Configuring Productions

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Configuring Productions
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1

Introduction to Configuration Tasks

Both developers and system administrators configure productions at various times. This page provides some background and an overview of the configuration tasks.

1.1 Background for System Administrators

A *production* is a specialized package of software and documentation that integrates multiple, potentially disparate software systems. A production includes elements that communicate with these external systems, as well as elements that perform processing that is internal to the production.

A production consists of a number of *business hosts* that communicate with each other (and with external systems). There are three distinct types of business host:

- A *business service* receives input from outside the production.
- A *business process* is responsible for communication and logic that is entirely within the production.
- A *business operation* usually sends output from the production. Business operations can also be used for communication and logic within a given production.

Within a production, all communication is carried out by means of request and response messages between the business hosts.

InterSystems IRIS® data platform permits only one production to be running in a given namespace at any given time.

A running production continues to run even when you close the Management Portal.

For additional background, see Core Concepts.

1.2 Introduction to Settings

A major part of configuration is the task of modifying settings. This section provides an introduction.

Settings are configurable values that control the behavior of a production. You can modify these while a production is running and the changes take effect immediately. Settings can affect a production in many ways. For example, a setting can specify:

- The TCP port on which a business service should listen

- How frequently to check for new input.
- The external data source name (DSN) to use.
- The TLS configuration to use when connecting to an external entity.
- How long to stay connected.
- And so on.

You can specify settings separately for the production and for each business host.

Some settings, such as **Actor Pool Size**, **Pool Size** and **Reply Code Actions**, should be decided as part of the production design and usually should not be changed later. Other settings are dependent on the environment, such as TCP/IP addresses or file paths. It is appropriate to modify these settings if the environment changes.

1.3 Possible Configuration Tasks

While you are creating a production, you will need to perform the following tasks:

- Creating a production. See Creating and Configuring a Production.
- Adding business hosts to the production. See Adding Business Hosts to a Production.
- Configuring settings of the production and its business host. See Creating and Configuring a Production and Configuring Business Hosts.'

You might also perform some or all of the following tasks:

- Configuring reusable items for use in settings: business partners, credentials, and schedule specifications. See Defining Reusable Items for Use in Settings.
- Defining other options: data lookup tables, system defaults, and source control settings.
- Configuring the Message Bank. See Configuring the Enterprise Message Bank.
- Creating dashboards to display business metrics. See Creating Dashboards.

If you are a system administrator, see Creating and Configuring a Production, Configuring Business Hosts, and Defining Reusable Items for Use in Settings.

1.4 Accessing the Configuration Options

To configure InterSystems IRIS, you use the Management Portal. To access the configuration tools in the Portal:

1. Click **Interoperability**.
2. Click **Configure**.

InterSystems IRIS then displays a menu. For information on the menu options, see Creating and Configuring a Production, Adding Business Hosts to a Production, and Configuring Business Hosts.

1.5 Accessing Management Options

The Production Configuration page (**Interoperability** > **Configuration** > **Production**) includes tabs that provide easy access to management options, which are described elsewhere.

If you click **Production Settings** above the diagram, the options apply to the entire production. Similarly, if you click a business host, the options apply to that business host.

These management tabs are as follows:

- **Queue** — Click to view a list of the queues related to this production or business host.
- **Log** — Click to view an abbreviated list of Event Log entries for this production or business host.
- **Messages** — Click to view an abbreviated list of messages processed by this production or business host.
- **Jobs** — Click to view jobs related to this production or business host.

Each these tabs provides a link to a management page (which opens in a new window) with more information. For details on the terminology and tasks, see Managing Productions.

On the **Jobs** tab, you can also manage active jobs. For more information, see Aborting Messages, Suspending Messages, and Stopping Jobs.

2

Creating a Production

The **Interoperability** > **List** > **Productions** page allows you to create a new production and open, export, document, or delete an existing production. After you open a production, InterSystems IRIS® data platform displays the **Production Configuration** page, which allows you to configure, start, and stop productions. To configure the current production, you can select **Interoperability** > **Configure** > **Production**, which also displays the **Production Configuration** page. Once you are working in a production, you can use the **Actions** tab to switch to a new or another existing production or to document or export the current one.

This topic primarily describes how to use these pages. Other pages describe how to add business hosts and configure settings for the production and all business hosts.

Note: If a production is Suspended or Troubled, see Correcting Production Problem States.

2.1 Creating a Production

To create a production:

1. If you are not already in an interoperability-enabled namespace, choose your working namespace from the available interoperability-enabled namespaces.
2. Navigate to the **Interoperability** > **List** > **Productions** page, and then click **Go**, if necessary.
3. Select **New** to create a new production.
4. Enter a **Package Name**, **Production Name**, and **Description**.
5. Choose **Generic** production.
6. Click **OK**.
7. Now you can add business hosts and configure them.

2.2 Opening a Production

To open a production:

1. If you are not already in an interoperability-enabled namespace, choose your working namespace from the available interoperability-enabled namespaces.

2. Navigate to the **Interoperability** > **List** > **Productions** page, and then select **Go**, if necessary.
3. Select **Open** to open an existing production.

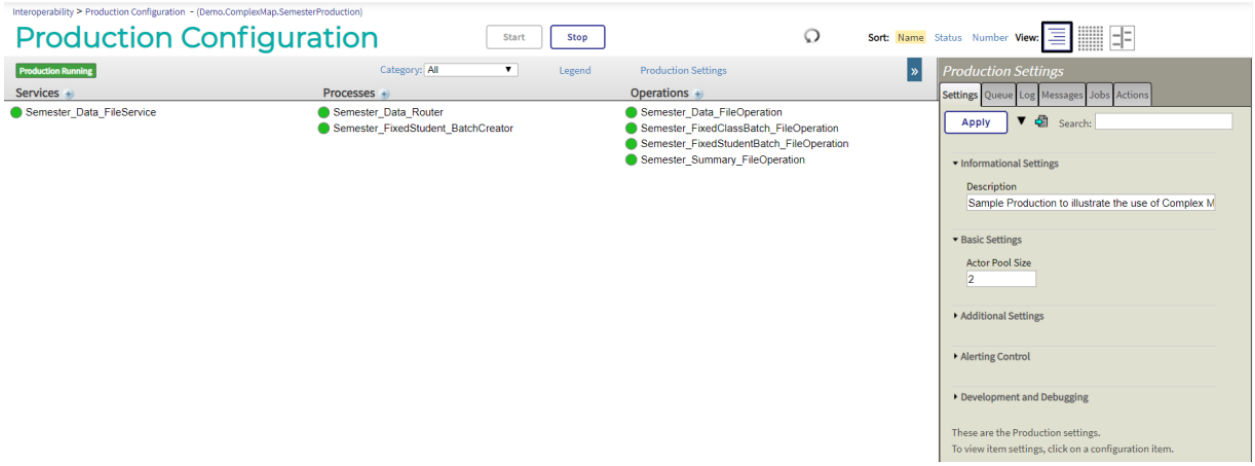
To open a production or create a new production when you currently configuring a production on the **Production Configuration** page:

1. If you have clicked anywhere within the diagram, click **Production Settings**.

   This step returns the focus to the production and changes the options on the **Actions** tab.
2. Select the **Actions** tab.
3. Select **Open** on the **Actions** tab to open an existing production or select **New** on the same tab to create a new production.

2.2.1 Introduction to the Production Configuration Page

For example, the following figure shows a sample production.



2.2.2 The Update Button

While you are developing new code and configuring the production, it sometimes happens that when you start the Management Portal, InterSystems IRIS detects a discrepancy between the production as defined in the code, and the status of the running production. Examples would be if:

- A specific business host experienced an error and has died (the most likely cause).
- You changed a configuration parameter for a business host in a running production, such that the host now needs to be restarted.
- You enabled or disabled an item in a production, and this action requires the production to be stopped and restarted.
- A production typically opens a Terminal window, but this window was closed by a user action while the production was still running.

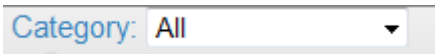
When such discrepancies occur, the **Update** button appears on the **Production Configuration** page. If you click the button, InterSystems IRIS updates the production to resolve the discrepancy. If you prefer for the system to attempt to resolve the discrepancy automatically, you can add a business service based on the Ens.ProductionMonitorService class to the production. For more information, see Using the Production Monitor Service.

2.3 Controlling the Display

This section describes how to filter the display, sort the display, how to display alternative views of the production, how to control the refresh of the display, and how to hide the production or business host settings.

2.3.1 Filtering the Display by Category

To filter the business hosts in the production diagram, use the **Category** list.



Select a value from this list. When you do so, the diagram display only those business hosts that have been assigned to the given category. Or click **All** to view all the business hosts in the production.

Note that a business host can be assigned to multiple categories.

For details, see Category in the reference Settings in All Productions.

2.3.2 Sorting Business Hosts

To sort the business hosts in the production diagram, use the **Sort** options:

- **Name** — Sorts items alphabetically within each column.
- **Status** — Sorts items within each column by status as follows: disabled, enabled, error, inactive.
- **Number** — Sorts items as listed in the production class (which, by default, represents the order in which they were added to the production). To modify this order, you can edit the production class in an IDE.

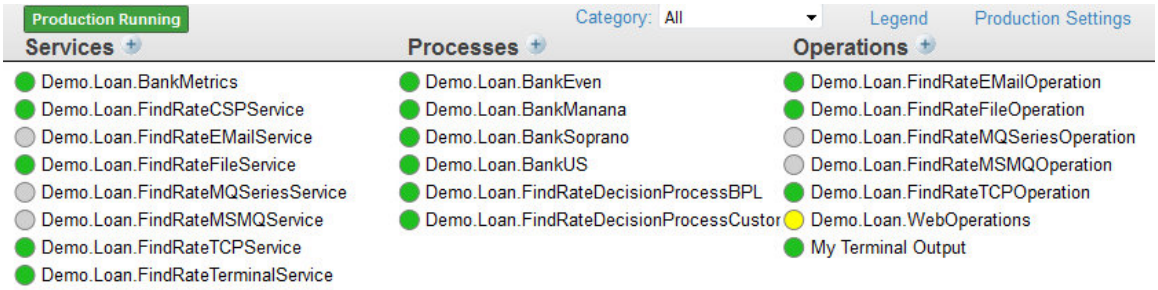
2.3.3 Choosing a View Type

To view the business hosts in a different way, use the **View** options:

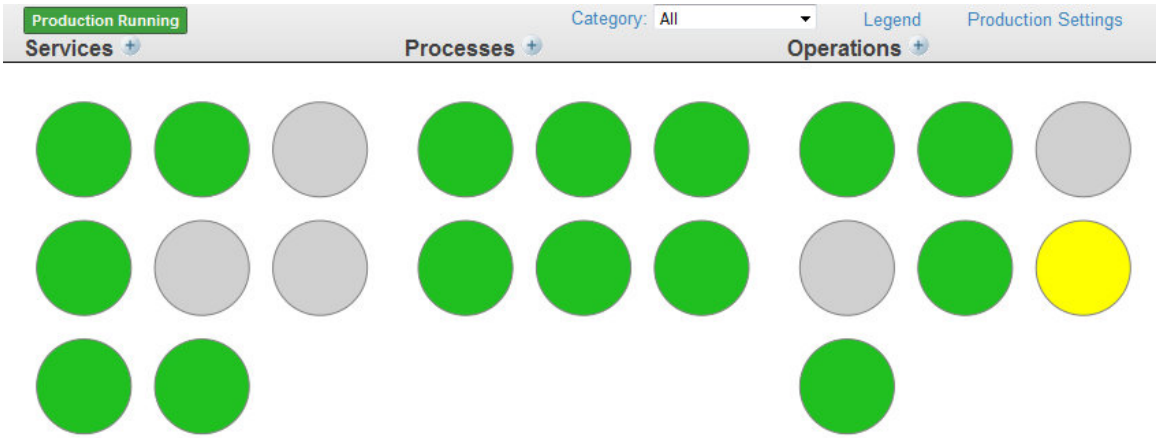
These view types are as follows:

- The *listing view* displays the business hosts in lists, within the **Services**, **Processes**, and **Operations** columns. If the name of a business host is truncated due to the width of the columns, you can hover over the business host to view its full name.

  The listing view is used in most of the documentation.

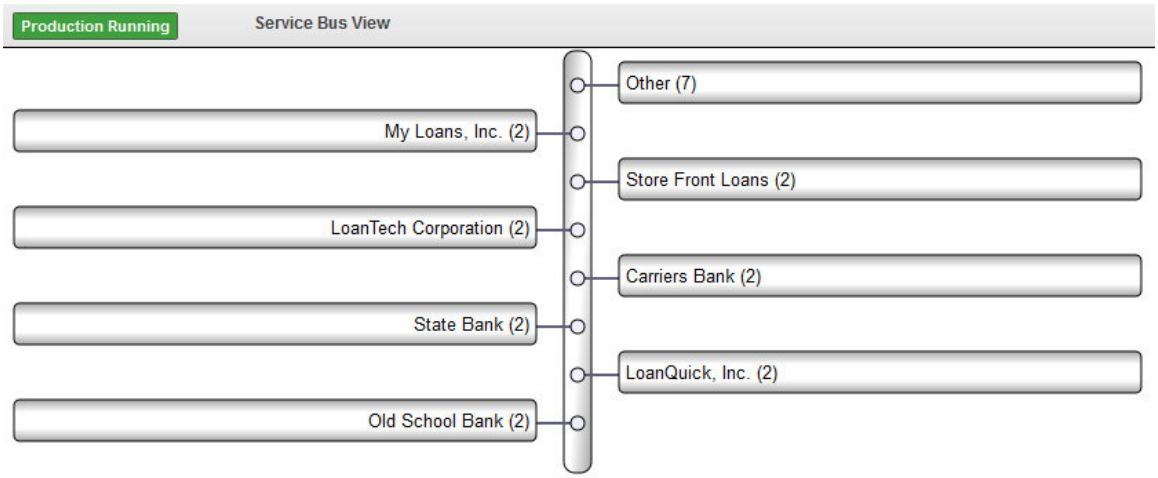


- The *monitor view* represents each business host in a larger circle where you can easily see items that may need attention. Here, click a circle to see a box with details for the business host.



- The *service bus view* is relevant only if you configure business partners and enter values in the **Business Partner** setting.

  This view displays the business hosts grouped by their associated business partners.



2.3.4 Controlling the Refresh

Click the circular arrow to refresh the diagram once or click **on** to reload a fresh copy of the production diagram every 60 seconds; the refresh timer is **off** by default.

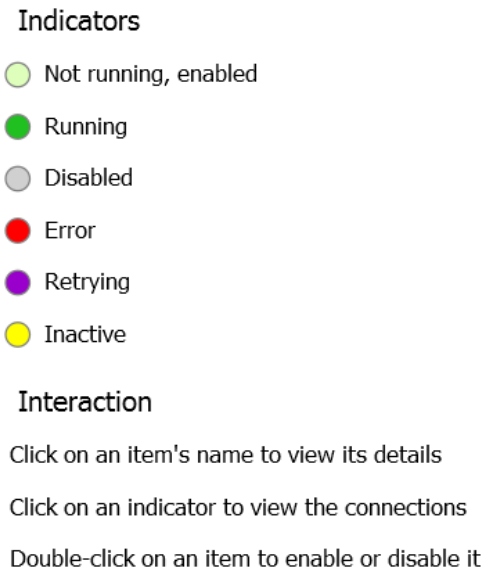
Note that InterSystems IRIS checks the status of individual business hosts (on a shorter interval) and refreshes the display for individual hosts as needed, regardless of the setting of auto-refresh.

2.3.5 Hiding the Settings Pane

Click the **Hide Settings Tabs** icon » to hide the production or business host settings.

2.4 Understanding the Color Coding

When in list or monitor view, the **Production Configuration** page displays a circular status indicator next to each business host. If you click **Legend** to see the meaning of this indicator, InterSystems IRIS displays the following:



Note: You can increase the visibility of the error states by specifying that the Error, Retry and Inactive states are to be indicated by a colored ellipse, not a circle. To do this append `&VISUALAID=1` to the URL for the Production Configuration page.

2.5 Starting a Production

To start a production that is displayed on the **Production Configuration** page:

1. Click **Start** and answer **OK** to launch the **Start Production** dialog box. It displays the name of the production, its startup status, and any messages associated with production startup.

   Note: If any Terminal windows open as a result of starting the production, do not close them.

2. When the startup dialog shows it is Done, click **OK** at the bottom of the **Start Production** dialog box.

You can stop the running production and start another one from this page. Only one of these productions can run at a time in a given namespace. If you try to start one, and another is already started, a warning message displays and nothing changes. For example:

```
12:05:06.292:Ens.Director: ERROR <Ens>ErrProductionAlreadyRunning:
Production 'Demo.Loan.FindRateProduction' is already running
12:05:06.352:Ens.Director: ERROR <Ens>ErrProductionAlreadyRunning:
Production 'Demo.Loan.FindRateProduction' is already running
Production 'Demo.Loan.BankUSProduction' not started:
ERROR <Ens>ErrProductionAlreadyRunning: Production
'Demo.Loan.FindRateProduction' is already running
```

Note: This option is primarily for use during development. For a live, deployed production, InterSystems recommends that you use the auto-start option. See Starting and Stopping Productions.

2.6 Stopping a Production

To stop a production that is displayed on the **Production Configuration** page:

1. Click **Stop** and answer **OK** to launch the **Stop Production** dialog box. It displays the name of the production, its shutdown status, and any messages associated with production shutdown.
2. When the shutdown dialog indicates it is Done, click **OK** at the bottom of the **Stop Production** dialog box.
3. If the request to stop the production initially fails, the portal displays a message:

   Production could not stop, do you want to force a shut down?

   And provides a command:

   Yes - Force to Shut Down

   If you click this command, the production is forced to shut down.

InterSystems IRIS displays an informational message if you try to stop a production that is not running.

2.7 Exporting a Production

To export a production from the **Production Configuration** page:

1. If you have clicked anywhere within the diagram, click **Production Settings** in the right-hand pane.

   This step returns the focus to the production and changes the options on the **Actions** tab.
2. Click **Export** on the **Actions** tab.
3. Select items to export.
4. Click **Export**.
5. Select whether you want to export the production to the server or to your local machine via the browser's downloading capability.
6. If you are exporting to the server, enter a path and name of the export file. If you are downloading to your local machine via the browser, enter the name of the export file.

7. Click **OK**.

See Deploying a Production for details on exporting and deploying a production.

2.8 Generating Production Documentation

You can navigate to the **Production Documentation** page from the following places in the Management Portal:

- From the **Interoperability** > **List** > **Productions** page, select a production name and click **Document**.
- From the **Interoperability** > **Configure** > **Production** page, on the **Actions** tab for the production, click **Document**.

From the **Production Documentation** page for a production, you can generate or view the production documentation, which includes a list of all the business hosts and their settings. Perform one of the following actions:

- Click **View** to display the online documentation you previously generated. If you click **View** and no HTML documentation exists, you can choose to generate it.
- Click **Generate** to create new documentation for this production using a background job.

  It may take a considerable amount of time to generate documentation for large productions; therefore, you may not want to generate new documentation if you have not made changes to the configuration of your production.
- **Cancel** to cancel the operation.

You can also generate HTML documentation and, additionally, PDF documentation using the following methods in the Ens.Config.Production class:

- **CreateDocumentHTML()** — creates new documentation in HTML format.

  For example, to create documentation for Demo.Loan.FindRateProduction in HTML format:

  ObjectScript

  ```
  Set
  status=##class(Ens.Config.Production).CreateDocumentHTML("Demo.Loan.FindRateProduction",1,.URL,.ErrLog)
  ```

- **RemoveDocumentHTML()** — removes existing HTML-format documentation from the current namespace.
- **CreateDocumentPDF()** — creates new documentation as a PDF file.

  For example, to create documentation for Demo.Loan.FindRateProduction in PDF format, you can use the method in a statement similar to the following:

  ObjectScript

  ```
  Set
  status=##class(Ens.Config.Production).CreateDocumentPDF("Demo.Loan.FindRateProduction",1,"C:\Temp\Rate.pdf",.Log)
  ```

  The PDF format requires that you have a PDF renderer installed. It also requires Java.

2.9 Deleting a Production

To delete a production:

1. Navigate to the **Interoperability** > **List** > **Productions** page.
2. Click the production that you want to delete.
3. Click **Delete**.
4. Click **OK**.

2.10 Using the Production List

On the **Interoperability** > **List** > **Productions** page, you can use the following options:

- Click **New** to start the **Production Wizard** to create a new production in this namespace.
- Click **Open** to display the **Production Configuration** page for the selected production.
- Click **Export** to export the selected production. See Deploying a Production for details on exporting and deploying a production.
- Click **Delete** to delete the selected production.
- Click **Document** to view or generate configuration documentation for this production.
- Enter text in the **Search** text box to search for productions that contain the specified text in their definitions.

The table on this page provides the following information for each production:

- **Production Name** — The name of the production.
- **Status** — The status of the production.

  If a production is Suspended or Troubled, see Correcting Production Problem States in *Monitoring Productions*.
- **Last Start Time** — The date and time when the production was last started.
- **Last Stop Time** — The date and time when the production was last stopped.

3

Adding Business Hosts

This topic describes generally how to use the **Production Configuration** page to add business hosts to a production.

Other topics describe the color coding in the diagram, and how to configure settings for the production and all business hosts.

3.1 Introduction

A business host is any business service, business process, or business operation within a production. These are also referred to generically as *configuration items*.

A configuration item is always associated with a specific production. It may resemble or duplicate items in other productions. Each production is an entirely closed universe that does not use configuration items from other productions.

3.2 Configuration Names

By default, the *name* of a configuration item is the name of its underlying host class. However, you can assign a different name, to describe the purpose of the item, for example.

For example, if you have a business service class that communicates with a specific type of server, and you use it to communicate with the same *type* of server in different enterprise *locations*, you must configure the business service with different settings to communicate with each enterprise location, even though the type of server is the same. Each different configuration of the business service must have a different *Name* in the diagram (except see Working with Multiple Versions of a Business Host).

The following rules govern configuration names:

- The name must consist of at least one character.
- The name can contain letters, numbers, and any printable character except for the following:

  `| ; , : [ < > \ / & "`
- Neither the first nor the last character can be any of the following: `! $ .`
- The first character cannot be _
- The name (if is it one character long) cannot be *

Important: You cannot change the name of an existing configuration item. If you require a name change, you can copy the item and delete the original item.

3.3 Adding Business Hosts to a Production

To add a business host to a production:

1. Identify (or create and compile) the appropriate business host class.
2. Open the production on the **Interoperability** > **Configure** > **Production** page.
3. Click plus-sign icon next to the **Services**, **Processes**, or **Operations** column heading.
4. Use the wizard, as described in the next topic.
5. Click **OK** to add the process to the production.
6. Configure the business process as needed.

This process does not generate any new classes. It updates the production class.

3.4 Wizard Options

This section describes the options in the Business Service Wizard, the Business Process Wizard, and Business Operation Wizard.

3.5 Options in the Business Service Wizard

The Business Service Wizard provides multiple tabs, which correspond to different types of business service classes to use. Click a tab and then specify values as follows:

- If you click the **All Services** tab, specify the following values:
  - Choose a host class from the **Service Class** list. If the class you need is not listed, create and compile the class in an IDE, and then return here to choose it.
  - Specify a configuration **Service Name**. For rules, see Configuration Names.
  - Enter a text label in the **Display Category** field to sort and organize items within the production. **Display Category** names are case-sensitive, and space characters are allowed. To place an item in multiple categories, list them in the **Display Category** field separated by commas (do not allow spaces around these commas).
  - **Comment** is an optional text description.
- If you click the **X12 Input** tab or **HL7 Input** tab (if available), specify the following values:
  - Choose a messaging protocol to select an existing specialized host class.
  - Specify a configuration **Name**. For rules, see Configuration Names.
  - Use the **Target Name** field to identify the business process or business operation to which this business service will send the messages that it receives.

If you select the **Create New Router** option, you can use the **New Rule Package** field to specify a package name that will be added to the name of the rule created for the new router. If you do not specify a **New Rule Package** value, the production's package is used.

- Select the **Default applies if no value** check box if you want blank settings to be replaced with the system default settings when the business service is created. Fields identified by an asterisk (*) will be replaced with the system default values. Click

  to view the possible default values.

- If you click the **Business Metric** tab, specify the following values:
  - Choose a host class from the **MetricClass** drop-down list. If the class you need does not appear on this list, create the class in an IDE, then return to choose it.

    See Creating Business Metrics.
  - Specify a configuration **Name**. For rules, see Configuration Names.
  - Enter a text label in the **Category** field to sort and organize items within the production. **Category** names are case-sensitive, and space characters are allowed. To place an item in multiple categories, list them in the **Category** field separated by commas (do not allow spaces around these commas).
  - **Comment** is an optional text description.
  - **Call Interval** determines how often the business metric will recalculate the values of its properties. The **Call Interval** is in seconds, starting from a minimum of 0.1 seconds. The default is 5 seconds.

3.6 Options in the Business Process Wizard

The Business Process Wizard provides multiple tabs, which correspond to different types of business process classes to use. Click a tab and then specify values as follows:

- If you click the **All Processes** tab, specify the following values:
  - **Business Process Class** — Choose a base class from the list of valid business process classes. If the class you need does not appear on this list, create and compile the class and then return here to choose it.
  - Specify a configuration **Name**. For rules, see Configuration Names.

    The wizard defaults to the business process class name if you leave this blank.
  - Specify other values as given after this list.

- If you click the **X12 Router** tab or **HL7 Router** tab (if available), specify the following values:
  - **Auto-create Rule** — Select this check box to create a rule definition name based on the business process class name. When **Auto-create rule** is selected, you can use the **New Rule Package** field to specify a package name that will be added to the name of the rule created for the new router. If you do not specify a **New Rule Package** value, the production's package is used. In most cases, the **New Rule Package** field is ignored if the **Routing Process Name** field begins with a package name. However, if the package specified by the **Routing Process Name** field is the system package name `Ens` or `Enslib`, a rule that is auto-created will have a different package name added to the beginning of the rule name. This additional package is determined by the contents of the **New Rule Package** field. If the package of the production or routing process is used instead of a specified value, the generated rule class name ends with 'RoutingRule'.

  - **Routing Rule Name** — Use the field to identify the name of the routing rule set to which this business process sends the messages that it receives. Only appears if the previous check box is cleared.

    Once you select a rule name, you can click the magnifying glass to open the Rule Editor.

  - Specify a **Routing Process Name**. For rules, see Configuration Names. To specify a package for the new routing process, use the format `package.name` in the field.

    The underlying business process class is EnsLib.MsgRouter.VDocRoutingEngine depending on which type of router you choose.

  - Specify other values as given after this list.

- If you click the **Component** tab, specify the following values:
  - **Component Class** — Choose a base class from the list of valid business process classes designated as components.
  - **Component Name** — Enter a configuration name for this item. For rules, see Configuration Names. The wizard defaults to the component class name if you leave this blank.
  - Specify other values as given after this list.

Note that all types of business process share the following optional fields:

- **Display Category** — Enter a text label in the field to sort and organize items within the production. Category names are case-sensitive and space characters are allowed. To place an item in multiple categories, enter a comma-separated list.
- **Comment** — Enter a brief comment about the business process to appear in the informational settings.
- **Enable Now** — Select this check box if you want this business process to begin processing messages immediately when the production runs; clear it for the process to be initially disabled.

3.7 Options in the Business Operation Wizard

The Business Operation Wizard provides multiple tabs, which correspond to different types of business operation classes to use. Click a tab and then specify values as follows:

- If you click the **All Operations** tab, specify the following values:
  - Choose a host class from the **Operation Class** list. If the class you need does not appear on this list, create the class in an IDE, then return here to choose it.
  - Specify a configuration **Name**. For rules, see Configuration Names.
  - Enter a text label in the **Display Category** field to sort and organize items within the production. **Display Category** names are case-sensitive, and space characters are allowed. To place an item in multiple categories, list them in the **Display Category** field separated by commas (do not allow spaces around these commas).
  - **Comment** is an optional text description.
  - Specify other values as given after this list.

- If you click the **X12 Output** tab, specify the following values:
  - Choose **TCP**, **File**, or **FTP** to determine the host class. Each class already exists and requires no programming. Simply choose one.
  - Give the item a configuration **X12 Operation Name**. For rules, see Configuration Names.

  - Specify other values as given after this list.
  - Select the **Default applies if no value** check box if you want blank settings to be replaced with the system default settings when the business operation is created. Fields identified by an asterisk (*) will be replaced with the system default values. Click

    to view the possible default values.

- If you click the **Workflow** tab, specify the following values:
  - Choose a host class from the **Operation Class** drop-down list. If the class you need does not appear on this list, create the class in an IDE, then return here to choose it.
  - Give the item a configuration **Operation Name**. For rules, see Configuration Names.
  - Choose whether or not to auto-create a workflow role.
  - Specify other values as given after this list.

All types of business operation share the following optional fields:

- **Display Category** — Enter a text label in the field to sort and organize items within the production. Category names are case-sensitive and space characters are allowed. To place an item in multiple categories, enter a comma-separated list.
- **Comment** — Enter a brief comment about the business operation to appear in the informational settings.
- **Enable Now** — Select this check box if you want this business operation to begin processing messages immediately when the production runs; clear it for the operation to be initially disabled.

3.8 Enabling, Disabling, or Restarting a Business Host

You can either enable, disable, or restart business hosts individually or for a selection of business hosts.

To enable, disable, or restart a single business host, do one of the following:

- Double-click a host item. InterSystems IRIS displays a dialog box that allows you to enable, disable, or restart the host item depending on the current state of the production and the host item:
  - If the production is running and the host item is enabled, the dialog box gives you the option to disable the host item, restart the host item, or to cancel the request.
  - If the production is not running and the host item is enabled, the dialog box gives you the option to disable the host item or to cancel the request.
  - If the host item is disabled, the dialog box gives you the option to enable the host item or cancel the request.
- Select or clear the **Enabled** setting (as appropriate) and then click **Apply**. To restart a host item, first disable it and then enable it.
- Use the **Stop**, **Start**, and **Restart** buttons on the **Action** tab. Because the setting controlled by the **Enabled** check box is a setting stored in the production class definition, you cannot use it to stop, start, or restart a production that you cannot edit, for example because you lack sufficient privileges, or it is marked read-only due to being managed by source control system. The **Stop**, **Start**, and **Restart** buttons on the **Action** tab perform these actions without modifying the production class definition.

To enable, disable, or restart a selection of business hosts, do the following:

1. Select multiple business hosts in the Production Configuration page by using the Ctrl and Shift keys. The Ctrl key keeps any existing selection and either adds or removes the item from the selection. The Shift key allows you to select a contiguous set of one kind of business hosts — either Business Services, Business Processes, or Business Operations.
2. Once you have selected multiple business hosts, the right panel automatically switches to the **Actions** tab, which will include **Enable**, **Disable**, and **Restart** buttons.
3. Select the button to enable, disable, or restart the selected business hosts.

Note: You cannot disable a business process with a pool size of 0. The management portal does not allow this action because disabling it would stop all business processes with a pool size of 0, which use the same shared actor queue. If you want to disable only a single business process, you must first set its pool size to 1 or more. After you apply the settings, you can disable it. If you do want to stop all business processes using the shared actor pool, select **Production Settings** and set the **Actor Pool Size** to 0. Also see Pool Size and Actor Pool Size.

3.9 Changing the Class That a Business Host Uses

To modify a business host so that it is based on a different class:

1. Display the **Production Configuration** page:
2. Click the business host in the diagram.
3. Click the **Actions** tab.
4. Click **Change Class**. This button is visible only when you can edit the business host.
5. Select a new class.

3.10 Copying a Business Host

To create a copy of a business host within a given production:

1. Display the **Production Configuration** page:
2. Click the business host in the diagram.
3. Click the **Actions** tab.
4. Click **Copy**. This button is visible only when you can edit the business host.
5. Click **Copy** to create a copy of the selected business host.

   A dialog box prompts you to enter a configuration name.
6. Enter a unique name and click **OK**.

When first created, the copy has the same host class and settings as the original; only the name is different. Generally your next step is to configure the copy to make it unique. For example:

- If you have an incoming TCP *business service* that receives messages from a client application, and you want to receive messages from a similar application on a different application server, you can copy the first TCP service and configure the copy with the other server address.

- If you have a *business process* for one message routing interface, and you want a similar one but with alterations for another interface, you can copy the first routing process and configure the copy to route messages between different sets of business services and business operations.
- If you have an outgoing email *business operation* that alerts a user, but you want to alert another user at different times of day, you can copy the first outgoing email operation and configure the copy with the other email address.

The copy has no relationship to the original item; you can configure, enable, and disable each item independently.

Note: The **Copy** command works only within the same production. You cannot copy a business host from one production to another.

3.11 Deleting a Business Host

To delete a business host within a given production:

1. Display the **Production Configuration** page:
2. Click the business host in the diagram.
3. Click the **Actions** tab.
4. Click **Delete**. This button is visible only when you can edit the business host.

   This process removes this item from the production configuration. This action does not delete the business host class on which the business host is based.

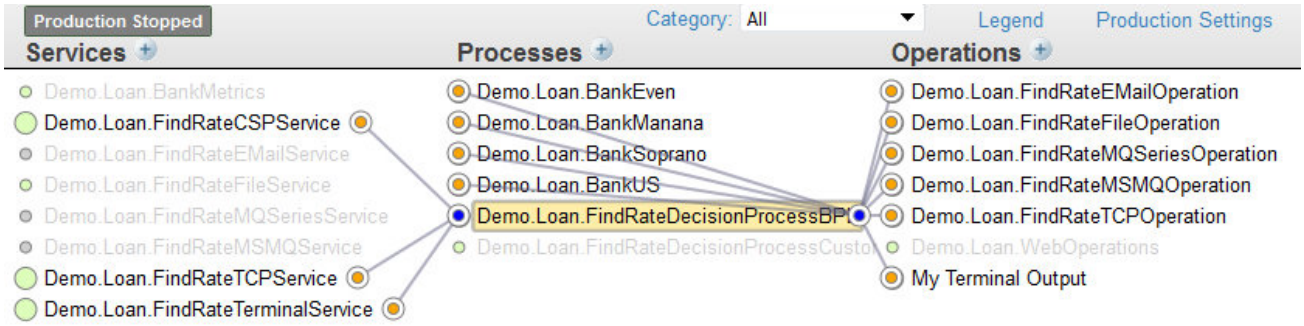
3.12 Repairing an Error

If the class for a given business host is not available, the diagram displays the item with a red background. To fix the error:

1. Select the item.
2. Click the **Actions** tab.
3. Now either click **Delete** to remove the item or click **Change Class** to choose a class. This button is visible only when you can edit the business host.

3.13 Viewing and Configuring Connections

When you click the status indicator of a business host, lines connect items as defined by the values in the **Target Config Names** setting or, in the case of a routing process, as defined by the associated **Business Rule Name**. The following figure shows an example:



You can assign a business service **Target Config Names** by clicking its status indicator and dragging the pointer to a business process or operation until you see its status indicator highlighted. When you do so, the **Production Configuration** page displays a dialog window requesting you to confirm the connection. If you confirm the connection, the page displays a *Settings applied* message and the item is added to the list in the **Target Config Names** setting.

3.14 Working with Multiple Versions of a Business Host

During development, it can be convenient to include multiple versions of a business host in the production and then switch among them for testing.

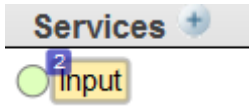
Only one of them can be enabled at any time; when you enable one, InterSystems IRIS automatically disables any previously enabled version.

To create and work with multiple versions of a host:

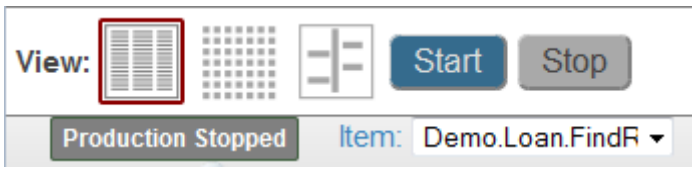
1. Add the first business host as usual.
2. Add the next business host and provide the same configuration name as for the first one.

   The production configuration still shows only one business host with the given name.
3. If you are not in listing view, click the listing view icon .
4. Select the business host.

   Now the diagram displays a small box that indicates the number of items that have this name, as follows:

   Also, the area above the diagram shows a drop-down list that you can use to select the specific item to work with:

   By default, the enabled version is selected. If no host is enabled, the selected version is the first business host that you added.
5. Use the **Item** list to select the version that you want to configure. Specify configuration details as usual and apply them.

6. Repeat if needed.

To understand why this is useful, consider the following: when testing or troubleshooting the production you might want to send messages by typing them at the console command line, or by reading data from files. But when running the production, you might intend for these messages to arrive from an external application via a TCP connection. Each means of obtaining input for the production requires a different business service host class.

4

Configuring Settings

This topic describes how to configure settings. There are multiple ways to perform many tasks, but this topic describes only one procedure for any task.

4.1 Configuring Settings

To configure settings for a business host:

1. Click the business host.
2. Click the **Settings** tab.
3. Expand and collapse the groups as needed to see the settings. You can also search for a setting.
4. Edit values as needed.
   - Some configuration settings, take comma-separated lists to define their possible values. You can change these items either by editing the list directly or by selecting the check boxes of the desired values in the associated drop-down list. When you edit settings that use drop-down lists, be sure to click outside of the list to close it.
   - Some configuration settings have a magnifying glass icon next to them. You can click this to see more details of a selected value, or to open a new portal page for entering additional information. This depends on the type of setting you are editing.

   See Settings in All Productions. Also see information on specific adapters and business hosts.
5. Click **Apply**.

   If the apply command is successful, you receive a *Settings applied* message.

   InterSystems IRIS® validates the values for settings. If you provide a string value for a setting that requires a numeric value, InterSystems IRIS does not apply that value.

Similarly, to configure settings for the production, first click **Production Settings**. This step returns the focus to the production and changes the options on the **Actions** tab. Then continue as described in the previous steps.

In both cases, the changes are immediately saved and take effect immediately.

4.2 Understanding the Color Coding for Settings

The setting names are color coded as follows:

Color	Source
Black	Setting value comes from the production definition — the value you enter and apply in the configuration page.
Green	Setting value comes from the class definition; it is the default value for the property as defined in the class.
Blue	Setting value comes from the default settings you enter in the **Default Settings** page for the namespace. See Defining System Default Settings.

4.3 Searching for a Setting

To find a setting more easily, use the **Search** option. Enter text to show all settings whose name, type, category, or value contains the search string. Click the X icon to clear the contents of the **Search** box.

4.4 Getting Help for Settings

This page provides context-sensitive help. Hover the cursor over any setting name to display its help text as it appears in the *Class Reference* for the associated class property or click the setting name to display the help text in a separate pop-up window.

The property name appears beneath the localized setting name in this window if the name is different.

Also see Settings in All Productions, as well as other pages that discuss specific adapters and business hosts.

4.5 Restoring a Setting to Its Default Value

To restore a setting to its default value:

1. Click the default setting icon on the **Settings** tab.

   InterSystems IRIS then displays a dialog box with a table that displays the following columns:

Column	Description
Select check box	Shown only if the current value is not the default.
Setting	Name of the setting as displayed in the Management Portal.
Target	Indicates if the setting applies to a host or to an adapter. This is blank for a production setting.
Value	Current value of the setting.

Column	Description
Value Source	Source of the current value: • `class definition` — the value is specified in the class on which this item is based. • `default setting` — the value is a system default value. For details, see Defining System Default Settings. • `production definition` — the value is specified in the production definition.
Default	Default value for this setting.
Default Source	Source of the default value: • `class definition` — if you see this, there is no system default for this setting. • `default setting` See the notes for **Value Source**.

2. For each setting that you want to change, select the check box.
3. Click **OK**. The property label changes color depending on the **Default Source**. See Understanding the Color Coding for Settings.

   Or, if you make a mistake and want to return to the original values, click **Cancel**; the settings refresh to the previous values and the dialog box closes.
4. Click **Apply** to save all your changes.

5

Configuring Alerts

This topic describes how to configure a production to alert users about important events, such as events that require user intervention.

5.1 About Alerts

An *alert* sends notifications to applicable users while a production is running, in the event that an alert event occurs. The intention is to alert a system administrator or service technician to the presence of a problem. Alerts may be delivered via email, text pager, or another mechanism.

The alert mechanism works as follows:

- As part of the development process:
  - Within business host classes for the production, the developers include code that generates alerts when applicable.

    For information, see Generating Alerts.
  - The developers define an additional business host class called an *alert processor* (also called an *alert target*). The alert processor contains the logic to contact each user in the most appropriate way.

    The developers might also develop business operations for the alert processor to call.

    For information, see Defining Alert Processors.
- You configure the production to include the alert processor, along with any business services that it requires. For details, see the next section.

All alerts *also* write messages to the Event Log, with the type Alert. See *Monitoring Productions* for details.

5.2 Configuring an Alert Processor

Each time any alert is sent, the alert text is added to the Event Log. This mechanism might be too passive for the most urgent messages. If you want the production to also actively seek the user, you must define and configure a business host that has the ability to contact a user device. This business host is known as an *alert processor* or an *alert target*.

To add the alert processor to the production:

1. Add the business host class to the production. This class is a business operation or business process class, depending on its implementation.
2. For the configuration name, specify `Ens.Alert`
3. If the alert processor has settings such as email addresses and telephone numbers, configure those.
4. Add any business services that the alert processor calls.

Note: Any production can include no more than one alert processor.

5.3 Configuring Alerts on Errors

InterSystems IRIS can send alerts automatically whenever a business host encounters an error condition. The Alert On Error setting controls this behavior. If Alert On Error is True, then whenever the business host encounters an error, InterSystems IRIS triggers an alert.

Note that business hosts provide an optional grace period that enables the business host to retry before triggering the alert. Depending on the kind of business host, this grace period is specified by the setting Alert Grace Period or Alert Retry Grace Period.

5.4 Configuring Alerts on Queue Buildups

InterSystems IRIS can send alerts when a business host's queue has too many messages or has messages that have waited too long. To enable these alerts, specify the following settings with nonzero values:

- Queue Count Alert — When the number of items in the queue exceeds this threshold, an alert is triggered. This alert has the prefix `QueueCountAlert:` (not localized). This alert is useful in situations where large queues are building up.
- Queue Wait Alert — Length of time that a message can wait in the queue or be the active message before an alert is triggered. This alert has the prefix `QueueWaitAlert:` (not localized). This alert is useful in situations where a queue is not processing messages.

5.5 Other System Alerts

InterSystems IRIS generates alerts on other occasions, including the following:

- When a job is marked as dead.

  This alert is prefixed with the non-localized text: `DeadJobAlert:` for simplified routing and handling.
- When a business host is marked as inactive, according to its Inactivity Timeout setting.
- When a business operation suspends its current message.

6

Defining Reusable Items for Use in Settings

This topic describes how to define certain reusable items for use as values of settings.

You might also need to define TLS configurations. For information, see InterSystems TLS Guide.

Also see Defining System Default Settings.

6.1 Defining Business Partners

InterSystems IRIS® data platform provides a way to add additional information to a production to help with the management of a production. A business partner profile is information about an organization or application connected to your InterSystems IRIS system. For each business partner, you can provide information such as the partner name, notes, primary and alternative contacts, and contact details. Defining a profile has no effect on the behavior or running of the production. It simply gives you a means to store more information.

For example, suppose your production talks to ABC Hospital and XYZ Hospital. You can enter profiles for both of these along with contact information. When you configure items that talk to these organizations, you can specify the defined **Partner Name** for each business host.

The **Interoperability** > **Configure** > **Business Partners** page allows you to view and edit profiles to store information about your business partners for use in your productions.

The page lists any Business Partner Profiles you have already defined and allows you to enter a new profile or edit an existing one in the right pane of the page.

Enter the required unique **Partner Name** and optional **Description** and then the following information for a **Primary Contact** and **Alternate Contact**:

- **Name**
- **Title**
- **Email address**
- **Phone Number**
- **Mobile Phone Number**
- **Notes**

Click **Save** to store this information in the current namespace. When you are configuring productions, this names appears in the **Business Partner** configuration setting list, which you can choose to use in your production enabling you to categorize business host items in your production by business partner.

To delete a specific business partner profile, select it from the list so it appears in the right pane and then click **Remove**.

6.2 Defining Credentials

Some remote systems require a username and password to log in to that system. A username-password pair is a login credential. InterSystems IRIS permits you to store login credentials in a centralized, secure table; only users with appropriate access to the Management Portal can view and edit this table.

The **Interoperability** > **Configure** > **Credentials** page displays the Credentials table for the current namespace.

Each entry in the Credentials table has an **ID** which you use as the value of the **Credentials** setting when configuring business services or business operations for the production. Adding an entry to the Credentials table for a production consists of assigning an **ID** to a username-password pair. You can also store an informational business partner name with the credential.

The **Credentials** page displays a list of defined credentials associated with the current namespace. Each row in the table has the following columns:

- **ID** — Unique string that identifies this username-password pair; the name you use in the **Credentials** setting when configuring a business service or business operation to establish a remote connection.
- **User name** — Username with which to log on to the remote system.
- **Password** — Password corresponding to the logon username.
- **Business Partner** (*Optional*) — Name of the business partner profile associated with this item.

  When editing, you can choose a profile from the list and view its details by clicking the magnifying glass. You can also create or edit a profile by clicking the **Business Partners Configuration Page** link.

When you select a Credential row, the right pane displays the current settings. If you do not select a row, the right pane shows empty fields for you to create a new credential. Enter values in the fields as outlined in the table description. You have the choice of two actions to perform in the **Credentials Viewer**:

- Click **Save** to store the updated or new values as a credential and display it in the table.

  If you choose to edit a row and change the ID, when you click **Save**, you must verify that you want to rename the credential.
- Click **Remove** to delete the selected credential.

CAUTION: You cannot undo the **Remove** operation.

6.3 Defining Schedule Specifications

The default scheduling for business hosts is for them to run whenever the production is running. However, a finer control is possible. Not only can you enable and disable business hosts, but the **Interoperability** > **Configure** > **Production** page also provides a **Schedule** setting for each business host. This is an optional command string that schedules the item to be stopped and started at specific times and on specific days of the week, month, or year. When it is time to start, if the item is enabled, the scheduler starts it; when it is time to stop, if the item is running, the scheduler stops it.

The **Interoperability** > **Configure** > **Schedule Specs** page aids you in creating a string to use in this configuration setting. Once you create a schedule string and give it a name, you can use this string as a value for the Schedule configuration setting.

6.3.1 Schedule Specifications

The **Schedule** string is a comma-separated list of event specifications. Each event specification has the following format:

action:*YYYY*-*MM*-*DD*T*hh*:*mm*:*ss*

Where each item in the event specification, from left to right, has the described values:

Item	Possible Values
action	START or STOP indicates the desired action
:	Required separator
YYYY-*MM*-*DD*	Either: • *YYYY* is the year as 4 numerals • *MM* is the month as 2 numerals • *DD* is the day of the month as 2 numerals • Any of these fields may be the single character * (asterisk) indicating all years, all months, or all days Or: • *YYYY* is the word WEEK • *MM* is the specific occurrence of the day of the week (indicated by *DD*) in the month (01 = first occurrence of the specific day of the week in the month, 02 = second occurrence in the month, etc.) • *DD* is a specific day of the week (00 = Sunday, 01 = Monday, etc.) • *MM* may be * for all occurrences and *DD* may be * for all days Once a field is specified as *, all fields to the left of it are also assumed to be *. Thus, if the *DD* value is *, the *MM* value is treated as * even if it has a specific numeric value. Similarly, if *MM* is *, *YYYY* is treated as *.
T	Required separator
hh:*mm*:*ss*	Hour, minute, and second
,	Use the comma separator only if there is another event specification after the current one. Do not use it at the end of the **Schedule** string.

If you set a schedule specification to be deployable, then the specification can be included when you export the production. When you are exporting the production, select **Deployable Settings** and select the Ens.Util.Schedule setting.

See the Ens.ScheduleHandler entry in the *Class Reference* for more information.

The following sections provide examples, details on Daylight Saving Time considerations, and the intended use and limitations of the setting.

6.3.2 Examples

If your schedule contains recurring events, the **Schedule** setting requires both START and STOP actions. If your schedule setting is an absolute one time event, then you need only use the appropriate single START or STOP action. In most cases, **Schedule** strings should contain both a START and a STOP action.

Some examples of **Schedule** strings follow:

- Start the business host every day at 8 a.m. and stop it every day at 5 p.m.

  ```
  START:*-*-*T08:00:00,STOP:*-*-*T17:00:00
  ```

- Stop every year on January 2 at 7 a.m. and start again on January 3 at 7 a.m.

  ```
  STOP:*-01–02T07:00:00,START:*-01-03T07:00:00
  ```

- Start every month on the second day of the month at 8 a.m. and stop every month on the tenth day of the month at 8:30 p.m.

  ```
  START:*-*-02T08:00:00,STOP:*-*-10T20:30:00
  ```

- Stop every Sunday at 10 a.m. and start every Monday at 8:30 a.m.

  ```
  STOP:WEEK-*-00T10:00:00,START:WEEK-*-01T08:30:00
  ```

- Start every third Tuesday at 9 a.m. and stop every third Friday at 4 p.m.

  ```
  START:WEEK-03-02T09:00:00,STOP:WEEK-03-05T16:00:00
  ```

- Stop on December 31, 2010 just before midnight.

  ```
  STOP:2010-12-31T23:59:59
  ```

- Start on January 3, 2011 at 6:45 a.m.

  ```
  START:2011-01-03T06:45:00
  ```

- The following two strings are equivalent: Start every day at 2 a.m.

  ```
  START:*-*-*T02:00:00
  START:WEEK-*-*T02:00:00
  ```

6.3.3 Scheduling and Daylight Saving Time

When daylight saving time (DST) begins, clocks skip an hour that day, usually from 2:00 a.m. to 3:00 a.m. Any item you have scheduled that falls into that nonexisting hour takes place at the beginning (which is also the end) of that hour. For example, on the day DST begins, an event scheduled to take place at 2:15 a.m. takes place at 2:00 a.m. (which is also 3:00 a.m.).

When DST ends, an hour of the day repeats, usually from 1:00 a.m. to 2:00 a.m. Any item you have scheduled that falls in that repeated hour takes place only once. Whether the event takes place on the first occurrence of the scheduled time or the second occurrence in the repeated hour depends on the operating system, but it only takes place once. For example, on a Windows system on the day DST ends, an event scheduled to take place at 1:15 a.m. takes place at the second occurrence of 1:15 a.m.

6.3.4 Intended Use and Limitations

The **Schedule** setting starts and stops production business hosts according to a schedule; it is not a task scheduler. The schedule string defines a square wave in time declaring during what time intervals the item *should* be running, in between which it should be not be running. InterSystems IRIS cannot prevent scheduled transitions from being interrupted or superseded by other production events.

The scheduler wakes up periodically (it sets its own alarm clock for when any scheduled item next expects a transition) and attempts to start or stop any items that are not currently in the expected state according to their schedule strings. It runs the **UpdateProduction()** method of the Ens.ScheduleHandler class and checks what event it needs to schedule next.

There are two general classes of things that can prevent transitions from taking place as the schedule string indicates:

- The scheduler might be unable to cause the intended state change; that is, the **UpdateProduction()** method fails to affect the relevant items.

  For example, an item could be in a Read timeout or some other busy state that lasts longer than the Update timeout. Another example is a business host the scheduler starts cannot be stopped by the scheduler if the item is in the middle of a synchronous call. The business host must wait for a response to the call before the scheduler stops it.

- The scheduler might not be able to wake up at the intended time. Examples of conditions that could cause this: the CPU is busy, a queue builds up of the alarm clock messages for the scheduler, the scheduler is itself disabled or crashed, the production is down, etc. The scheduler is not guaranteed to wake up during any particular interval, and when it does wake up it only looks at the intended state for the current moment, not at any history of when it *should have* woken up.

Use of the schedule setting is not intended or designed as an event signaling device. It is intended to accommodate planned outages and scheduled intervals of activity or inactivity. If you have events that you must trigger at a particular time or as soon as possible thereafter, InterSystems IRIS provides better alternatives:

- You can configure your business service to use an inbound adapter with the implemented **OnTask()** method where you call the business service. InterSystems IRIS provides classes for many types of inbound adapters. See the Ens.InboundAdapter entry in the *Class Reference* and the books in the *Application Development: Using Adapters and Gateways in Productions* set for details.

- If you do not want to use an adapter, you can call the business service programmatically and schedule it to run using the **System Operations** > **Task Manager** page in the Management Portal. This gives you finer control in situations such as the system being down at 1:00 a.m.

  The recommended approach is to configure the business service with **Pool Size** = 0 and then use the Task Manager to launch a task that calls **CreateBusinessService()** on it and invokes **ProcessInput()** on the resulting service instance object. The advantage of calling a business service this way is that you call it at the time you want and it runs only once. If InterSystems IRIS happens to be down at that time, your task can register an error. See the following sections for details:

  – Using the Task Manager

  – Invoking a Business Service Directly

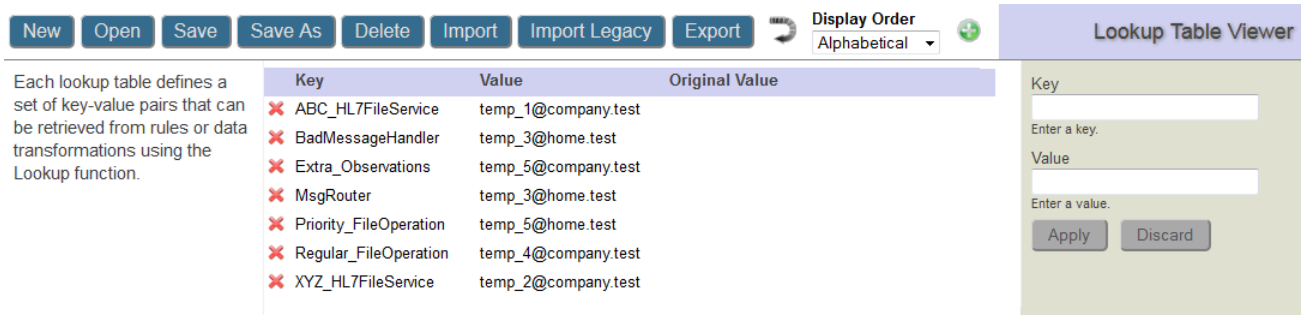
7

Defining Data Lookup Tables

The Lookup Tables portal page allows you to create and configure data tables to support the Lookup and Exists utility functions. The Lookup utility function is provided so that you can easily perform a table lookup from a business rule or DTL data transformation. To avoid possible complications when exporting a lookup table, it is recommended that you avoid using special characters when naming the lookup table. As an exception, it is safe to use periods (.) in the name.

For details, see Utility Functions for Use in Productions in *Developing Business Rules*.

The Lookup function works only after you have created a lookup table and have populated it with data. You can do this selecting **Interoperability**, **Configure**, and **Data Lookup Tables**. If you click **Open**, a dialog box lists the lookup tables that are defined in the namespace. Select a lookup table and InterSystems IRIS® displays the following form:



To edit entries in a lookup table, you can:

- Delete an entry by selecting the red X icon. The entry is deleted when you save the table. Until you have saved the table, you can restore the entry by selecting the green + icon that is displayed to the left of the entry.
- Update an entry by entering the same key as the entry and a new value in the form on the right and then selecting **Apply**. After you update the value, the original value is displayed in the **Original Value** column until you save the lookup table. Selecting an existing entry populates the form on the right with the entry's current values.
- Add a new entry by entering a new key and its value in the form on the right and selecting **Apply**.
- Undo the previous action by selecting the curved arrow in the menu bar.

Note: Selecting an entry has only one effect: initializing the values in the form on the right. Selecting **Apply** acts on the entry specified in the **Key** field not on the selected entry. If the key field matches an existing entry, that entry is updated. If the key field does not match an existing entry, then a new entry is added. Selecting the green + icon on the menu bar or selecting **Discard** clears the form but does not have any other effect.

You can take an action by selecting one of the following buttons:

- **New**—Displays a form so that you can name the lookup table and then displays the empty table. Add entries to the table by entering in key and value pairs and selecting **Apply** for each pair. You must select **Save** to make the lookup table permanent.
- **Open**—Displays the lookup tables defined in the current namespace and allows you to select one.
- **Save**—Saves the current lookup table with any edits that you have applied. Clears the **Original Value** column and removes deleted records.
- **Save As**—Saves the current table entries to a new table. Specify the new table name and select **OK**. Clears the **Original Value** column and removes deleted records.
- **Delete**—Deletes the current table. If you have made any edits to the table since opening it, InterSystems IRIS asks if you want to leave the page. To delete the table, select **Leave Page**. If you select **Stay on Page**, InterSystems IRIS treats the current table as if it were a new table.
- There are two ways to import lookup tables: **Import Legacy** and **Import** . An important difference between them is that when you are importing a lookup table with the same name as an existing lookup table, **Import Legacy** merges the existing table with the data from the file and **Import** replaces the existing lookup table with the data from the file.
  - **Import Legacy**—Imports the lookup tables defined in the file. If an imported lookup table has the same name as an existing table, the values are merged. If a key is defined in the file, it overwrites any existing value of that key in the lookup table.
  - **Import**—Adds new lookup tables that are defined in an XML file. If any of the new tables have the same name as an existing table, the new table replaces the old one. Select **Browse** to specify an XML file, then select **Open**. The form displays the LookUp Table (LUT) document or documents defined in the file. You can select all of the lookup tables or some of the lookup tables listed, then select **Import** to import the lookup table(s). The **Import** button can only import the new file format (see following note).

  Note: There are two lookup table file formats: a new format and the legacy format. The new format contains additional XML Document tags. **Import Legacy** can handle both the new and the legacy format, but **Import** can only handle the new format. The new format is exported by Studio and by the **Export** portal button. The old format is exported by the **Ens.Util.LookupTable.%Export()** method. See Lookup Table File Format for a description of the lookup table file formats.

- **Export**—Exports the current table to an XML file. Although you can specify the name of the file, the lookup table exported has the same name as the current lookup table and does not use the file name. You can export only using the current XML format; you cannot export the legacy XML format with this release.

  If you used special characters when naming the lookup table, you may encounter issues when exporting the table. As a workaround, you can export the entire `^Ens.LookupTable` global rather than an individual table. For details, see Exporting Globals. Alternatively, you can export the global subscript that corresponds to the name of a lookup table. For example, to export the lookup table `My/Lookup/Table`, call:

```
set st = $SYSTEM.OBJ.Export("Ens.LookupTable(""My/Lookup/Table"").GBL","filename.xml")
```

CAUTION: You cannot undo the **Delete**, **Import**, or **Import Legacy** operation.

Note: If there is an existing lookup table with the same name, the **Import** button has a different behavior from the **Import Legacy** button. The **Import** button completely replaces the contents of the existing lookup table. In contrast, the **Import Legacy** button merges the new values with the existing values.

For information on working with lookup tables in programs, see Programmatically Working with Lookup Tables.

The following subsections describe:

- Lookup Table File Format
- Importing Flat Files As Data Lookup Tables

7.1 Lookup Table File Format

There are two XML formats that describe lookup tables: the new format and the legacy format.

The new Lookup Table XML format consists of one or more XML Document elements, for example:

```
<?xml version="1.0" encoding="UTF-8"?>
<Export
  ts="2014-10-21 11:52:51">
  <Document name="AlertTable.LUT">
  <lookupTable>
      <entry table="AlertTable" key="BadMessageHandler">temp_1@company.test</entry>
      <entry table="AlertTable" key="Extra_Observations">temp_5@company.test</entry>
      <entry table="AlertTable" key="MsgRouter">temp_3@home.test</entry>
      <entry table="AlertTable" key="Priority_FileOperation">temp_5@home.test</entry>
      <entry table="AlertTable" key="Regular_FileOperation">temp_4@company.test</entry>
    </lookupTable>
  </Document>
</Export>
```

The XML elements have the following syntax:

- Each `Document` element must has a `name` attribute that specifies the lookup table name and has a file type .LUT.
- Each `Document` element contains one `lookupTable` element.
- Each `lookupTable` element contains a list of `entry` elements.
- Each `entry` element has a `table` attribute that specifies the same table name as specified in the `Document` name, specifies a `key` attribute, and specifies the value of the entry as text.

The legacy format exported by the **Ens.Util.LookupTable.%Export()** method does not have the `Document` element. It consists of just a single `lookupTable` element and the `entry` elements that it contains. It can contain entries for multiple lookup tables by specifying different names in the `table` element.

7.2 Importing Flat Files as Data Lookup Tables

You can import a flat file as a data lookup table, if the file is as follows:

- It can include a header row.
- It must include three values, separated by spaces, commas, tabs, or another delimiter.
- From left to right, the three values must correspond to the **Value** column of a lookup table, the **Key** value of a lookup table, and the desired name of the lookup table.

To import such a file as a lookup table, use the Data Import Wizard, as described in Importing Data from a Text File. For the schema name, use **Ens_Util**. For the table name, use **LookupTable**.

8

Defining System Default Settings

This section discusses system default settings. It includes the following sections:

- Purpose of System Default Settings
- Accessing the System Default Settings
- Creating or Editing a System Default Setting
- Using System Default Settings

8.1 Purpose of System Default Settings

The purpose of *system default settings* is to simplify the process of copying a production definition from one environment to another. In any production, the values of some settings are determined as part of the production design; these settings should usually be the same in all environments. Other settings, however, must be adjusted to the environment; these settings include file paths, port numbers, and so on.

System default settings should specify only the values that are specific to the environment where InterSystems IRIS is installed. In contrast, the production definition should specify the values for settings that should be the same in all environments.

System default settings only apply within a single namespace. They can be applied to all productions, business hosts, and business host classes or a subsect of these. For example, you could create a system default setting for all business hosts within a single production or for a single business host in all productions.

To find the value for a setting for a production, business host, or adapter, InterSystems IRIS searches the following locations, in order:

1. The production definition. If InterSystems IRIS finds a value for a setting here (even if the value is an empty string), it uses that value unless the value is overridden by the system default setting.
2. The system default settings, which are stored outside the production definition.

   If InterSystems IRIS finds a value here (even if the value is an empty string), it uses that value.
3. The value of the setting as specified in the definition of the class on which the production, business host, or adapter is based.

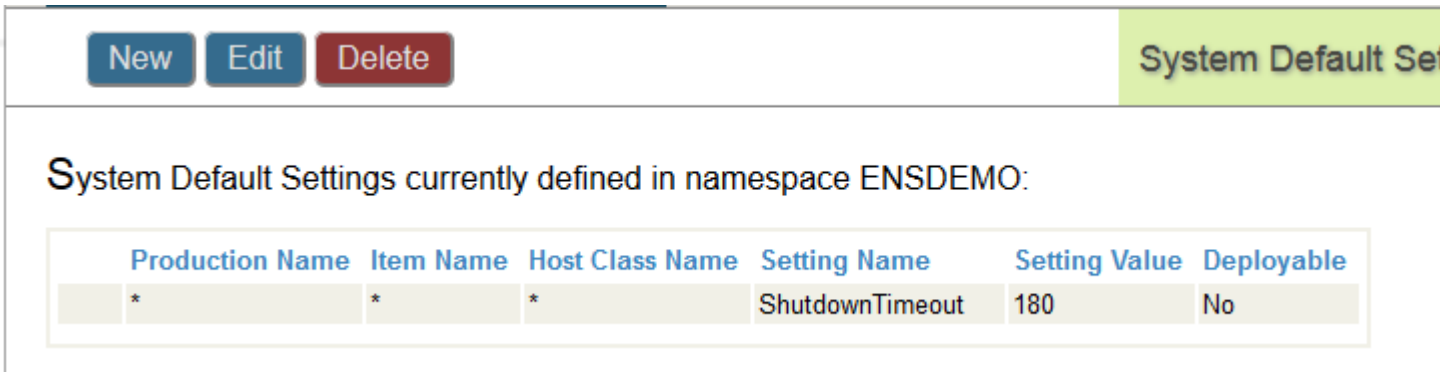
   InterSystems IRIS uses this value only if there is no system default for the setting.

   Some settings do not have any default value.

When you configure a production, the labels are color-coded to indicate whether the value was set in the production, the system default settings, or the class definition. See Understanding the Color Coding for Settings for more information.

8.2 Accessing the System Default Settings

To access the System Default Settings page, select **Interoperability** > **Configure** > **System Default Settings**. The System Default Settings page displays the settings defined in the namespace:



To create a new system default setting, click **New**. To edit an existing setting, select the setting and click **Edit**. To delete a setting, select the setting and click **Delete**.

Note: Security privileges may restrict you from creating, editing, or deleting some of the system default settings. For information about these security privileges, see Security for System Default Settings.

The following elements define a system default setting:

- **Production Name**—Optionally, specifies the production to which this default applies. If set to *, this default applies to all productions in the namespace.

  Note: You cannot change the value of this field once you save the default. You must delete the default and create a new one.

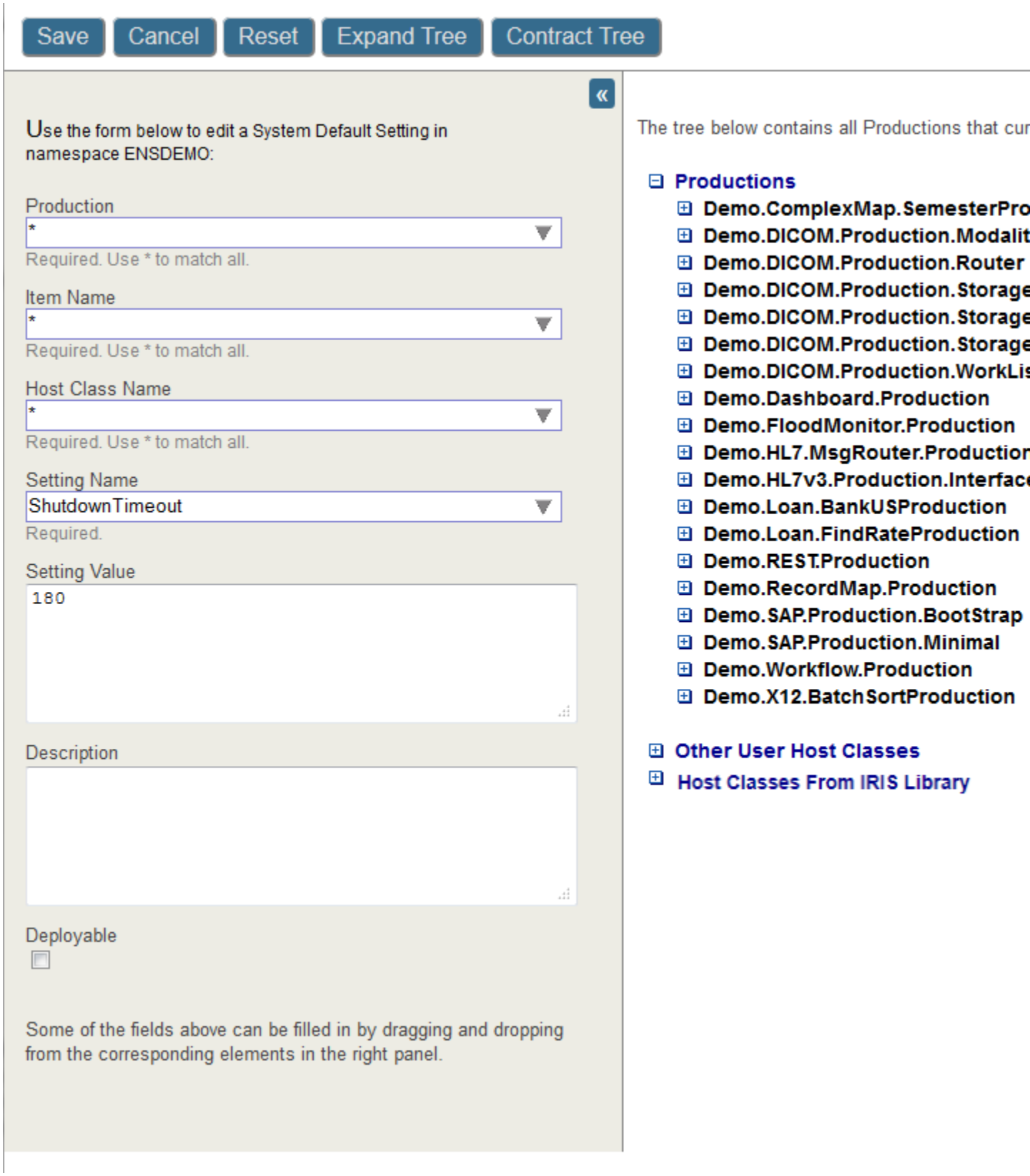
- **Item Name**—Optional, specifies the business host to which this default applies. If set to *, this default applies to all hosts in the production or in all productions.
- **Host Class Name**—Optional, specifies the class of the business host to which this default applies. If set to *, this default applies to all hosts in the production or in all productions.
- **Setting Name**—Specifies the name of the property to set. Note that property names do not include spaces. In most cases, the property name is similar to the setting name, with the spaces removed. For example, the setting **Log Trace Events** is based on a property called LogTraceEvents.

  Tip: You can see the property name within the popup window that displays descriptive text for the setting.

- **Setting Value**—Specifies the value to assign to the property. If this field is blank; it sets the default to an empty string.
- **Description**—Optional, specifies a description of the default.
- **Deployable**—If set, the system default setting can be deployed to another production. For more information about deployment, see Deploying a Production.

8.3 Creating or Editing a System Default Setting

If you are creating a new system default setting or editing an existing one, InterSystems IRIS displays the following form:



The System Default Setting page allows you to create a new system default setting or edit an existing one. For convenience it displays a tree of productions and other classes. This allows you to find existing settings and drag the names and values to the form. The **Expand Tree** and **Contract Tree** buttons and the plus and minus icons allow you to explore the tree to locate the property you are seeking.

While you can use an asterisk (*) in the**Production**, **Item Name**, and **Host Class Name** fields to apply a setting to all the productions in a namespace, you cannot use other wildcard input such as `EnsLib*`. Additionally, you can specify only one value in each of these fields.

Note: Your security privileges determine which system default settings appear in the tree. For information about these security privileges, see Security for System Default Settings.

When you have completed defining or updating the system default setting, click **Save**. The **Cancel** button discards any changes and returns to the list of system default settings without creating or updating a setting. The **Restore** button returns to fields to their initial values and allows you to edit the values.

8.4 Using System Default Settings

When using a wizard to create the business service or operation, use the **Default applies if no value** check box to specify that you want to use system default settings when available. This option is selected by default.

Without the **Default applies if no value** option, the business host is created with blank values, not the system defaults. In this case, you must manually change the value of the setting to the default on the **Settings** tab of the Production Configuration window. For instructions, see Restoring a Setting to Its Default Value.

8.5 Using System Default Setting to Override Production Values

Some system default settings can override the corresponding production and business host class values. If a value is specified for these system default settings, that value will be used for all productions in the specified environment. User will not be able to change the value for individual production or business hosts. The system default setting will have to be deleted or changed in order to change the value in an individual production. Users will be unable to change these values in a production and will instead be prompted that the system default setting will need to be updated. Additionally, any productions in the given environment with different values for these setting will be updates so that the settings match the system default setting.

Any settings whose values are determined in this way will be colored blue (to demonstrate that the value is determined by a system default setting). See Understanding the Color Coding for Settings for details.

For productions, the settings that will override the production class values include:

- **ActorPoolSize**
- **TestingEnabled**

For business hosts, the settings that will override the business host class values include:

- **Enabled**
- **PoolSize**

9

Configuring Default Settings for Manually Purging Production Data

As productions run in a given namespace, InterSystems IRIS may write entries to the Event Log, message warehouse, business process log, business rule log, and I/O archive log for the namespace. Since the entries can accumulate over time and consume large amounts of disk space, InterSystems IRIS enables you and other users with appropriate permissions to purge outdated entries. You can do so manually; that is, you can purge production data on an ad hoc basis. You can also schedule regular purges. For more information, see Purging Production Data.

InterSystems IRIS enables you to configure default settings for manual purges. The defaults apply on the **Purge Management Data** page and can be overridden only by users with appropriate permissions. For more information, see Controlling Access to Management Portal Functions.

To configure default settings for manual purges in a namespace, navigate to **Interoperability** > **Configure** > **Purge Data Settings** in the namespace. Alternatively, set the following nodes of the `^Ens.Configuration` global for the namespace:

```
^Ens.Configuration("PurgeSettings","BodiesToo")

^Ens.Configuration("PurgeSettings","KeepIntegrity")

^Ens.Configuration("PurgeSettings","Description")
```

CAUTION: Purges are irreversible and can lead to unintentionally orphaned data or the loss of unresolved requests. Consequently, InterSystems recommends that you carefully review the descriptions of the settings in Settings for Purging Data before you configure them.

10

Configuring Source Control Settings

There is a flag to indicate whether the source control system requires a project context to be supplied to work correctly. The flag is activated as follows:

```
Set ^%SYS("Ensemble","SourceControl", $namespace, "ProjectContext") = 1
```

Existing user templates used as dialog windows in Studio must include the Ens_SourceControl.js in /csp/broker/ensemble/ (which can be referenced by the path ensemble/Ens_SourceControl.js) to manage your browser-based interactions. This inclusion is required both for any web pages. Depending on the context required by your source control hooks, you may need to add some extra data to certain returns.

You can configure source control settings for each interoperability-enabled namespace. For information on this, see Integrating InterSystems IRIS with Source Control Systems.

The Production Configuration Page, which you reach by selecting **Interoperability** > **Configure** > **Production**, supports source control by default. If you want to exclude the Production Configuration Page from source control, select **Interoperability** > **Manage** > **Configuration** > **Interoperability Settings** and select the check box labeled **Exclude Production Configuration Page from Source Control:** then **Apply**.

When source control is in use, source control buttons appear on the page:

– Source Control Commands

– **View Source Control Output**

Click the **Source Control Commands** button to see available commands. The exact menu of commands depends on the current state of the production with respect to source control, as well as the source control implementation. The appearance of the **View Source Control Output** button changes to when there is new output to be viewed.

The following Management Interoperability browser based editors also support Source Control hooks:

- **Interoperability** > **Configure** > **Data Lookup** Tables
- **Interoperability** > **Build** > **Business Processes**
- **Interoperability** > **Build** > **Data Transformations**
- **Interoperability** > **Build** > **Business Rules**
- **Interoperability** > **Build** > **Record Maps**
- **Interoperability** > **Build** > **Complex Record Mapper**

Note: If a production is under source control and you do not have it checked out for update, you cannot modify the production definition. You can temporarily **Stop**, **Start**, and **Restart** business hosts by using the buttons on the **Action** tab. These buttons temporarily stop or start the host but do not modify the production definition. A business host can only be temporarily stopped if it has a pool size greater than 1 or in the case of Business Processes and Business Operations are invoked Queue and not InProc.

11

Configuring a Mirror Virtual IP as the Network Interface

If you set up a mirror virtual IP (VIP) in your environment, you can optionally specify the VIP as the destination for connections from some production components. Specifically, you can use the VIP for outgoing connections when the production component has a **Local Interface** setting. For example, TCP adapters have a **Local Interface** setting, which you can set to the VIP.

12

Configuring the Enterprise Message Bank

The Enterprise Message Bank is an optional remote archiving facility where you can collect messages, Event Log items, and search table entries from *multiple* InterSystems IRIS® client productions. This topic describes how to configure it.

Identifying Enterprise Systems for Viewing and Monitoring describes how to configure enterprise systems so that you can resend messages from the Message Bank.

For information on defining the Enterprise Message Bank, which is a specialized production, see Defining an Enterprise Message Bank.

For information on using it, see Using the Enterprise Message Bank.

12.1 Configuring the Message Bank Link

The **Interoperability** > **Configure** > **Message Bank Link** page allows you to configure a link (for this namespace) to the Enterprise Message Bank.

On this page, provide the following information so the InterSystems IRIS® can connect to the Message Bank (if defined):

- **Web Server IP Address** — Specify the IP address of the machine on which the Message Bank is running.
- **Web Server Port Number** — Specify the port number used by the web server that is configured for use with InterSystems IRIS on that machine.
- **Instance Prefix** — Specify the path for the instance of InterSystems IRIS on the web server. This is required if you are using HealthShare Health Connect as the target Message Bank. Also, if you are using a different web server, potentially with other instances of InterSystems IRIS using the same web server, you must specify this prefix so that the Message Bank can construct URLs that connect with the correct InterSystems IRIS instance through the web server.
- **Message Bank Production Namespace** — Specify the InterSystems IRIS namespace in which the Message Bank production is running.
- **Use SSL To Connect To The Message Bank Web Server** — Select this to use TLS to connect to the Message Bank.

For information on defining the Enterprise Message Bank, which is a specialized production, see Defining an Enterprise Message Bank.

12.2 Configuring a Client Production to Send Messages

You must configure each desired client production to send messages to the Message Bank. For each client production, perform the following configuration steps:

1. Add the specialized message bank operation (Ens.Enterprise.MsgBankOperation) to the production and configure it as needed.

   Note: For this business host, **Operation Name** must be the Message Bank operation class name. Either leave this blank to use the default class name or enter `Ens.Enterprise.MsgBankOperation`.

   See the following subsection for configuration details.

2. If you have not yet done so, configure the link to the Message Bank, as described in the previous section.

   Or navigate to the **Interoperability** > **View** > **Enterprise Message Bank** page. The first time you enter the **Enterprise Message Bank** page, InterSystems IRIS prompts you for information to define the link. This information is the same as described earlier.

Now the production is configured to send messages to the Message Bank, and the Management Portal has a link to the Message Bank web pages.

Important: While the Enterprise Message Bank can receive messages without having the sending production listed as an enterprise system, it cannot resend messages without access to the credentials. Indentifying Enterprise Systems for Viewing and Monitoring has instructions on enabling access to productions, so that messages can be resent.

12.2.1 Configuring a Message Bank Business Operation

Configure the following settings specifically for the Message Bank:

Enable Archiving

Set to True. This starts messages queuing from all business hosts in the client production. Note that this queueing continues even if you disable the operation and while it is not able to connect to the Message Bank. The operation forwards any queued messages to the Message Bank server whenever it is enabled.

If set to False, the operation does not queue any messages for the Message Bank.

IP Address

IP address of the Message Bank production. Note that this does not include the web server port number.

Port

TCP port number used by the Message Bank production input service (9192 is the default).

Optionally configure the following additional settings:

Archive Items

Controls which messages to send to the Message Bank. The default behavior is to archive everything except scheduler messages as shown by the value:

```
*[*],-Ens.ScheduleService[*],-Ens.ScheduleHandler[*]
```

See the following subsection.

Event Log Interval

How frequently should we check for conforming Event Log events that may need to be forwarded to the Message Bank server. 0 means check only when messages are being forwarded.

Force Keepalives

If set to True, send empty event submissions periodically if no conforming events need to be submitted.

MyForceIPAddr

IP address to report to the Message Bank server. If you do not specify a value, the business operation queries the local system and reports the local IP address.

You may choose to specify an IP address for several reasons:

- The client machine is a member of a cluster with a common cluster IP address. If you specify the cluster IP address, the Message Bank server responds to the cluster rather than to the client machine.
- The client machine is multi-homed and associated with more than one local IP address. In this situation, you can specify which local IP address the business operation reports to the Message Bank server. Doing so prevents the Message Bank server from generating multiple **Node Id** values for the client machine.

You can modify the MyForceIPAddr setting only from the ObjectScript shell by defining the MyForceIPAddr node of the `^Ens.MsgBank` global, for example:

```
set ^Ens.MsgBank("MyForceIPAddr") = "192.0.2.23"
```

Specifying the MyForceIPAddr setting may prevent the Message Bank server from automatically recognizing that a client has been upgraded or otherwise modified. Additionally, the setting may prevent the Message Bank from generating new **Node Id** values for client machines that report the same **Node Id** value. If multiple client machines contribute messages under the same **Node Id**, message ID collisions in the Message Bank repository may occur.

For information on other settings, see the following:

- Settings in All Productions.
- Reference for TCP Adapter Settings. (The Ens.Enterprise.MsgBankOperation class uses a TCP adapter and thus inherits settings from it.)

12.2.2 Details for the Archive Items Setting

The **Archive Items** setting controls which messages the production sends to the Message Bank. It is a comma-separated list of configuration names of items whose messages are to be archived to the Message Bank server.

Archive log events for each item using the following colon-separated syntax:

```
item[evtype1:evtype2:Trace_cat]
```

Within the event type brackets, you can use the following characters in your selection list:

Pattern character	Placement	Resulting action
*		include all event types
-	at the front of an item	exclude the type from archiving entirely
!	at the end of an item	exclude message bodies from archiving
$	at the end of an item	exclude search table entries from archiving
-	at the end of an item	exclude message headers from archiving
_	for events of type Trace	optionally used to select a particular category of trace event. Event type Trace without a suffix means Trace events of all categories.

For example:

- `*[*]` — Archive everything
- `*$[*],Ens.Alert![-*]` — Archive all events, headers, and bodies but not SearchTable entries; but do not archive bodies or events from item Ens.Alert.

Note: InterSystems IRIS only archives trace events if it has logged them. You can use these settings only to restrict which *logged* events get archived, not to archive any events that you did not configure to be logged.

12.3 Configuring the Message Bank Service on the Server

The Ens.Enterprise.MsgBank.TCPService component on the Message Bank server helps process the incoming messages from the Message Bank client productions. If you have configured enterprise systems, the TCPService uses the information that you defined to associate the incoming message with the enterprise system. See Identifying Enterprise Systems for Viewing and Monitoring for details on configuring enterprise systems. If you do not identify the enterprise system, the monitor service identifies the incoming message based on the elements of the message.

There are two cases where it there may be conflicting information to identify the enterprise system sending the message:

1. If the enterprise system has multiple IP addresses and the system restarts it may be sending messages from a different IP address. To instruct the Message Bank to recognize that these messages are coming from the same enterprise system as the earlier messages, select the **Ignore Client IP Changes** check box on the Ens.Enterprise.MsgBank.TCPService.
2. Although it is not a recommended configuration, it is possible to terminate an enterprise system and restart a new one with the exact same configuration and name but resetting the message IDs. Since the message IDs are not related to the ones in the messages sent by the previous enterprise system, the Message Bank should treat it as a new enterprise system. In this case you should clear the **Ignore Client IP Changes** check box on the Ens.Enterprise.MsgBank.TCPService.

The **Ignore Client IP Changes** check box does not affect how the Message Bank treats enterprise systems that are part of an InterSystems IRIS mirror set (see Mirroring Architecture and Planning in the *High Availability Guide*).

13

Identifying Enterprise Systems for Viewing and Monitoring

On systems with the Enterprise Message Bank, Enterprise Message Viewer, or Enterprise Monitor, you should identify the productions that you are monitoring or whose messages you are viewing. Also, when you are using the Enterprise Message Bank, you must configure the client systems so that they permit access to the monitoring code.

13.1 Configuration on Message Bank Server or Enterprise Message Viewer

The client productions — the productions being monitored or sending to the Message Bank, are called *Enterprise Systems*.

When you identify a production you specify its system address and the credentials needed to access it. To use the Enterprise Message Viewer or Enterprise Monitor for a production you must identify the production in the Enterprise System list. Although the Enterprise Message Bank can receive messages without having the sending production listed as an enterprise system, it cannot resend messages without access to the credentials. Although you can monitor messages on the Message Bank without configuring the enterprise systems, you should configure an enterprise system for every production sending messages to the Message Bank.

To enable access to the productions, do the following in the Management Portal on the Message Bank Server or on the system with the Enterprise Message Viewer:

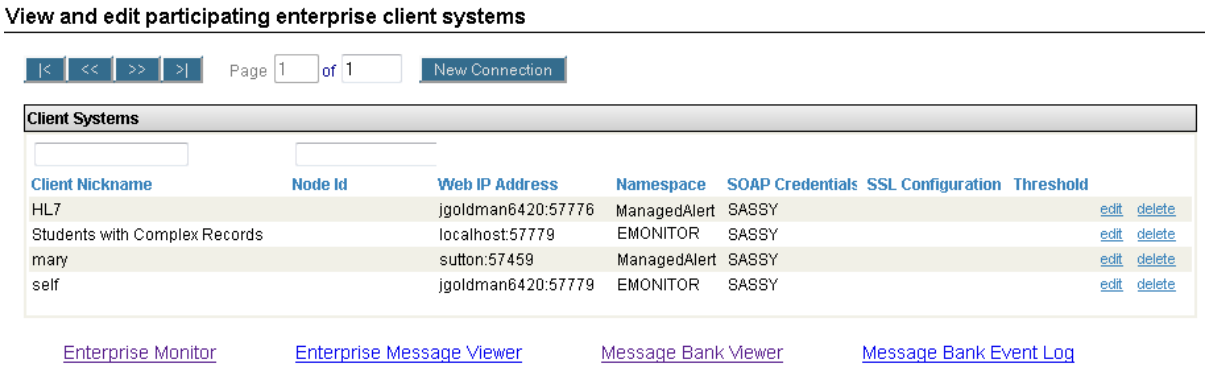
1. Create production credentials that have an InterSystems IRIS® username and password for a user that has sufficient privileges to access the production.

   For information, see Defining Credentials.

2. If needed, create a TLS configuration to connect to this client production.

   For information, see InterSystems TLS Guide.

3. Navigate to the **Interoperability** > **Configure** > **Enterprise Systems** page. InterSystems IRIS then displays the list of systems that are currently defined.



4. Click the **New Connection**

   The page then displays an editing area.

5. Enter the following information:

   - **Name** — A convenient short name for this client production. You must specify a value if you want to resend messages to this production.
   - **Web IP Address** — The server IP address *and* the web server port used by InterSystems IRIS on that server (separated by a colon). For example: `enserver1:80`
   - **Namespace** — Namespace in which the client production is running.
   - **Queue Threshold**—The threshold for queues for the Enterprise Monitor.
   - **Service Web Application Path** — The URL path to the client's web application for the service `%CSP.Monitor.Server`. The URL path must end with `/` and should not include `http(s)://`. Leave blank to use the default `/csp/namespace/`. For HealthShare, an example could be `/csp/healthshare/namespace/services/`.
   - **SOAP Credentials** — Credentials to use for accessing the system. Select the production credentials created in step 1.
   - **SSL Configuration** — TLS configuration to use for viewing messages with the Enterprise Message Viewer or for resending messages from the Enterprise Message Bank.

6. Click **Save**.

7. To edit or delete an existing entry, select edit or delete.

Note: If you are using the Enterprise Message Bank, when the bank receives a message from a new namespace, it creates an entry for that system. You can edit this entry to add a name, the SOAP credentials, and the TLS configuration so that you can resend messages to this system.

13.2 Configuring Access to Monitoring Code

When you are using the Enterprise Message Bank, you must configure the client systems so that they permit access to the monitoring code. To do so, on each such system, in the Terminal, go to the %SYS namespace and enter the following command:

ObjectScript

```
Set ^SYS('Security','CSP','AllowPrefix','<monitor URL>','%CSP.Monitor.') = 1
```

For <*monitor URL*>, see the discussion of **Service Web Application Path** in the previous section. Be sure to include the trailing period as shown.

14

Creating Dashboards

This topic describes how to create dashboards that display business metrics.

For information on defining business metrics, see *Developing Productions*.

14.1 Introduction to Dashboards

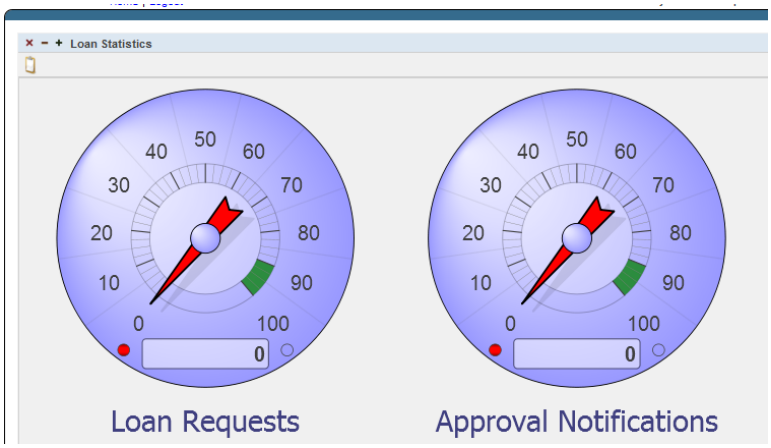
A dashboard displays business metrics or other data (such as Analytics pivot tables). InterSystems dashboards are web-based. You can display them with the Dashboard Viewer (which is a web page).

The left area of a user dashboard displays items such as the following:

- Alerts (messages from other users of the User Portal). These are unrelated to InterSystems IRIS® Interoperability alerts.
- List of recently accessed dashboards.
- List of dashboards marked as favorites.

Using Dashboards and the User Portal explains how to use this user interface and how to work with dashboards.

If you click the link for a dashboard in the User Portal, the Dashboard Viewer then displays the dashboard. The following shows a simple example:



You create dashboards in the User Portal. If you want users to have access to the User Portal but not have the ability to create their own dashboards, see Setting Up Security for Business Intelligence.

You can instead embed individual dashboards in web pages. In this case, the users would not need the User Portal. For information, see Accessing Dashboards from Your Application.

14.2 Creating Dashboards

The following is an example procedure of how to create a simple dashboard. Note that not all options you see are described in these steps. (See *Creating Dashboards* for full details.)

1. In a namespace that is enabled for analytics (select **Analytics** on the namespace's web application), select **Analytics** > **User Portal**, and then select **Go**.
2. From the **User Portal**, click **New Dashboard** on the **Menu**.

   The system displays a dialog box that prompts you for basic information about the new dashboard.
3. For **Dashboard Name**, type the name of the dashboard.
4. Optionally provide values for the following options:
   - **Folder** — Specifies the folder, if any, to which the dashboard belongs. You can either type a folder name or select an existing folder. Use the slash character (`/`) to specify a subfolder. For example, you can enter the following for **Folder**:

     ```
     My Folder/My Subfolder
     ```

     Folders organize the dashboards as seen in the User Portal.
   - **Dashboard Title** — Specifies the title of the dashboard.

     If you specify a title, the main area of the User Portal displays the title of the dashboard. Otherwise, it displays the name of the dashboard.
   - **Public** — Specifies whether this dashboard is displayed in the User Portal main area.

     (Even if the dashboard is not marked as public, you can access it via **Main > Open**. Also, you can find it in the User Portal by using the Find option. See *Using Dashboards and the User Portal*.)
   - **Locked** — Enables you to temporarily prevent changes to this dashboard. If you select this option, you cannot edit the dashboard again unless you first clear the **Locked** option again.
   - **Dashboard Owner** — Optionally specifies the InterSystems IRIS user who owns this dashboard. If a dashboard has an owner, then only the owner can specify the **Access Resource** value for the dashboard; see the next item.
   - **Access Resource** — Optionally specifies the InterSystems IRIS resource that is used to control access to this dashboard. See the *Implementing InterSystems Business Intelligence*.
   - **Keywords** — Lists any keywords or phrases to help you find this dashboard later. Enter one keyword or phrase per line; that is, each line you enter here is treated as a single keyword.

     These keywords are displayed in the User Portal.
5. Click **OK**.

   The system creates, saves, and displays the dashboard, which is initially empty.
6. Click **Add New Widget** on the **Menu** and then click **Bar Chart** on the left from the list of **Pivots and Charts**.
7. Click the magnifying glass to the right of the **Data source**.
8. Click **Business Metrics** on the left of the **Finder Dialog**.

9. Click *Demo.Dashboard.Production* and then *SalesMetrics* to choose this metric as the data source. Click **OK** to add this widget to the dashboard. You now see this widget in the dashboard work space. Resize the widget graphic out so you can see what it contains.
10. Click **Save** on the **Menu** to save the dashboard.
11. Click **Home** to see the list of dashboards and then click the dashboard name you just added to view it.
12. Click the clipboard icon at top left of the bar chart, to edit the appearance of the widget you added using the **Widget Designer**.
13. Click the **Data Properties** tab.
14. Click the plus sign icon at right, click **Sales** in the **Data Value** list, and click **OK**.
15. Click the plus sign icon again, click **Units** in the **Data Value** list, and click **OK**.
16. Click **Save** on the **Menu**.
17. Refresh the browser to see the display change as the production runs.

14.3 Location of Dashboard Definitions

When you create a dashboard, its definition is visible in the Studio **Workspace** window, within the **Other** folder. You can export and import this definition as you do with other items in Studio.

A dashboard definition is not a class definition but can be copied and pasted into a special container class if needed; this container class can contain multiple dashboards and other items. For details, see Packaging Analytics Elements into Classes in *Implementing InterSystems Business Intelligence*.

14.4 For More Information

InterSystems dashboards are documented more fully within the Analytics documentation. See:

- *Creating Dashboards* describes how to create and modify dashboards.
- *Using Dashboards and the User Portal* describes how to work with the User Portal.

Settings in All Productions

This section provides reference information on settings that are present in all productions and all business hosts.

Settings in All Productions

Provides reference information for settings that are available in all productions.

Summary

All productions have the following settings:

Group	Settings
Informational Settings	Description
Basic Settings	Actor Pool Size
Additional Settings	Shutdown Timeout, Update Timeout
Development and Debugging	Testing Enabled, Log General Trace Events

Actor Pool Size

Number of system jobs available in a public pool of jobs for use by business processes that have no private pool of jobs. Allow enough for requests to keep moving through the message queues, but no more.

For a full discussion of appropriate pool sizes for different types of production, see Pool Size and Actor Pool Size.

Description

Comments that describe the production.

Log General Trace Events

Trace messages are informational text messages that InterSystems IRIS can deliver to the Terminal window and, optionally, to the Event Log. Trace messages are unrelated to Visual Trace, which provides a graphical view of production message objects as they travel through a production.

By default, the **Log General Trace Events** check box is clear. When selected, it enables logging of all trace messages issued by production elements that are *not* business hosts. Logging means that InterSystems IRIS automatically stores copies of these trace messages in the Event Log.

Each business host has its own **Log Trace Events** setting, which controls logging of trace messages from that business host. There is no overlap or interaction between these settings. **Log General Trace Events** does not override or provide a default value for **Log Trace Events**.

Shutdown Timeout

How long in seconds to wait while attempting to shut down a production before forcing the shutdown. The value must be between `0` and `3600` (or one hour). The default value is `120`.

Testing Enabled

Select this check box to enable use of the **Testing Service** pages to test this production. Clear this check box to disable the testing service.

Update Timeout

How long in seconds to wait while attempting to update the configuration for a production that is busy, before abandoning the update. The value must be between `0` and `3600` (or one hour). The default value is `10`.

Settings in All Business Services

Provides reference information for settings that are available in most or all business services.

Summary

All business services have the following settings:

Group	Settings
Informational Settings	Comment, Category, Class Name, Description, Adapter Class Name, Adapter Description, Business Partner
Basic Settings	Enabled
Additional Settings	Schedule, Pool Size, Throttle Delay, GenerateSuperSessionID
Alerting Control	Alert Grace Period, Alert On Error, Inactivity Timeout
Development and Debugging	Foreground, Log Trace Events, Archive IO

Adapter Class Name

Common to business services and business operations. The class name for the inbound adapter associated with this business host, if any. This field is read-only and is determined by the business host class definition.

Adapter Description

Common to business services and business operations. Comments that describe the adapter class. This field is read-only and displays the first line of the class annotation in the code.

Alert Grace Period

Specifies an optional grace period during which errors relating to external connections do not trigger alerts (even if **Alert On Error** is True). If the error condition still exists after the grace period, the business service triggers an alert; otherwise no alert is triggered.

Business processes and operations have a similar setting.

Alert On Error

Common to all business hosts. When this setting is set to True, as soon as the business host encounters any type of error condition it automatically triggers an alert. An alert writes a message to the Event Log and can also send notification to a user via email or pager. For details, see Configuring Alerts.

Archive IO

Common to business services and operations. If True, the adapter associated with this business service or operation logs in the I/O archive each input and output communication it shares with the external system.

Business Partner

Common to all business hosts. Specifies an optional business partner applicable to this business host. Select a business host profile, if available.

A business partner profile is information about an organization or application connected to your InterSystems IRIS system. For each business partner, you can provide information such as the partner name, notes, primary and alternative contacts, and contact details. Defining a profile has no effect on the behavior or running of the production. It simply gives you a means to store more information.

For example, suppose your production talks to ABC Hospital and XYZ Hospital. You can enter profiles for both of these along with contact information. When you configure items that communicate with these organizations, you can specify the defined business partner for each business host.

For information on defining these profiles, see Configuring Business Partners.

Category

Common to all business hosts. An optional text label that you can use to visually group business hosts within the production diagram. Category names are case-sensitive and can contain space characters.

The **Category** drop-down list contains all the categories that are used in the current production. Specify this setting as follows:

- To specify one category, either type the category name or select it from the **Category** drop-down list. If you type a category name and it does not yet exist, InterSystems IRIS creates it.
- To specify multiple categories, select the check box for each desired category from the **Category** drop-down list. Or type a comma-separated list of categories.

To delete a category, remove that category selection from all business hosts that use it. If the **Category** drop-down list still displays the category, that means that the category is still in use. In this case, filter the display to show only business hosts that use that category (see Filtering the Display by Category). Then for each of the business hosts that you see, edit the **Category** to remove the category.

Class Name

Common to all business hosts. The business host class name. This field is read-only.

Comment

Common to all business hosts. An optional text description.

Description

Common to all business hosts. Comments that describe the business host class. This field is read-only and displays the first line of the class annotation in the code.

Enabled

Common to all business hosts. Enables the business host, so that it processes messages whenever the production runs. You can also double-click a business host in the diagram to toggle between enabling and disabling it.

When the **Enabled** check box is clear, the business host is still present in the configuration, and its queue continues to accept messages, but none of these messages are processed until the business host is enabled again.

This setting is useful, for example, if there is a communications breakdown on the external side. For example, if an email server goes down, or something similar happens, you can disable the associated business service until throughput is restored.

The **Enabled** check box is a setting stored in the production class definition. If the production is read-only due to being managed by source control, you cannot change this setting unless you have checked the production out of source control. If the production is in source control, you can manage the item using the **Stop**, **Start**, and **Restart** buttons on the **Action** tab without checking the production out of source control. The action of these buttons does not change the production class.

Foreground

Common to business services and operations. By default, this check box is clear. Select it for debugging or diagnostic purposes only. Jobs in operational systems almost never run in the foreground. When you select the **Foreground** check box, any system jobs used by the business service run in a Terminal window at the front of the console display. This allows InterSystems IRIS to display debugging or trace messages in that window. See Testing and Debugging Productions.

Generate SuperSession ID

This property controls whether the message will have a SuperSessionID, which can be used to identify messages that cross from one namespace to another. If this property is set, the business service first checks the inbound message for a SuperSession ID. If it has a SuperSessionID value, it uses it; otherwise, it generates a new SuperSession value. It sets the SuperSesssion value in the production message and can also return the value in any response it sends to the caller. The HTTP business services, including the SOAP business service, define how the SuperSessionID is passed in the HTTP headers and handle the SuperSessionID without custom code. For other business services, you must define how the SuperSessionID is represented in the external message and implement the OnGenerateSuperSession callback to process it.

Inactivity Timeout

Common to all business hosts. A business host has an *Inactive* status after it has not received any messages within the number of seconds specified by the **Inactivity Timeout** field. The production Monitor Service periodically reviews the status of business services and business operations within the production, and marks the item as *Inactive* if it has not done anything within the **Inactivity Timeout** period.

The default value is 0 (zero). If this setting is 0, the business host will never be marked *Inactive*, no matter how long it stands idle.

Log Trace Events

Common to all business hosts. Trace messages are informational text messages that InterSystems IRIS can deliver to the Terminal window (if you select the **Foreground** check box) and, optionally, to the Event Log. Trace messages are unrelated to Visual Trace, which provides a graphical view of production message objects as they travel through a production.

By default, the **Log Trace Events** check box is clear. When selected, it enables logging of all trace messages issued by this business host. Logging means that InterSystems IRIS writes the trace messages to the console Terminal window (if your job is running in the foreground) and it also stores copies of these messages in the Event Log.

Pool Size

Common to all business hosts. Specifies how many system jobs to allocate to run this business host.

Notes specific to business services:

- For business services, the default is 1.
- You must use a value of 0 if the business service is being invoked via the Ens.Director method **CreateBusinessService()**; this is called an *adapterless* business service.
- You may use a value greater than 1 with File or FTP inbound adapters if you want multiple jobs competing to pull files from the same input directory, or if you have a TCP Service configured with an exclamation point (!) to make it initiate the connection.

For a full discussion of appropriate pool sizes for different types of production, see Pool Size and Actor Pool Size.

Schedule

Common to all business hosts. An optional command string that schedules stop and start times for the business host. The string is a comma-separated list of event specifications, each of which has the following format:

action:*YYYY*-*MM*-*DD*T*hh*:*mm*:*ss*

Where *action* is either `START` or `STOP` to indicate the desired event. Type a schedule string or select an existing schedule specification.

For details on the schedule string, see Configuring Schedule Specifications.

Throttle Delay

Common to business services and business operations. Specifies a period of forced idleness before processing the next message, in milliseconds. The default is 0.

For a business service, the delay occurs before each call to the adapter's **OnTask()** method. For a business operation, the delay occurs before each attempt to dequeue a new message.

This setting does not apply to SOAP services in CSP mode and other services invoked externally via **CreateBusinessService()**. It applies on a per-job basis so that operations with Pool Size greater than 1 and services with JobPerConnection as true can still generate multiple messages within the interval.

Settings in All Business Processes

Provides reference information for settings that are available in most or all business processes.

Summary

All business processes have the following settings:

Group	Settings	Notes
Informational Settings	Comment, Category, Class Name, Description, Business Partner	See these settings for business services
Basic Settings	Enabled	See this setting for business services
Additional Settings	Schedule,	See this setting for business services
Additional Settings	Pool Size, Reply Code Actions,	
Alerting Control	Alert Retry Grace Period, Queue Count Alert, Queue Wait Alert	
Alerting Control	Alert On Error, Inactivity Timeout	See these settings for business services
Development and Debugging	Log Trace Events	See this setting for business services

Alert Retry Grace Period

Common to business processes and operations. Specifies an optional grace period during which errors relating to external connections do not trigger alerts (even if **Alert On Error** is True).

This grace period starts only after the first occurrence of an error.

If the error condition still exists after the alert period expires, the business operation triggers an alert; otherwise no alert is triggered.

Note that depending on how long it takes the adapter or business operation to return errors, the business host may avoid triggering an alert even when the **Failure Timeout** expires. For instance, suppose the **Retry Interval** is 5 seconds, **Failure Timeout** is 15 seconds, and **Alert Retry Grace Period** is 14 seconds. If it takes the adapter or business operation more than 1 second to return the error, then the **Alert Retry Grace Period** goes beyond the **Failure Timeout** and the alert may not be triggered, depending on how long the adapter/operation takes to return after retrying.

Business services have a similar setting.

Pool Size

Common to all business hosts. See this setting for business services.

Notes specific to business processes:

- A business process shows no pool size if its private pool size is 0 (zero), meaning that it gets its jobs from the public actor pool shared by all business processes in the production.
- This number could be larger to allow higher throughput in some circumstances. If this number is 0, the business process has no private pool of jobs, and uses jobs from the public actor pool for the production.

- Larger numbers are not necessarily helpful; while the potential pool sizes actually range from 0–100, most pool sizes are best set to either 0 or 1, and there can be serious consequences when sizes are set to a number greater than 1.

Important: When you disable a business process, it must have a **Pool Size** = 1 or greater if you want all instances of only this business process to stop. If the business process has a **Pool Size** = 0, the action disables all business processes that share the actor pool. See Pool Size and Actor Pool Size.

Queue Count Alert

Common to business processes and operations. Specifies an alert threshold for the number of items in the queue of this business host. An alert is triggered when this threshold is exceeded.

InterSystems IRIS sends an alert when the number of items in a business host's queue reaches the threshold set by this setting for that business host. This alert has the prefix `QueueCountAlert:` (not localized). This alert is to detect large queues that are building up.

The service that checks the queue count runs every five seconds, so the granularity of the checking is somewhat limited, but should still provide timely warnings about processing and flow problems.

To disable this alert, specify this setting as 0.

For information on alerts, see Configuring Alerts.

Queue Wait Alert

Common to business processes and operations. Specifies the length of time that a message can wait in the business host's queue or be the active message before an alert is triggered.

This alert has the prefix `QueueWaitAlert:` (not localized). This alert is useful to detect whether a queue is processing messages.

To disable this alert, specify this setting as 0.

The service that checks the wait periods runs every five seconds, so the granularity of the checking is somewhat limited, but should still provide timely warnings about processing and flow problems.

If a Queue Wait alert has been triggered, then the clearing of the known delay happens when the queue delay time for the item at the head of the queue is less than 80% of the Queue Wait Alert time setting. This is to prevent false re-alerting as a queue is drained. It is possible to change the default 80% with the API: `Do ##class(Ens.MonitorService).setQWTPct(0.9)`

For information on alerts, see Configuring Alerts.

Reply Code Actions

Common to business processes and business operations. Comma-separated list of code-action pairs, specifying which action the business process takes on receipt of various reply status conditions.

The **Reply Code Actions** setting allows you to supply a comma-separated list of code-action pairs, specifying which action the business host takes on receipt of various reply status conditions. The format of the list is:

code=*actions*,(*code*,*code*)=*actions*, ... *code*=*action*

The following table lists the types of reply status condition identified by *code*.

Code	Meaning
E	Error status returned from message handler.
E#*statuscode*	Error status returned from message handler has status code equal to *statuscode*.

Code	Meaning
E*text*	Error status returned from message handler contains text string *text*.
X	There is no reply message object at all.

The following values for *action* may be used alone or combined to form strings.

Action	Meaning
C	Treat the document as *Completed OK*.
W	Log a warning but treat the document as *Completed OK*.
R	Retry the message according to the configured **Retry Interval** and **Failure Timeout** settings; finally *Fail*, unless a different action is also specified.
S	Suspend the message, log an error, and move on to try the next message (the default).
D	Disable the business process or operation, log an error, and restore the outbound message to the front of the business host queue. When you choose the disable action for a business process, you must configure the business with a **Pool Size** = 1 or greater if you want all instances of only this business process to stop. If the business process has a **Pool Size** = 0, the disable action disables all business processes that share the actor pool. See Pool Size and Actor Pool Size.
F	Fail with an error and move on to try the next message.

For example:

```
E#6301=R,E*ErrGeneral=R,E=F
```

The default value for the **Reply Code Actions** string is:

```
E=F
```

Which means when there is an error, fail and move on to try the next message.

All codes where the *actions* consists of only W (log a Warning) are evaluated and warnings generated if they trigger. Other codes are evaluated in left-to-right order, executing the first one that triggers that has a non-warning *actions* value. For example if the reply code action has the value E=RD, the business process or operation first retries to send the message until **Failure Timeout** setting and then, if the failure continues, it disables the business process or operation.

Settings in All Business Operations

Provides reference information for settings that are available in all business operations.

Summary

All business operations have the following settings:

Group	Settings	Notes
Informational Settings	Comment, Category, Class Name, Description, Adapter Class Name, Adapter Description, Business Partner	See these settings for business services
Basic Settings	Enabled	
Additional Settings	Schedule, Pool Size	
Additional Settings	Reply Code Actions	See this setting for business processes
Additional Settings	Retry Interval, Failure Timeout	
Additional Settings	SendSuperSession	
Additional Settings	Throttle Delay	See this setting for business services
Alerting Control	Alert Retry Grace Period	
Alerting Control	Queue Count Alert, Queue Wait Alert	See these settings for business processes
Alerting Control	Alert On Error, Inactivity Timeout	See these settings for business services
Development and Debugging	Foreground, Log Trace Events, Archive IO	See these settings for business services

Alert Retry Grace Period

Common to business processes and operations. Specifies an optional grace period during which errors relating to external connections do not trigger alerts (even if **Alert On Error** is True).

If the error condition still exists after the alert period expires, the business operation triggers an alert; otherwise no alert is triggered.

Business services have a similar setting.

Failure Timeout

Total number of seconds to keep trying to connect with a destination outside InterSystems IRIS. After this number of seconds has elapsed, the business operation discards the message data and returns an error code. To ensure that no message is ever skipped, enter a **Failure Timeout** value of –1, which means never time out. Use a setting of –1 when complete data delivery is critical, for example in healthcare applications.

Retry Interval

Number of seconds to wait between attempts to connect with a destination outside InterSystems IRIS.

SendSuperSession

The SendSuperSession property controls whether outbound adapters include the SuperSession property in the outgoing message. The SuperSession property is used to associate messages that cross from one namespace to another. The HTTP and SOAP outbound adapters support SuperSession and automatically write the SuperSession value to the outgoing HTTP header. Although the other outbound adapters do not automatically support SuperSession, you can add custom code that inserts the SuperSession value into the outgoing message. For details, see SendSuperSession.

Pool Size and Actor Pool Size

Provides conceptual and reference information for the **Pool Size** and **Actor Pool Size** settings.

Introduction

The choice of **Actor Pool Size** for the production, and **Pool Size** for each business host, determines how many jobs are available to perform which types of work for the production. These numbers are an essential part of the production design and are unlikely to need adjustment once the production is deployed live. Larger numbers are not necessarily helpful; most pool sizes are best set to either 0 or 1, and there can be serious consequences when sizes are set to a number greater than 1.

Private Pool Size for Business Hosts

Each business service, business process, or business operation can have its own, private pool of allocated jobs. You can configure the size of this pool in the Management Portal. If in testing your production, you find that you need more than 100 jobs per business host, it may indicate some other kind of problem, such as a bottleneck or deadlock that you should address. If it is a computational bottleneck, then there is no point in having the pool size larger than the number of CPUs.

InterSystems IRIS uses a **Pool Size** of 0 for an *adapterless* business service. This is a business service that is invoked directly from outside InterSystems IRIS, rather than receiving its requests in the usual way, via an inbound adapter. An adapterless business service may be invoked via InterSystems IRIS language bindings, CSP pages, SOAP, or a routine invoked from the operating system level. For details, see Invoking a Business Service Directly in Developing Productions.

If you set a business operation to run *in process* as opposed to queued, InterSystems IRIS does not create a background job or message queue for the business operation. Instead, whenever a request is sent to this business operation, the production instantiates the business operation *within the caller's job*, and invokes its methods within that job, as well. Consequently, no job pool is necessary, and you must set the business operation **Pool Size** to 0.

For all other types of business service or business operations, if you set the **Pool Size** to 0, the business host does not run.

Production Actor Pool Size for Business Processes

Unlike other types of business host, a *business process* has the option of sharing jobs from a public pool; this pool is called the *actor pool* or **Ens.Actor**. You can configure the **Actor Pool Size** for the production. Actors in the production-wide actor pool have no affiliation with or knowledge of a specific business process. Any business process that has a private **Pool Size** of 0 can use jobs from the public actor pool.

The choice as to whether or not a business process should use its own private pool or the public pool depends on the needs of the production. Any nonzero value for a private **Pool Size** ensures that the business process only uses jobs from its private pool. If you want any business process to use jobs from the actor pool, its private **Pool Size** *must* be 0. The default production configuration allows 1 job in the private pool for each business host, and 2 jobs in the production-wide actor pool. This means that if you want business processes to share the actor pool it does not happen automatically; you must set their individual **Pool Size** settings to 0.

When you disable a business process, the result depends on the private **Pool Size** configuration setting:

- **Business process Pool Size > 0:**

  The business process only uses jobs from its private pool; you can disable just this process by clearing the **Enabled** check box on the configuration page of the business process.

- **Business process Pool Size = 0:**

  You cannot disable a business process with a pool size of 0 because it would stop all business processes using the shared actor pool. If you want to disable a business process, first set the pool size > 0 so it uses its own dedicated queue. If you do want to stop all business processes using the shared actor pool, set the **Actor Pool Size** to 0 in the production settings tab.

Effect of Changing Pool Size

When a business host has a **Pool Size** of 1 or more, the queue for that business host is named the same as the business host. If you modify **Pool Size** for a business process, setting it to 0, the business host now uses the shared queue Ens.Actor; this can be confusing if you are accustomed to looking at the queue.

First-In First-Out (FIFO) for Healthcare

A private **Pool Size** of 1 makes first-in, first-out (*FIFO*) processing possible. If all the business hosts in the production have only one job available, only one message can be processed at a time by each host. This gives each message from a given source only one possible path through the production, so each message is guaranteed to arrive at its configured destination in the same order in which it was sent. Without guaranteed FIFO, a message from a particular source could *skip over* other messages from the same source by using a faster, parallel job to arrive at its destination sooner.

For this reason, InterSystems recommends that every business service, business process, and business operation in a message routing production for healthcare has its **Pool Size** setting configured to 1, with the **Actor Pool Size** for the production at 0.

To guarantee FIFO for a BPL business process, in addition to setting its **Pool Size** to 1, either:

1. Make calls using a <code> SendRequestSync() call

   OR

2. Do not make calls from conditional branches of your business process logic *and* only make calls to elements that are themselves FIFO.

For more details on maintaining FIFO and developing business processes, see Key Principles.

FIFO is essential for healthcare applications. Suppose a patient enters a hospital and requires care. System A sends out an admit event, followed by a treatment order, but System B receives the order first. System B cannot process the order without an admit, so upon receiving the order, it produces an error. This may delay patient care or require the information system to execute complex logic to associate admit with the order after the admit finally arrives at System B.

Considerations and Trade-offs

In situations other than healthcare, private pools of a size 1 or greater can be useful for fast-running business processes in a production that also includes slow-running business processes. A fast-running business process can have a private pool to ensure that its requests never get stuck in the public actor queue behind accumulated requests for the slow-running business processes.

If every business process in your production has a private pool, then the **Actor Pool Size** for the production can be 0. On the other hand, if your production includes many business processes that use the public actor pool, you can raise the **Actor Pool Size** for the production from the default of 2 to prevent bottlenecks when many business processes are running. InterSystems recommends that, as a maximum, you set the **Actor Pool Size** equal to the number of CPUs in your InterSystems IRIS server machine. You could set the number higher, but at any one time there are only as many jobs available as there are CPUs.

Time Stamp Specifications for Filenames

Provides reference information for time stamp specifications for filenames.

Details

While configuring business operations and business services that transmit data to and from files, you can often specify input and output filenames in a string that includes date and time format codes, such as %Y%m%d%H%M%s_%f.txt. At runtime, the format codes within this string resolve dynamically based on the current date and time.

InterSystems IRIS ® data platform supports the following rules for composing a *time stamp specification string*:

- The string may contain literal characters and any of the format codes listed in the following table.
- Characters that are not part of a format code appear in the resulting time stamp unchanged.
- All format codes are optional.
- Each format code consists of a % character, an optional # character, and a conversion character.
- InterSystems IRIS converts the time to a specific time zone or locale if the %K or %L format codes appear at the beginning of the string.

Symbol	Meaning Within a Filename Specification
%a	Locale's abbreviated weekday name (Sun, Mon, ..., Sat)
%A	Locale's full weekday name (Sunday, Monday, ..., Saturday)
%b	Locale's abbreviated month name (Jan, Feb, ..., Dec)
%B	Locale's full month name (January, February, ..., December)
%c	InterSystems IRIS date and time representation as provided by the local machine, except that in forming the time stamp, InterSystems IRIS replaces certain characters in the usual date and time format. It replaces spaces with underscores (_), slashes (/) with hyphens (-), and colons (:) with dots (.). The result is something like: MM-DD-YY_hh.mm.ss The %c specifier can have parameters. %c(*dformat*,*tformat*,*precision*) formats the date and time according to your specifications, where: • *dformat* is a number indicating date format. • *tformat* is a number indicating time format. • *precision* is the number of decimal places used to represent subseconds. See $ZDATETIME for a list of all possible *dformat* and *tformat* values.
%d	Two digits indicating the day of the month (01-31)
%#d	Day of the month without leading zeros (1-31)
%D	Date; equivalent to %m/%d/%y
%#D	Date; equivalent to %#m/%#d/%y

Symbol	Meaning Within a Filename Specification
%f	Name indicating the source of the data. The source is usually the input filename (for File and FTP) or a concatenation of the IP address and port number (for data that arrived via TCP). In substituting a value for the format code %f, InterSystems IRIS strips out any of the characters |,?,\,/,:,[,],<,>,&,,,;,NUL,BEL,TAB,CR,LF, replacing spaces with underscores (_), slashes (/) with hyphens (-), and colons (:) with dots (.).
%#f	Only use the part of the input filename up to but not including the last period. For example: • With Input filename “Summary.docx”, %#f is replaced with “Summary”. • With input filename “MyData.txt.dat”, %#f is replaced with “MyData.txt”.
%$f	Only use the part of the input file name from the last period to the end of the filename (the file extension). For example, if the input filename is “MyData.txt.dat”, %$f is replaced with “.dat”.
%F	As for %f, but with all alphabetic characters converted to uppercase.
%#F	As for %#f, but with all alphabetic characters converted to uppercase.
%$F	As for %$f, but with all alphabetic characters converted to uppercase.
%h	Locale’s abbreviated month name. Equivalent to %b.
%H	Two digits indicating the hour in 24-hour format (00-23)
%#H	Hour in 24-hour format without leading zeros (0-23)
%I	Two digits indicating the hour in 12–hour format (01-12)
%#I	Hour in 12–hour format without leading zeros (1-12)
%j	Three digits indicating the day of the year as a number (001-366)
%#j	Day of the year as a number without leading zeros (1-366)
%K(*n*)	Use the %K(*n*) format code only at the beginning of the time stamp specification string. %K(*n*) produces no output, but specifies a base time zone to convert to before formatting the time stamp. *n* is the time zone, and can be one of the following (case-insensitive): • `Server` — (Default) Time on the server where the executing code resides. • `UTC` — Universal Time Coordinated (UTC) • [+]*n* — Number of hours after (east of) UTC time. *n* may have a fractional value expressed as a decimal; for example, 4.5 • *-n* — Number of hours before (west of) UTC time (*n* may be fractional) • [+]*hhmm* — Hours and minutes after (east of) UTC time, in the ISO 8601:2000 standard format • *-hhmm* — Hours and minutes after (west of) UTC time in ISO format
%m	Two digits indicating the month number (01-12)
%#m	Month number without leading zeros (1-12)
%M	Two digits indicating minutes (00-59)
%#M	Minutes without leading zeros (0–59)

Symbol	Meaning Within a Filename Specification
%N	Three digits indicating the number of milliseconds (000-999)
%p	Locale's a.m. or p.m. indicator for a 12-hour clock (lowercase, with dots)
%#p	Locale's am or pm indicator for 12-hour clock (lowercase, without dots)
%P	Locale's A.M. or P.M. indicator for a 12-hour clock (uppercase, with dots)
%#P	Locale's AM or PM indicator for a 12-hour clock (uppercase, without dots)
%q or %q()	HL7 format date and time; equivalent to %Y%m%d%H%M%S or %q(0)
%q(0)	HL7 format date and time; equivalent to %Y%m%d%H%M%S or %q
%q(1)	ODBC format date and time; equivalent to %Y-%m-%d %H:%M:%S.%N
%q(2)	ISO 8601:2000 standard date format; equivalent to %Y-%m-%d
%q(3)	InterSystems IRIS $HOROLOG format
%q(4)	InterSystems IRIS $ZTIMESTAMP format
%q(5)	Creates a GUID
%Q	ODBC format date and time; equivalent to %Y-%m-%d %H:%M:%S.%N or %c(3,,3) or %q(1)
%Q(*n*)	Equivalent to %q(*n*)
%r	Time with seconds in 12-hour format using a.m. or p.m. notation; equivalent to %I:%M:%S %p
%#r	Time with seconds in 12-hour format using am or pm notation without whitespace or dots; equivalent to %I:%M:%S%#p
%R	Time in 24-hour notation; equivalent to %H:%M
%S	Two digits indicating seconds (00-60) (60 for leap seconds)
%t	Produces a <tab> character
%T	Time with seconds in 24-hour notation; equivalent to %H:%M:%S
%u	Day of the week as a number (1-7). Monday=1, Tuesday=2, ..., Sunday=7.
%#u	Equivalent to %u
%U	Two digits (00–53) indicating the current week within a week-based year convention that does not conform to the ISO 8601:2000 standard. The rules are as follows: • The week numbers are 00-53 • Sunday is the first day in each week. • The first Sunday of January is the first day of week 1 • Days in the new year before the first Sunday are in week 0.
%#U	Number indicating the current week within a week-based year that follows the rules described for %U, except the output does not include leading zeros (0-53).
%w	Day of the week (Sunday=0, Monday=1, ..., Saturday=6)

Symbol	Meaning Within a Filename Specification
%#w	Equivalent to %w
%W	Two digits (00–53) indicating the current week within a week-based year convention that does not conform to the ISO 8601:2000 standard. The rules are as follows: • The week numbers are 00-53 • Monday is the first day in each week • The first Monday of January is the first day of week 1 • Days in the new year before the first Monday are in week 0. %W is equivalent to %U(1).
%#W	Number indicating the current week within a week-based year that follows the rules described for %W, except the output does not include leading zeros (0-53). %#W is equivalent to %#U(1).
%y	Two digits indicating the year within a century (00-99). For example, the year 1983 produces the number 83 in the time stamp; 2019 produces 19.
%Y	Four digits indicating the year (0000-9999)
%z	Time zone as an offset from Universal Time Coordinated (UTC) in the ISO 8601:2000 standard format (+*hhmm* or -*hhmm*). For example, `-0430` means 4 hours 30 minutes behind UTC (west of Greenwich). If InterSystems IRIS cannot determine the time zone, it ignores the %z code in the time stamp specification string.
%#z	Time zone as an offset from Universal Time Coordinated (UTC) in hours with leading +/- and without leading zeros. Trailing decimals may appear. For example, `-4.5` means 4 hours 30 minutes behind UTC (that is, west of Greenwich). If InterSystems IRIS cannot determine the time zone, it ignores the %#z code in the time stamp.

Symbol	Meaning Within a Filename Specification
%+(*nn*)	Inserts a counter and tests for filename uniqueness on a local file (not FTP) where *nn* is a string of alphanumerics and other characters. The alphanumeric characters in the string are incremented from the right-most character. Nonalphanumeric characters are included unchanged in the output file specification. Numeric characters are incremented from 0 to 9 and alphabetic characters are incremented from a to z or from A to Z. For example, if the filename string specification is “%f_%+(1)” and the input file is “NewFile.txt”, then InterSystems IRIS first checks if “NewFile.txt_1” exists. If it exists, it checks “NewFile.txt_2” through “NewFile.txt_9” and then “NewFile.txt_10” and so on. It creates the file with the first filename that doesn’t yet exist. If the filename string is “%f_%+(a.1), it first increments the 1 digit and then, after reaching 9, it increments the a; first testing the strings “NewFile.txt_a.1” through “NewFile.txt_a.9” and then “NewFile.txt_b.0” through “NewFile.txt_b.9” and then “NewFile.txt_c.0” and so on. After it reaches “NewFile.txt_z.9”, it prepends an 1 to the string. In this case, it tests “NewFile.txt_1a.0” next. Typically, the counter is used in conjunction with a timestamp to reduce the possibility that filenames are duplicates even if they are created with the same timestamp. Combining a timestamp with a counter makes it extremely unlikely that filename collisions will occur. You can use the %+ counter specification only once within a filename specification. The counter format can be modified by inserting any of the following symbols between the percent sign and the plus sign: • Dollar sign ($)—Allows the counter to be used for remote FTP filenames. Always increment a static counter and use the resulting value. For local files, the uniqueness check is then made. • Exclamation point (!)—Only append the counter if the filename without the counter would not be unique. • Number sign (#)—Omit leading zeroes and omit leading a’s if they are not required to make a unique filename. If the dollar sign ($) is not specified, the counter always restarts from the initial value specified in *nn*. If used with a timestamp, the counter is typically incremented a small number of times before a new timestamp value ensures uniqueness. If you are using the counter without a timestamp and expect it to be incremented many times, you should specify the dollar sign to avoid continually rechecking the filenames that you have already created. Consider the format “%#F_%Q_%+(a0)%$f”. If the input filename is “NewFile.txt” and three files are created with the same timestamp, these files are named: • NEWFILE_2014-09-12_16.43.15.895_a0.txt • NEWFILE_2014-09-12_16.43.15.895_a1.txt • NEWFILE_2014-09-12_16.43.15.895_a2.txt
%%	Literal % percent sign
%(	Literal (left parenthesis
%_	Reserved token (do not use). This sequence passes through unchanged.

The previous table describes all the format codes that you can use when specifying time stamps for use with an inbound or outbound file adapter. These codes conform to POSIX, IEEE, and ISO standards for time format codes. The following table lists the time stamp format codes that do not conform to these standards, or that conform to other standards.

Symbol	Unique Meaning Within a Filename Specification
%#	InterSystems IRIS® supports (and extends) certain Microsoft extended semantics, such as the %# prefix.
%c	This indicates the InterSystems IRIS time stamp provided by the local machine.
%E	InterSystems IRIS does not support the %E code.
%F	InterSystems IRIS supports %F as an uppercase replacement string, not an ISO format date. InterSystems IRIS supports the ISO format date as %q(2) or %Q(2).
%K(*n*)	The user defines the time zone by providing the %K(*n*) code at the beginning of the file specification string. The %K(*n*) code produces no output, but specifies a base time zone to convert to before formatting the time stamp.
%L(*n*)	The user defines the locale by providing the %L(*n*) code at the beginning of the file specification string. The %L(*n*) code produces no output, but specifies a base locale to use with locale-dependent format codes.
%O	InterSystems IRIS does not support the %O code.
%P	InterSystems IRIS defines this code as uppercase AM or PM.
%q,%Q	InterSystems IRIS defines some of these codes according to standards other than POSIX, IEEE, or ISO, such as HL7 or ODBC.
%(	InterSystems IRIS defines this code as a literal (character.