, you can redeploy the Agent to upgrade them. See *JAMS Agent for Windows* for more information.
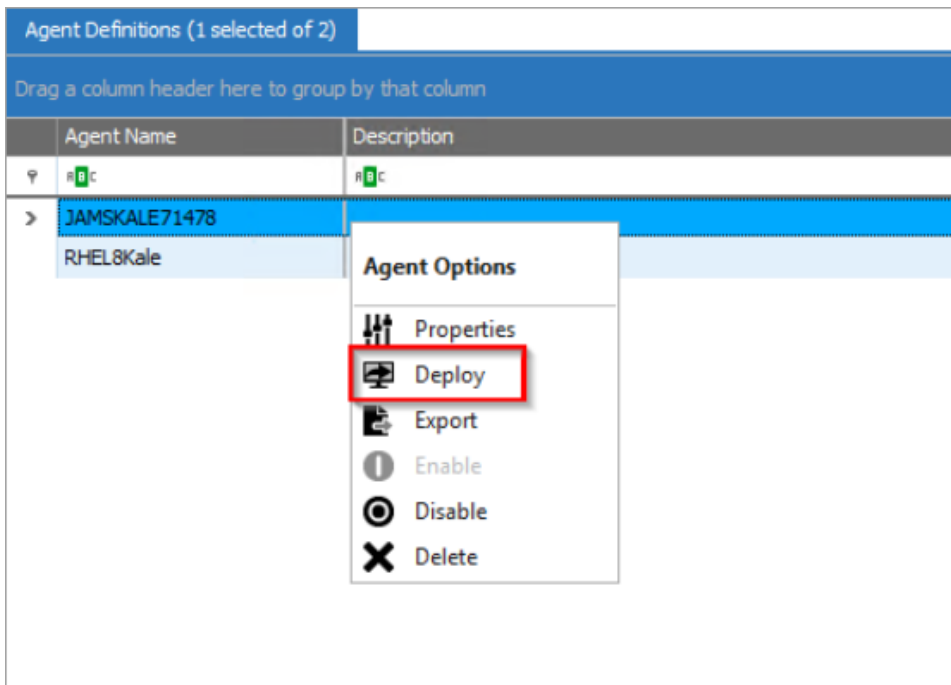
You can also upgrade JAMS Windows Agents by using the SetupAgent.MSI file for the latest release. The MSI is a smaller file size than the full JAMS installer, and it can be accessed from the JAMS Support Site.

Upgrading Other JAMS Agents

The UNIX/Linux, iSeries, and OpenVMS Agents have separate versions and release schedules from the JAMS Scheduler and JAMS Client, so they can be upgraded independently from the other JAMS components.

The latest UNIX/Linux Agents can be downloaded from the JAMS AgentD and AgentX repositories. For more information on the repositories and the installation instructions, see *JAMS Agentd for Linux/Unix* and Manual Installation of JAMS AgentX.

By default, you can find the latest iSeries Agent in the following location after upgrading the JAMS Scheduler: C:\Program Files\MVPSI\JAMS\Scheduler\Agents\IBMSeriesi . For the Installation instructions, see *JAMS Agent for System i*.

The latest OpenVMS Agent can be downloaded from the JAMS for OpenVMS download page. For installation instructions, see *JAMS Agent for OpenVMS*.

Upgrade Notes

If you do not update the JAMS Scheduler, JAMS Windows Agents, and JAMS Clients to the same version during the upgrade, you may be unable to use new or updated functionality. The section below lists some features and functionality that required the JAMS Client, JAMS Agent, and JAMS Scheduler to be upgraded to, at a minimum, the version where the feature/functionality was originally released.

JAMS 7.6

- To use or view the Certificates ACL, ensure the JAMS Client and JAMS Scheduler are upgraded to 7.6.0 or higher.

JAMS 7.5

- The Automate Execution Method requires the JAMS Client and JAMS Scheduler to run 7.5.2 or higher. If the JAMS Client is running an older version than the JAMS Scheduler, you will see an error message when opening the Source. If that occurs, upgrade your JAMS Client.

- To use the EWSSession workflow activity for Modern Authentication, ensure the JAMS Client and JAMS Scheduler are upgraded to 7.5.1 or higher.

JAMS 7.4

- The following Sequence Tasks require the JAMS Client, JAMS Agent, and JAMS Scheduler to be updated to the same 7.4.462 or higher: Automate and Command Script. If an older JAMS Client or JAMS Agent is used with a newer JAMS Scheduler, you may see an error message and you may be unable to edit the Task. If this occurs, upgrade the JAMS Client or JAMS Agent.

JAMS 7.3

- For the Banner Integration, a JAMS V7.1/7.2 Client or Agent cannot be used with a JAMS V7.3 or higher Scheduler. Upgrade the JAMS Client or JAMS Agent to V7.3 or higher to use the Banner Integration.

- If you are using a V7.3 Client or higher to connect to a V7.2 Scheduler/Server, the Explore JAMS section on the Home page for the V7.2 Scheduler/Server will be unavailable from the Client. Upgrade the Scheduler/Server to view the Explore JAMS section.

- The following Sequence Tasks require the JAMS Client, JAMS Agent, and JAMS Scheduler to be updated to 7.3.338 or higher: Banner, Oracle, SAP. If an older JAMS Client or JAMS Agent is used with a newer JAMS Scheduler, you may see an error message and you may be unable to edit the Task. If this occurs, upgrade the JAMS Client or JAMS Agent.

- The SAPJobV2 Execution Method requires the JAMS Client to run the same or newer version of JAMS as the JAMS Scheduler. If the JAMS Client is running an older version than the JAMS Scheduler, you will see an error message when modifying a Job that has the new properties. If that occurs, upgrade your JAMS Client.

JAMS 7.2

- The following Sequence Tasks require the JAMS Client, JAMS Agent, and JAMS Scheduler to be updated to 7.2.529 or higher: Event Tasks. If an older JAMS Client or JAMS Agent is used with a newer JAMS Scheduler, you may see an error message and you may be unable to edit the Task. If this occurs, upgrade the JAMS Client or JAMS Agent.

- If you are using JAMS V7.2.632 or older for the InformaticaCloud Execution Method, it is recommended that you upgrade the JAMS Client and JAMS Scheduler to the latest version to use the new optimization improvements. To edit Informatica Cloud Jobs, the JAMS Client must be upgraded if it connects to a JAMS Scheduler that has been upgraded to the latest version. After you upgrade, you will need to edit each existing Informatica Cloud Job as follows:
  - Reselect your task in the Task drop-down on the Source tab. (Select a different task, and then select the original task.)
  - Save the Job.

JAMS 7.1

- JAMS V7.1.557 includes enhancements to the Submit Job Task that have limited functionality when you edit a Sequence with an older JAMS Client. For example, some properties of the new Submit Job Task cannot be seen or modified with an older JAMS Client. You can continue to use older JAMS Clients for other features of JAMS, but we recommend upgrading to V7.1.557 or higher to edit Submit Job Tasks in a Sequence.

- When you upgrade to V7.1.57X or higher, you need to update the JAMS Agents to V7.1.57X or higher if you are using a Sequence with any of the following:
  - An override property.
  - A binding on an inherited property.
  - A binding on a Credential

PowerShell

The articles in this section will help you to use PowerShell within JAMS. This includes installing the PowerShell Module, the viewing the cmdlets, and using the JAMS PowerShell export-import cmdlet.

Installing the PowerShell Module

PowerShell is a powerful scripting and command line environment that replaces the Windows Command Prompt. Microsoft designed PowerShell to provide more task automation and configuration management tools based on the .NET framework. PowerShell includes a command line shell and an extensive scripting language that uses small programs called "cmdlets".

PowerShell can provide creative ways to simplify and automate tedious and repetitive tasks by creating scripts that combine multiple commands.

JAMS has fully incorporated PowerShell. The JAMS Client component includes a PowerShell Module that includes dozens of JAMS cmdlets, which are detailed in the topic:JAMS PowerShell Cmdlets.

> **NOTE:** If you want to use the PowerShell Core Execution Method, the .NET Core Framework must be installed.

Adding the JAMS PowerShell Module

> **NOTE:** The PowerShell cmdlets listed below cannot be used with PowerShell Core.

Before using a PowerShell Module, you will need to add it to the PowerShell environment.

This can be performed by using the Import-Module cmdlet. The JAMS Module can be added by simply running the following cmdlet in PowerShell:

```
PS C:\> Import-Module JAMS
```

To get a list of the commands in the JAMS Module, enter:

```
PS C:> Get-Command -Module JAMS

JAMS
```

To get help with any JAMS-related or other PowerShell command, you can use the following case example for the Submit-JAMSEntry cmdlet:

```
PS C:\> Get-Help Submit-JAMSEntry
```

For details on each JAMS-related cmdlet, go to the topic: JAMS PowerShell Cmdlets.

JAMS PowerShell Cmdlets

Microsoft designed PowerShell to provide more task automation and configuration management tools based on the .NET Framework. PowerShell includes a command line shell and an extensive scripting language that uses small programs called "cmdlets".

PowerShell's capabilities provide creative ways to simplify and automate tedious and repetitive tasks by creating scripts and combining them with multiple commands.

JAMS has fully incorporated PowerShell. The JAMS Client component includes a PowerShell Module that includes dozens of JAMS cmdlets, which are listed and detailed in the following section.

JAMS PowerShell Cmdlets

The JAMS PowerShell Module contains dozens of cmdlets that add extensive PowerShell capabilities to JAMS. The following table contains an extensive listing of each JAMS-related cmdlet, detailing the cmdlet's description and syntax.

> **NOTE:** The PowerShell cmdlets listed below cannot be used with PowerShell Core.

JAMS Cmdlets	Description
Connect-JEWS	Establishes a connection to an EWS server. When using Microsoft Office 365 Modern Authentication, use the JAMSConnection option to specify the EWS Connection Store object. The Connection should have the Client Id, Tenant Id, and Client Secret Value. You can use Get-JAMSCredential to get a valid Credential. [AcceptAllCertificates] [-AllowSSL] [-AllowTLS] [-AllowTLS11] [-AllowTLS12] [-Authentication <String>] [-Credential]<String>] [-ImplicitMode] [-JAMSConnection <string>] [-MinimumKeySize <int32>] [-Port <Int32>] [<CommonParameters>]
Connect-JFTP	Establishes a connection to an FTP server. This must be done before any other file transfer operation can succeed. [-Binary] [-Passive] [-KeepAlive] [-KeepAliveInterval <Int32<PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [<CommonParameters>]
Connect-JFTPS	Establishes a connection to an FTPS server. This must be done before any other file transfer operation can succeed. Connect-JFTPS [-ClientCertificate <String>] [-AllowSSL] [-AllowTLS] [-ImplicitMode] [-SecureCiphers][-AcceptAllCertificates] [-Binary] [-Passive] [-KeepAlive] [-KeepAliveInterval <Int32>] [-Name] <String>[-Credential <PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [<CommonParameters>]
Connect-JSFTP	Establishes a connection to an SFTP server. This must be done before any other file transfer operation can succeed. [-AcceptKey] [-Binary] [-JAMSCredential <JAMSCredential>] [-ServerType <JAMSSftpServerType>] [-Name] <String> [-Credential <PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [<CommonParameters>]
Connect-JIMAP	Establishes a connection to an IMAP server. This must be done before any other file transfer operation can succeed. [-Authentication <ImapAuthentication>] [-Name] <String> [-Credential <PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [-SSL] [-ImplicitMode] [-SecureCiphers] [-AcceptAllCertificates] [<CommonParameters>]

JAMS Cmdlets	Description
Connect-JPOP	Establishes a connection to a POP server.This must be done before any other file transfer operation can succeed. [-Authentication <Pop3Authentication>] [-Name] <String> [-Credential <PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [-SSL] [-ImplicitMode] [-SecureCiphers] [-AcceptAllCertificates] [<CommonParameters>]
Connect-JS3	Establishes a connection to an S3 server. This must be done before any other file transfer operation can succeed. [-Bucket <String>] [-Name] <String> [-Credential <PSCredential>] [-Port <Int32>] [-Timeout <Int32>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
ConvertTo-Date	Converts a natural language date specification into a date. [-InputObject] <String> [[-Today] <DateTime>] [[-StartDate] <DateTime>] [-Server <String>] [<CommonParameters>
Debug-JAMSEntry	Debugs a JAMS entry. Debug-JAMSEntry [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Debug-JAMSEntry [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Debug-JAMSEntry [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Disable-JAMSTime	Disables a JAMS Named Time. Named times can be automatically or manually enabled and disabled. Disable-JAMSTime [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] Disable-JAMSTime [-InputObject] <NamedTime[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Disconnect-JFS	Disconnects a session that was established by a Connect_Jxxx command. [[-FileServer] <JAMSFileServer>] [<CommonParameters>]
Disconnect-JMS	Disconnects a session that was established by a Connect-JIMAP or Connect-JPOP command. [[-MailServer] <JAMSMailServer>] [<CommonParameters>]
Enable-JAMSTime	Enables a JAMS Named Time. Named times can be automatically or manually enabled and disabled. [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <NamedTime[]> [-Server <String>] [-WhatIf] [-Confirm][<CommonParameters>]
Export-JAMSXML	Exports one or more JAMS Definitions to XML. [-Path] <String> [-InputObject] <Object[]> [-IgnoreACL <SwitchParameter>] [-Server <string>] [<CommonParameters>] [-Path] <String> [-AppMenu <SwitchParameter>] [-IgnoreACL <SwitchParameter>] [-Server <string>] [<CommonParameters>]
Export-JKey	Export all or matched JAMS Signing Keys from the default or specified Key Ring using the specified File name. File format depends on the type of key and may be binary or ASCII armored. [-PublicKeyRing <String>] [-SecretKeyRing <String>] -OutputFile <String> [-Fingerprint <String>] [-Identity <String>] [-PublicOnly] [-SecretOnly] [-AsciiArmor] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Find-JAMSObject	Searches for objects in the JAMS database that match the query string. Objects can include an Agent, Connection Store, Credential, Execution Method, Folder, Job, Queue, or a Variable. If the -Source option is set, the sources in Job and Execution Method definitions are searched to see if they match the query. If there is a match, the Job or Execution Method object is returned. [-Query <String>] [-Server <String>] [-SelectType <Object Type>] [-MaxCount <Number of Search Results>] [-Source] [-Recursive] [-FolderPath <String>]

JAMS Cmdlets	Description
Get-JAMSAgent	List all agents on a JAMS Server. [[-Name] <String>] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Get-JAMSAudit	Retrieves audit trail information from a JAMS Object for the specified time window. [[-ObjectType] <ObjectType>] [[-StartDate] <DateTime>] [[-EndDate] <DateTime>] [[-UserName] <String>] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Get-JAMSBookmark	Gets the most recent Bookmark on an executing Workflow Job. Returns a Hash table to be used when sending a response to a Workflow Bookmark. Get-JAMSBookmark [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Get-JAMSBookmark [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Get-JAMSBookmark [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Get-JAMSCredential	Gets a set of credentials from a JAMS Server. The credentials are retrieved from a JAMS User definition. Please note: you must have "Submit" access to the User definition. In addition, to use password security you must also have "Get Password" access. [-Username] <String[]> [-Server <String>] [<CommonParameters>]
Get-JAMSEntry	The Get-JAMSEntry cmdlet retrieves a CurJob object for each entry in the current schedule. Without parameters, "Get-JAMSEntry" retrieves all of the entries in the schedule, as though you typed "Get-JAMSEntry *". You can also identify a particular entry by job name or entry number or pass a CurJob object through the pipeline to Get-JAMSEntry. [[-Name] <String>] [[-State] <StateType>] [-FolderName <String>] [-Server <String>] [<CommonParameters>]

JAMS Cmdlets	Description
Get-JAMSFailoverStatus	Retrieves the failover status of a JAMS Server. [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Get-JAMSHistory	The Get-JAMSHistory cmdlet retrieves a History object for each matching job. Without parameters, "Get-JAMSHistory" retrieves the job history for the current day, as though you typed "Get-JAMSHistory * -start 12:00am". [[-Name] <String>] [[-StartDate] <DateTime>] [[-EndDate] <DateTime>] [-FolderName <String>] [-JobFolderName <String>] [-Recursive] [-JobFolderRecursive] [-Status <HistoryStatus>] [-Server <String>] [<CommonParameters>]
Get-JAMSParameter	Gets the value of a JAMS Parameter from a specific entry in the schedule. When running as a part of a JAMS job, the default is to retrieve the parameter value for the current entry. [-Name] <String> [-Entry <Int32>] [-Server <String>] [<CommonParameters>]
Get-JAMSQueue	Gets the JAMS queues that match the specified name. A server name can be specified to return a queue from a remote server. [[-Name] <String[]>] [-Server <String>] [<CommonParameters>]
Get-JAMSVariable	Gets the JAMS Variables that match the specified name. A server name can be specified to return a variable from a remote server. [[-Name] <String>] [-ValueOnly] [-Server <String>] [<CommonParameters>]
Get-JFSChildItem	Gets an item from a location on a JAMS File Server. A path can be specified to get an item that is not located in the current directory on the file server. [[-Path] <String[]>] [-FileServer <JAMSFileServer>] [<CommonParameters>]
Get-JFSItem	Gets an item from a location on a JAMS File Server. A path can be specified to get an item that is not located in the current directory on the file server. [[-Path] <String[]>] [-FileServer <JAMSFileServer>] [<CommonParameters>]

JAMS Cmdlets	Description
Get-JFSLocation	Gets the path of the current location on the JAMS file server. [-FileServer <JAMSFileServer>] [<CommonParameters>]
Get-JKey	List all or matching JAMS Signing Keys from the default or specified Key Rings. [-PublicKeyRing <String>] [-SecretKeyRing <String>] [-Fingerprint <String>] [-Identity <String>] [-PublicOnly] [-SecretOnly] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Get-JMailHeader	Returns one or more MailMessageInfo objects that represent an email header. The returned objects can be used with Get-JMailMessage to return the message body. [-MailServer <JAMSMailServer>] [-Subject <String>] [-From <String>] [-To <String>] [-Unread] [<CommonParameters>]
Get-JMailMessage	Returns a message body for one or more MailMessageInfo objects which are retrieved from the Get-JMailHeader cmdlet. [-MailServer <JAMSMailServer>] [-InputObject] <JAMSMailMessageInfo[]> [-WhatIf] [-Confirm] [<CommonParameters>]
Get-JMSFolder	Gets the current folder on the mail server. [-MailServer <JAMSMailServer>] [<CommonParameters>]
Import-JAMSXml	Imports one or more JAMS Definitions from XML. The following definition types can be imported: Jobs, Folders, Triggers, Menus, Methods, Resources, Variables, and Batch Queues. [-Path] <String[]> [-IgnoreACL <SwitchParameter>][-Server <String>] [-TargetFolder <string>] [<CommonParameters>]

JAMS Cmdlets	Description
Import-JKey	Import JAMS Signing Keys from file name or file info. [-ImportFile] <String[]> [-PublicKeyRing <String>] [-SecretKeyRing <String>] [-PublicOnly <Boolean>] [-SecretOnly <Boolean>] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] [-ImportObject] <PSObject[]> [-PublicKeyRing <String>] [-SecretKeyRing <String>] [-PublicOnly <Boolean>] [-SecretOnly <Boolean>] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
New-JKey	Create a signing key using a specified key type (PGP) and algorithm. Only PGP RSA and DSA keys can be created. The new key will be saved to the default or specified keys rings. [-PublicKeyRing <String>] [-SecretKeyRing <String>] -Passphrase <SecureString> -RealName <String> -EmailAddress <String> [-Comment <String>] [-KeyAlgorithm <String>] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Protect-JEncryption	Use the public key of the specified recipient to encrypt a file such that only that recipient can decrypt it (using their private key). Protect-JEncryption [-InputFile] <String[]> [-OutputFile <String>] [-AsciiArmor] [-CompressionAlgorithm <String>] [-CompressionLevel <Int32>] [-PublicKeyRing <String>] -Recipient <String> [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Protect-JEncryption [-InputObject] <PSObject[]> [-OutputFile <String>] [-AsciiArmor] [-CompressionAlgorithm <String>] [-CompressionLevel <Int32>] [-PublicKeyRing <String>] -Recipient <String> [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]

JAMS Cmdlets	Description
Protect-JSignature	Use PGP to create a signature for one or more files, which can be binary, detached, or cleartext. Based on a private key selected with the current user name. The recipient of the file can verify with the public key. Protect-JSignature [-ClearSign] [-DetachSign] [-AsciiArmor] [-HashAlgorithm <String>] [-CompressionAlgorithm <String>] [-CompressionLevel <Int32>] [-InputFile] <String[]> [-OutputFile <String>] [-Sender <String>] [-Passphrase <SecureString>] [-Credential <PSCredential>] [-SecretKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Protect-JSignature [-ClearSign] [-DetachSign] [-AsciiArmor] [-HashAlgorithm <String>] [-CompressionAlgorithm <String>] [-CompressionLevel <Int32>] [-InputObject] <PSObject[]> [-OutputFile <String>] [-Sender <String>] [-Passphrase <SecureString>] [-Credential <PSCredential>] [-SecretKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Receive-JFSItem	Receives the contents of a file from a JAMS File Server. A local destination can be specified for the item being received from the file server. [-Name] <String[]> [[-Destination] <String>] [-Recurse] [-FileServer <JAMSFileServer>] [-WhatIf][-Confirm] [<CommonParameters>] [-InputObject] <JAMSFileServerItem[]> [[-Destination] <String>] [-FileServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>]
Remove-JFSItem	Removes an item from a JAMS File Server. [-Path] <String[]> [-FileServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>]
Remove-JKey	Remove matching JAMS Signing Keys from default or specified Key Rings. [-PublicKeyRing <String>] [-SecretKeyRing <String>] [-Fingerprint <String>] [-Identity <String>] [-PublicOnly] [-SecretOnly] [-KeyType <JAMSKeyType>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [-WhatIf] [-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Remove-JMailMessage	Removes an item from a JAMS File Server [-Path] <String[]> [-MailServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>]
Rename-JFSItem	Renames an item on the JAMS File Server. [-Name] <String> [-NewName] <String> [-FileServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>]
Reset-JAMSTrigger	Resets a JAMS Trigger to NOT reset when fired.A trigger which doesn't reset when fired stays in a "fired" state after it fires.The trigger will not fire again until after it has been reset. [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <Trigger[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Restart-JAMSEntry	Kills an executing JAMS entry and restarts it from the beginning. [-Hold] [-Comment <String>] [-Severity <Severity>] [[-Name] <String[]>] [-State <StateType>][-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Hold] [-Comment <String>] [-Severity <Severity>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Hold] [-Comment <String>] [-Severity <Severity>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Resume-JAMSEntry	An entry can be suspended with the Suspend-JAMSEntry command, the JAMS GUI Client or, because the job is set to be held when submitted. [-Comment <String>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Comment <String>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Comment <String>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Send-JAMSEntry	Allows data to be sent to a Job at runtime. The result of this command is specific to the execution method. Send-JAMSEntry [-Message <String>] -Data <Hashtable> [-Comment <String>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Send-JAMSEntry [-Message <String>] -Data <Hashtable> [-Comment <String>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Send-JAMSEntry [-Message <String>] -Data <Hashtable> [-Comment <String>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Send-JFSCommand	Sends a command to a JAMS File Server. [-Command] <String[]> [-FileServer <JAMSFileServer>] [<CommonParameters>]

JAMS Cmdlets	Description
Send-JFSItem	Sends an item to a JAMS File Server. A path to the item and its destination on the File Server should be specified. [-Name] <String[]> [-Recurse] [[-Destination] <String>] [-PassThru] [-FileServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <PSObject[]> [[-Destination] <String>] [-PassThru] [-FileServer <JAMSFileServer>] [-WhatIf] [-Confirm] [<CommonParameters>]
Set-JAMSEntry	The Set-JAMSEntry command can be used to set properties of a JAMS entry before the entry has started executing. [-After <DateTime>] [-Queue <String>] [-Priority <Int32>] [-Hold] [-Comment <String>] [-AgentNode<String>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-After <DateTime>] [-Queue <String>] [-Priority <Int32>] [-Hold] [-Comment <String>] [-AgentNode <String>] [-InputObject] <CurJob []> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-After <DateTime>] [-Queue <String>] [-Priority <Int32>] [-Hold] [-Comment <String>] [-AgentNode <String>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Set-JAMSFailoverStatus	Set the failover status of a JAMS Server. [-Active] [-Server <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Set-JAMSParameter	Sets the parameter value of an item in the current schedule. A parameter can be changed while the job is waiting to start or while it is executing. [-Name] <String> [[-Value] <Object>] [-Entry <Int32>] [-Server <String>] [-WhatIf][-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Set-JAMSQueue	This cmdlet is used to set various properties of a JAMS Queue. The available properties include: JobLimit, Name, and Server. [-JobLimit <Int32>] [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-JobLimit <Int32>] [-InputObject] <BatchQueue[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Set-JAMSStatus	Sets the display text that a job shows in the monitor. This text is displayed underneath the Job name in the monitor. [-Status] <String> [-Entry <Int32>] [-Server <String>] [<CommonParameters>]
Set-JAMSVariable	Sets the value of a JAMS Variable. [-Name] <String> [[-Value] <Object>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Set-JFSLocation	Sets the current location on the JAMS File Server. [-Location] <String> [-FileServer <JAMSFileServer>] [<CommonParameters>]
Set-JMSFolder	Sets the current folder on the IMAP or POP3 server. [-Folder] <String> [-MailServer <JAMSMailServer>] [<CommonParameters>]
Start-JAMSEntry	Starts a JAMS entry waiting in the current schedule by releasing one or more of the prerequisites of the job. The default is to remove only the next attribute that is causing the entry to not start. [-Force] [-Comment <String>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Force] [-Comment <String>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Force] [-Comment <String>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>][-WhatIf] [-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Stop-JAMSEntry	Stops an entry or kills it if it is currently executing. [-Force] [-Comment <String>] [-Severity <Severity>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Force] [-Comment <String>] [-Severity <Severity>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Force] [-Comment <String>] [-Severity <Severity>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Start-JAMSQueue	Starts a JAMS queue which allows jobs to begin executing in the queue. [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <BatchQueue[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Stop-JAMSQueue	Stops a JAMS queue. Jobs which are executing in the queue will continue to execute but, no new jobs can begin until the queue is restarted. [-Name] <String[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <BatchQueue[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputObject] <BatchQueue[]> [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]

JAMS Cmdlets	Description
Submit-JAMSEntry	Submits a new entry into the current schedule. [-Name] <String[]> [[-After] <DateTime>] [[-Queue] <String>] [-Agent <String>] [-UserName <String>] [-AltUserName <String>] [-Comment <String>] [-OverrideName <String>] [-LogLocation <String>] [-LogFileName <String>] [-Hold] [-RunDebug] [-UseVariables] [-DependsOn <Int32[]>] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-InputJob] <Job[]> [[-After] <DateTime>] [[-Queue] <String>] [-Agent <String>] [-UserName<String>] [-AltUserName <String>] [-Comment <String>] [-OverrideName <String>] [-LogLocation <String>] [-LogFileName <String>] [-Hold] [-RunDebug] [-UseVariables] [-DependsOn <Int32[]>] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Suspend-JAMSEntry	The Suspend-JAMSEntry cmdlet puts a manual hold on a pending or timed job. [-Comment <String>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Comment <String>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-Comment <String>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]
Test-JSignature	Verifies the selected signed files, based on stored public keys. Test-JSignature [-SigFile] <String[]> [-InputFile <String>] [-PublicKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Test-JSignature [-SigObject] <PSObject[]> [-InputFile <String>] [-PublicKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]

JAMS Cmdlets	Description
Unprotect-JEncryption	Use private key from secret key ring to decrypt a file. Unprotect-JEncryption [-InputFile] <String[]> [-OutputFile <String>] [-Passphrase <SecureString>] [-Credential <PSCredential>] [-SecretKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Unprotect-JEncryption [-InputObject] <PSObject[]> [-OutputFile <String>] [-Passphrase <SecureString>] [-Credential <PSCredential>] [-SecretKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Unprotect-JSignature	Remove signature from file. Unprotect-JSignature [-SigFile] <String[]> [-OutputFile <String>] [-PublicKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>] Unprotect-JSignature [-SigObject] <PSObject[]> [-OutputFile <String>] [-PublicKeyRing <String>] [-WarningAction <ActionPreference>] [-WarningVariable <String>] [<CommonParameters>]
Wait-JAMSEntry	The Wait-JAMSEntry cmdlet waits until a specified JAMS entry completes or the command times out. The default timeout limit of this cmdlet is 8 hours. [-TimeOut <TimeSpan>] [-Severity <Severity>] [[-Name] <String[]>] [-State <StateType>] [-FolderName <String>] [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-TimeOut <TimeSpan>] [-Severity <Severity>] [-InputObject] <CurJob[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>] [-TimeOut <TimeSpan>] [-Severity <Severity>] [-SubmitResult] <SubmitResult[]> [-PassThru] [-Server <String>] [-WhatIf] [-Confirm] [<CommonParameters>]

The Power of PowerShell

PowerShell provides creative ways to simplify and automate tedious and repetitive tasks by creating scripts using single or multiple commands.

JAMS has fully incorporated PowerShell. The JAMS Client component includes a PowerShell Module that contains dozens of JAMS cmdlets which are listed and detailed in the topic:JAMS PowerShell Cmdlets.

There is so much that PowerShell can do within JAMS that we can only provide a few basic examples. For more PowerShell solutions, please visit the JAMS Technical Support site at: support.jamsscheduler.com and scroll down to access the PowerShell knowledge base articles.

> **NOTE:** The PowerShell cmdlets listed below cannot be used with PowerShell Core.

Example: Creating or Modifying Existing JAMS Jobs

One of the benefits that JAMS provides is the power to script the creation of new Jobs, Sequences, Folders, or any type of JAMS definition. Because the JAMS Module includes a PowerShell provider, you can use native PowerShell commands like **New-Item** or **Get-Item**to define or change any JAMS definition.

For example, to create a new Job in JAMS, use the following PowerShell script.

Creating a New JAMS Job

```
Import-Module JAMS -ErrorAction SilentlyContinue


New-PSDrive JD JAMS localhost -ErrorAction SilentlyContinue
$job = New-Item JD:\Samples\MyJob123 -itemtype Job -MethodName Command
$job.Description = "This job was added programmatically"
# Create and Add a Schedule Trigger Element to the Job
#
$ScheduleTrigger = [MVPSI.JAMS.ScheduleTrigger]::New("Monday, Tuesday, Wednesday, Thursday",
[MVPSI.JAMS.TimeOfDay]"23:40")
$ScheduleTrigger.Enabled = $false$job.Elements.Add($ScheduleTrigger)
#
# Define Jobs Source
#
$job.Source = "Dir C:\"
#
# Create a new Resource Requirement and add it to the Job
```

```
#

$Resource = [MVPSI.JAMS.ResourceRequirement]::New("new", 12)

$job.Elements.Add($Resource)

#

# Update the Job object for changes to take effect

#

$job.Update()

```

Modify an Existing JAMS Job

```
Import-Module JAMSNew-PSDrive JD JAMS localhost$job = Get-Item JD:\Samples\MyJob

$job.Description = "This job was added programmatically"

$sched = new-object MVPSI.JAMS.ScheduleTrigger("Monday, Tuesday, Wednesday, Thursday",
[MVPSI.JAMS.TimeOfDay] "21:40")$job.Elements.Add($sched)

$job.Properties.SetValue("Enabled", $false)

$job.Source = "Dir C:\"

$requires = new-object MVPSI.JAMS.ResourceRequirement("Widgets", 12)

$job.Elements.Add($requires)

$requires = new-object MVPSI.JAMS.ResourceRequirement("Gadgets", 5)

$job.Elements.Add($requires)

$job.Update()
```

Using the JAMS File Transfer PowerShell Cmdlets

In addition to using the "File Transfer" execution method, file transfers can also be performed using the JAMS PowerShell Module. The module supports transfers in the following formats: FTP, FTPS, and SFTP.

Importing the JAMS Module and Getting Credentials

Before a connection can be made, users must verify:

1. MyJob does not exist in the\Samples Folder
2. The following resources already exist:
    1. Widgets
    2. Gadgets

Getting Credentials from a JAMS User

```
Import-Module JAMS

New-PSDrive JD JAMS localhost

$job = New-Item JD:\Samples\MyJob -ItemType "Job" -MethodName "Command"

$job.Description = "This job was added programmatically"

$sched = new-object MVPSI.JAMS.ScheduleTrigger("Monday, Tuesday, Wednesday, Thursday",
[MVPSI.JAMS.TimeOfDay] "23:40")

$job.Elements.Add($sched)

$job.Properties.SetValue("Enabled", $false)

$job.Source = "Dir C:\"

$requires = new-object MVPSI.JAMS.ResourceRequirement("Widgets", 12)

$job.Elements.Add($requires)$requires = new-object MVPSI.JAMS.ResourceRequirement("Gadgets",
5)

$job.Elements.Add($requires)

$job.Update()
```

Establishing a Connection

Once the credentials have been established, a connection can then be made. The following example shows how to define a FTP connection script.

FTP Connection Script

```
Connect-JFTP -Credential $userCredentials -Name YourFileServerName
```

The other two transfer method follow the same format except that "Connect-JFTP" is replaced with "Connect-JFTPS" or "Connect-JSFTP".

Once a connection is made, users can then retrieve or send files to the server.

Sending and Receiving Files

Sending and Retrieving Files

```
Send-JFSItem -Name C:\MyFile.txt -Destination C:\ServerDirectory\MyFile.txt
```

Viewing File Details

To view files in a directory, use the cmdlet "Get-JFSChildItem".

Viewing Files in a Directory

```
Get-JFSChildItem -Path C:\Logs\
```

Alternatively, you view the details about a specific item using the JAMS cmdlet: "Get-JFSItem".

Getting Details on a Specific Item

```
Get-JFSItem -Path C:\Logs\Audit.log
```

The "Get-JFSChildItem" cmdlet is similar to the "Get-ChildItem" cmdlet, as they both return a collection of objects.

The "Get-JFSChildItem" returns a collection of JAMSFileServerItems. Each item describes a single file or directory located on the file server. You can process these items using all the standard PowerShell commands, for example:

Get-JFSChildItem

```
$fileList = Get-JFSChildItem *.txt
foreach($file in $fileList)
{
  if (($file.IsFile) -and ($file.Modified -gt $checkDate))
  {
    Receive-JFSItem $file
  }
}
```

Directory Modification

The "Get-JFSLocation" cmdlet allows you to control the current path on the file server. The example below to shows how to store the current directory in a PowerShell variable.

Store the Current Directory in a PowerShell Directory

```
$CurrentDirectory = Get-JFSLocation
```

The "Set-JFSLocation" cmdlet gives users the ability to change the directory on a file server using the format:

Changing the Directory on a File Server

```
Set-JFSLocation -Location C:\NewDirectory
```

Renaming and Removing Files

Renaming and removing files using PowerShell is also straightforward. An example of renaming a file is shown below:

Renaming a File

```
Rename-JFSItem -Name OriginalName.txt -NewName NewName.txt
```

An example script for removing a file is:

Removing a File

```
Remove-JFSItem -Path "C:\FTPNewName.txt" -Confirm:$false
```

> **NOTE:** Setting the "-Confirm switch to false means there should not be a verification prompt before deleting the file.

Disconnecting from the FTP Server

Once the file transfer actions have completed, you must disconnect from the FTP server in order to close the connection using the "Disconnect-JFS" cmdlet.

FTP Transfer Script Example

Any of the aforementioned cmdlets can be issued from a PowerShell console or from a JAMS Job that uses the PowerShell execution method. Below is an example script using these cmdlets to perform a FTP transfer.

FTP Transfer Example

```
#
# Get the credentials for our FTP user
$userCredentials = Get-JAMSCredential JAMSFTPUser


#
# Connect to the FTP Server
#
Connect-JFTP -Credential $userCredentials -Name FTPServer7


#
# Send a file
#
Send-JFSItem -Name C:\Logs\Audit_Data.txt -Destination C:\Common\Audit_Data.txt
#
# Retrieve a file
#
Receive-JFSItem -Name C:\Common\Audit_Data.txt -Destination C:\Logs\Audit_Data.txt


#
# Disconnect from the server
#
Disconnect-JFS
```

The JAMS PowerShell Provider

Introduction to Windows PowerShell Providers

A Windows PowerShell provider is a .NET program that allows any data store to be viewed as if it were a mounted drive. The data, which appears in a temporary drive for the session, can be managed with built-in or custom cmdlets.

A provider can also override the "Item" cmdlets (for example, "Get-Item"or "Set-Item") in ways that allow the data store data to be treated like typical files and directories in a file system.

Each Windows PowerShell provider exposes a drive called a PSDrive. The PSDrive is then used to display the data that is exposed via the Windows PowerShell provider. So, by default, you can gain access to the Alias, Environment, FileSystem, Function, Registry, and Variable providers.

> **NOTE:** The PowerShell cmdlets listed below cannot be used with PowerShell Core.

Using PowerShell Providers with JAMS

You can use the PowerShell and the JAMS PowerShell provider drive capabilities to synchronize Jobs and Sequences, between JAMS Servers. A JAMS PowerShell provider drive allows you to access the JAMS SQL Database backend as if it were a flat file system.

To add a new PowerShell drive, open a PowerShell window (running as an Administrator), and type the following information at the PowerShell prompt:

Adding a PowerShell Drive

```
New-PSDrive MyDrv JAMS your.server.name
```

Where "MyDrv" is your specification for the new "drive letter/phrase" and "your.server.name" is the name of the server where you want to create the temporary drive.

Once you have a drive added for the servers, you can change the directory to that drive and run a simple "dir" commands to drill down through the file structure of each server. For example, if you wish to view all Jobs on a server, enter the following:

Viewing all Job on a Server

```
PS C:\temp> cd JD:\ PS JD:> cd Folder/Samples/
```

This will go into the Systems directory, then into the Samples System, and finally into the Jobs directory for that System. You can then perform all of the same commands as you would on any flat file system to copy or move any portion of JAMS information from one server to another or to a different name on the same server.

For additional ways to work with the provider, review the examples below.

Example: Copying a Job between Servers

Copying a Job between Servers

```
Import-Module JAMS
#
# Create a new JAMS Drive for two JAMS servers
#
New-PSDrive -Name JD -PSProvider JAMS -Root localhost
New-PSDrive -Name JDServerB -PSProvider JAMS -Root ServerB


# Move into the Samples Folder
Set-Location JD:\Samples\
#
# Copy the Sleep Job to another JAMS server
#
Copy-Item -Path JD:\Samples\SleepJob -Destination JDServerB:\Test\ -Verbose
```

Example: Creating a Variable

Creating a Variable

```
Import-Module JAMS
#
# Create a new JAMS Drive for the local primary engine
#
New-PSDrive -Name JD -PSProvider JAMS -Root localhost
# Move into the Samples Folder
Set-Location JD:\Samples\
```

```
#
# Create a new Variable in the Samples Folder
#
$newVar = New-Item -ItemType Variable -Name DBName
$newVar.Description = "The name of the test database."
$newVar.DataType = [MVPSI.JAMS.DataType]::Text
$newVar.Value = "BusinessTestingDB";
$newVar.Update();
```

Example: Updating Job Properties

Updating Job Properties

```
Import-Module JAMS
#
# Create a new JAMS Drive for the local primary engine
#
New-PSDrive -Name JD -PSProvider JAMS -Root localhost

# Move into the Samples Folder

Set-Location JD:\Samples\

# Get the SleepJob

$job = Get-ChildItem *SleepJob*

if($job)

  {
    #
    # Update properties on the Job
    #
    $job.JobName = "Sleep500"

    $job.Source = "Start-Sleep 500"
```

```
    $job.Description = "Sleeps for 500 seconds";


    $job.Update();


}
```

JAMS PowerShell Export-Import Cmdlets

You can export and import Jobs, Sequences, folders, triggers, and variables with the JAMS PowerShell Module as well as its Export-JAMSXml and Import-JAMSXml cmdlets.

> **NOTE:** These PowerShell cmdlets cannot be used with PowerShell Core.

To ensure objects are accessible to Jobs and Sequences, import them in the order shown below. Otherwise, an error may occur because the object is not available.

1. Resources
2. Variables
3. Users
4. Queues
5. Agents
6. Dates
7. Folders
8. Jobs
9. Sequences

Banner in JAMS

Introduction

JAMS offers two robust and user-friendly integrations with Ellucian Banner. The V2 Banner Procedure option comes with updates to the Execution Method to support direct integration with the Banner Oracle database, while the V1 Banner option may still be configured if desired.

Both Banner integrations allows JAMS users to take advantage of Banner's core functionality such as registration, grade distribution, human resource information, financial aid processing, and other financial information.

When the adapter runs, it initiates communication with the Banner application server and instructs executing Banner Jobs as configured in JAMS. The process can then be monitored, canceled, and restarted in either Banner or JAMS.

> **NOTE:** A JAMS V7.1/7.2 Client or Agent cannot be used with a JAMS V7.3 or higher Scheduler. Upgrade the JAMS Client or JAMS Agent to V7.3 or higher to use the Banner Integration.

Advanced Queues

JAMS now supports Advanced Queues in Banner. No configuration is needed within JAMS for Advanced Queues because it is self-contained within the Banner Package. If Advanced Queuing is detected and enabled, JAMS uses Advanced Queues. If Advanced Queuing is not enabled, dbms pipes are used.

Setting up the V2 Banner Procedure Integration

Load the Banner Integration Pack

You can load the Banner Integration Pack by using the JAMS installer.

> **NOTE:** The V2 Banner Integration requires the Oracle Integration Pack to be installed. It also requires the Oracle Connection Store Objects, which are part of the Integration Pack.

1. Run the JAMS installer.
2. Follow the prompts until you see the Integration Packs page.
3. Select the **Banner Integration Pack**.

4. Click **Next**.
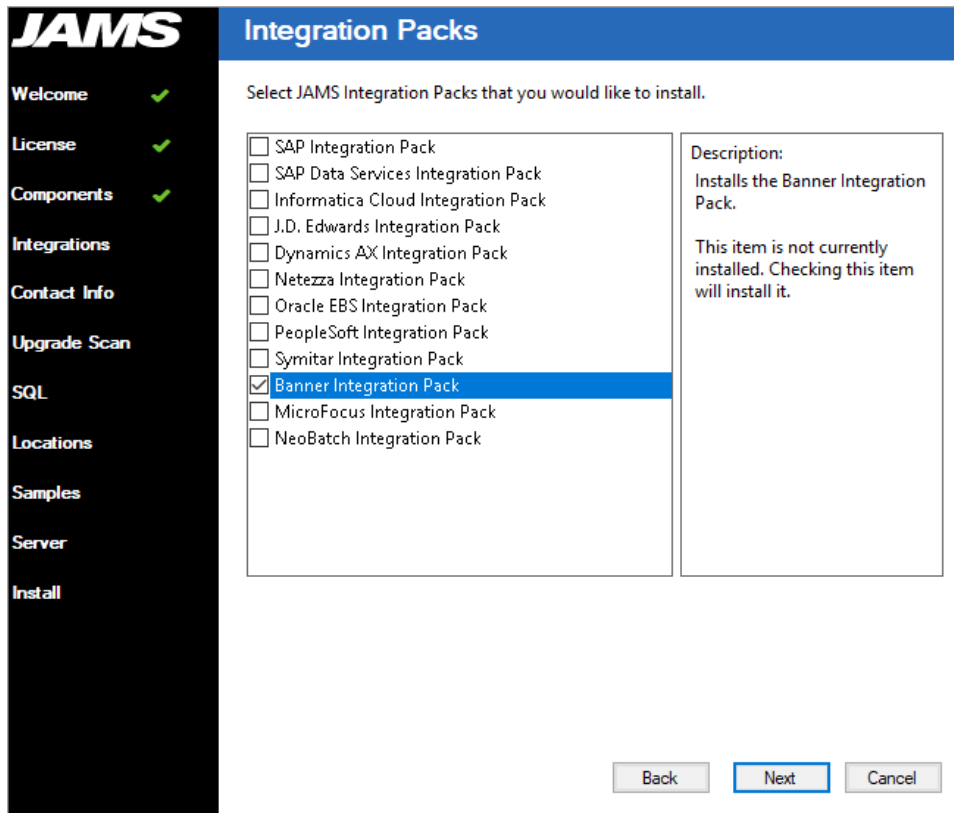
5. Follow the remaining prompts in the installer to complete the installation.

If needed, you can run the LOAD/ASSEMBLY=JAMSBannerIntegration command in JAMSDBA to reset the Execution Methods back to their default states, if you selected the Banner Integration Pack during install.

1. Go to <JAMS Install Folder>\MVPSI\JAMS\Scheduler.
2. Right-click **JAMSDBA.exe** and select **Run as administrator**.
3. At the JAMSDBA prompt, run the **LOAD/ASSEMBLY=JAMSBannerIntegration** command.
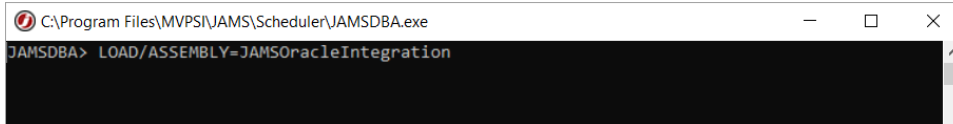
> **NOTE:** Starting with JAMS V7.3, the **Load/Assembly=JAMSBannerIntegration** command is the preferred command over the **LOAD/BANNER** command. Previous versions of JAMS should run the LOAD/BANNER command.

Install the JAMS Oracle Integration the JAMS Server

After the Banner Integration Pack is installed, install the JAMS Oracle Integration.
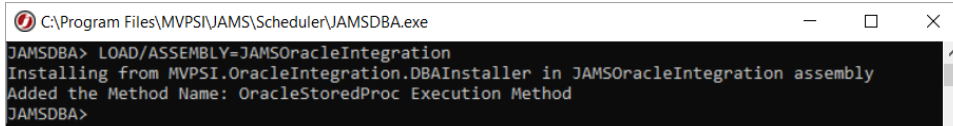
It is recommended that you create a maintenance window if you are doing this during normal business hours due to restarting the JAMS Scheduler and JAMS Server services.

1. In the JAMSDBA, run the **LOAD/ASSEMBLY=JAMSOracleIntegration** command.

2. Verify the following screen is displayed after the assembly loads.

3. On the JAMS Scheduler, open the Windows Services application.
4. Click the JAMS Scheduler service and click **Restart**.
5. Click the JAMS Server service and click **Restart**.

Install the Oracle Stored Procedure on the Banner Database

1. Log in to the Banner Oracle database as "baninst1".
2. Compile the custom package Z_HS_JAMS_JOBUTIL. The package is located on the JAMS Scheduler in the <JAMS Install Folder>\MVPSI\JAMS\Integrations\Banner directory.

   > **NOTE:** The package contains functions and procedures for running Ellucian Banner Jobs through the JAMS Scheduler. Refer to the package definitions for additional details.

3. Create a public synonym for the package by running the command below.

   ```
   CREATE PUBLIC SYNONYM Z_HS_JAMS_JOBUTIL FOR BANINST1.Z_HS_JAMS_
   JOBUTIL;
   ```

4. Create a custom role to be assigned to the database user that will be used by JAMS by running the command below.

   ```
   CREATE ROLE HS_JAMS_ROLE;
   ```

5. Add the required grants to the role by running the commands below.

   ```
   GRANT EXECUTE ON Z_HS_JAMS_JOBUTIL TO HS_JAMS_ROLE;
   GRANT SELECT,INSERT,UPDATE ON GJBPRUN TO HS_JAMS_ROLE;
   ```

6. Create a database user that will be used by JAMS by running the commands below. Replace **<password>** with a valid password for the database user.

   ```
   CREATE USER JAMSADMIN IDENTIFIED BY <password>;
   GRANT CREATE SESSION TO JAMSADMIN;
   GRANT HS_JAMS_ROLE TO JAMSADMIN;
   ```

Creating a JAMS Connection to the Banner Oracle Database

This option is available only if the Oracle Integration has been installed. See ***Connections for Integrations* on page 15** for more information.

> **NOTE:** If you're making a high volume of connections to your Oracle database, we advise consulting your DBA to ensure your Oracle Connection Pool settings are optimal for your usage.

Creating a Banner Procedure Job in JAMS

1. On the Home screen, click **Create a Job**.
2. Select **JAMS Integration Jobs**.
3. Select **Create a Banner Procedure job**. If you do not see the Jobs as shown below, close JAMS, install the Integration Pack again, and reopen JAMS.
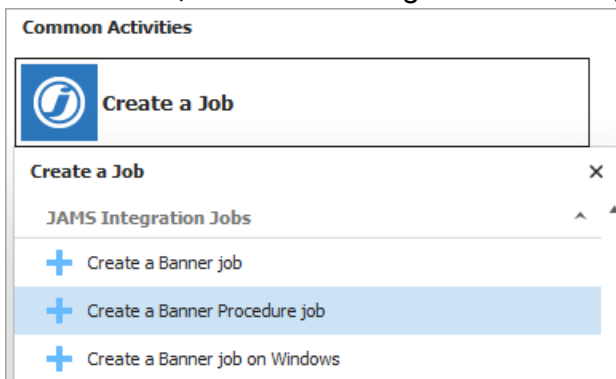
4. On the Add a New JAMS Job Definition dialog, do the following:

    - In the Folder field, select the Folder where the Job will be saved.

    - In the Name field, enter a name for the Banner Job.

    - Click **OK**. The Banner Job is created. The Source tab is displayed.

5. On the Source tab of the Job, do the following:

    - In the Banner Connection field, select your Banner Connection that was created in the Connection Store.

    - In the Banner Job field, view the list of the available Jobs in Banner.

    - In the Banner User field, select a JAMS Credential for the Banner user.

    - In the Parameter Set field, select the Parameter Set that will be used when executing the Job. The Parameter Set will populate the Parameter tab within the JAMS Job.

    - Review the **Include .log File** and **Include .lis File** check boxes. If there is sensitive information within the .log and .lis files and you do not want them in the JAMS Job log file, clear the check boxes for these two options.

    > **NOTE**: If multiple .log and .lis files are used in a Banner Job, they can be displayed in the JAMS Entry Log. If you do not see this information in the JAMS Log, increase the Log File Polling Interval value on the Properties tab to a value that slightly exceeds the expected run time of the Job. The default value is 30 seconds.

> **NOTE:** If Banner Credentials have not yet been saved in JAMS, save them by clicking the **Credentials** Shortcut within the JAMS Shortcut menu in the JAMS Client. When adding the Banner Credential in JAMS, ensure the **Display Name** and **Logon Name** are the actual Banner user name. If a proxy user is used to submit Banner Jobs, the Logon Name should use the '[]' format, such as [banproxy], to match the format used by the GURJOBS process.

6. Click the **Properties** tab.

7. BannerProcedure Jobs need to run on the JAMS Scheduler server. This can be configured in the Properties tab by leaving the Agent field blank. If the default Agent inherited from the Folder is different than the JAMS Scheduler, select the JAMS Scheduler Server from the dropdown menu in the Agent field.

8. Click the **Save and Close** button.

> **NOTE:** If Banner Credentials have not yet been saved in JAMS, save them by clicking the **Credentials** Shortcut within the JAMS Shortcut menu in the JAMS Client. When adding the Banner Credential in JAMS, ensure the **Display Name** and **Logon Name** are the actual Banner user name. If a proxy user is used to submit Banner Jobs, the Logon Name should use the '[]' format, such as [banproxy], to match the format used by the GURJOBS process.

Banner Properties

There are additional properties that you can modify. Properties can be inherited from the Job Properties tab for the Banner Procedure Execution Method or set within the Banner

Procedure Sequence Task or Job Definition. (In the Banner Procedure Job, you can hover your cursor over a property to view a tooltip that indicates if the property is inherited.)

The following properties are available in a Banner Procedure Sequence Task and Job Definition:

Property	Description
Banner Connection	Sets the Connection Store for connecting to Banner.
Banner User	Sets the JAMS Credential for the Banner user. This Credential is used to run Jobs.
Printer Name	Sets the name of the printer to use.
Form Name	Sets the name of the Banner form.
Submit Time	Sets the submit time for the Banner Job.
Include .log file	Includes the contents of the .log file into the JAMS Entry Log. Multiple .log files can be included in the JAMS Log.
Include .lis file	Includes the contents of the .lis file into the JAMS Entry Log. Multiple .lis files can be included in the JAMS Log.
Log File Polling Interval	Sets the polling time for the Banner .log and .lis files. The default is 30 seconds. It is recommended that this value be set to a value that slightly exceeds the expected run time of the Job.
MIME Type	Sets the type of file used to format reports/output files. Select PDF or Plain Text.
Special Print	Sets the field that may be used to pass information to 3rd-party applications.
PDF Font	Sets the type of font to use for PDF reports.
PDF Font Size	Sets the size of the font to use for PDF reports.
Environment Type	Sets the type of environment for the Banner instance to either Unix or Windows. By default, this option is set to **Unix**. If the Oracle database instance is running on Windows rather than Unix, set this option to **Windows**.

Submitting a Banner Procedure Job

1. In the Shortcuts menu, click **Definitions**.
2. Expand the folder containing the Banner Procedure Job.

3. Right-click the Banner Procedure Job and select **Submit**.The Submit dialog is displayed. Any required parameters are also marked and need to be updated before the Job will run.

> **NOTE:** If the required parameters are not marked, reload the parameter sets/parameter from within Banner.

4. Click **Submit Run Request**.

> **NOTE:** If you cancel a Banner Job that is currently running, only the corresponding JAMS Job is canceled. The Job log file in JAMS displays a message indicating the Banner Job on the host may still be running. As a best practice, check the Job in Banner.

Setting up the V1 Banner Integration

1. Install AgentX on the Banner application server. This Agent can be automatically deployed or manually installed, specifically where the gjajobs.shl is stored.

   Use the links at the end of this topic to learn more about deploying JAMS Agents.

   > **NOTE:** If the Banner server is running Windows, you may deploy a JAMS Windows Agent to the Banner server.

2. From the JAMS Client, create a JAMS user that has permission to access the Banner application server and can also connect to the remote Linux server. This can also be the same user that was used to deploy the Agent.

3. From the JAMS Client, select the **Execution Methods** Shortcut to access the list of available Execution Method options.

4. Double-click the **Banner** Execution Method to open its properties.

5. Select the **Template** tab.

6. Customize the template settings in the areas shown in the following screenshots.
   Line 6 through 16- Set the source options for Oracle and Java.
   Line 21 - Source the Banner environment.
   Line 26 - Change the value to the Banner directory.
   Line 28 through 33 - This section is used to increment the Banner One-Up-Number. This section should not need to be changed.
   Line 35 through 40 -This section ensures the Parameters on the JAMS Job are passed to the Banner server. This section should not need to be changed.
   Line 44 - Ensure gjajobs.shl is referenced properly. You may need to SSH into the Banner server and manually confirm this information.
   Line 53 through 66 - This section pulls the .lis and .log files from Banner. This section should not need to be changed.

```
#!/bin/bash
##################################################################
# JAMS Banner Execution Method
##################################################################
#
# Set Oracle environment
#
ORACLE_SID=PROD;
export ORACLE_SID

JAVA_HOME=/u01/java17/JDK
export JAVA_HOME

PATH=${JAVA_HOME}/bin/:${PATH}:${ORACLE_BASE}/product/11.2.0/client_64:${ORACLE_BASE}/product/11.2.0/client_x86/bin
export PATH

#
# Source the Banner environment
#
. /banvol/jams/bannerenv

#
# Change to Banner directory
#
cd /jobsub/ugdev8

echo "Getting next one up number"
one_up_number=`sqlplus -S -R 3 <<JAMS.XM.Username>>/<<JAMS.XM.Password>>@$ORACLE_SID << END
SET ECHO OFF HEADING OFF FEEDBACK OFF PAGESIZE 0
select trim(general.gjbpseq.nextval) from dual;
exit
END`

echo "Inserting parameter values"
sqlplus -S -R 3 <<JAMS.XM.Username>>/<<JAMS.XM.Password>>@$ORACLE_SID << END
exec dbms_session.set_role(umw_getcmd('<<JAMS.XM.ScriptName>>'));
<%BannerParameter(JAMS.BannerParameters)%>
exit
END

echo "Calling Banner"
```

```
END

echo "Calling Banner"

/banvol/ugdev8/links/gjajobs.shl <<JAMS.XM.ScriptName>> <<JAMS.XM.JobTypeCode>> <<JAMS.XM.Username>> <<JAMS.XM.Password>> $
#  Wait for the Banner job to complete
#
while [ -f /home/banjob/<<JAMS.XM.ScriptName>>_$one_up_number.shl ]
do
    sleep 30
done

#
#  Display the log files
#
if [ -f /home/banjob/<<JAMS.XM.ScriptName>>_$one_up_number.log ]
then
echo "*******.log file found*******"
cat /home/banjob/<<JAMS.XM.ScriptName>>_$one_up_number.log
fi

if [ -f /home/banjob/<<JAMS.XM.ScriptName>>_$one_up_number.lis ]
then
echo "*******.lis file found*******"
cat /home/banjob/<<JAMS.XM.ScriptName>>_$one_up_number.lis
fi

##################################### END #####################################
```

> **NOTE:** The Banner Environment may also be set using a bash profile (source ~/.bash_profile) if the Banner environment variables have been set on the default bash profile.

> **NOTE:** The Banner directory and the directory containing the gjajobs.shl need to be configured.

> **NOTE:** If sensitive data would be included in the Banner .log and .lis files, you may want to create a copy of the Banner Execution Method, and then remove the logging options from the copy's template. This new Banner Execution Method could be used in situations where Banner writes sensitive data to the Banner output files.

7. Make sure that **any** folder containing a JAMS Banner Job (including sub-folders) includes a path to the Banner Macro. This path must be populated in the Folders Properties (**Properties -> Source Options -> Template Library).**

    By default, this path is C:\Program Files\MVPSI\JAMS\Scheduler\BannerMacros.xml

8. With the configuration complete, create a new JAMS Job and select the **Banner** Execution Method in the Job Definition dialog.

9. On the Job Definition Source page, set the Banner User, select a Job Type from the list, and then enter the Job Name.

> **NOTE:** The Job name should not include the folder path or the .shl extension. The Job name in JAMS must be in the same case as what is stored on the Banner server.

10. Double-click the newly completed JAMS Job to access its properties.

11. Click the **Properties** tab and go to the Submit Options section.

12. Edit the Job by selecting the **Execute As** and **Agent** properties. The Execute As should be a UNIX account with access to JAMS AgentX.

Banner Parameters

Banner parameters always have an associated number, as seen in the left side of the example below.

To pass parameters from JAMS to Banner, create JAMS Parameters with names that match the Banner parameter numbers on the given Job. Set the default value of the JAMS Parameter to what the value would be in Banner. Finally, you may set the Parameter Prompt in JAMS to match the Banner parameter name.

The example below shows how the above Banner Parameters would look when set on a JAMS Job:
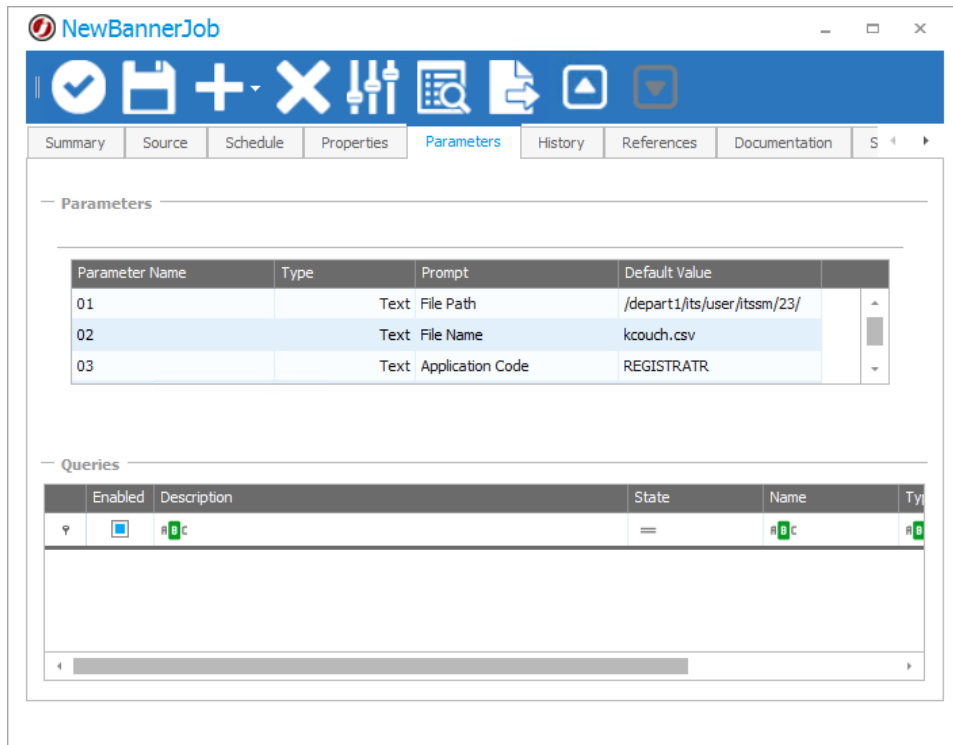
You may also specify multiple values for a single parameter by separating the values with pipe characters "|".

For example, if parameter 01 had a value of

`|Val1|Val2|Val3|`

JAMS would send the following to Banner:

01 = Val1

01 = Val2

01 = Val3

V2 Banner Parameter 88

The Parameter 88 setup was updated with the V2 Banner Integration to resemble other Banner parameters.

For example, a value of |One,Federal|Two,Grant is passed to Banner as the following:

88 = |One,Federal|Two,Grant|

You can define the parameter as 88 and then the value will contain a | delimited name,value pair.

V1 Banner Parameter 88

Parameter 88 is special as it can include a "label" before each value. JAMS removes the value and then inserts it into the 88 parameter. A value of "This,That" is passed to Banner as "88This = That".

For example, a value of |One,Federal|Two,Grant is passed to Banner as the following:

88One = Federal

88Two = Grant

You can also define the parameter as "88This" and then the value only needs to contain "That".

Configuring the OracleStoredProc Execution Method

The OracleStoredProc Execution Method lets you create JAMS Jobs to run Oracle Stored Procedures.

Installing the OracleStoredProc Execution Method
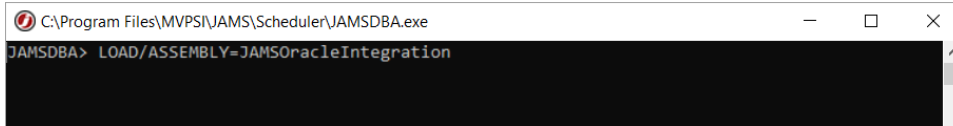
To install the OracleStoredProc Execution method, run the command below in JAMSDBA after JAMS is installed. This command also adds the Oracle Sequence Tasks, the Oracle Connection Type in the Connection Store, and the ability to add an Oracle Query Parameter to a Job.

It is recommended that you [create a maintenance window](#) if you are doing this during normal business hours due to restarting the JAMS Scheduler and JAMS Server services.

> **NOTE:** If you are upgrading from JAMS V7.2 to V7.3 or later and you were using the Oracle Integration that includes the OracleStoredProc Execution Method, you may also need to run the command below to continue using the Oracle Integration in JAMS V7.3 or later.
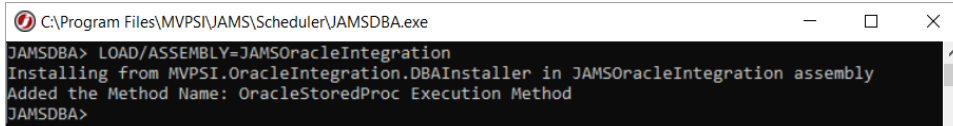
1. Go to <JAMS Install Folder>\MVPSI\JAMS\Scheduler.
2. Right-click **JAMSDBA.exe** and select **Run as administrator**.

3. In the JAMSDBA, run the **LOAD/ASSEMBLY=JAMSOracleIntegration** command.

4. Verify the following screen is displayed after the assembly loads.

5. On the JAMS Scheduler, open the Windows Services application.
6. Click the JAMS Scheduler service and click **Restart**.
7. Click the JAMS Server service and click **Restart**.

Connection Information

To use the Oracle Stored Procedure Execution Method, you need to have a user name, password, and a datasource. As long as the datasource is in a format that is compatible with an Oracle Connection String, it will open a connection to the Oracle DB server.

You have two options for setting up the connection to the Oracle Database:

- (Recommended) Use the Oracle Connection in the JAMS Connection Store. This option is recommended for newer installations.
- Use the Parameters from the OracleStoredProc Execution Method. This option was available in legacy versions and is still supported.

See the sections below for information.

Using the Oracle Connection in the JAMS Connection Store

Creating Credentials in JAMS

To use the OracleStoredProc Execution Method, you first need to create two Credentials:

- A Credential that stores the username and password for connecting to the Oracle Database.
- A Credential the Windows process that initiates the connection will run under when the Job starts.

The Oracle Credential is used on the Connection Store item, and the JAMS Credential is used on the Oracle Stored Procedure Job. See Working with Credentials for more information on creating a Credential.

Creating a Connection Store Item to an Oracle Database

You can create a Connection Store Item for the connection information to the Oracle database. This Connection Store Item can be referenced in multiple Jobs, which allows you to store the connection information in one place. See ***Connections to Database Servers* on page 6** for more information on creating this Connection.

If you do not use a Connection Store Item, you need to enter the connection string and select a Login As credential on the Oracle Stored Procedure Job.

Creating an Oracle Stored Procedure Job

1. Click **Definitions** from the Shortcuts menu.
2. Click a Folder to save the Job.
3. Click **+**.
4. In the Name field, enter a name for the Oracle Stored Procedure Job.
5. In the Execution Method field, select **OracleStoredProc**.
6. Click **Ok**.
7. In the Oracle Connection field, select the Oracle Connection from the Connection Store. The Data Source field is automatically updated with the connection string and the Login As field is disabled.
8. In the Procedure field, select the stored procedure that will run in the Job.
9. (Optional) In the Output field, enter a file path to a file that will store the output from the Stored Procedure. For example, "C:\Users\Administrator\Desktop\output.txt.
10. Select or clear the **Include dbms_output in JAMS log file** option to have the output visible or hidden from the Log File tab in the Job entry in the Monitor view.
11. Click the **Properties** tab.
12. In the Execute As field, select a Credential in JAMS to run the Job.
13. Define the Schedule, Parameters, Documentation, and Security as desired.
14. When the Job has been configured as desired, click **Save and Close**.

You can manually submit the Job or schedule the Job to run at a set date, time, or condition.

Using Parameters for the Oracle Connection

The Oracle Stored Procedure can use a Parameter default value to store the Oracle Connection. The Parameter can be specified in the Execution Method, or at the Folder or Job level. An OracleConnectionString parameter is available on the Parameters tab.

The default format for the Execution Method is:

- User Id={0}
- Password={1}
- DataSource={2}

> **NOTE:** By default, the User Id, Password, and DataSource set on the given OracleStoredProc Job will be passed into the "{}" braces on the Execution Method. Users do not need to edit the OracleConnectionString parameter by default.

Once the ConnectionString format has been set, include a datasource and User Name in the Job Source tab. Establish the connection. Once the User has authorized access to the Oracle DB Server, click on the dropdown list to view a populated listing of stored procedures.

> **NOTE:** Once all the properties have been populated, save and submit the Job.

Using SAP Execution Methods to Run JAMS Jobs

To run SAP Jobs, you can use a Sequence Task within a JAMS Sequence Job or one of two Execution Methods. The Sequence Task uses the definition that is maintained within SAP and uses JAMS for the scheduling. For information on the SAP Sequence Tasks, see [Sequence Tasks](#). The Execution Methods let you manage all the steps and their details within JAMS. They are used to support Job execution processes using SAP outside the [SAP Business Objects Data Services](#) Integration Pack.

Two SAP Execution Methods are available:

- SAPJobV2 provides support for executing multi-step background Jobs. It is also the replacement for the SAPJob and SAPStandardJob Execution Methods.
- SAPProcessChain provides process chain execution handling in JAMS.

When you create a Job using an SAP Execution Method, it is submitted and executed normally in JAMS. For SAPJobV2, the JAMS log file displays the Job Number that matches in the entry in the SAP Client view. For SAPProcessChain, the Job output includes a process chain number (log ID). The JAMS log file displays the output of the process chain.

> **NOTE:**
> To use the SAP Process Chain and SAPJobV2 Execution Methods, you must have the following:
> - SAP ERP Central Component (ECC) 6.0, with SAP Enhancement Package 7 (EHP) or newer.
> - SAP NetWeaver 7.4 or newer.
> - SAP Environment must be a Unicode system.
> - Microsoft Visual C++ 2015-2022 Redistributable Pack (x64) installed on the JAMS Scheduler server.

The two screenshots below highlight these Execution Methods along with their respective Parameters. If you have already created the JAMSSAPServer and JAMSSAPClient Parameters, you can continue to use them. However, the recommended approach is to set the SAP Server and Client information within the SAP Connection in the Connection Store.
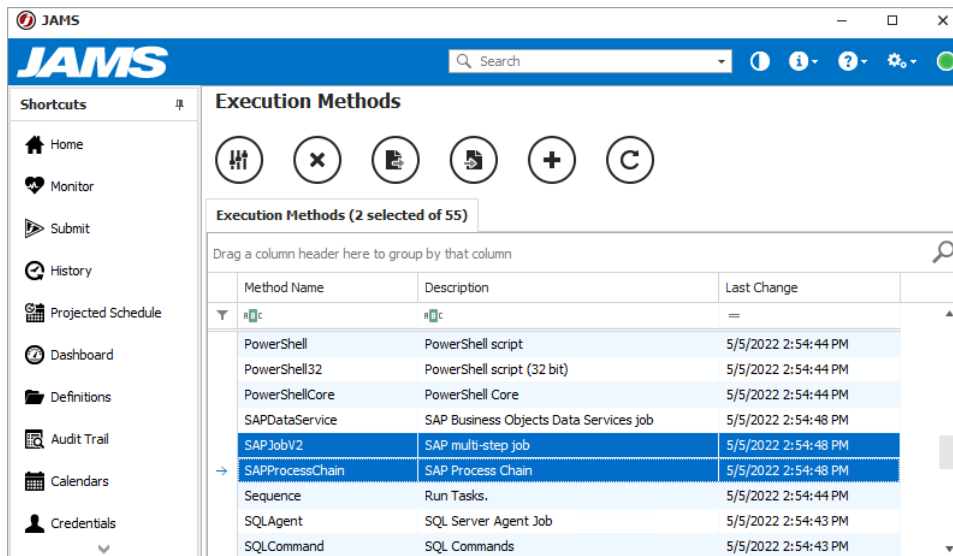
> **NOTE:**
> To define an Instance Number on your Execution Method, you have two options:
> - Use the Connection in the Connection Store. For the SAP (Custom Application Server) Connection, set the Application Server and Instance Number. Using the Connection Store is the preferred method, but any existing Parameters are supported for backward compatibility.
> - Use the JAMSSAPServer Parameter. Set the JAMSSAPServer parameter to "Servername:InstanceNumber" for the given Execution Method. For example, if the server was "192.0.2.0" and the Instance Number was "23", set the JAMSSAPServer parameter to be "192.0.2.0:23".

SAP Connections and Credentials

Before you create a Job, ensure you have created a Credential in JAMS and a Connection in the Connection Store. For the Connection, two SAP connection types are available.

Review the following items regarding creating a Connection or a Credential:

- The SAP user in the SAPCredential property on the SAP Connection must reference a JAMS Credential that has been configured for a SAP user with the permissions outlined in the "SAP Configuration Requirements" section below.
- The Credential in JAMS should have the same username and password as the credential in SAP.
- SAP Instance Numbers are used to define the listener port. The port is defined as "33XX", where "XX" is the Instance Number. If the Instance Number was"23", the SAP port would be "3323".
- To define language on an SAPJobV2 Job or an SAP Process Chain, specify the Logon Language within the Connection that you create in the Connection Store.

See [JAMS Security: Working with User Credential Definitions](#) and ***Connections for Integrations* on page 15** for more information.

> **NOTE:** To run SAPJobV2 and SAP Process Jobs on an Agent, ensure the SAP Integration Pack from the JAMS installer is installed on the Agent.

SAP Configuration Requirements

These permissions describe the necessary roles and permissions in SAP to allow users to run a Job using the JAMS SAP Integration.

SAP_BC_BATCH_ADMIN -- This role contains all authorizations for background processing administration, including the creation of background jobs and general administrations functions (SMxx transaction codes, in particular SM36, SM37, SM50, and SM51).

SAP_BC_ENDUSER -- This role contains non-critical basis authorizations for all users, including job creation and job release.

S_BTCH_ADM -- This role allows user the ability to perform any operation on any job, including:

- Selecting jobs from all clients (from the Job Overview, Transaction SM37)
- Deleting any job
- Releasing jobs to start
- Changing jobs, including copying, canceling, checking, repeating, and capturing and debugging
- Displaying jobs, job steps, and job logs
- Triggering events manually (transaction SM64)
- Editing system events
- Working with raised events in the event history (transaction SM62)
- Using restricted job classes A or B
- Scheduling an external program in a job

S_XMI_XBP_A -- This profile needs to be added to the SAP user to allow JAMS to execute an SAP Job or Process Chain.

Five User Type are available in SAP. Based on SAP [recommendations](#), the User should be **"System"**.

Type	Purpose
Dialog	Individual, interactive system access.
System	Background processing and communication within a system (such as RFC users for ALE, Workflow, TMS, and CUA).
Communication	Dialog-free communication for external RFC calls.
Service	Dialog user available to a larger, anonymous group of users.
Reference	General, non-person related users that allows the assignment of additional identical authorizations, such as for Internet users created with transaction SU01. No logon is possible.

Overview of the properties of users with different user types.

Property \ User Type	Dialog	Communication	System	Service
Dialog Logon (SAP GUI)	X	-	-	X
Multiple Logons	-	X	X	X
RFC Logon	X	X	X	X
Background Job Execution	X	-	X	X
Password Change	X	X	-	-
Logon Ticket can be Generated	X	X	-	-

"X" represents Yes.

SAP Function Modules

Customers running SAP Jobs in secure SAP environments with heavy restrictions on function modules will need to allow the following modules

BAPI_XMI_LOGON	BAPI_XBP_JOB_START_ ASAP	BAPI_XBP_JOB_ADD_ ABAP_STEP
BAPI_XMI_LOGOFF	BAPI_XBP_JOB_COPY	BAPI_XBP_ADD_JOB_STEP
BAPI_XMI_SET_AUDITLEVEL	BAPI_XBP_JOB_ABORT	BAPI_XBP_EXT_COMM_ SEARCH
BAPI_XBP_MODIFY_ CRITERIA_TABLE	BAPI_XBP_EVENT_RAISE	RSPC_API_CHAIN_GET_ STATUS
BAPI_XBP_GET_ INTERCEPTED_JOBS	BAPI_XBP_JOB_JOBLOG_ READ	RSPC_API_CHAIN_GET_ PROCESSES
BAPI_XBP_JOB_STATUS_GET	RSPC_API_GET_CHAINS	RSPC_API_PROCESS_GET_ LOG
BAPI_XBP_VARIANT_ CHANGE	BAPI_XBP_JOB_READ	RSPC_API_PROCESS_SKIP
BAPI_XBP_VARINFO	BAPI_XBP_JOB_SELECT	RSPC_API_PROCESS_ RESTART
BAPI_XBP_OUTPUT_DEVICE_ SEARCH	BAPI_XBP_JOB_ DEFINITION_GET	RSPC_API_CHAIN_RESTART
BAPI_XBP_REPORT_SEARCH	BAPI_XBP_JOB_ CHILDREN_GET	RSPC_API_CHAIN_ INTERRUPT
BAPI_XBP_VARIANT_INFO_ GET	BAPI_XBP_JOBLIST_ STATUS_GET	RSPC_API_CHAIN_START
BAPI_XBP_JOB_DELETE	BAPI_XBP_JOB_OPEN	RSPC_PROCESS_FINISH
BAPI_XBP_JOB_START_ IMMEDIATELY	BAPI_XBP_JOB_CLOSE	RSPC_API_CHAIN_GET_LOG

SAP Multi-Step Job (SAPJobV2)

Creating an SAP Multi-Step Job (SAPJobV2) in JAMS

1. On the Home screen, click **Create a Job**.
2. Select **JAMS Integration Jobs**.
3. Select **Create an SAP multi-step job**. If you do not see the Jobs, close JAMS, install the Integration Pack again, and reopen JAMS.
4. On the Add a New JAMS Job Definition screen, do the following:
    1. In the Folder field, select a folder where the Job will be saved.
    2. In the Name field, enter a name for the Job.
    3. Optional - In the Description field, enter a description for the Job.

4. Optional – In the Scheduled Date field, select a date for the Job to start.

5. Optional – In the Calendar field, select the calendar to use.

6. Optional – In the Scheduled Time field, select the time for the Job to start.

7. Click **Ok**.

5. On the Job Definition screen, click the **Source** tab.

6. In the SAP Connection field, select the appropriate Connection that was created in the Connection Store.

7. In the Job Name field, verify the correct Job name is displayed.

8. In the Job Class field, set the scheduling priority for the Job to High, Medium, or Low.

9. In the Target Server field, enter the server where the Job will run. If you do not select a server, SAP will select the server and load balance.

10. Review the **Wait for Child Jobs** checkbox. Select the checkbox to force the parent Job to wait for the child Jobs to complete or clear the checkbox to allow the parent Job to complete before the child Jobs have run (finished).

11. Review the **Execute Immediately** checkbox. Select the checkbox to have the SAP Job run immediately, or clear the checkbox to have the Job run ASAP.

12. Click the **Save & Close** icon or add a Job Step.

Adding Job Steps

1. On the Source tab, click **Add** in the Job Steps section.

2. On the Step tab, do the following:

    1. Select **ABAP**, **Command**, or **Program** as the type of Step. The available options on the Step tab change based on the selected type.

    2. In the Name field, enter or select the name of the Step. This field will automatically populate options based on the ABAP and Command types.

    3. In the Variant field, enter the Variant. (This option is available for only the ABAP option.)

    4. In the Parameters field, enter the Parameters that will be passed to the Command or Program type. (This option is available for only the Command and Program options.)

    5. In the Operating System field, enter the operating system where the Command will run. (This option is available for only the Command option.)

    6. In the Target Server field, enter the server where the Step will run.

    7. (Optional) In the User Name field, enter the SAP user name that will be used to run the Step. This user does not need to exist as a Credential in JAMS, and it lets you specify a user other than the ExecuteAs user on the Job.

3. On the Options tab, review and update the options below as needed. (Additional information can be found in the SAP documentation.) This tab is disabled for the ABAP step.

   1. Select the **Log output** checkbox to set an indicator in SAP to write the standard output for an external command or program to the SAP job log.

   2. Select the **Log errors** checkbox to set an indicator in SAP to write the standard error output for an external command or program to the SAP job log.

   3. Select the **Wait for termination** checkbox to set an indicator in SAP for an external command or program run synchronously or asynchronously.

   4. Select the **Enable Trace** checkbox to set an indicator in SAP if SAP tracing level 3 is activated for tracing SAPXPG, the program that starts an external command or program.

4. On the Output tab, review and update the optional properties below as needed. This tab is disabled for the Command and Program steps.

   1. In the Output Device field, select the output device that is configured in SAP. This field will automatically populate options based on the Output Devices configured within SAP.

   2. In the Format Type field, select the format for the output.

   3. In the Title field, enter a title for the output.

   4. In the Department field, enter the name of the department.

   5. In the Copies field, enter the number of copies that will be created.

   6. In the Start Page field, enter the start page for the output.

   7. In the End Page field, enter the end page for the output.

5. Click **OK**.

SAP Process Chain

Creating an SAP Process Chain Job in JAMS

1. On the Home screen, click **Create a Job.**

2. Select **JAMS Integration Jobs**.

3. Select **Create an SAP Process Chain job**. If you do not see the Jobs, close JAMS, install the Integration Pack again, and reopen JAMS.

4. On the Add a New JAMS Job Definition screen, do the following:

   1. In the Folder field, select a folder where the Job will be saved.

   2. In the Name field, enter a name for the Job.

   3. Optional - In the Description field, enter a description for the Job.

4. Optional – In the Scheduled Date field, select a date for the Job to start.

5. Optional – In the Calendar field, select the calendar to use.

6. Optional – In the Scheduled Time field, select the time for the Job to start.

7. Click **Ok**.

5. On the Job Definition screen, click the **Source** tab.

6. In the SAP Connection field, select the appropriate connection that was created in the Connection Store.

7. Next to the Process Chain field, click the … button.

8. On the **Find SAP Process Chain** dialog, enter a name or description to find the correct process chain.

9. Click **Find**.

10. Select the process chain.

11. Click **Ok**.

12. Click **Save and Close**.

Submitting an SAP Job

1. In the JAMS Shortcuts menu, click **Definitions**.

2. Expand the folder containing the SAP Job.

3. Right-click the Job and select **Submit**. The Submit dialog is displayed.

4. Click **Submit Run Request**.

Resuming a Process Chain

If a process fails inside the process chain, you can resume the process chain from the JAMS Monitor view. When the process fails, the icon for the process chain in the Monitor view will change. The Job stays in the "Executing" state, but the execution is halted until you select an option as described below.

SAP Process Chain Execution Method

To resume a failed process chain when you are using the SAP Process Chain Execution Method:

1. From the JAMS Shortcut menu, click **Monitor**.

2. Right-click the Job and select **Release**.

3. On the Release Job dialog, select one of the following options:

- **Release from wait with retry** - Retry the failed process in process chain before continuing.
- **Release from wait** - Skip the failed process and resume the process chain.

SAP Process Chain Sequence Task

To resume a failed process chain when you are using the SAP Process Chain Sequence Task:

1. From the JAMS Shortcut menu, click **Monitor**.
2. Double-click the entry for the Sequence Job.
3. Click the **Sequence** tab. The Sequence editor is displayed.
4. Right-click the Task in the Design area and select one of the following options:
   - **Retry Failed Processes** - Retry the failed process in process chain before continuing.
   - **Skip Failed Processes** - Skip the failed process and resume the process chain.
   - **Cancel Process Chain** - Stop the process chain. The Task completes successfully.
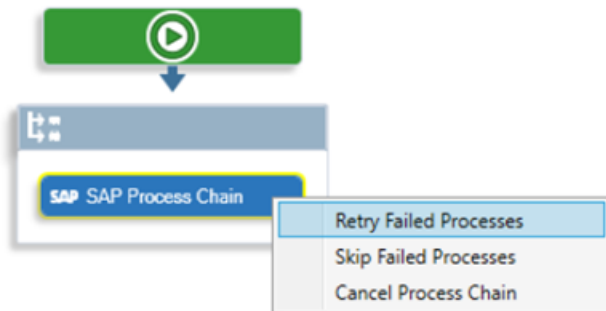
Parallel Execution for JAMS and SAP Jobs

Once JAMS submits the Job, SAP creates and executes a parallel job as shown in the following two screenshots.
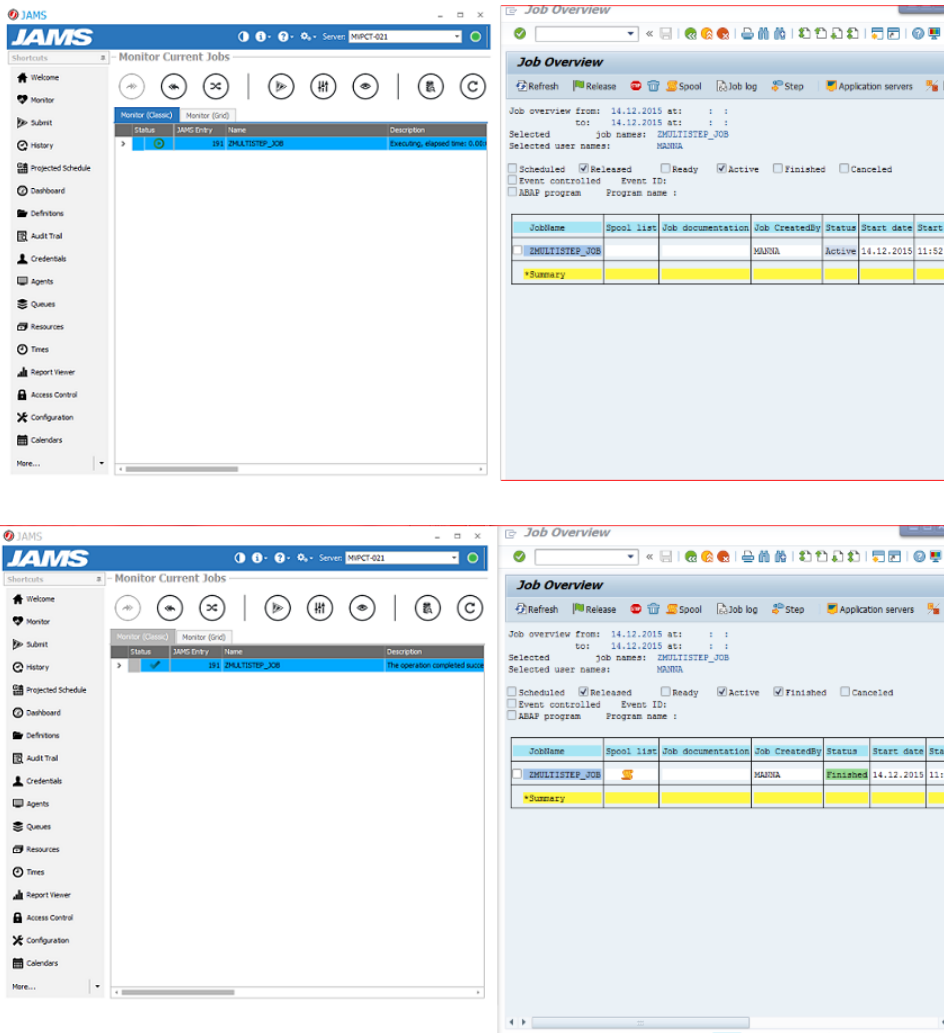
Job Execution Logs

Once a Job executes, logs can be viewed from either the JAMS or SAP environments.
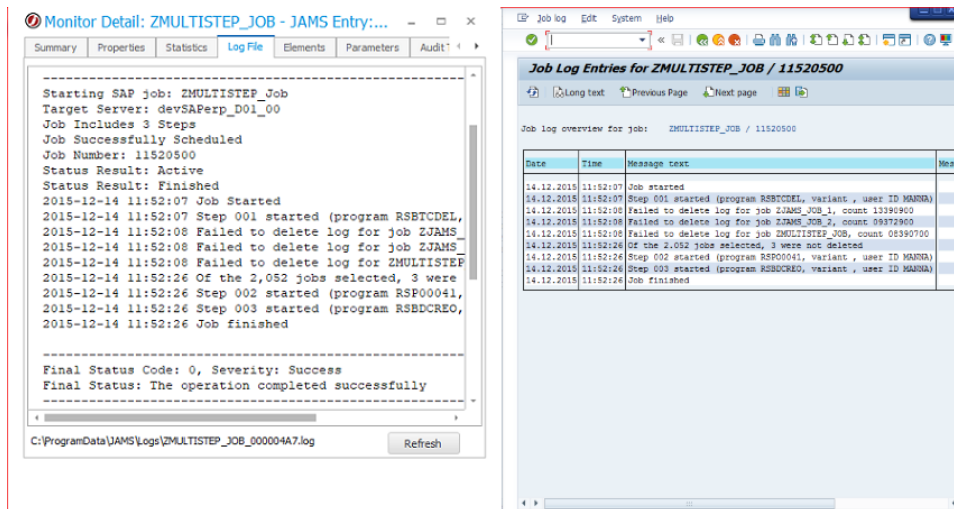
Authorized users may, in certain cases, cancel a currently executing Job. In SAP, such a job would go into a cancelled state. Logs can then be checked in both environments.

Run SAP Business Objects Data Services in JAMS

The SAPDataService Execution Method allows you to automate any Job that already exists in an SAP Business Objects Server environment.

Before You Begin

To use the SAP Data Services, you must have the following:

- SAP ERP Central Component (ECC) 6.0, with SAP Enhancement Package 7 (EHP) or newer
- SAP NetWeaver 7.4 or newer
- SAP Environment must be a Unicode system

Installing the SAP Data Services Integration Pack

1. Run the JAMS Installer.
2. On the Integration Packs page, ensure the **SAP Data Services Integration Pack** is selected.
3. Complete the installation.

> **NOTE:** Clearing the checkboxes for components listed in the installer will uninstall them.

Configuring the SAP Data Service Execution Method

1. Run the JAMS Client as an administrator.

2. Click **Execution Methods** from the Shortcuts menu.

3. Double-click the **SAPDataService** Execution Method to open the Execution Method Definition dialog.

4. Click the **Parameters** tab.

5. Double-click the SAPEndpoint parameter.

6. Set the SAPEndpoint values to reflect the environment. The value of the SAPEndpoint should look similar to the following:
   http://sampledomain.com:8080/DataServices/servlet/webservices?ver=2.1

7. Click the arrow on the dialog to open the SAPAuthentication parameter and set the values.

8. Click **Save and Close** on the Parameters dialog.

9. Click **Save and Close** on the Execution Method dialog.

> **NOTE:** The user running SAP Data Service Jobs must have full access to the SAP BODS server.

Creating an SAP Data Services Job in JAMS

1. Click **Definitions** from the Shortcuts menu.

2. Click a Folder where the Job will be saved, or right-click a Folder and select **Add Folder** to add a new Folder.

3. Click **+** to add a new Job.

4. In the Name field, enter a name for the Job.

5. In the Execution Method field, select **SAPDataService**.

6. Click **Ok**.

7. Define the Schedule, Parameters, Security, Properties, and Documentation as desired.

> **NOTE:** On the Properties tab, configure an **Execute As** property with a user that has full access to the SAP BODS Server.

8. On the **Source** tab, set the SAP BODS Job options.

   1. In the Authentication field, use the drop-down list to select a CMS Authentication method for your environment.

   2. In the Repository field, use the drop-down list to select the relevant directory where the SAP Job is stored.

   3. In the Job Name field, use the drop-down list to select the desired SAP Job from the specified Repository.

   4. Under Execution Options, select the appropriate options for the Job. See the SAP documentation for more information.

9. When the relevant SAP Job has been configured in the new JAMS Job, click **Save and Close**.