



Monitoring Productions

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Monitoring Productions

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Table of Contents

1 Core Concepts When Monitoring Interoperability Productions	1
1.1 Productions	1
1.2 Production States	1
1.3 Business Hosts	2
1.4 Messages	2
1.4.1 Message Basics	2
1.4.2 Sessions	3
1.4.3 Message Status	4
1.4.4 Message Invocation Style and Time Stamps	5
1.4.5 Message Priority	6
1.5 Jobs and Message Queues	6
2 Monitoring All Namespaces	7
2.1 General Notes	7
2.2 Viewing Summaries for Active Productions	7
2.3 Using the Production System Monitor	7
2.3.1 Production Throughput	8
2.3.2 Production Jobs	8
2.3.3 System Time	8
2.3.4 System Usage	8
2.3.5 Production Queues	9
2.3.6 Errors and Alerts	9
2.3.7 Licensing	9
2.3.8 Task Manager	9
2.4 Monitoring Multiple Productions with the Enterprise Monitor	9
2.4.1 Configuring the Enterprise Monitor	10
2.4.2 Using the Enterprise Monitor	10
2.4.3 Configuring and Using Enterprise Monitor Roles	11
2.4.4 Troubleshooting the Enterprise Monitor	12
3 Monitoring a Production	13
3.1 General Notes	13
3.2 Using the Production Monitor Page	13
3.2.1 Input Connections	14
3.2.2 Output Connections	15
3.2.3 Queues	16
3.2.4 Event Log	16
3.2.5 Activity Graph	16
3.2.6 Custom Metrics	18
3.3 Using the Production Monitor Service	18
3.4 Monitoring Production Queues	18
3.4.1 Diagnosing Problems with Queues	20
3.5 Monitoring Active Jobs	20
3.5.1 Diagnosing Problems with Jobs	21
3.5.2 Aborting Messages, Suspending Messages, and Stopping Jobs	21
3.6 Using the Production Configuration Page	22
3.7 Correcting Production Problem States	22
3.7.1 Recovering a Suspended Production	23

3.7.2 Recovering a Troubled Production	23
4 Viewing, Searching, and Managing Messages	25
4.1 Browsing the Messages	25
4.1.1 Available Information	25
4.1.2 Paging Through the Messages	26
4.2 Filtering the Messages	26
4.3 Filtering with Basic Criteria	27
4.4 Filtering with Extended Criteria	27
4.4.1 Adding a Criterion	28
4.4.2 Criterion Type	28
4.4.3 Class	29
4.4.4 Filter Conditions	29
4.4.5 Rearranging and Modifying Criteria	31
4.4.6 How Criteria Are Combined	31
4.5 Viewing Message Details	32
4.5.1 Message Header Fields	32
4.5.2 Message Body Fields	33
4.5.3 Message Contents	34
4.6 Tracing the Path of Related Messages	35
4.7 Resending Messages	37
4.7.1 Resending Messages from the Management Portal	38
4.7.2 Resending Messages Programmatically	39
4.8 Viewing the SQL Query Used by the Message Viewer	40
4.9 Managing Suspended Messages	40
4.9.1 Resend Editor for Resubmitting Messages	41
4.10 Exporting Messages	41
4.10.1 Exporting Large Quantities of Messages	41
4.11 Auditing Message Viewing	43
5 Viewing the Event Log	45
5.1 Introduction to the Event Log	45
5.2 Introduction to the Event Log Page	45
5.3 Entering Search and Purge Criteria	46
5.3.1 Quick Search	46
5.3.2 Event Types	47
5.3.3 Search Events By	47
5.3.4 Purge Event Log	47
5.4 Viewing Event Log Entries	48
5.5 Viewing Event Details	49
6 Enabling Tracing	51
6.1 About Tracing	51
6.2 Enabling Tracing	51
6.3 Enabling Logging for Trace Messages	53
6.4 Seeing Trace Messages in the Terminal	53
7 Viewing the Business Rule Log	55
7.1 Introduction	55
7.2 Entering Search and Purge Criteria	55
7.2.1 Quick Search	56
7.2.2 Search Rules By	56
7.2.3 Purge Rule Log	56

7.3 Viewing the Executed Rule List	56
7.4 Viewing Rule Execution Details	57
8 Viewing Business Process Instances	59
8.1 Introduction	59
8.2 Filtering the List of Process Instances	59
8.3 Viewing Summary Information for Business Process Instances	60
8.4 Purging the Business Process Log	61
9 Viewing the I/O Archive for a Production	63
10 Viewing Messages from Multiple Productions	65
11 Using the Enterprise Message Viewer	67
11.1 Specifying a Query in the Enterprise Message Viewer	67
11.2 Working with the Search Results in the Enterprise Message Viewer	68
11.3 See Also	68
12 Using the Enterprise Message Bank	69
12.1 Accessing the Message Bank Pages	69
12.2 See Also	69
13 Viewing Interface Maps	71
13.1 Working with an Interface Map	71
13.2 Entering Search Criteria	72
13.2.1 Production	72
13.2.2 Search Criteria	72
13.2.3 Options	72
13.3 Exporting Interface Maps	72
14 Finding Interface References	75
14.1 Search Criteria	75
14.2 Result Types	75
15 Monitoring Alerts	77
15.1 Introduction to Alerts	77
15.2 Choosing How to Handle Alerts	78
15.3 Calibrating Alert Sensitivity	78
15.4 Configuring Alert Monitoring	80
15.4.1 Configuring Simple Notifications	80
15.4.2 Configuring Alert Routing	81
15.4.3 Configuring Alert Management	82
15.5 Monitoring, Tracking, and Resolving Managed Alerts	86
15.5.1 Acting on Alerts by Viewing My Managed Alerts	88
15.5.2 Viewing Managed Alerts	90
15.6 Managed Alerts Example	91
15.6.1 Open a Sample Production and Delete Any Alert Processor	91
15.6.2 Adding the Alert Manager, Notification Manager, Alert Monitor, and Alert Operation	92
15.6.3 Configuring the Production	92
15.6.4 Starting the Production and Managing Alerts	93
15.6.5 Customizing Alert Management with Rules and Transformations	93
16 Monitoring Activity Volume	99
16.1 Activity Monitoring Overview	99
16.2 Enabling Activity Monitoring	100

16.3 Using the Activity Monitor Dashboard	101
16.4 Writing Custom Code to Record Activity	102
16.5 Accessing Activity Monitor Tables	103
16.6 Purging Activity Monitor Tables	103
16.7 Failovers and Restarts	103
17 Managing Port Usage	105
17.1 Configuring the Port Authority	105
17.1.1 Configuring a Port Authority Task	105
17.1.2 Configuring a Port Authority External-Service Registry	106
17.2 Using the Port Authority Report	106
17.2.1 Production Ports	107
17.2.2 Port Reservations	108
17.2.3 Port Usage Advice	109
17.2.4 Inbound Production Conflicts	110
17.2.5 Ranges not used in Productions	110

1

Core Concepts When Monitoring Interoperability Productions

This topic discusses the concepts that are relevant when you monitor an interoperability production.

1.1 Productions

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.

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.

1.2 Production States

It is important to be familiar with the acceptable states of a production, as well as the problem states. These states are displayed in the Management Portal:

State	Meaning
Running	When a production has been started and is operating normally, it has a status of Running. This is an acceptable state.
Stopped	A production acquires a status of Stopped when, at the end of the shutdown sequence, all of its queues are free of synchronous messages. This is an acceptable state.
Suspended	A production acquires the Suspended status if, at the end of the shutdown sequence, some queues still contain synchronous messages, waiting for a response. Depending on how the production has been designed, this may or may not indicate a problem. If you suspect a problem, see Correcting Production Problem States .
Troubled	A production acquires a status of Troubled if InterSystems IRIS is stopped but the production did not shut down properly. See Correcting Production Problem States .

1.3 Business Hosts

A production includes a number of *business hosts* that communicate with each other (and with external systems). A business host is responsible for some category of work.

There are three distinct types of business host. In order to monitor a production, it is not necessary to know the details of why a given business host was implemented as a certain type. However, it is useful to be aware of the types:

- A *business service* receives input from outside the production, sometimes by means of an inbound *adapter*.
- A *business process* is responsible for communication and logic that is entirely within the production.
- A *business operation* usually sends output from the production, sometimes by means of an outbound adapter.

Business operations can also be used for communication and logic within a given production.

1.4 Messages

Within a production, all communication is carried out by means of request and response messages between the business hosts. In order to understand a production at a high level, just remember that messages carry all traffic, and that the work of a production is to process messages.

Without exception, the production message warehouse stores all messages, and this information is available in the Management Portal. This section provides an overview of messages and the information that is available about them:

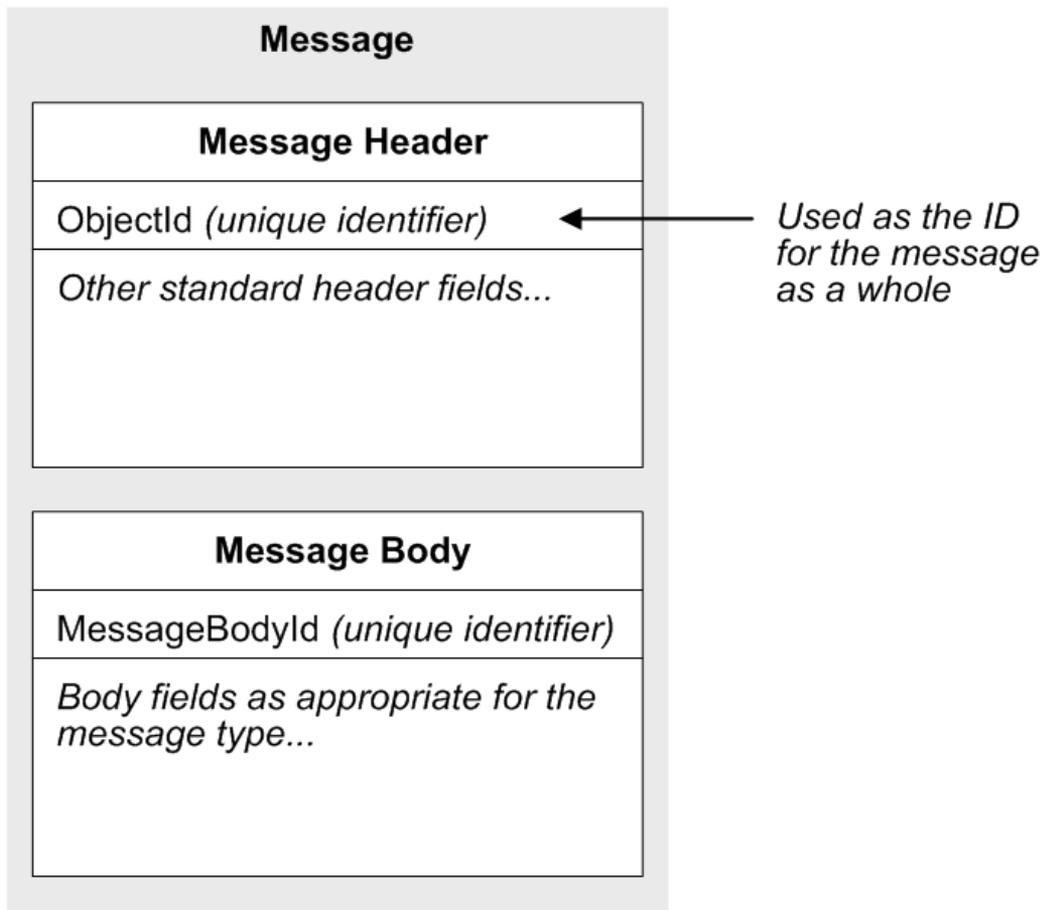
- [Message Basics](#)
- [Sessions](#), which correspond to sets of messages related in time
- [Message Status](#)
- [Message Invocation Style and Time stamps](#)
- [Message Priority](#)

1.4.1 Message Basics

Every message is either a request or a response. There may be requests that do not have a corresponding response defined, but every response is (conceptually) paired with a request. Any request may be synchronous (waits for a response) or asynchronous (does not wait), depending on the details of the business host; you cannot configure this.

Each message has a unique numeric identifier or *ID*. This is displayed in many places in the Management Portal, with the caption **ID** or **<ObjectId>**, depending on the location on the page.

A message has a header, whose structure is the same for all messages. The header contains data fields that help route the message through the system. A message also contains a body, which provides different fields depending on the message type.



Each message uses a specific message body class, chosen by the production developers. The message body class determines whether the message is a request or a response and determines the fields that the message contains. These decisions are not configurable once the production is complete.

For Electronic Document Interchange (EDI) formats, InterSystems IRIS provides specialized message body classes that represent the message as a virtual document. In this case, the message body does not contain fields to represent data in the message. InterSystems IRIS provides alternative mechanisms for accessing that data. For an introduction, see [Using Virtual Documents in Productions](#).

The Management Portal displays contents of the message as a whole, treating the message header and the message body as a single unit. The ID of the message header is the ID of the message as a whole. In some cases (for example, if you resend a message), a new header is added (with a new unique ID); as a result, the ID of the resent message is not the same as that of the original message.

1.4.2 Sessions

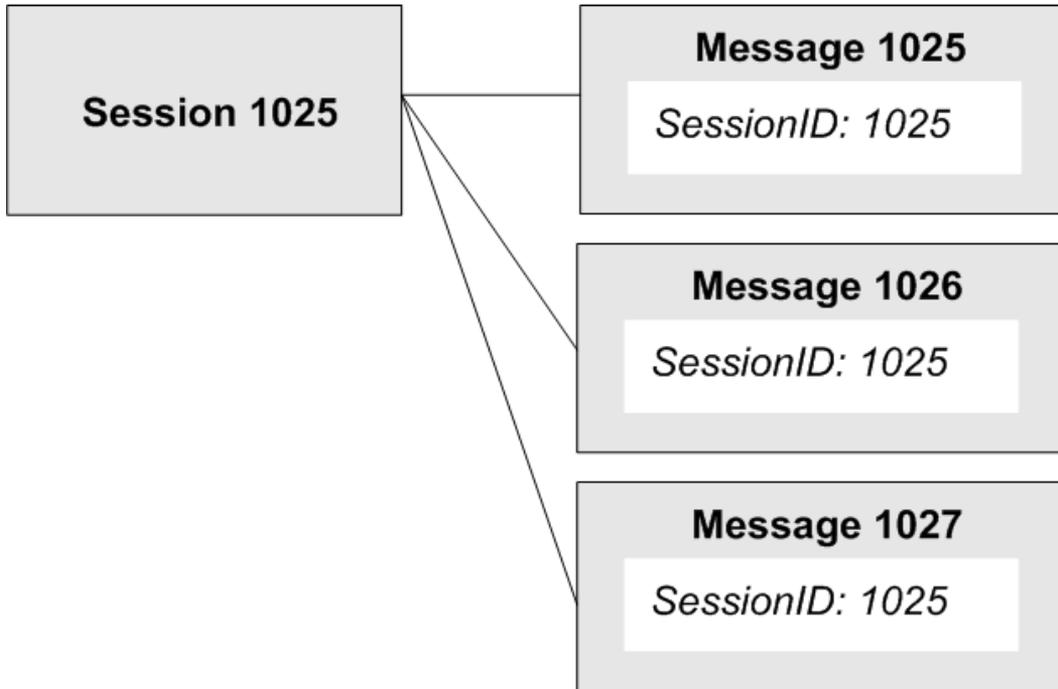
Every message is associated with a specific *session*. A session marks the beginning and end of all the activities prompted by a *primary request message* from outside InterSystems IRIS. Sessions are useful to you because they give you an easy way to see sets of related messages; the Management Portal provides an option for visually tracing the messages, and you can filter this display by session.

Each session has a unique numeric *SessionID*. All messages associated with a session use the same SessionID. InterSystems IRIS assigns these SessionIDs as follows:

1. The primary request message starts the session. The SessionID is the same as the ID of the primary request message.

- 2. Each additional message that is instantiated during this session has the same SessionID as the primary request, but has a unique message ID.

The following shows an example. Note that (unlike the example) the message IDs within a session are unlikely to be sequential in a production that has many business hosts. When creating a new message, InterSystems IRIS always uses the next available integer as the message ID.



1.4.3 Message Status

Each message has a life cycle during which its *status* changes. These statuses are visible on most pages that display messages. The possible status of any message is one of the following:

Created

The message is in transit between its sender and the appropriate queue. This is the first stage in the normal life cycle of a message.

Queued

The message is on a queue. This is the second stage in the normal life cycle of a message.

Delivered

The intended recipient has received the message. This is the third stage in the normal life cycle of a message.

Completed

The intended recipient has received the message and has finished processing the message. This is the fourth stage in the normal life cycle of a message.

Deferred

This status applies only to response messages.

A business operation can defer a message response for later delivery. The response can be picked up and sent back to the original requester by any business host in the production. Between the time when the business operation defers the response, and when the response is finally sent, the response message has a status of `Deferred`.

The sender of the original message is unaware of the fact that the message was deferred. If the original call was synchronous, the call does not return to the sender until the response is sent.

When the response message is finally sent, it has a status of `Completed`.

Discarded

A response message becomes `Discarded` if it reached its destination after the timeout period for the corresponding request expired.

You can also manually mark a message as `Discarded`, which you might do for a suspended message that cannot be delivered for some reason.

Note that a message that is marked as `Discarded` still remains in the permanent store; messages are deleted only when you explicitly delete them.

Suspended

The message was suspended by the business operation after failing to reach its external destination or was manually suspended by an administrator. Note that some business operations are designed to set the status of any failed messages to `Suspended`.

In either case, you can view this message within the Management Portal to determine why it failed and you can resend it if appropriate. For example, if the problem is on the external side of the communication, the external system can be repaired, and then the message can be resent. You could also discard it or even delete it.

Aborted

The message was aborted by an administrator.

Error

The message encountered an error.

Note that request and response messages have separate statuses. Request-response pairs are not tracked together for various reasons: a request might be repeated several times before it is successfully delivered; some requests have an optional response that can be ignored if it does not arrive; some responses can be deferred for later delivery; some requests are designed to have no response.

1.4.4 Message Invocation Style and Time Stamps

Each message has an *invocation style*, which describes how the message was sent. The business host that sends a message specifies its invocation style:

- `Queue` means the message is created in one job, then placed on a queue, at which time the original job is released. Later, when the message is processed, a different job will be allocated for the task.
- `Inproc` means the message will be formulated, sent, and delivered in the same job in which it was created. The job will not be available again in the sender's pool until the message is delivered to the target.

InterSystems IRIS records the following two time stamps for each message. Note that the invocation style affects the meaning of these time stamps:

- The *message creation time stamp*. For `Queue` messages, this is when InterSystems IRIS placed this message on the queue. For `Inproc` messages, this is when InterSystems IRIS called the `Send` method.

- The *message processed time stamp*. InterSystems IRIS sets TimeProcessed when the message is taken off the queue but then resets it to the current time while the message is being processed. Typically, for a completed message, it represents the time that the message processing was completed.

1.4.5 Message Priority

The Management Portal displays the *priority* of the messages in several places. The priority of a message determines how that message is handled relative to other messages in the same message queue. For information about message queues, see [Monitoring a Production](#).

The InterSystems IRIS messaging engine determines the priority of a message, which is one of the following:

- HighSync (1)—Used for ACK messages and alarms for interrupted tasks.
- Sync (2)—Used for synchronous messages.
- SimSync (4)—Used for an asynchronous call made for a BPL synchronous <call>. This ensures that the request and response are processed before any queued asynchronous message.
- Async (6)—Used for other asynchronous messages.

1.5 Jobs and Message Queues

The business hosts process messages by means of jobs. A *job* is a CPU process that hosts the work done by a production. This terminology is intended to avoid confusion between CPU processes (jobs) and business processes (processes).

In general, a job is either *running* (processing a message) or it is not running. From a low-level, system viewpoint, a production consists almost entirely of jobs waiting to wake up to perform work.

A *pool* consists of one or more jobs. Each business host can have its own, private pool of allocated jobs—a pool with a specific size that cannot be exceeded.

When a business host receives a message, the business host assigns the work to a job from its pool. The job then performs the work. If no job is available, the business host waits for a job to become available. After the job completes the work, the job either returns to the pool or starts work on another message.

More formally, each message is assigned to a specific *message queue*, which handles messages in the order that it receives them. Each queue is associated with a single pool, and vice versa.

Unlike other types of business host, a business process can use a public pool (called the *actor pool*), which receives messages from a public queue (called the *actor queue* or `Ens.Actor`). The actor pool and actor queue are shared by all business processes that do not use private pools and queues.

For further information, see [Pool Size and Actor Pool Size](#).

2

Monitoring All Namespaces

This topic describes how to monitor productions in all namespaces.

2.1 General Notes

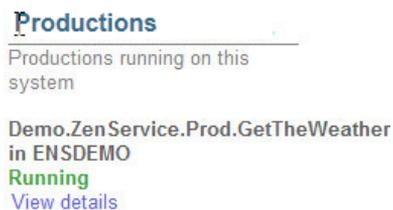
For background information, see [Concepts](#).

For information on starting and stopping productions, see [Managing Productions](#). Note that for a live, deployed production, InterSystems recommends that you use the [auto-start](#) option.

If a production is Suspended or Troubled, see [Correcting Production Problem States](#).

2.2 Viewing Summaries for Active Productions

When you select any option in the **Interoperability** menu, the right side of the page displays summary information about the productions, as follows:



2.3 Using the Production System Monitor

The **Production System Monitor** page provides a high-level view of the state of your system, across all namespaces. (It displays production information combined with a subset of the information shown on the **System Operation > System Dashboard** page.)

To access this page in the Management Portal, select **Interoperability**, **Monitor**, and **System Monitor**.

This page displays tables of information, described in the following subsections.

Also see [General Notes](#).

2.3.1 Production Throughput

This table provides information about the throughput of productions in all namespaces. The table lists the following values:

- **Productions Running**—Number of productions that are currently running.
- **Productions Suspended or Troubled**—Number of productions that are currently suspended or troubled.
If a production is Suspended or Troubled, see [Correcting Production Problem States](#).
- **Incoming Messages in Last 30 Seconds**—Number of messages received by business services in the last 30 seconds.
- **Last Incoming Message**—Date and time of last message received by any business service.
- **Outgoing Messages in Last 30 Seconds**—Number of messages processed by business operations in the last 30 seconds.
- **Last Outgoing Message**—Date and time of last message processed by any business operation.

2.3.2 Production Jobs

This table provides information about the jobs associated with the currently running productions in all namespaces. The table lists the following values:

- **Total System Processes**—Number of system processes that are currently active, including processes that are not specifically associated with productions.
If you click **Total System Processes** and then click the link at the bottom of the page, InterSystems IRIS® data platform displays the **System Operation > Processes** page. For information, see [Controlling InterSystems IRIS Processes](#).
- **Active Production Jobs**—Number of production jobs that are currently active.
- **Visiting Production Jobs**—Number of jobs outside of production that are currently invoking InterSystems IRIS code.
- **Most Active Processes**—Displays a table of the processes that have the highest number of recently executed commands, across all namespaces, including processes that are not specifically associated with productions. **PID** is the process ID, and **Commands** is the number of recently executed commands.

Also see [Diagnosing Problems with Jobs](#).

2.3.3 System Time

This table provides the same information as in the **System Time** table of the **System Operation > System Dashboard** page. See [Monitoring System Dashboard Indicators](#).

If you click a row in this table and then click the link at the bottom of the page, InterSystems IRIS displays the **System Operation > System Dashboard** page.

2.3.4 System Usage

This table provides a subset of the information in the **System Usage** table of the **System Operation > System Dashboard** page. See [Monitoring System Dashboard Indicators](#).

If you select a row in this table and then click the link at the bottom of the page, InterSystems IRIS displays one of the following pages, as appropriate for the row you selected:

- **System Operation > Databases**

- [System Operation > Journals](#)
- [System Operation > Locks](#)

2.3.5 Production Queues

This table provides information about production queues in all namespaces. The table lists the following values:

- **Active Queues**—Count of currently active production queues.
- **Most Active Queues**—Displays a table of the queues that have the largest number of unprocessed messages. In this table, **Messages** is the count of messages in the given queue.

Also see [Diagnosing Problems with Queues](#).

2.3.6 Errors and Alerts

This table provides information about errors and alerts. The table lists the following values:

- **Serious System Alerts**—Number of serious system-level alerts that have been raised.
- **Production Alerts**—Number of serious Production alerts that have been raised.
- **Production Errors**—Number of application errors that have been logged.

For information on configuring a production to send alerts, see [Configuring Alerts](#).

2.3.7 Licensing

This table provides the same information that is shown in the **Licensing** table of the **System Operation > System Dashboard** page. See [Monitoring System Dashboard Indicators](#).

If you select a row in this table and then click the link at the bottom of the page, InterSystems IRIS displays the **System Operation > License Usage** page **Summary**.

2.3.8 Task Manager

This table provides the same information that is shown in the **Task Manager** table of the **System Operation > System Dashboard** page. See [Monitoring System Dashboard Indicators](#).

If you select a row in this table and then click the link at the bottom of the page, InterSystems IRIS displays the **System Operation > Task Manager > Upcoming Tasks** page.

2.4 Monitoring Multiple Productions with the Enterprise Monitor

The Enterprise Monitor displays the overall status of multiple running productions. These productions can be running on different namespaces within the same instance of InterSystems IRIS or can be running on multiple instances of InterSystems IRIS. You can display the Production Monitor or the InterSystems IRIS Management Portal for any of the productions being monitored. The monitored productions can be running in different namespaces on the same InterSystems IRIS instance, running on multiple InterSystems IRIS instances on the same system, running on multiple systems, or running on any combination of these.

This section contains the following topics:

- [Configuring the Enterprise Monitor](#)
- [Using the Enterprise Monitor](#)
- [Configuring and Using Enterprise Monitor Roles](#)
- [Troubleshooting the Enterprise Monitor](#)

2.4.1 Configuring the Enterprise Monitor

The Enterprise Monitor runs in its own namespace with a special production that gets the status of the monitored systems.

To configure an Enterprise Monitor, you perform the following steps:

1. Create a namespace for the Enterprise Monitor or choose to use an existing namespace for it. The following steps are done in this namespace.
2. Define credentials that provide access to the systems that you will be monitoring.
3. Configure Enterprise Systems, defining a new connection for each system that you are monitoring. Optionally, specify a queue threshold for each system. For details on configuring Enterprise Systems, see [Identifying Enterprise Systems for Viewing and Monitoring](#).
4. Optionally, specify Enterprise Monitor Roles. If the user using the Enterprise Monitor has one of these roles, the user only monitors the configuration items that have one of the specified categories. For details, see [Configuring and Using Enterprise Monitor Roles](#)
5. Create a production for the special Enterprise Monitor service. The class of this production must derive from the `Ens.Enterprise.Production` class. You can create the production in an IDE or create it using the management portal and then edit in an IDE as follows
 - a. In an IDE, open the class that defines the production running in the Enterprise Monitor namespace.
 - b. Replace the class `Ens.Production` with `Ens.Enterprise.Production`. For example, if the class definition is

```
Class EMon.EntMonitorProd Extends Ens.Production
```

edit it so that the class extends `Ens.Enterprise.Production` so that it appears as:

```
Class EMon.EntMonitorProd Extends Ens.Enterprise.Production
```
 - c. Compile the class.
6. Add the `Ens.Enterprise.MonitorService` business service to the production and enable it.
7. Start the production.
8. Select **Interoperability**, **Monitor**, and **Enterprise Monitor** to display the Enterprise Monitor. Note that this menu item is only visible if you have configured Enterprise Systems in the current namespace.

2.4.2 Using the Enterprise Monitor

You must have the following permissions to use the Enterprise Monitor:

- Use access to `%Ens_Dashboard`
- Use access to `%Ens_Portal`, or use access to the resource required to run the web application that corresponds to the namespace associated with the Enterprise Monitor
- Read access to the database that corresponds to the production associated with the Enterprise Monitor

For more information, see [Controlling Access to Management Portal Functions](#).

The Enterprise Monitor displays a line for each monitored system. For example, the following Enterprise Monitor is monitoring four systems:

Enterprise Systems Enterprise Monitor Roles Enterprise Message Viewer Message Bank Viewer Message Bank Event Log Previous Next

Client systems last polled on Thursday Oct 16, at 8:48:18 a.m. (1 seconds ago)

Running Production 'EMon.EntMonitorProd' to collect monitor data from configured client systems in namespace (EMONITOR) on machine jgoldman6420

Client Name	Queued	Status	Production Name	System Management Portal	Start Time	UpdateReason	WebIPAddress	Namespace
mary	0	Stopped		sutton : MANAGEDALERTS			sutton:57459	ManagedAlerts
HL7	0	Running	Demo_HL7_MsgRouterProduction	jgoldman6420 : ENSDEMO	2014-10-14 16:06		jgoldman6420:57776	ENSDEMO
Students with Complex Records	0	Running	Demo_ComplexMap_SemesterProduction	jgoldman6420 : ENSDEMO	2014-10-15 12:45		localhost:57779	ENSDEMO
self	0	Running	EMon.EntMonitorProd	jgoldman6420 : EMONITOR	2014-10-15 15:21		localhost:57779	EMONITOR

The Enterprise Monitor displays the following information for each system:

- **Bar graph**—Indicates the status of the configuration items of the production. The green, red, and yellow indicate the percentage of the items in each state. Green indicates the items that are active and running correctly; yellow indicates the items that are inactive; and red indicates the items that have encountered an error. If you hover over the bar graph, the pop-up text displays the number of items in each state.
- **Client Name**—Name defined when configuring Enterprise Systems to identify the system in the Enterprise Monitor.
- **Queued**—Specifies the total number of messages currently waiting in queues. If you have set the queue threshold and the number of messages exceeds the threshold, the number is displayed in red. If the number exceeds 85% of the threshold, it is displayed in yellow. If the number is below 85% of the threshold, it is displayed in green. If no threshold is specified, the queue number is displayed in black.
- **Status**—Indicates the status of the productions: running, stopped, suspended, or troubled.
- **Production Name**—Displays the production name. If you click on this link, the Enterprise Monitor opens the Production Configuration page on this system.
- **System Management Portal**—Displays the system name and namespace of the system. If you click on this link, the Enterprise Monitor opens the InterSystems IRIS management portal on the system.
- **Start Time**—Displays the date and time that the InterSystems IRIS instance was started if it is currently running.
- **UpdateReason**—Specifies the reason that the production configuration was last updated.
- **WebIPAddress**—Specifies the system name and port number.
- **Namespace**—Specifies the namespace of the system.

If you click on an item in the Enterprise Monitor that is not a link, the Enterprise Monitor displays the production monitor for that system. For information on the Production Monitor, see [Monitoring a Production](#).

2.4.3 Configuring and Using Enterprise Monitor Roles

Enterprise Monitor Roles allow you to limit the production components that are visible in the Enterprise Monitor based on the roles of the current user and the categories specified in the production configuration for the component. When a user displays the Enterprise Monitor, it checks if the user has any roles specified in the Enterprise Monitor Roles. If none of the roles match, the Enterprise Monitor displays information about all the components in the productions. If one or more of the roles match, the Enterprise Monitor displays information about components that have one of the specified categories.

To add new roles or edit an existing role, select **Enterprise Monitor Roles** on the Enterprise Monitor. The following illustrates the Enterprise Monitor Roles page:

View and edit participating monitor roles

[|<](#)
[<<](#)
[>>](#)
[>|](#)
 Page of
[New Role](#)

Client Systems			
Role	CategoryList		
LabManager	LabSystems	edit	delete
NetworkAdmin	Network	edit	delete
PharmAdmin	Pharm,LabSystems	edit	delete

[Enterprise Monitor](#)

[Enterprise Message Viewer](#)

[Message Bank Viewer](#)

[Message Bank Event Log](#)

To add a new role, select **New Role**. To edit or delete a role, select edit or delete. When you enter the role and category, the form does not list the existing roles or categories. You must know these and enter them as text. Once you have entered a category, it is available as a check box when you add or edit a role.

2.4.4 Troubleshooting the Enterprise Monitor

If the Enterprise Monitor is not working, this troubleshooting list may help you resolve the problem:

- If the Enterprise Monitor cannot get access from any monitored system and displays the message Not currently collecting monitor data from configured client systems - No Message Bank or Enterprise Production is running in this namespace (EMONITOR) on machine testmachine6070:

Ensure that the production in the namespace is running. You will get this message if it is not running.

- If the Enterprise Monitor appears to be working correctly but it is displaying the message Not currently collecting monitor data from configured client systems - No Message Bank or Enterprise Production is running in this namespace (EMONITOR) on machine testmachine6070:

The production in the namespace must have a class that extends the Ens.Enterprise.Production class. If you create a new production using the InterSystems IRIS portal, it creates a production that extends Ens.Production. To fix this problem, edit the production in an IDE and change the class that it extends. Then compile the class and stop and restart the production.

- If the Enterprise Monitor does not display an error message but the clients are not being polled and the data is not being updated:

Ensure that the production contains the Ens.Enterprise.MonitorService business service and that it is enabled.

- If you observe an error where a non-functioning login screen appears in the Enterprise Monitor instead of an embedded graph, change your configuration to use https rather than http. In addition, set the web application's **Session Cookie Label** setting to **None**. You can access your web application's settings from **System Administration > Security > Applications > Web Applications**.

3

Monitoring a Production

This topic describes how to monitor a single production (in contrast to when you use the [Production System Monitor](#), which monitors all namespaces).

3.1 General Notes

For background information, see [Concepts](#).

For information on starting and stopping productions, see [Managing Productions](#). Note that for a live, live, deployed production, InterSystems recommends that you use the [auto-start](#) option.

If a production is Suspended or Troubled, see [Correcting Production Problem States](#).

3.2 Using the Production Monitor Page

The **Interoperability > Monitor > Production Monitor** page displays real-time status information about the currently running production in a condensed, one-page format, with links for further details. To display this page in the Management Portal, select **Interoperability, Monitor, Production Monitor**, and **Go**.

You can use this page to monitor the general health of the production in the selected namespace. The following is a partial example of what this page displays:

INCOMING CONNECTIONS			
Last Activity: 2013-01-30 14:35:28.391 Completed: 25			
!	- FTP Service	0	- - FileService 6
- o	HTTPService	0	- o StatusService 0
X	- TCPSERVICE27105	7	

OUTGOING CONNECTIONS			
Last Activity: 2013-01-30 14:36:48.185 Completed: 11 In Progress: 1			
• x	TCPOperation	4	- - HTTPOperation 0
• -	FTPOperation	0	• - FileOperation 7

QUEUES			
Total Queued Messages: 0			
•	Actor	0	• Alarm 0
•	FTPOperation	0	• FileOperation 0
•	HTTPOperation	0	• Process 0
•	ScheduleHandler	0	• SendSyncProcess 0
•	TCPOperation	0	• _SyncCall:10528 0
S	**Suspended Messages** 0		

EVENT LOG			
Errors Since Last Start: 14,746 Last Error: 2013-01-30 14:36:48.564			
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	0	min
!	...nd Credentials for ID name 'anonftp' : SQLCODE=100	1	min

- [Input Connections](#)
- [Output Connections](#)
- [Queues](#)
- [Event Log](#)
- [Activity Graph](#)
- [Custom Metrics](#)

The **Production Monitor** page displays real-time information provided by the Monitor Service. The Monitor Service is a business service that is implicitly included in every production (not visible as part of its configuration). The Monitor Service continually monitors the activities of items while a production is running, and records data about them at frequent intervals.

3.2.1 Input Connections

The **Incoming Connections** table lists all incoming connections from external systems. The **Completed** field indicates how many messages have been processed by the production’s business services, including internal services like `Ens.ScheduleService`. Each entry in the table indicates the following:

1. Business service status
2. Business service connection status
3. Business service name
4. Number of messages processed since the production started

The statuses are indicated by the cell color. The item status and the connection status cells have the following meaning:

- Business Service status (first cell).

- Green • (dot)—Active and OK.
 - Yellow - (hyphen)—Currently inactive, but otherwise OK.
 - Red ! (exclamation mark)—Error.
 - Gray X (letter X)—Disabled.
- Connection status (second cell). The connection status is meaningful for TCP, HTTP, FTP, and ODBC connections.
 - Green + (plus sign)—Connected.
 - Yellow o (letter o)—Listening.
 - Red x (letter x)—Disconnected.
 - Gray - (hyphen)—Not applicable, disabled, unscheduled, or not connecting.

If you hover over the name of the service, the hover text provides additional information. If you select on the name of the service, the right area is updated with details and also displays the following associated links:

- **Event Log**—Click to view the Event Log entries for the selected configuration item. For information, see [Viewing the Event Log](#).
- **Queue Contents**—Click to view the production queues. For information, see [Monitoring Production Queues](#).

3.2.2 Output Connections

The **Outgoing Connections** table lists all outgoing connections to external systems. The **Completed** field indicates how many messages have been processed by the production’s business operations, including internal operations like `Ens.ALarm`. Each entry indicates the following:

1. Business operation status
2. Business operation connection status
3. Business operation name
4. Number of messages processed since the production started

The statuses are indicated by the cell color. The item status and the connection status cells have the following meaning:

- Business Operation status (first cell).
 - Green • (dot)—Active and OK.
 - Yellow - (hyphen)—Currently inactive, but otherwise OK.
 - Red ! (exclamation mark)—Error.
 - Gray X (letter X)—Disabled.
 - Gray • (dot)—Retry. The business operation connection failed and the operation is retrying the connection.
- Connection status (second cell). The connection status is meaningful for TCP, HTTP, FTP, and ODBC connections.
 - Green + (plus sign)—Connected.
 - Yellow o (letter o)—Listening.
 - Red x (letter x)—Disconnected.
 - Gray - (hyphen)—Not applicable, disabled, unscheduled, or not connecting.

If you select the name of the operation, the right area is updated with details and the same links as for the **Incoming Connections** table.

3.2.3 Queues

The **Queues** table lists the status of InterSystems IRIS® internal message queues and how many messages are currently waiting in each queue.

This table uses the same icons and color-coding as the **Incoming Connections** table. If you click an item in this table, the right area is updated with details and the **Queue Contents** link.

3.2.4 Event Log

The **Event Log** summarizes recent entries in the Event Log.

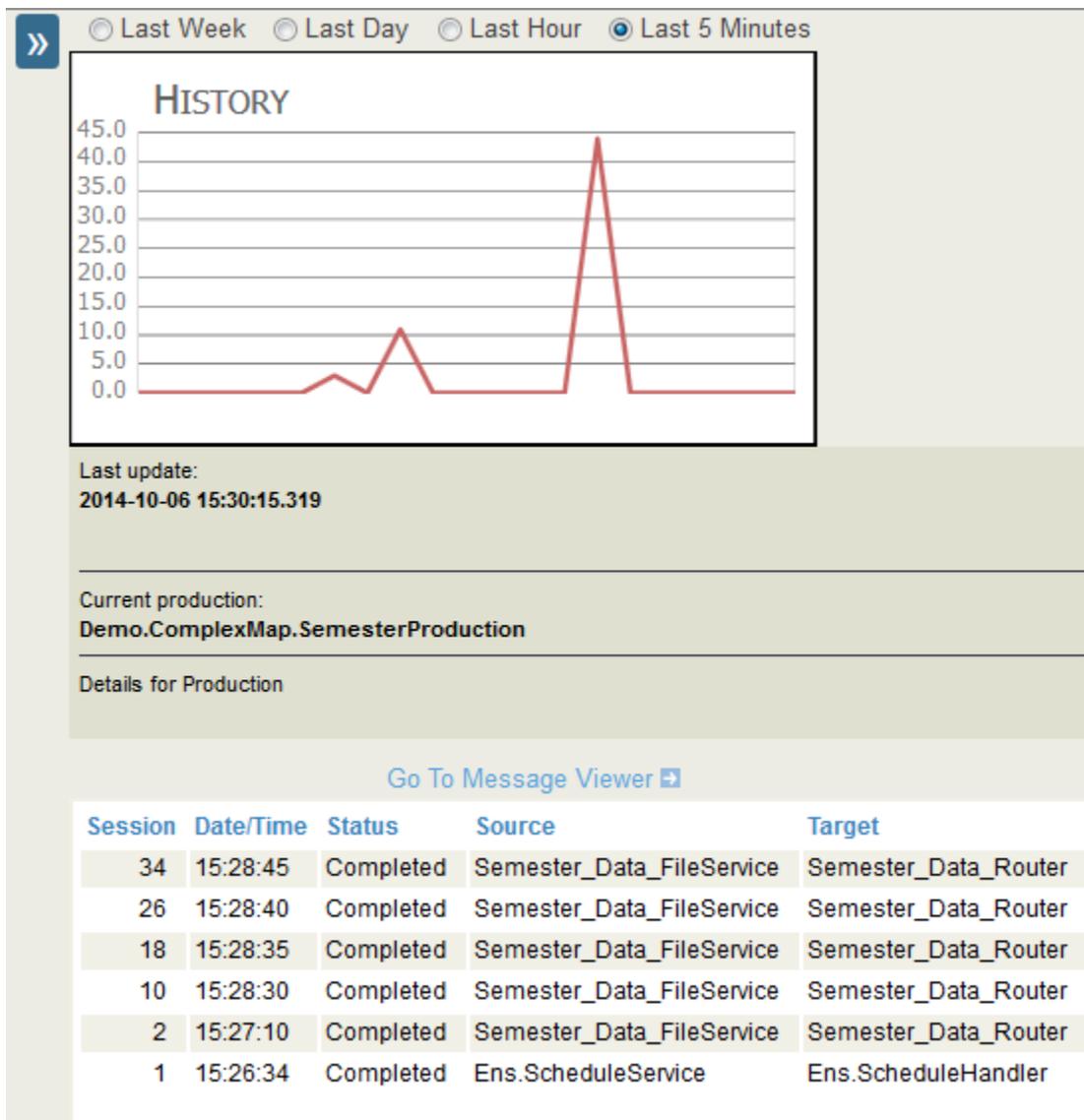
Each entry provides an icon and color to indicate the item's status, as follows:

- Red !—Error.
- Orange W—Warning.
- Yellow A—Alert.

If you select an item in this table, the right area is updated to show details of that Event Log entry. It also displays the **Event Log** link, which you can use to see the entire Event Log.

3.2.5 Activity Graph

The activity graph shows the message activity for the production or for a selected incoming or outgoing connection. The graph can show the message activity over a time period ranging from the previous 7 days to the previous 5 minutes. The following displays the activity graph or history of the production monitor:



You can specify the following for the activity graph:

- **Component to monitor**—when you start the Production Monitor, the Activity Graph shows the messages for all incoming and outgoing connections. If you select an incoming or an outgoing connect on the Production Monitor, the Activity Graph shows the activity for the selected component only. If you want to return to the activity of the entire production, select on the currently selected connection to deselect it.
- **Auto update**—if this check box is selected, the Production Monitor regularly updates the Activity Graph.
- **Time period to display**—select one of the following:
 - **Last week**—display the activity for the previous 7 days. The vertical axis specifies the number of messages per hour.
 - **Last day**—display the activity for the previous 24 hours. The vertical axis specifies the number of messages per 15-minute interval.
 - **Last hour**—display the activity for the previous 60 minutes. The vertical axis specifies the number of messages per minute.

- **Last 5 minutes**—display the activity for the previous 5 minutes. The vertical axis specifies the number of messages per 15-second interval.

3.2.6 Custom Metrics

The bottom area of the page might display one or more tables of custom metrics added by your InterSystems IRIS® developers. For example:

WORKFLOW TASKS	
Last Update: 2012-10-19 10:51:06.414	
• Assigned	29
• Unassigned	12

See [Adding Business Metrics to the Production Monitor](#).

3.3 Using the Production Monitor Service

While a production is running, InterSystems IRIS may detect discrepancies between the status of the production and its definition in the code. For example, the system may detect that a business host has experienced an error and died. When this happens, the **Update** button appears on the **Production Configuration** page and enables you to manually resolve the discrepancy.

If you prefer to take action programmatically when a production is out-of-date, you can use the `Ens.ProductionMonitorService` class. Specifically, you can add a business service based on the `Ens.ProductionMonitorService` class to your production as described in [Adding Business Hosts to a Production](#). By default, this business service checks the status of the production every five seconds. If the production is out-of-date, the business service calls the **UpdateProduction()** method of the `Ens.Director` class. You can change the interval at which the business service checks the production by modifying its **Call Interval** value. You can also customize the behavior of the business service when it detects that a production is out-of-date by modifying its **OnProcessInput()** method.

3.4 Monitoring Production Queues

The **Interoperability > Monitor > Queues** page shows the current state of all the message queues being used by the running production in the selected namespace.

The screenshot displays the 'Monitoring Production Queues' application. It features a 'Queues Table' on the left, an 'Active Messages' table in the center, a 'Queue Contents' table below it, and a 'Message Viewer' panel on the right. The 'Queues Table' lists various queues such as 'Ens_Enterprise.MsgBankOperation' and 'tcpService2_Router'. The 'Active Messages' table shows a single active message with Job ID 20294. The 'Queue Contents' table lists multiple messages with indices from 14556 to 14570. The 'Message Viewer' panel shows details for a message with ObjectID 3641, including its source, target, and session information.

The table on this page has one row for each queue. The columns in this table are as follows:

- **Name**—The name of the configuration item that has the queue. It may be different from the host class name.

Note: The `_SyncCall : <process id>` queue is not named after a configuration item. It is a temporary queue created to receive the response from a [synchronous request](#).
- **Count**—How many messages are on the queue. This value is a snapshot and may change when you refresh the page.
- **Active**—The number of active messages.
- **Creation Time**—The date and time when the queue was first created.

To see the contents of any given queue, select the row for that queue. The active messages and queue contents for that queue are displayed. If you select an entry in the queue contents or active messages, information about the message is displayed.

You can refresh the list of queues and contents by clicking the refresh arrow.

The **Active Messages** table is displayed when there are active messages in the selected queue. It has one row for each active message, which identifies the message and its state. If you select one or more messages by checking the check box, you can [abort](#) or select the selected messages.

In the **Active Messages** table, you can select a message row to view the details of the selected message. The details are displayed to the right in the **Header**, **Body**, **Contents**, and **Trace** tabs. These tabs are the same as in the **Message Viewer** page; see [Viewing, Searching, and Managing Messages](#),

The **Queue Contents** table on this page is displayed if there are messages in the selected queue. It has one row for each message in the given queue. The columns in this table are as follows:

- **Index**—This integer value starts at 1 for the first message placed on the queue after the production starts, and increments by 1 for each successive message. A message has the same **Index** value for the entire time it is on the queue. **Index** values are never reused.
- **Priority**—The priority of the message. See [Message Priority](#).
- **MessageId**—The object identifier for the message.

In the **Queue Content** table, you can perform the following tasks:

- Select a message row to view the details of the selected message. The details are displayed to the right in the **Header**, **Body**, **Contents**, and **Trace** tabs. These tabs are the same as in the **Interoperability > View > Messages** page; see [Viewing, Searching, and Managing Messages](#).
 - Select messages by checking the check box for the messages.
 - Click **Abort** to abandon any ongoing attempts to send one or more messages selected with the check box. Click **OK** to verify the operation.
 - Click **Abort All** to abandon ongoing attempts to send all the messages in the queue. You must then click **OK** to verify the operation.
- Note:** In order to use **Abort** or **Abort All**, you must have the `WRITE` permission on the `%Ens_Queues` resource.
- Select a page number to view that page in the list. Selecting `|<` displays the first page, `<<` displays the previous page, `>>` displays the next page, and `>|` displays the last page.

3.4.1 Diagnosing Problems with Queues

By looking at queues and [jobs](#), you can often quickly spot a problem in the system.

When there is buildup on a queue, it usually means something needs to be repaired. Usually the most important information about queues is the destination, or “target,” of any message that has been too long on a queue. In general, when a queued message is not being sent, it is because it cannot get to its target. If you can find out what is causing a problem with the target, when you solve that problem, the queue buildup will generally disappear. For example:

- For a business service or business operation, if a queue is *suddenly* longer, this generally means that there is a problem communicating with an external system. An external connection may be down, or there may be a peak-hour effect that is affecting throughput on your external connections.
- For a business service or business operation, if a queue is *consistently* long, this generally means that there is a consistent delay in sending messages. You should probably examine the external connection to see if there a performance problem that you can solve. If that is not possible, you could increase the appropriate pool size (unless you need to ensure first-in-first-out processing).

See [Pool Size and Actor Pool Size](#).

- For a business process that uses a private pool, if a queue is consistently long, you could increase the appropriate pool size (unless you need to ensure first-in-first-out processing).
- If the actor queue is suddenly longer, a business process may have experienced an error that has caused it to become “stuck” in some way.
- If the actor queue is consistently long, the actor pool for the production may need to be larger.
- If many queues have a consistently large buildup, there may be a general capacity issue on the host computer, the production (in its role as a CSP application) may need more resources, or the underlying InterSystems IRIS installation may need to be tuned. For suggestions, see the System Administration Guide. In general, however, you will be able to keep queues moving with the simpler adjustments listed in this topic.

3.5 Monitoring Active Jobs

The **Interoperability > Monitor > Jobs** page shows the currently active jobs for the production in the selected namespace.

The table on this page has one row for each active job. The columns in this table are as follows:

- **Job**—Internal numeric identifier of the job.
- **Configuration Name**—Configuration name of the business host for which this job was started.

Each time a business service, business process, or business operation needs to do work, it starts a system job in which to complete its tasks. This job comes either from a private pool of jobs belonging to the business service, business process, or business operation, or (in the case of a business operation) it may come from the public actor pool for the production. When the task is done, the job returns itself to the pool of jobs from which it came.

A production might need to start and stop several different jobs to complete a single request. The details depend (in part) on whether requests are made synchronously or asynchronously. For example, if a job is required to wait, the job returns itself to its pool during the wait time to free up that resource.

- **Mode**—Either `Background` or `Foreground`.
- **Status**—Typically, this is `running` or `dequeuing`.
- **Detail**—Any additional detail that is available for the job.
- **Active Message**—ID of the message currently being processed, if any.
- **State**—Typically, this is `active`.

3.5.1 Diagnosing Problems with Jobs

By looking at jobs and [queues](#), you can often quickly spot a problem in the system.

Most jobs spend most of their time in a `dequeuing` state while they wait for messages. During shutdown they should become quiescent. If the job does not become quiescent during shutdown, that likely indicates a problem. If the job is constantly in a `running` state, that also indicates a problem, unless you expect the component to be doing a lot of processing (and it is actually completing this processing).

Jobs that are marked as `dead` are jobs that have been terminated for some reason and InterSystems IRIS has detected that the job is no longer present on the system. This is normally an indication of a serious problem and should not occur. Also, if InterSystems IRIS detects a dead job, it writes an error to the [Event Log](#).

3.5.2 Aborting Messages, Suspending Messages, and Stopping Jobs

The Management Portal enables you to perform the following tasks in order to manage or troubleshoot active jobs:

- Abort the message that a job is currently attempting to resend. You can then view the message in the **Message Viewer**. For more information, see [Browsing the Messages](#).
- Suspend the message that a job is currently attempting to resend. Suspended messages are routed to a special queue, which you can view in the **Suspended Messages** page. For more information, see [Managing Suspended Messages](#).
- Stop a job altogether.

You must have `WRITE` permission on the `%Ens_Jobs` resource to stop a job or request that it abort a message. You must have `USE` permission on the `%Ens_MessageSuspend` resource to request that a job suspend a message.

To take action on an active job, do the following:

1. Navigate to **Currently Active Jobs** page or to the **Jobs** tab in the **Production Configuration** page that includes the job of interest.

Note: The Jobs tab lists only the latest 100 jobs.

2. Select the job of interest.

3. Click **Abort**, **Suspend**, or **Stop** as appropriate.

3.6 Using the Production Configuration Page

InterSystems IRIS provides another way to view a production, the **Interoperability > Configure > Production** page.

This page displays the business hosts in the production, with useful color coding as in the following example:

Production Running			Category: All	Legend	Production Settings
Services	Processes	Operations			
● Demo.Loan.BankMetrics	● Demo.Loan.BankEven	● Demo.Loan.FindRateEMailOperation			
● Demo.Loan.FindRateCSPService	● Demo.Loan.BankManana	● Demo.Loan.FindRateFileOperation			
● Demo.Loan.FindRateEMailService	● Demo.Loan.BankSoprano	● Demo.Loan.FindRateMQSeriesOperation			
● Demo.Loan.FindRateFileService	● Demo.Loan.BankUS	● Demo.Loan.FindRateMSMQOperation			
● Demo.Loan.FindRateMQSeriesService	● Demo.Loan.FindRateDecisionProcessBPL	● Demo.Loan.FindRateTCPOperation			
● Demo.Loan.FindRateMSMQService	● Demo.Loan.FindRateDecisionProcessCustor	● Demo.Loan.WebOperations			
● Demo.Loan.FindRateTCPService		● My Terminal Output			
● Demo.Loan.FindRateTerminalService					

This 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:

Indicators

- Not running, enabled
- Running
- Disabled
- Error
- Retrying
- Inactive

Interaction

Click on an item's name to view its details

Click on an indicator to view the connections

Double-click on an item to enable or disable it

Note that the primary purpose of this page is for configuring productions as described in [Configuring Productions](#).

3.7 Correcting Production Problem States

If a production is [Suspended](#) or [Troubled](#), read this section.

If the state of a production is [Running](#), then a production has been started and is operating normally. This is an acceptable state.

If the state of a production is [Stopped](#), it is not running and all of its queues are free of synchronous messages. This is also an acceptable state.

In some cases (usually during development), you might see the **Update** button on this page for a production that is Running. Click this, and InterSystems IRIS updates the production to resolve the discrepancy. For an explanation, see [The Update Button](#).

3.7.1 Recovering a Suspended Production

A production acquires the Suspended status when, at the end of the shutdown sequence, some queues still contain synchronous messages.

You can start the Suspended production again to permit these messages to be processed. However, if the underlying problem is not resolved, you might acquire more synchronous messages in the queue without processing the previous messages.

Therefore, if a live, deployed production goes into a Suspended state, contact the [InterSystems Worldwide Response Center \(WRC\)](#) for assistance.

If a production becomes Suspended during development, see [Correcting Production Problem States](#). In this case, you can use a procedure that discards the messages.

3.7.2 Recovering a Troubled Production

A production acquires a status of Troubled if InterSystems IRIS is stopped but the production did not shut down properly. This can happen if you restarted InterSystems IRIS or rebooted the machine without first stopping the production. In this case, click the **Recover** button.

4

Viewing, Searching, and Managing Messages

All communication within a production is accomplished with *messages*, and the Management Portal provides many tools for viewing and working with messages. Also see [Viewing Messages from Other Productions](#).

For background information on messages, see [Concepts](#).

4.1 Browsing the Messages

You can view information about the messages that your production has sent or queued. The **Interoperability > View > Messages** page displays the messages. In addition to accessing this page from the menu, you can also access it by selecting **Go to Message Viewer** at the top of the **Messages** tab on the **Production Configuration** page.

The middle area lists the messages. To refresh this area, click the **Search** button. You can use the bottom left area to filter the list of messages; for information, see the [following section](#). The right area displays details; see [Viewing Message Details](#) and [Tracing the Path of Related Messages](#).

4.1.1 Available Information

The top area of this page displays the following information for each message:

- **ID**—The ID of the message. See [Message Basics](#).
- **Time Created**—The message creation time stamp. See [Invocation Style and Message Time Stamps](#).
- **Session**—The ID of the session associated with this message. See [Sessions](#).

You can select the **Session** number in any row of the table to see a [visual trace](#) of the message object through the production.

- **Status**—Indicates the status of the message. See [Message Status](#).
- **Error**—Provides a quick overview of the results returned by the message to the business host that sent it.

OK means normal behavior; `Retry` means the message experienced a failure but the business host that sent it is configured to retry the failed message. `Error` means an error was reported somewhere in the activity. `Inactive` means that the business host that sent the message has been idle for longer than its [Inactivity Timeout](#) setting, and may require diagnostic action.

- **Source**—The business host that sent the message.
- **Target**—The business host to which the message was sent.

The **Session** column also uses color as follows:

Background Color	Indication
Red	The message encountered an error.
Green	The message marks the start of a session.
Silver	The message arrived after a timeout expired and is marked as discarded.
Orange	The message is suspended.
White and pale tan, in alternating rows	These messages are OK or are queued.

If you are using the Message Bank Viewer, there is an additional option to specify the Message Bank client to search. See [Using the Enterprise Message Bank](#).

4.1.2 Paging Through the Messages

Typically there are multiple pages of messages. To see all the messages, you have the following options:

- You can display the next page of messages. To do so, click **Next**.
- You can display more messages. To do so, select a larger value for **Page Size** and click **Search** again.
The default is 100 messages.
- You can display the previous page of messages. To do so, click **Previous**.
- You can change how the messages are sorted. To do so, click a different value for **Sort Order**.

Also use **Time Format** to specify whether to show only the time or the complete time with the date. The default is `Complete`.

The read-only **Page** field indicates which page of the list is being displayed.

4.2 Filtering the Messages

To find a specific message more easily, you can filter the messages shown in the **Interoperability > View > Messages** page. The basic process is as follows:

1. Specify the filter criteria. In general, you can do this in two different ways:
 - Use the [Basic Criteria](#) and [Extended Criteria](#) areas to specify filter criteria.
 - Use the **Saved Searches** area to retrieve a previously saved set of filter criteria. To do so, select a value from the drop-down list and then click the check mark.
2. Click **Search**. The page is redisplayed with a list of messages that match your filter criteria. If the search has not yet completed, you can interrupt it by clicking **Cancel**.
Or click **Reset** to restore the default criteria.
3. If more matches are found than can be displayed, the **Next** button is active, and you can use that. Or, to display more data, select a larger value for **Page Size** and click **Search** again. Or adjust your filter criteria to narrow the search.

- Optionally click **Save** or **Save As** to save the search criteria for later reuse. InterSystems IRIS then displays a field in which you provide a name for the search criteria. Enter a value and click the check mark.

This operation overwrites any previously saved criteria with the same name.

To delete a saved search, click its name in the **Saved Searches** list and then click the red X.

Note: Timed Out—When searching through an especially large message bank, it is possible that the search will time out before returning results. You can avoid this time out by increasing the Server Response Timeout parameter of the Web Gateway. For more information about increasing the Server Response Timeout parameter, see [Configuring Default Parameters](#). The default value of the parameter is 60 seconds.

4.3 Filtering with Basic Criteria

To filter the messages shown in the **Interoperability > View > Messages** page, specify some or all of the following fields in the **Basic Criteria** area:

- Status**—Select a value from the drop-down list. See [Message Status](#).
- Type**—Select a value from the drop-down list: Session Start, Request, Response, or All (the default).
- Start Time**—Enter the earliest desired message creation time stamp. See [Invocation Style and Message Time Stamps](#).
- Start Id**—Enter the lowest desired message ID.
- End Time**—Enter the latest desired message creation time stamp.
- End Id**—Enter the highest desired message ID.
- Source**—The business host that sent the message. Choose from the list.
- Target**—The business host that is the target of the message. Choose from the list.

If you are using the Message Bank Viewer, there is an additional filter that restricts the search to a single Message Bank client. See [Using the Enterprise Message Bank](#).

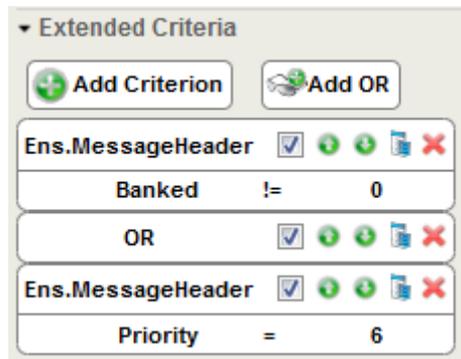
4.4 Filtering with Extended Criteria

The **Extended Criteria** area enables you to filter the displayed messages by extremely specific criteria. An advanced filter consists of one or more conditions, combined with the logical operators AND and OR. Each condition can use any information contained in the messages, comparison operators from a rich set, and your arbitrary expressions. Only messages that meet all the combined conditions are displayed.

To use this area, click the triangle next to **Extended Criteria**. Then do either of the following:

- To add a criterion, click **Add Criterion**. See the [first subsection](#).
- To add an OR, click **Add OR**. By default, the criteria are combined with AND. Use this option to combine adjacent criteria instead with OR. See [How Criteria Are Combined](#).

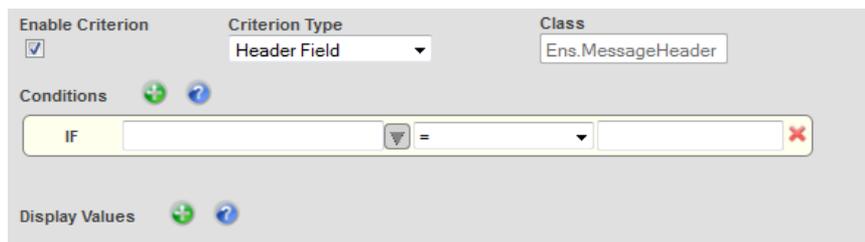
After you add these items, the **Extended Criteria** list displays your selections. For example:



When you are satisfied with your selections, click **Search**. The Message Viewer page displays the list of messages that match all your filter criteria.

4.4.1 Adding a Criterion

To add a criterion, click **Add Criterion**. InterSystems IRIS displays a wizard as follows:



Specify the following values:

- **Enable Criterion**—Select to enable this search.
- **Criterion Type**—Choose a value from the list. See the [next subsection](#).
- **Class**—Click a class name from the list. See the [Class](#) subsection.
- **Conditions**—Allows you to specify fields and values for your logical statement. See the [Conditions](#) subsection.
- **Display Values**—Allows you to specify additional values to display in the table. Your chosen values are displayed on the right side of the table.

Click **OK** to save this criterion and add it to the **Extended Criteria** list.

4.4.2 Criterion Type

For **Criterion Type**, select a value from the drop-down list, if applicable. The following table lists the choices and how they affect your subsequent choices in the **Class** and **Conditions** fields.

Type	Class and Conditions refer to...
Body Property	Properties of a standard production message body object.
Header Field	Fields in a standard production message header object.
OR	(used to logical OR two filter terms)
SearchTable Field	Entries in a search table class that you have defined in this namespace. A search table class is a specialized tool that you create to work with virtual documents.

Type	Class and Conditions refer to...
VDoc Segment Field	Fields in a virtual document message segment . Identify the standard and the segment of interest. InterSystems IRIS then prompts you to choose from a list of fields in that segment.
VDoc Property Path	Fields in a virtual document message segment. Identify the standard and then enter a virtual property path that identifies a message segment and field that is valid for that standard.

Note: For background information about the VDoc fields in the **Extended Criteria** interface, see [Using Virtual Documents in Productions](#). You do not need to use these fields unless your production routes some type of virtual document.

4.4.3 Class

For **Class**, select a value from the drop-down list, if applicable. InterSystems IRIS lists all the classes appropriate for the selected **Criterion Type**. For example:

Type	Class Name
Body Property	Choose from all the message classes in this namespace.
Header Field	—
OR	—
SearchTable Field	Choose from all the search table classes in this namespace.
VDoc Segment Field	Choose from all the virtual document classes in this namespace.
VDoc Property Path	Choose from all the virtual document classes in this namespace.

4.4.4 Filter Conditions

For **Conditions**, specify fields and values for your logical statement, from left to right, as follows:

1. For the first cell, select a value from the drop-down list, which includes all choices appropriate for this context. For further instructions, see the first table below.
2. For the second cell, select a comparison operator from the drop-down list. See the second table below.
3. In the third cell, type the literal string that you intend to match using the selected operator.

Do not use double quotes around the string.

Choices in the **Conditions** panel vary according to your choice of **Type**. The following table describes the choices.

Type	Conditions
Body Property	Choose from all the properties in the Class Name message class.
Header Field	—
OR	—
SearchTable Field	Choose from all the search table entries defined in the Class Name search table class.

Type	Conditions
VDoc Segment Field	<p>Select a value for Segment Type and then select a value for Field Name. (Or type values, if you know the applicable values.)</p> <p>For some schemas, you can type a numeric references if you prefer them to names, for example [5], [18.1], or 2.3.1:[3().1]. You may edit out the category reference and colon prefix, but keep the square brackets and their contents intact.</p> <p>Square brackets differ from curly brackets in that square brackets enclose a <i>segment: field</i> combination that does not require you to identify its containing message structure.</p>
VDoc Property Path	<p>Select a value for Doc Type and then select a value for Property Path. (Or type values, if you know the applicable values.)</p> <p>Instead of selecting options to fill the left-hand Conditions field, you can type a virtual property path into the field, as long as you are careful to use the correct syntax. Curly bracket syntax requires a specific message structure to be identified.</p>

The comparison operator between the two values in a **Conditions** statement can be any one of the following.

Operator	The condition is true when the value at left is...
=	Equal to the value on the right.
!=	<i>Not</i> equal to the value on the right.
>	Greater than the value to the right of the operator.
>=	Greater than or equal to the value to the right.
<	Less than the value to the right.
<=	<p>Less than or equal to the value to the right.</p> <p>If a condition >, >=, <, or <= involves strings, they are sorted alphabetically to determine the result. Symbols and numbers sort <i>before</i> alphabetic characters.</p>
Contains	<p>A string that contains the substring to the right.</p> <p>The Contains operator is case-sensitive (except possibly within search table fields). If the value at left is <code>Hollywood, California</code> and the value at right is <code>od, Ca</code>, there is a match, but a value of <code>Wood</code> does not match.</p> <p>The Contains operator might or might not be case-sensitive in search table fields, depending on the implementation of a particular search table class.</p>
DoesNotContain	A string that does <i>not</i> contain the substring at right.
DoesNotMatch	A string that does <i>not</i> match the pattern in the string specified to the right, which uses syntax suitable for the ? pattern matching operator in ObjectScript. For details, see the Pattern Match Operator reference page.
In	Identical to one of the items in the comma-delimited string at right.
NotIn	Identical to <i>none</i> of the items in the comma-delimited string at right.
StartsWith	A string that starts with the substring at right.
DoesNotStartWith	A string that does <i>not</i> start with the substring at right.

Operator	The condition is true when the value at left is...
Like	A string that matches the pattern in the substring specified to the right, according to the rules for the LIKE predicate in SQL. Matching for the Like and NotLike condition may be summarized as follows: The character <code>_</code> matches any single character, and the character <code>%</code> matches any sequence of zero or more characters. Thus, if the value at left contains the pattern <code>%Com_</code> and the selected operator is Like, values of <code>TransCom1</code> and <code>UltraCom2</code> match, but values of <code>UltraCom17</code> and <code>Foxcom8</code> do not match.
Matches	A string that matches the pattern in the string specified to the right, which uses syntax suitable for the <code>?</code> pattern matching operator in ObjectScript. For details, see the Pattern Matching reference page.
NotLike	A string that does <i>not</i> match the pattern in the substring specified to the right, according to the rules for the LIKE predicate in SQL.
InFile	Found in the text file whose full pathname is specified to the right.
NotInFile	<i>Not</i> found in the text file whose full pathname is specified to the right.

Important: When InterSystems IRIS indexes virtual documents (thus adding to the search tables), it replaces any vertical bar (`|`) with a plus sign (`+`). Take this into consideration when you use the search table to search for content. For example, to search for a message that contains `my|string`, use `my+string` as the search criterion.

4.4.5 Rearranging and Modifying Criteria

If you have multiple items in the **Extended Criteria** section, you can click the up-arrow and down-arrow icons to adjust their order.

To edit an item, click the edit button  for that item.

To delete an item, click **X**.

4.4.6 How Criteria Are Combined

If **Extended Criteria** displays contains multiple criteria, they are implicitly joined by AND. For example, suppose that you have three statements visible:

```
Logical Statement 1
Logical Statement 2
Logical Statement 3
```

In this case, your filter actually works like this:

```
Logical Statement 1
AND
Logical Statement 2
AND
Logical Statement 3
```

To modify this logic, use **Add OR** and reposition the OR as needed. Suppose you added an OR row and a fourth logical statement to the list shown above. The **Extended Criteria** panel now looks like this:

```
Logical Statement 1  
Logical Statement 2  
Logical Statement 3  
OR  
Logical Statement 4
```

And the resulting logic is now:

```
Logical Statement 1  
AND  
Logical Statement 2  
AND  
Logical Statement 3  
OR  
Logical Statement 4
```

The operator AND binds more tightly than OR, so the effect of the above sequence is actually:

```
(1 AND 2 AND 3) OR 4
```

4.5 Viewing Message Details

For each message, InterSystems IRIS provides details about how the message was created and sent. You can access the relevant page from multiple places. For example:

1. Access the **Interoperability > View > Messages** page.
2. Select a message.

The system displays the following tabs in the right pane:

- **Header**—Displays the [fields in the message header](#).
- **Body**—Displays the [fields in the message body](#).
- **Contents**—Displays [contents of the message body](#) in an appropriate format.
- **Trace**—Displays a small visual trace of the message and related messages through the production. To see the larger version (the **Visual Trace** page), click **View Full Trace**.

Note: On a backup mirror member, it may not be possible to view message body data.

The following subsections describe the **Header**, **Body**, and **Contents** tabs.

The **Trace** tab displays a subset of the data and options that you see on the larger **Visual Trace** page. The **Visual Trace** page is described in the [next section](#).

4.5.1 Message Header Fields

The **Header** tab displays the standard fields in any production message header:

- **<ObjectId>**—The ID of the message header (and also the message ID; see [Message Basics](#)).
- **TargetConfigName**—The name of the business host that is intended to receive the message.
- **Type**—The message type, Request or Response.
- **Invocation**—Indicates how the message was sent. See [Invocation Style and Message Time Stamps](#).
- **CorrespondingMessageId**—For a request message, this field contains the message ID of the corresponding response (if any) or it is blank. For a response message, this field contains the message ID of the corresponding request.

- **SessionId**—The ID of the session associated with this message. See [Sessions](#).
- **SourceConfigName**—The business host that sent the message.
- **SourceBusinessType**—BusinessService, BusinessProcess, BusinessOperation, or Unknown.
- **TargetBusinessType**—BusinessService, BusinessProcess, BusinessOperation, or Unknown.
- **BusinessProcessId**—Every business process that gets executed has an instance and this is the object ID of that instance. If the message is a request, this field identifies the business process in whose context the message was created (sender). If the message is a response, this field identifies the business process to which it is being returned (receiver). This field is empty in various circumstances, for example if an error occurred.
- **TargetQueueName**—The destination “address” for the message, this indicates where it is going:
 - If this is a name, it identifies a public queue, such as Ens.Actor.
 - If this is a number, it identifies the job ID associated with the private queue of a business host.
- **ReturnQueueName**—The return “address” for the message, this indicates where it came from:
 - If this is a name, it identifies a public queue, such as Ens.Actor.
 - If this is a number, it identifies the job ID associated with the private queue of a business host.

The **ReturnQueueId** value is listed even if there is no response expected or needed for a particular request message type.

- **MessageBodyClassName**—The class name for the message body.
- **MessageBodyId**—The ID for the message body. This field matches the **<ObjectId>** field in the **Message Body** table.
- **Description**—A text description of the message. The InterSystems IRIS Business Process Language (BPL) provides text in this field automatically, based on the type of BPL activity that generated the message.
- **SuperSession**—The ID for messages sent via HTTP from one production to another. For details, see [SendSuperSession](#).
- **Resent**—Indicates whether this is a resent message.
- **Priority**—The priority of the message relative to others in the queue, as assigned by the InterSystems IRIS messaging engine. See [Message Priority](#).
- **TimeCreated**—The message creation time stamp. See [Invocation Style and Message Time Stamps](#).
- **TimeProcessed**—The message usage time stamp. InterSystems IRIS sets this field when the message is taken off of the queue but then resets it to the current time while the message is being processed. Typically, for a completed message, it represents the time that the message processing was completed.
- **Status**—Indicates the status of the message. See [Message Status](#).
- **IsError?**—The value 1 means that the message encountered an error. The value 0 means the message did not encounter any errors.
- **ErrorStatus**—If **IsError?** is 1, then this is the text associated with the error. When **IsError?** is 0, **ErrorStatus** is the string “OK”.
- **Banked**—Indicates whether or not this message is part of a message bank.

4.5.2 Message Body Fields

The **Body** tab displays the message body information. Fields include:

- The message body class name above the list of fields.

- If the message body is a standard production message body object, a table displays the following information:
 - **<ObjectId>**—The object identifier for the message body. This field matches the **MessageBodyId** field in the **Header** tab.
 - The name and value of each property in the **Message Type** class.

If the message body is any other type, there are no additional fields in the display.

4.5.3 Message Contents

The **Contents** tab displays formatted contents of the message body.

The standard production message body appears in colorized XML format, as shown in the following example:

```
<?xml version="1.0" ?>
<!-- type: EnsLib.Testing.Request id: 82 -->
<Request>
  <Target>Demo.Loan.FindRateDecisionProcessBPL</Target>
  <Request xsi:type="Application">
    <Amount>10000</Amount>
    <Name>John Smith</Name>
    <TaxID>123456789</TaxID>
    <Nationality>USA</Nationality>
    <BusinessOperationType></BusinessOperationType>
    <Destination></Destination>
  </Request>
  <SyncCall>false</SyncCall>
  <_requestClassname></_requestClassname>
  <_requestId></_requestId>
</Request>
```

A virtual document appears in segments, with one segment per line.

To view all the contents of large virtual document, it may be necessary to drag the bottom scroll bar far to the right. To view the message in a wider display, click the **View Full Contents** link or the **View Raw Contents** link. **View Full Contents** displays the message formatted by fields and **View Raw Contents** displays the unprocessed message contents, which can easily be copied and pasted into a text editor. For background information, see [Using Virtual Documents in Productions](#).

4.5.3.1 Changing the Character Limit for XML Messages in the Contents Tab

When you select a message in the **Messages** page and then click the **Contents** tab, the Management Portal displays only the first 20000 characters of the message by default. This character limit prevents the Management Portal from becoming unresponsive while rendering very large messages such as batch files parsed with a record map. However, InterSystems IRIS enables you to modify the character limit by setting either of the following global nodes:

```
^EnsPortal.Settings("All", "MessageContents", "OutputSizeLimit")
```

```
^EnsPortal.Settings("All", "MessageContents", "OutputSizeLimit", <MessageBodyClassname>)
```

<MessageBodyClassname> is an optional node that specifies the class name of the message bodies to which the limit applies. If you set both nodes, the value in the *<MessageBodyClassname>* node is used.

You can set the nodes to a value of 0 or greater, where 0 indicates no limit and a positive value indicates the number of characters to display in the **Contents** tab. For example, to increase the character limit for the **Contents** tab to 30000 characters

for the *Demo.Loan.Msg.CreditRatingResponse* sample message body class, you can issue the following command in the Terminal:

```
set ^EnsPortal.Settings("All", "MessageContents", "OutputSizeLimit", "Demo.Loan.Msg.CreditRatingResponse")
= 30000
```

The `OutputSizeLimit` nodes do not affect the behavior of the **View Full Contents** or **View Raw Contents** pages. If you click the **View Full Contents** or **View Raw Contents** links in the **Contents** tab for a message, InterSystems IRIS attempts to display the complete message. To set a character limit for either page, you can append `&LIMITSIZE=limit` to the page URL, where *limit* indicates the maximum number of characters to display. For example, to set the character limit for the **View Raw Contents** page to 30000, you might modify the URL, using the `<baseURL>` for your instance:

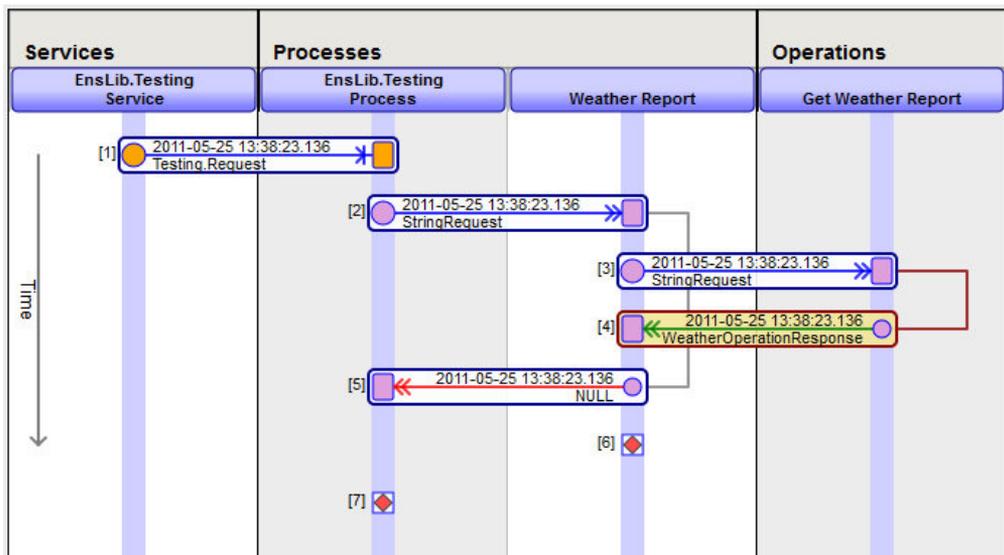
```
http://<baseURL>/csp/proddemo/EnsPortal.MessageContents.zen?HeaderClass=Ens.MessageHeader&Header.ID=3&RAW=1&LIMITSIZE=30000
```

4.6 Tracing the Path of Related Messages

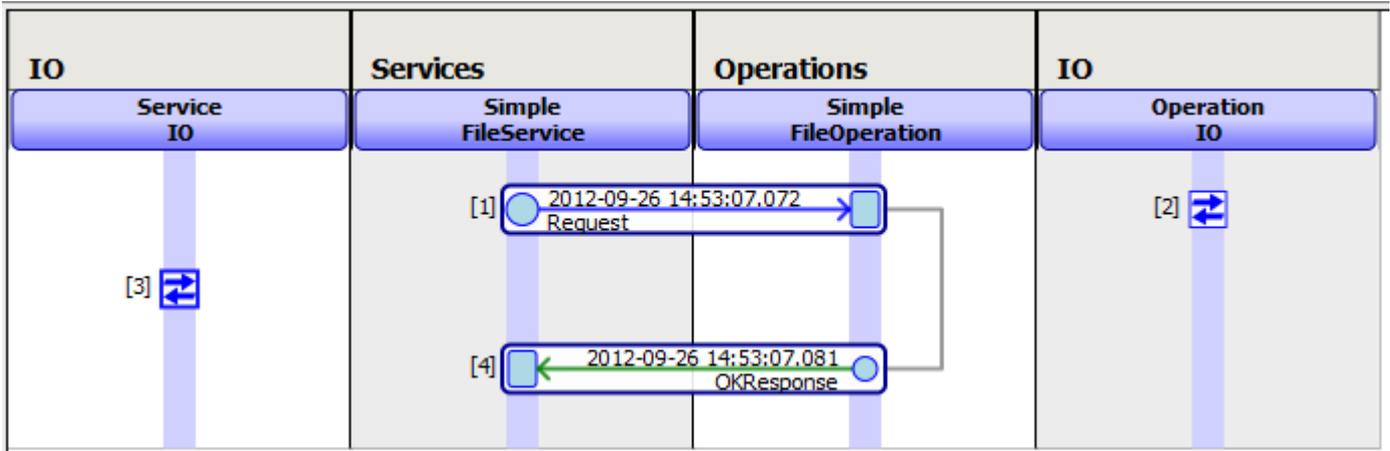
The **Visual Trace** page enables you to visually trace the path of a set of related messages between business hosts. You can access this tool from multiple places. For example:

1. Access the **Interoperability > View > Messages** page.
2. Select a message.
3. Select the **Trace** tab, which displays a small version of the trace.
4. Select **View Full Trace**.

The left area of the **Visual Trace** page displays a visual representation of message activity, with one column for each business host that handles the message. The business hosts are grouped into business services, business processes, and business operations.



If you enable the [Archive IO](#) setting for one or more business service and business operations, the **Visual Trace** also displays the input and output data in addition to the production messages. For example:



Note: When you view calls with this tool, synchronous calls from long-running business processes are portrayed as if they were asynchronous. This does not change the fact that the calls are actually synchronous. It is a side effect of the internal tracking mechanism that InterSystems IRIS uses to free system resources while it is waiting for a synchronous call to return.

When a message has traveled from one item to the next, an arrow connects the two items within a rounded box:

- The source item is marked with a circle; this is the item that sends the message.
- The target item is marked with a rounded rectangle. The arrow points to this item, away from the source item.

In both cases, you can read the name of the business host at the top of the column.

Each of these rounded boxes corresponds to a message and displays information as follows:

- A number in square brackets outside the box on left is the message identifier.
- A date and time within the box above the arrow indicates the message creation time stamp. See [Invocation Style and Message Time Stamps](#).
- The arrow is displayed in color. Normal request message arrows are blue; responses are green. If a message encountered an error, its arrow is red.
- The text below the arrow is the message name.

Additional lines indicate when a given business host receives and later sends a message.

If there are many messages shown in the full trace, it can be useful to limit the messages displayed by using a filter. This is also useful if you are trying to find messages that are related to an ACK or Archive IO message. The **Apply Filter** drop-down allows you to restrict messages in the following ways:

- To filter for the matching request or reply for a specific message—select the message and then select **Corresponding** from the **Apply Filter** drop-down menu. This selection limits the messages displayed to the following:
 - All preceding messages with the target set to the source of the selected message.
 - If a request message is selected, the corresponding response message.
 - If a response message is selected, the corresponding request message.
 - If an ACK or IOLog message is selected, the corresponding request or reply.
- To filter for all messages with a specific component as either the source or target of the message—select the column for the component and then select **Host** from the **Apply Filter** drop-down menu. This selection limits the messages to those having either a source or target of the selected component.

- To filter for all messages having the same source and target as a specific message—select the message and then select **Host** from the **Apply Filter** drop-down menu. This selection limits the messages to those that have both the same source and same target as the selected message.

When you apply a filter, the message trace displays the filter it is applying. For example:

Filter = SourceHost:MsgRouter250, TargetHost:TCPOp001

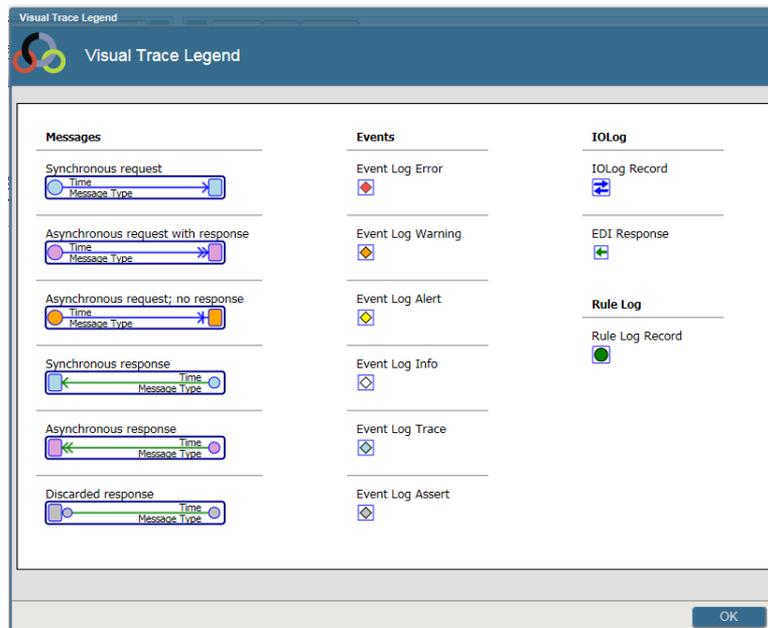
Once you have applied a filter, the **Apply Filter** label changes to **Reapply Filter**. If you change the selection of the value of the drop-down menu, you must select **Reapply Filter** to change filters.

If there are more messages than will display on a page, you can use the **Items per page** drop-down to control the number of items displayed. You can either use the **Go to items** drop-down or the **Previous Page** and **Next Page** links to scroll through the pages.

The right area displays details for the selected message in the trace. The **Header**, **Body**, and **Contents** tabs display the same information as the **Interoperability > View > Messages** page; see [Viewing the Message Details](#).

Note: On a backup mirror member, it may not be possible to view message body data.

If you select **Legend**, InterSystems IRIS displays a popup guide with additional information, as follows:



If a message is sent out from an outbound HTTP adapter to another interoperability-enabled namespace, the incoming message is assigned a new SessionID. If you want to associate the related messages across namespaces, you can use the **SendSuperSession** setting. If this setting is specified on an outbound HTTP adapter, the adapter sets the SuperSession property in the HTTP header. This header property is preserved through the incoming HTTP adapter and preserved throughout the production. For details, see [SendSuperSession](#).

4.7 Resending Messages

If a message failed to be delivered, you can correct the problem that resulted in the failure, and then resend the message.

You can resend messages from the Management Portal or using a programmatic solution, as described in the following sections. A programmatic solution is more efficient for resending 100 or more messages at a time.

4.7.1 Resending Messages from the Management Portal

1. Access the **Interoperability > View > Messages** page.
2. Select the messages by selecting the check boxes in the left column. Or [filter](#) the display appropriately and then click the check box at the top of the left column.

If you need to edit messages before resending them, then select a single message. You cannot use the **Edit and Resend** option (shown later) if you select multiple messages on this page.

3. Select **Resend Messages**.
4. If you checked the check box at the top of the left column and if there are multiple pages of selected messages, the system then displays the following message:

More messages match your search criteria than appear here. If you want to resend all the messages that match your criteria, including those not shown on this page, click **OK**. To resend only your selected messages, click **Cancel**.

Now do one of the following:

- Select **OK** to continue with all the selected messages.
- Select **Cancel** to continue with only the selected messages that were visible on the first page.

In either case, you can later cancel the action.

5. The system then displays details for the selected messages. The table includes the following information:
 - **Session**—The session to which each message belongs. Click this to view the [visual trace](#) of the primary message object through the production. See [Sessions](#).
 - **Header**—The ID for the message header (also the message ID). Click this to view the [visual trace](#) of this specific message. See [Message Basics](#).
 - **Msg Body**—The ID for the message body. Click this to view the [message contents](#).
 - **Created**—The message creation time stamp. See [Invocation Style and Message Time Stamps](#).
 - **Source**—The business host that sent the message.
 - **Target**—The business host that was intended to receive the message. This field also indicates if the production target is not running; note that you cannot resend a message if the intended target is not running. Click this to see the contents of the target's message queue.

If you selected more than 1000 messages, only the first 1000 are shown, but the page indicates the total number that you selected.

6. Optionally select a new target business host. To do so, select a value for **New target**.
7. Optionally select **Resubmit at head of queue**.

If you do so, InterSystems IRIS places the resent message at the front of its target queue. This helps to preserve FIFO (first in, first out) processing when the order of messages is important.

Important: Before using this option, first disable the target component temporarily. This enables the production to build up the queue in the expected order, so that the target does not take messages from the queue before you have finished adding all the messages you want to resend.

8. Click one of the following:
 - **Cancel**—To cancel this action.
 - **Resend**—To resend the message or messages as specified.

- **Edit and Resend**—To edit the message and resend it as specified. See the [subsection](#) for details.

When you resend multiple messages, InterSystems IRIS resends them in order by age, starting with the oldest messages.

When you resend the messages, the page is redisplayed with an additional **Resend Status** column. Any status other than **OK** indicates that the resend operation failed. A resent message retains the same **Session** identifier and transmits the same message body, but acquires a new message header (with a new, unique ID) to mark its additional trip through the production. The [visual trace](#) includes both the original message transmission and any resend operations that involve the same message. The description in the message header contains text indicating this message has been resent; the description includes the original along with any subsequent header object identifiers.

4.7.1.1 Resend Editor

When you select one message to resend from the Message Viewer page, you have the option to edit the body of the message before resending it.

1. Click **Edit then Resend** to display the **Resend Editor** page.
2. Use the entry fields to update the message body data. The fields vary depending on the message. If the message has no properties, none are displayed.

If you are editing a virtual document message, you can edit data in the message content and also edit object properties in the box below the content box.

3. Click **Resend** to send a new copy of the message header with your edited message body to the target.
4. After a successful resend, the page refreshes with text indicating the new **Header** and **Msg Body** identifiers. Click **Trace** to see the visual trace of the resent message.

4.7.2 Resending Messages Programmatically

A programmatic solution is more efficient than the **Message Viewer** page for resending large numbers of messages. You can create a class using an SQL cursor and the **ResendDuplicatedMessage()** method of the `Ens.MessageHeader` to resend 100 or more messages at a time, for example:

```
Class Sample.Resender Extends %RegisteredObject
{
    ClassMethod Resend()
    {
        //Resend all messages sent from 'FromComponent' to 'ToComponent' between 2016-06-15 and 2016-06-20

        &sql(DECLARE C1 CURSOR FOR
        SELECT ID INTO :id FROM Ens.MessageHeader
        WHERE SourceConfigName='FromComponent' AND TargetConfigName='ToComponent'
        AND TimeCreated BETWEEN '2016-06-15' AND '2016-06-20')

        &sql(OPEN C1)
        &sql(FETCH C1)

        set tSC = $$$OK

        while (SQLCODE = 0) {
            //id holds the id for one message. Resend it
            set tSC = ##class(Ens.MessageHeader).ResendDuplicatedMessage(id)
            quit:$$$ISERR(tSC)
            &sql(FETCH C1)
        }

        &sql(CLOSE C1)
        quit tSC
    }
}
```

4.8 Viewing the SQL Query Used by the Message Viewer

For debugging purposes, you might want to view the SQL query currently used by the Message Viewer. To do so:

1. Open the Terminal, change to your working namespace, and enter the following command:

ObjectScript

```
Set ^Ens.Debug("UtilEnsMessages","sql")=1
```

This command sets a code in a utility debugging global.

2. Access the **Interoperability > View > Messages** page.

Notice that this page now includes the **Show Query** button; this button is shown only if the previously mentioned global is set.

3. Select **Show Query**.

4.9 Managing Suspended Messages

A business operations can set the status of a failed message to suspended. In addition, a synchronous message is suspended when a production stops before the message could be processed. You can also manually suspend a message.

InterSystems IRIS automatically places all *Suspended* messages on a special queue, shown in the **Interoperability > View > Suspended Messages** page of the Management Portal. You can use this page to determine why the message failed, fix the problem, and then resend the message. For example, if the problem is that an external destination went out of service, you can make a change to reestablish communication with that server. Then you can resubmit the suspended messages to the external server from this page. Or you can discard or delete the message.

To manage suspended messages, do the following:

1. Navigate to the **Interoperability > View > Suspended Messages** page.
2. If any messages in the currently running production are suspended, the system lists them in a table with the following information:
 - **ID**—The ID of the message. See [Message Basics](#).
 - **Time Created**—The message creation time stamp. See [Invocation Style and Message Time Stamps](#).
 - **Session**—The ID of the session associated with this message. See [Sessions](#).
 - **Error?**—A quick overview of the results returned by the message to the business host that sent it.

OK means normal behavior; *Retry* means the message experienced a failure but the business host that sent it is configured to retry the failed message. *Error* means an error was reported somewhere in the activity. *Inactive* means that the business host that sent the message has been idle for longer than its [Inactivity Timeout](#) setting, and may require diagnostic action.
 - **Source Configuration Name**—The business host that sent the message.
3. Select the messages by selecting the check boxes in the left column.
4. Then use any of the following buttons:

- **Resubmit**—Click this to resubmit the messages. As message similar to the following displays for each successfully resubmitted message:

```
Resubmit suspended message ID '7' completed.
```

Any message that you resubmit retains the same **Session** identifier and transmits the same **Header** object. The description in the message header contains text indicating this is a `Resubmitted` message.

- **Edit & Resubmit**—Click this to edit a single message before resubmitting; this command is only valid if you select exactly one message. See the [following subsection](#) for details.
- **Discard**—Click this to remove the message from list on this page. The message is still accessible from the **Message Viewer**, and its status is now `Discarded`.
- **Delete**—Click this to remove all record of the message from the InterSystems IRIS database.

CAUTION: You cannot undo the **Discard** or **Delete** operations.

Any message that you edit and resubmit retains the same **Session** identifier and includes the same **Header** object, but it contains a new **Msg Body** object with a new identifier. The description in the original message header contains text indicating that this message has been resubmitted and includes the original **Msg Body** object identifier.

4.9.1 Resend Editor for Resubmitting Messages

When you select one message to resubmit from the **Interoperability > View > Suspended Messages** page, you can edit the body of the message before resubmitting it.

1. Select **Edit & Resubmit** to display the **Resend Editor** page.
2. Use the entry fields to update the message body data. The fields vary depending on the method signature of the message. If the method has no properties, none are displayed.

If you are editing a virtual document message, you can edit data in the message content and also edit object properties in the box below the content box.

3. Select **Resubmit** to resubmit the original message header with your edited message body contents to the target.
4. After a successful resubmit, the page refreshes with text indicating the **Header** and **Msg Body** identifiers. Click **Trace** to see the visual trace of the resubmitted message.

4.10 Exporting Messages

You can download multiple messages to your local machine using the **Export** button of the Message Viewer, which you access from **Interoperability > View > Messages**. Clicking the **Export** button brings up a dialog box where you can specify the name of the export file, how you want to separate the messages within the file, and the character set used. The export file is downloaded to your local machine using your browser's built-in download capabilities. You must have USE permissions for the `%Ens_MessageExport` resource to export messages.

4.10.1 Exporting Large Quantities of Messages

To prevent you from accidentally exporting a very large quantity of messages, the process for exporting large quantities is more complex. If you select all messages, but there are more messages returned by the search than fit on the results page,

you must have access to the Workflow Inbox to complete the export process. For administrative instructions on giving users access to the Workflow Inbox, see [Giving Users Access to Workflow Inbox](#) .

To export large quantities of messages:

1. Go to **Interoperability > View > Messages** and search for the messages you want to export.
2. Click the check box in the header of the search results page to select all messages.
3. Click **Export** .

A dialog box appears that indicates that you have selected more messages than appear on the search results page.

4. Click **OK** .
5. Specify the name of the download file, how you want messages separated in the file, and the character set used.
6. Click **OK** twice.
7. Go the InterSystems IRIS home page.
8. Go to **Analytics > User Portal** . The current namespace must be enabled for Analytics to complete this step.
9. Click **Workflow Inbox** .
10. Select the message in the Workflow Inbox and click **Confirm** in the body of the message.
11. Wait until a new message titled “Exported File available for download” appears in the Workflow Inbox, then select the message.
12. Click **Download** in the body of the message.
13. When the file has been successfully downloaded by the browser, click **Completed Download** to remove the temporary file from the server.

Note: You cannot download messages if they exceed 50% of the free disk space in the directory specified by `%SYS("TempDir", namespace)` .

4.10.1.1 Giving Users Access to Workflow Inbox

You must have proper credentials to complete these steps. The user will not be able to access the Workflow Inbox unless the namespace is enabled for Analytics.

1. Go to **Interoperability > Manage > Workflow > Workflow Users** .
2. Select the user’s name from the **Name** drop-down list.
3. Select **Active** .
4. Click **Save** .
5. Go to **Interoperability > Manage > Workflow > Workflow Roles** .
6. In the **Name** field, enter: `%ProductionMessageExport` and click **Save** .
7. Select the new role from the list and click **Add** .
8. Select the user’s name from the **User Name** drop-down list and click **OK** .

Note: If you want to change whether the user must confirm the download of multiple messages or who needs to confirm the export, add the `EnsLib.Background.Process.ExportMessageSearch` class to the production and edit the **WorkFlow Settings** .

4.11 Auditing Message Viewing

If the system is auditing the `%SMPEXplorer/ViewContents` event, it writes data to the event log when the user is viewing a message in the Management Portal. If you wish to extend the kind of data written to the audit log, you can define a custom Data Transformation named `EnsCustom.Util.DTL.Audit.MessageView`. For more information about auditing events, see [Auditing](#).

5

Viewing the Event Log

This topic describes the purpose of the Event Log and explains how to use it.

5.1 Introduction to the Event Log

The Event Log is a table that records events that have occurred in the production running in a given namespace. The primary purpose of the Event Log is to provide diagnostic information that would be useful in case of a problem while the production is running. It includes the following items:

- System-generated Event Log entries. These entries are generated for events such as production startup and are not discussed in detail here.

Note that these events are not the same as *system events*, which are generated and handled internally by InterSystems IRIS®. System events, for example, include putting background processes to sleep and later waking them. The Event Log does not record system events.

- Event log entries generated by the business host classes used in the production. For information, see [Generating Event Log Entries](#).

For a typical production, this is the most common kind of entry in the Event Log.

- 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. All alerts are recorded in the Event Log.

For information on configuring a production to send alerts, see [Configuring Alerts](#), which also provides information on specifying the conditions under which certain events cause alerts.

- Trace messages, discussed in [Enabling Tracing](#).

Viewing the Event Log is a way to take the pulse of a production by scanning the informational text messages that it produces while it runs. Event log entries are stored persistently in the InterSystems IRIS database and may be purged according to age, as they accumulate.

5.2 Introduction to the Event Log Page

To view the Event Log from the Management Portal, navigate to the **Interoperability > View > Event Log** page.

This page is divided into the following three panes where you can perform the indicated functions:

Left	Middle	Right
Enter search and purge criteria	View Event Log entries	View event details

To expand and collapse the right and left panes, use the double arrow icons.

The **Event Log** page has the following commands:

- **Search**—Sort and filter the list of event entries using the criteria shown in the left pane. See [Search Events By](#) for details.
- **Cancel**—Cancel the current search.
- **Reset**—Reset the Event Log search criteria to the default values of the quick search fields and selected event types. See [Quick Search](#) and [Event Types](#) for details.
- **Previous**—Show the previous page of results based on the **Page Size**.
- **Next**—Show the next page of results based on the **Page Size**.
- **Export**—Export the selected entries to a text, tab-delimited (.csv), HTML, or XML file. If you selected more than 50,000 entries, InterSystems IRIS exports the 50,000 most recent entries.

The exported file is useful troubleshooting problems for developers or the InterSystems Worldwide Response Center. You can use any application to examine the exported event file, but the exported file is not intended to be imported into InterSystems IRIS. To specify the format of the exported file, enter `.txt`, `.csv`, `.html`, or `.xml` as the file extension of the file name. You have the option to save the file to a location on the server or to save it locally via the browser's downloading capability.

5.3 Entering Search and Purge Criteria

Use the left pane to enter search and purge criteria to filter the list of events.

There are three types of search filters:

- [Quick Search](#)
- [Event Types](#)
- [Search Events By](#)

Or remove entries from the Event Log as described in [Purge Event Log](#).

5.3.1 Quick Search

Enter the following values to filter the event list:

- **Sort Order**—Select to list either the oldest or the newest entries first. The default is **Newest First**.
- **Page Size**—The maximum number of Event Log entries to display in the middle panel as a result of the search. To see additional entries, click **Previous** and **Next**. The default is 500.
- **Page**—(Read-only) Indicates which page of the list is displayed.
- **Time Format**—Select to show the time only or the time with the date. The default is **Complete** (time with date).

As you enter values in these fields the middle pane display updates to reflect your entries.

5.3.2 Event Types

Select or clear the following check boxes to filter events as you determine necessary:

- **Assert**
- **Error**
- **Warning**
- **Info**
- **Trace**
- **Alert**

The default list shows events of all types; each event type is selected.

5.3.3 Search Events By

If you do not see the message you want to view in the Event Log page, you can filter the list of entries. To do so, enter values in one or more of the following fields:

- **Start Time**—Enter the lower limit of a range of **Time Logged** values.
- **Start ID**—Enter the lower limit of a range of **ID** values.
- **End Time**—Enter the upper limit of a range of **Time Logged** values.
- **End ID**—Enter the upper limit of a range of **ID** values.
- **Source Config Item**—Select a configuration item or type the name of one.
- **Source Class**—Enter a value in this field to list all the events logged by a specific host class.
- **Session ID**—Find all the Event Log entries associated with a particular session.
- **Source Method**—Enter a value in this field to list all the events logged by a specific method.
- **Job**—Enter a value in this field to find events hosted by a specific system job.
- **Text**— Enter a value in this field to list all the events whose text contains this string.

Note: Most of these fields support the use of the SQL Like wildcard character (%).

Once you enter new search criteria, click **Search** in the ribbon bar to refresh the list accordingly.

5.3.4 Purge Event Log

You can purge outdated records from the Event Log by entering the number of days to keep the entries and then clicking **Purge**.

The displayed fields aid you in purging Event Log entries as follows:

- **Current Count**—Read-only field displaying the total number of Event Log entries that are now in the persistent store for this production. Use the **Current Count** to decide whether or not it is worthwhile to purge the Event Log at this time.
- **Do Not Purge Most Recent**—Parameter for the purge operation. It tells InterSystems IRIS how many days' worth of Event Log entries to keep. The default value is 7, which keeps entries for the last seven days. If you want to purge all entries in the log, enter 0 in the **Days** field.

The count of days includes *today*, so keeping messages for 1 day keeps the messages generated on the current day, according to local server time.

When you click **Purge**, InterSystems IRIS immediately starts to purge the Event Log according to the parameters you have entered.

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

Note: You can also purge Event Log data from the **Purge Management Data** page and schedule purges using the `Ens.Util.Tasks.Purge` task. For more information, see [Purging Data](#).

5.4 Viewing Event Log Entries

Each time an event of interest occurs in the life cycle of a production, InterSystems IRIS writes an entry to the Event Log stating the details of what happened. You can view this log on the **Interoperability > View > Event Log** page of the Management Portal. The list displays the following information for each Event Log entry:

- **Type**—Indicates the type of entry: Alert, Assert, Error, Info, Trace, or Warning. The column color also indicates the event type as follows:

Event type	Column coloring
Alert	Yellow background with bold red text
Assert	Silver background with bold red text
Error	Pink background with bold red text
Info (production start)	Green background with bold green text
Info (production stop)	Green background with bold green text
Trace	Light blue background with bold blue text
Warning	Orange background with bold red text
Info (all others)	Default row color

- **ID**—The unique identifier for the message that comprises this Event Log entry.
- **Time Logged**—The date and time when this entry was logged.
- **Session**—The ID of the session associated with this message. See [Sessions](#).

You can click **Session** link to see a [visual trace](#) of the session that contained this event.

- **Job**—The system job that hosted the event.
- **Source**—The configuration item (service, process, or operation) that sent the message.
- **Text**—The text string associated with the Event Log entry.

5.5 Viewing Event Details

You can select a log entry to view the details of that particular event. Select a row in the middle pane and the expanded right pane displays the following informational fields:

ID

Unique identifier for the message that comprises this Event Log entry.

Type

Indicates the type of entry: Alert, Assert, Error, Info, Trace, or Warning. The type contains the same coloring as the list entry.

Text

Text string associated with the Event Log entry.

Logged

Date and time when this entry was logged.

Source

Configuration item (service, process, or operation) that sent the message.

Session

The ID of the session associated with this message. See [Sessions](#).

If this event has a session ID, you can click **Trace** at the top of the right pane to see a [visual trace](#) of the session that contained this event.

Job

System job that hosted the event.

Class

Business host class that logged the event.

Method

Method of the business host class that was running when the event was logged.

Trace

(none)

Stack

List of instructions leading up to the error.

6

Enabling Tracing

This topic describes how to enable tracing, view trace messages, and log trace messages.

6.1 About Tracing

Tracing is a tool for use primarily during development. Trace elements enable you to see the behavior of various elements in a production, for the purpose of debugging or diagnosis. You typically disable tracing before a production goes live.

The production trace mechanism works as follows:

- As part of the development process, InterSystems IRIS® developers add trace elements to the appropriate areas of your code. These trace elements (potentially) write trace messages at runtime. See [Adding Trace Elements](#).

Note that these are messages only in a general sense; trace messages are simply strings and are unrelated to `Ens.Message` and its subclasses.
- As part of the configuration process, do the following:
 - Configure the production to [enable tracing](#). This step means that, at runtime, the trace elements are executed (rather than being ignored).
 - Optionally [enable logging](#) for the trace messages. This step writes trace messages to the [Event Log](#).
 - Optionally configure the applicable business hosts to run in the foreground so that you can see trace messages in the Terminal while the production is running. See the [last section](#).

You typically disable tracing before a production goes live.

6.2 Enabling Tracing

By default, all user trace elements are enabled. You can also enable tracing of various system events.

To do so, set values for some or all of the following nodes of the `^Ens . Debug` global:

Node	Purpose
^Ens.Debug("TraceCat ")	Controls tracing overall as follows: <ul style="list-style-type: none"> • If this node is not set, only user trace elements are enabled. In this case, you can enable specific kinds of system tracing by setting subnodes, as described in the rest of this table. • If the value of this node is 0, no tracing is enabled. • If the value of this node is 1, all tracing is enabled, apart from any explicitly disabled kinds of tracing.
^Ens.Debug("TraceCat " , "bproc")	Enables or disables system traces from business processes. For this node and all the rest of the nodes in this table, if the node value is 1, the specified traces are enabled. If the node value is 0, these traces are disabled. This node is ignored if the parent node value is 0.
^Ens.Debug("TraceCat " , "connwait")	Enables or disables system traces from adapters waiting to connect.
^Ens.Debug("TraceCat " , "exterr")	Enables or disables system traces showing errors from external systems.
^Ens.Debug("TraceCat " , "file")	Enables or disables system traces from file read or write operations.
^Ens.Debug("TraceCat " , "ontask")	Enables or disables system traces from business host framework events.
^Ens.Debug("TraceCat " , "parse")	Enables or disables system traces from virtual document parsers.
^Ens.Debug("TraceCat " , "protocol")	Enables or disables system traces of sequence numbers from the MSH segment in HL7 messages.
^Ens.Debug("TraceCat " , "queue")	Enables or disables system traces related to message queue management.
^Ens.Debug("TraceCat " , "sql")	Enables or disables system traces from processing events of the SQL adapter.
^Ens.Debug("TraceCat " , "system")	Enables or disables general system trace elements.
^Ens.Debug("TraceCat " , "timing")	Enables or disables system traces providing information about duration of calls.
^Ens.Debug("TraceCat " , "transform")	Enables or disables system traces about DTL data transformations, apart from errors.
^Ens.Debug("TraceCat " , "user")	Enables or disables user traces.
^Ens.Debug("TraceCat " , "xform")	Enables or disables system traces about errors in DTL data transformations.

For example, to enable tracing related to message queue management, enter the following command in the Terminal, in the appropriate namespace:

```
set ^Ens.Debug("TraceCat", "queue")=1
```

Also see [Enabling %ETN Logging](#).

6.3 Enabling Logging for Trace Messages

InterSystems IRIS can also log trace messages (that is, write them to the [Event Log](#)). To enable or disable logging of trace messages, use the following settings:

- For any business host, use the [Log Trace Events](#) setting. When this setting is selected, InterSystems IRIS logs all the enabled trace messages for this business host log.
- For the production, use the [Log General Trace Events](#) setting. When this setting is selected, InterSystems IRIS logs all enabled trace messages from production elements that are *not* business hosts.

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](#).

See [Settings in All Productions](#).

6.4 Seeing Trace Messages in the Terminal

To see the trace messages in the Terminal, do the following:

1. If you are using Windows Vista or Windows 7, enable the Interactive Services Detection Service, as follows:
 - a. On the Windows Start menu, go to **Administrative Tools > Services**.
 - b. Scroll to **Interactive ServicesDetection**.
 - c. Right click and select **Start**.
2. Enable the [Foreground](#) setting for the business host or business hosts in which you are interested.

When you run the production, InterSystems IRIS opens a Terminal window for each foreground business host. This Terminal window shows all enabled trace messages for that business host. It also shows all log items and alerts.

3. On Windows Vista or Windows 7, the Interactive Services Detection Service displays a dialog box to indicate that a program is attempting to display a message. Click **View the Message**. The Interactive Services Detection Service then displays a window that contains one or more Terminal windows.

7

Viewing the Business Rule Log

The Business Rule Log (**Interoperability > View > Business Rule Log**) is a persistent record of business rules that have been executed, their respective results, and reasons for the result. You can navigate to this page using the menu or you can select **Rule Log** in the ribbon bar of the **Interoperability > List > Business Processes** page.

This topic describes this page and how to use it.

7.1 Introduction

The **Business Rule Log** page is divided into the following three panes where you can perform the indicated functions:

Left	Middle	Right
Enter search and purge criteria	View the executed rule list	View rule execution details

You can expand and collapse the right and left panes as desired using the double arrow icons.

There are four commands in the ribbon bar of the Rule Log page:

- **Search**—Click to sort and filter the list of rule log entries using the criteria shown in the left pane. See [Search Rules By](#).
- **Reset**—Click to reset the rule log search criteria to the default values of the quick search fields. See [Quick Search](#).
- **Previous**—Click to show the previous page of results based on the **Page Size**.
- **Next**—Click to show the next page of results based on the **Page Size**.

7.2 Entering Search and Purge Criteria

The left pane permits you to enter search and purge criteria to filter the list of rules.

There are two types of search:

- [Quick Search](#)
- [Search Rules By](#)

You can also remove entries from the rule log as described in [Purge Rule Log](#).

7.2.1 Quick Search

Enter the following values to filter the executed rule list:

- **Sort Order**—Select to list either the oldest or the newest entries first. Default is **Newest First**.
- **Page Size**—The maximum number of rule log entries to display in the middle panel as a result of the search. If more entries exist, you can click **Previous** and **Next** to page through the results. Default is 500.
- **Page**—This is a read-only field showing what page of the list is being displayed.
- **Time Format**—Select to show the time only or the time with the date. Default is **Complete** (time with date).
- **Errors**—Select this check box if you only want to see rule executions that had errors. Default is to show all executions (check box is cleared).

As you enter values in these fields the middle pane display updates to reflect your entries.

7.2.2 Search Rules By

You can filter what entries display in the list by entering values in one or more of the following fields:

- **Start Time**—Enter the lower limit of a range of **Time Executed** values.
- **End Time**—Enter the upper limit of a range of **Time Executed** values.
- **Rule Name**—Choose a rule name as defined in the Rule Editor. The filter finds all of the occasions when this rule has been invoked by business processes.
- **Session Id**—Find all the rule log entries associated with a particular session.

Once you enter new search criteria, click **Search** in the ribbon bar to refresh the list accordingly.

7.2.3 Purge Rule Log

You can purge the rule log by entering the number of days to keep the entries and then clicking **Purge**. The **Current Count** is a read-only field displaying the number of entries in the rule log. If you want to purge all entries in the log, enter 0 in the **Days** field.

7.3 Viewing the Executed Rule List

Each time a business process executes or fires a rule, InterSystems IRIS® writes an entry to the Business Rule Log stating the details of what happened. You can view this log on the **Business Rule Log** page of the Management Portal. The list displays the following information for each business rule log entry:

- **Session**—The unique identifier for the session that is (or was) associated with this rule. A session marks the beginning and end of all the activities prompted by a primary request message from outside InterSystems IRIS.
- **Time Executed**—The date and time when this rule was last invoked.
- **Rule Name**—The name assigned to the rule in the Rule Editor.
- **Error**—The value 1 means that the rule encountered an error. The value 0 means that the rule did not encounter any errors.
- **Return value**—The value returned by the rules engine for this rule.

You can also perform the following actions on a selected rule:

- Select the **Session** to navigate to the **Visual Trace** display for the session that contained this particular execution of the business rule.
- Select the **Rule Name** to navigate to the **Rule Editor** page for this business rule definition class.

7.4 Viewing Rule Execution Details

You can select a log entry to view the details of that particular execution of the rule. Select a row in the middle pane and the expanded right pane displays the following informational fields:

Execution ID

Unique identifier for this rule execution.

Session ID

Unique identifier for the session that is (or was) associated with this execution of this rule. A session marks the beginning and end of all the activities prompted by a primary request message from outside InterSystems IRIS.

Time Executed

Date and time when this rule was executed.

Rule Name

Name of the rule definition class that was executed.

Rule Set

Name of the rule set that was executed.

Reason

Specific rule name that cause the rules engine to generate the result. If a business rule is empty or undefined, the reason is **Rule Missing**.

Error?

Displays **Yes** or **No** depending on whether the execution of the rule resulted in an error.

Error Message

If the rules engine returns an error, then this is the text associated with the error.

Return Value

Value returned by the rules engine for this rule.

Activity Name

Name assigned to the <rule> activity in the BPL code.

Effective Begin Date/Time

Effective begin date and time of the executed rule set.

Effective End Date/Time

Effective end date and time of the executed rule set.

These informational values correspond to properties of the `Ens.Rule.Log` class, which you can view in the [Class Reference](#).

From the right pane, you can perform the following actions on the selected rule:

- Click **Trace** to see a [visual trace](#) of the session that contained this execution of the business rule.
- Click **Rule** to navigate to the **Rule Editor** page for this business rule definition class. See [Developing Business Rules](#).

8

Viewing Business Process Instances

This topic describes how to view and monitor business processes.

8.1 Introduction

The **Interoperability > List > Business Processes** page displays any current instances of a business process in the currently running production. If a business process has completed its work, there is no entry for it on this page.

On this page:

- The left area permits you to enter search criteria to [filter the list of instances](#).
- The middle area displays [lists the instances](#).
- The right area displays details.

The following topics provide details.

8.2 Filtering the List of Process Instances

The left area of the **Interoperability > List > Business Processes** page provides the following options that you can use to filter the list of business process instances displayed on this page:

- **Sort Order**—Select a value from the drop-down list: **Oldest First** or **Newest First**.
- **Page Size**—Select the number of instances to display on a given page of results.
- **Time Format**—Select a value from the drop-down list: **Time Only** or **Complete** (time with date).
- **Time Created: Start**—Enter the lower limit of a range of **TimeCreated** values.
- **Time Created: End**—Enter the upper limit of a range of **TimeCreated** values.
- **Session Id**—Enter the ID of a session.
- **Primary Request**—Enter the message ID number of the request that caused this business process to be instantiated.
- **Configuration Name**—Enter the configuration name of a business process to find all instances of that item.

After you have edited these fields, you can click one of the commands at the top of the page:

- Click **Search** to sort the list of entries in the top display using the criteria shown in the bottom display.
- Click **Reset** to redisplay the entries in their default order and return the fields in the bottom display to their default values.

InterSystems IRIS then redisplay the page.

8.3 Viewing Summary Information for Business Process Instances

The middle area of the **Business Process List** page displays the following information for each business process instance:

- **ID**—The unique identifier for the instantiated business process.
- **IsCompleted**—The value 1 means that the primary request that initiated this business process has been completed. The value means that the primary request has not yet been completed.
- **Configuration Name**—The configured name of the business process host class.

When this is underlined, it means that the host class is a BPL business process. You can click on the underlined name to display the BPL diagram for the host class.

- **SessionId**—The ID of the session associated with this business process. See [Sessions](#).

One or more business processes may be instantiated within InterSystems IRIS during the session, in order to fulfill the primary request. All of these business processes share the same **SessionId**, but business process has a different **ID** value.

- **PrimaryRequest**—The message ID number of the request that caused this business process to be instantiated. The **PrimaryRequest** number is distinct from the object **ID** number of the business process. The **PrimaryRequest** may or may not be the same as the **SessionId**. If the numbers are different, it means that the request message that started the session triggered subsequent requests within InterSystems IRIS, and one of these later messages is the one that actually instantiated the business process.

When the **PrimaryRequest** number is underlined, it means that the primary request message can be displayed as a set of properties in XML format. You can click on the underlined **PrimaryRequest** number to display the message properties in colorized XML format in the right area of the page. For example:

```
<?xml version="1.0" ?>
<!-- type: Demo.Loan.Msg.Application id: 2 -->
- <Application>
  <Amount>1234</Amount>
  <Name>Susan</Name>
  <TaxID>19238437</TaxID>
  <Nationality>USA</Nationality>
</Application>
```

- **TimeCreated**—The date and time when this business process was instantiated.
- **TimeCompleted**—The date and time when this business process completed the primary request that instantiated it. If this request has not been completed, this field is blank.
- **ContextId**—The unique identifier for the general-purpose, persistent variable *context*, which is defined using the `<context>` and `<property>` elements in BPL to hold persistent properties for this business process instance. This column is available for BPL business processes only.

The **ContextId** is underlined to indicate that you can click on it to display the *context* properties in colorized XML format in the right area of the page. For example:

```
<?xml version="1.0" ?>
<!-- type: Susan.RuleBP.Context id: 1 -->
- <Context>
  <Amount>1234</Amount>
  <CreditRating>1</CreditRating>
  <Name>Susan</Name>
  <Nationality>USA</Nationality>
</Context>
```

- **RuleLog**—Click this command to display the [business rule log](#) for this business process instance.

In each row, background color indicates the status of the business process instance:

- Gray—Completed.
- White—These items are in progress.

8.4 Purging the Business Process Log

You can purge outdated records from the business process archives by clicking the **Purge** command at the bottom left of the **Business Process List** page.

The fields in this dialog allow you to purge business process instance data as follows:

- **Current Count**—The number in this column reflects the total number of instances that are now in the persistent store for this production. Use the **Current Count** to decide whether or not it is worthwhile to purge these records at this time.
- **Do not purge most recent**—Specifies the number of days' worth of records to keep. The number can be 0 (zero), which keeps nothing and deletes all business process instance records that exist at the time of the purge operation. The default value for **Do not purge most recent** is 7, which keeps records for the last seven days.

The count of days includes *today*, so keeping messages for 1 day keeps the messages generated on the current day, according to local server time.

To purge the data, click **Purge**. InterSystems IRIS immediately starts to purge instances according to the parameters you have entered in the dialog box.

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

Note: For information on how to purge business process instances along with other management data, see [Purging Production Data](#).

9

Viewing the I/O Archive for a Production

If you enable the [Archive IO](#) setting for one or more business service and business operations, InterSystems IRIS® archives the input and output data in addition to the production messages. The input and output data is shown in the Visual Trace window; see [Tracing the Path of Related Messages](#).

You can also display the I/O archive by executing an SQL query as follows:

1. In the Management Portal, click **System Explorer**, **SQL**, **Execute SQL Statements**, and then click **OK**.
2. Choose the namespace where you want to execute the query from the list on the left.
3. In the **SQL Query** box, type:

```
SELECT * FROM Ens_Util.IOLog
```

Where the table name identifies Ens.Util.IOLog or one of its subclasses. The choice of subclass depends on the type of data. Options include Ens.Util.IOLogFile, Ens.Util.IOLogObj, Ens.Util.IOLogStream and Ens.Util.IOLogXMLObj.

4. Click **Execute Query**. The results display in the bottom half of the page.
5. If there are no results, or if the results do not match your expectations, check to see that you have enabled the [Archive IO](#) setting for the business service or business operation that you want to investigate.

10

Viewing Messages from Multiple Productions

In some cases an overall business process spans multiple productions. Although a namespace can have only a single production, you can have multiple productions running using any of the following configurations or any combination of them:

- Multiple namespaces running on a single instance of InterSystems IRIS®, each with its own production.
- Multiple instances of InterSystems IRIS running on a single system.
- Multiple systems each running an instance of InterSystems IRIS.

Note: If you are running and monitoring multiple productions, we recommend that you define a separate namespace for each production, even if they are running on separate InterSystems IRIS instances or on separate systems.

There are two features that allow you to search for messages from multiple productions:

- Enterprise Message Viewer. See [Using the Enterprise Message Viewer](#)
- Enterprise Message Bank. See [Using the Enterprise Message Bank](#).

The Enterprise Message Viewer allows you to search for and view messages from multiple productions, without the need to store the messages centrally. The Enterprise Message Bank stores messages from multiple productions into a central repository, where they can be stored, analyzed and processed in other ways. This reduces the need to store data on the individual InterSystems IRIS systems.

The Enterprise Message Viewer allows you to search for messages across multiple productions. The Enterprise Message Viewer sends your query to the interoperability-enabled namespaces running the business productions, and the productions return the messages that match the query to the Enterprise Message Viewer. You do not have to modify the production to access its messages in an Enterprise Message Viewer.

The Enterprise Message Bank allows you to store messages from one or more productions into a central repository, where they can be stored, analyzed and processed in other ways. The productions send their messages to the Enterprise Message Bank. To enable this, you must add a Message Bank Operation to each production and configure it to connect to the Message Bank. The Message Bank operation forwards the messages to the Enterprise Message Bank. The Enterprise Message Bank creates a separate copy of each message in a special Message Bank production. The Enterprise Message Bank is a central repository and can require substantial resources to store and retain messages. Since you can retain messages in the Enterprise Message bank, you may be able to purge them in the originating productions.

The Enterprise Message Viewer and the Enterprise Message Bank have the following differences:

- The Enterprise Message Viewer can only query messages which are currently accessible in the namespace message store. If the message has been purged, it is not accessible to the Enterprise Message Viewer. The Enterprise Message

Bank contains an independent copy of each message, and the Enterprise Message Bank has retention policies that are independent of the policies on the systems running the business productions. Consequently, even if the original message is purged, the copy can still be available on the Enterprise Message Bank. Maintaining the copies of the messages consumes storage resources.

- The Enterprise Message Viewer displays basic information about the message as well as the values in columns specified in the query. You cannot view the complete message or resend a message from the Enterprise Message Viewer. In order to access the message, you can follow a link in the Enterprise Message Viewer and open a Message viewer on the InterSystems IRIS instance running the production. In contrast, the Enterprise Message Bank provides access to the complete message. It is possible to resend a message directly from the Enterprise Message Bank. You cannot resend a message from the Enterprise Message Viewer but can resend a message after following the link to the system running the production.

On the Enterprise Message Viewer system, you must identify and specify credentials for each production that you will be querying for messages. For each production, you provide a name, Web IP address (including port number), namespace, SOAP credentials, and TLS configuration. For details, see [Identifying Enterprise Systems for Viewing and Monitoring](#). This information enables the Enterprise Message Viewer to find and access the namespace running the production. On the Enterprise Message Bank, you should provide the same information. Although the Enterprise Message Bank can receive messages without knowing the credentials, it cannot resend messages without them.

Also see [Using the Enterprise Message Viewer](#) and [Using the Enterprise Message Bank](#).

11

Using the Enterprise Message Viewer

This topic describes using the Enterprise Message Viewer, which is a special production that runs in a namespace. In this namespace, you should identify the systems that you intend to search for messages. To identify a system, you provide a name, Web IP address (including port number), namespace, SOAP credentials, and TLS configuration. For details, see [Identifying Enterprise Systems for Viewing and Monitoring](#). In addition, you must define on the Enterprise Message Viewer system all classes that you will be using in search criteria. These classes are the ones that define the body parts and search tables in the production messages.

Once you have identified one or more systems, you can access the Enterprise Message Viewer by clicking **Interoperability, View, and Enterprise Messages**. You can also access the Enterprise Message Viewer by clicking **Interoperability, Configure, and Enterprise Systems** and then clicking the **Enterprise Message Viewer** link.

11.1 Specifying a Query in the Enterprise Message Viewer

To specify a query in the Enterprise Message Search, you can enter any of the following:

- **Sort Order**—specifies whether the messages should be stored newest or oldest first.
- **Page Size and number**—specifies the number of messages to display on a page and the page to display.
- **Time Format**—specifies whether the time or time and date are displayed.
- **Basic Criteria**—provides the basic selection criteria.
 - **Status**—specifies whether all messages are to be selected or only messages with the specified status, such as suspended messages.
 - **Type**—specifies whether session start messages, request messages, response messages, or all messages are to be selected.
 - **Start Time and End Time**—specifies the range of date-times of the messages to be selected.
 - **Start ID and End ID**—specifies the range of message IDs that are to be selected. Since each system numbers messages independently, these criteria are typically only useful when you are searching for messages from a single system.
 - **Source**—specifies the name of the production component that originates the message. Typically, this is a business service or business process. By default, messages from all sources are included in the selection.
 - **Target**—specifies the name of the production component that is the target of the message. Typically, this is a business process or business operation. By default, messages to all targets are included in the selection.
 - **Maximum Rows**—specifies the maximum number of messages that each system should return to the Enterprise Message Viewer.

- **Query Timeout**—specifies the number of seconds to wait for the systems to respond to the query. A value of zero specifies that there is no timeout period. The query timeout can be specified to 1/100th of a second precision.
- **Enterprise Clients**—specifies which systems should be queried. Check the box for each system that you want to query. The systems listed are the ones specified in [Identifying Enterprise Systems for Viewing and Monitoring](#).
- **Extended Criteria**—allows you to specify queries, which can be combined with the AND and OR operators. The query form specifies:
 - **Enable Criterion**—specifies whether this element of the query is active.
 - **Criterion Type**—specifies whether this element of the query is on the **HeaderField**, **BodyProperty**, **SearchTableField**, **VDocSegmentField**, **VDocPropertyPath**, or an **OR** operation combining the previous element of the query with the next element of the query.
 - **Class**—is dependent on the criteria type and the types defined on the Enterprise Message Viewer system. Note that you do not have access to classes defined on the systems running the productions that are not also defined on the Enterprise Message Viewer system.
 - **Conditions**—specify one or more conditions of the query. The fields of the conditions form are determined by the criterion type.
 - **Display Values**—specify one or more fields to display in the results but that are not part of the selection criteria.
- **Saved Searches**—allows you to save the current search or retrieve a saved search.

11.2 Working with the Search Results in the Enterprise Message Viewer

The Enterprise Message Viewer displays a page of the search results. You can page through the results with the **Next** and **Previous** buttons. You can examine the information about the message that was included in the search results or you can click the system name in the first column, which is a link to the Message Viewer on the system that runs the business production. You may be prompted for username and password to log onto the system. The link opens the Message Viewer on the system but does not select the individual message that you were examining on the Enterprise Message Viewer. You can use the message ID to search for the message.

11.3 See Also

- [Identifying Enterprise Systems for Viewing and Monitoring](#)
- [Viewing Messages from Other Namespaces](#) (compares the Enterprise Message Viewer and the Enterprise Message Bank)

12

Using the Enterprise Message Bank

This topic describes how to use the [Enterprise Message Bank](#), which is an optional remote archiving facility where you can collect messages, Event Log items, and search table entries from multiple client productions.

12.1 Accessing the Message Bank Pages

To access the Message Bank pages on the Message Bank server, select **Interoperability > Configure > Enterprise Systems** and then select either **Message Bank Viewer** or **Message Bank Event Log**.

- The Message Bank Viewer page is similar to the **Message Viewer** page. For general information on using this page, see [Browsing the Messages](#).

On this page, when you resend messages, optionally select a value for **Target Client**. By default, the message is sent to its original client, but you *can* send it to a different client.

To improve efficiency, you can restrict the search to a single client by using the **Message Bank Client** filter. This allows InterSystems IRIS® to optimize searches with filters using message create times by using the system ID index.

- The Message Bank Event Log page is similar to the **Event Log** page. For general information on using this page, see [Viewing the Event Log](#).

To jump from a [configured client](#) directly to the Message Bank, **Interoperability > Configure > Message Bank Link**. (If the client has not yet been configured, the portal instead displays a page where you can [specify](#) the details needed to generate this link.

12.2 See Also

- [Defining an Enterprise Message Bank](#)
- [Configuring the Enterprise Message Bank and Its Clients](#)
- [Viewing Messages from Other Namespaces](#) (compares the Enterprise Message Viewer and the Enterprise Message Bank)

13

Viewing Interface Maps

The Interface Maps utility lists all the routes that a message can take within a production, allowing you to view related production components in a tabular format. The search criteria allow you to focus on a specific component such as finding where a routing rule or data transformation is used within the production. Each interface map represents a unique route that a message can take through the production. For example, if a business process connects to multiple business operations, multiple interface maps are shown because a message could flow to any of the business operations. Displaying interface maps is useful when:

- Finding all components named for a particular feed in a complex production that has multiple feeds. For example, you could find all the message routes that include a business service whose name contains the word “EMR1”.
- Visualizing message flow through a complex production.
- Documenting a complex production to make it easier to maintain.
- Ensuring that you have tested all possible paths when modifying a production.

To access the Interface Maps utility, select **Interoperability > View > Interface Maps**.

The utility displays the interface maps for the production that was most recently running. You can export the results of the interface map search into a .csv, .txt, .xml, or .html file.

13.1 Working with an Interface Map

Each interface map includes the following production components:

- **Service**—Name of the business service where the message begins.
- **Process**—Name of the business host called between the input and output. This is usually a business process, but can also be a business operation if it makes a call to another production component, for example, when the business operation makes a call to Ens.Alert.
- **Rule**—Name of the routing rule called while processing the message.
- **Transformation**—Name of the data transformation called while processing the message.
- **Operation**—Name of the business host where the message stops. This is usually a business operation, but can also be a business process if it never calls a business operation, for example, when the message stops at a business process that simply stores data directly in the database.

Tip: You can double-click a column header to sort the list of interface maps by that production component.

Tip: Once you find the production route you are interested in, you can click the row in the list to view a visual representation of the route.

13.2 Entering Search Criteria

Use the left-hand pane to enter search criteria that controls which interface maps appear in the list. There are three sections of the search pane:

- [Production](#)
- [Search Criteria](#)
- [Options](#)

13.2.1 Production

Displays the name of the production. You can click the production name to open the production in the Production Configuration window. To change the production, start a new production in the Production Configuration window. A green graphic indicates that the production is currently running while a yellow graphic indicates that the production is currently stopped.

13.2.2 Search Criteria

Enter text that is part of the name of the production component you are looking for. You can indicate whether the search is case sensitive.

The Interface Maps utility only searches the types of components (service, operation, process, routing rule, or data transformation) that are selected. The **Process** and **Operation** options refer to the position of the component in the interface map, not a business process or business operation. A production's business process shows up as an operation in the interface map if it does not make a call to another component. Similarly, a production's business operation shows up as a process in the interface map if it makes a call to another component. If you want to find a business process or business operation regardless of where it shows up in the interface map, select both **Process** and **Operation** in the search criteria.

You can use the **Category Filter** drop-down list to focus your search on components that have been labeled with a specific category. A production route appears when any component in the route belongs to the category. Categories are defined in the **Informational Settings** section of the **Settings** tab for each business service, business process, or business operation of a production.

13.2.3 Options

When you select **Highlight search text**, the text string that you entered in the Search Criteria is highlighted in the names of the production components in the list of interface maps.

13.3 Exporting Interface Maps

You can use the **Export** button to save the interface map routes found by a search as a .csv, .txt, .xml, or .html file. This is a useful way to document a production. The extension of the filename that you specify determines the format of the exported file. An exported .csv file is tab-delimited, not comma-delimited. The export file is saved to your local machine via your browser's downloading capability.

Tip: When the setting to auto refresh the Management Portal is disabled, you receive a message telling you to click the Refresh icon  to complete the export process. This Refresh icon is located next to the **Export** button.

14

Finding Interface References

You can search a namespace to find where production components such as data transformations are referenced by other production components. For example, you can search business rules to find the ones that call a certain data transformation. You could also find all the DTLs that use a custom function, which is useful when determining the impact of modifying the function. To begin searching for interface references, select **Interoperability > View > Interface References**.

14.1 Search Criteria

To begin a search, specify the name and type of the component that you want to find within other production components. You can search for references to the following components:

- Business processes (BPL)—Searches for references to BPL business processes with the specified name. Note that you cannot search for references to business processes that cannot be viewed in the Management Portal, for example, custom coded processes.
- Business rules—Searches for references to business rules with the specified name.
- Data transformations—Searches for references to data transformations with the specified name.
- HL7 schemas (if available)—Searches for references to HL7 schemas with the specified name.
- Lookup tables—Searches for references to lookup tables with the specified name.
- Utility functions—Searches for references to utility functions with the specified name.

The search finds partial text matches. For example, entering `alert` and selecting all of the component types could find references to a data transformation `Demo.MsgRouter.EmailAlertTransform` as well as a lookup table `AlertTable`.

14.2 Result Types

By default, your search finds references to the specified component within:

- Business hosts—Finds references within the configuration settings of business services and business processes, but does not find references that are embedded in the code of a business host class. For example, you can find the name of a business rule in the **BusinessRuleName** setting of a routing process.
- BPL business processes—Finds references in a BPL business process as seen on the BPL Editor page. For example, you can find the name of a data transformation in a Transform activity.

- Business rules—Finds references within a business rule.
- Data transformations—Finds references within a data transformation.

You can limit your search to references within only certain types of components by deselecting the result types options.

Clicking a reference in the results list opens that component in the Management Portal. For example, clicking a reference found in a data transformation opens the transformation in the DTL Editor. For business hosts, you can open the production that contains the business host.

15

Monitoring Alerts

Alerts are automatic notifications triggered by specified events or thresholds being exceeded. This topic describes how to configure and monitor alerts.

15.1 Introduction to Alerts

Alerts provide a way for InterSystems IRIS® to automatically notify users about a serious problem or condition that requires a quick resolution to ensure that the production continues operating normally. When properly configured InterSystems IRIS generates alerts for potentially serious problems and should not generate any alerts caused by normal variations in the production performance.

The other monitoring features described in this document require the user to actively check for a problem. Typically, users only check for a problem after it has had a noticeable impact on the production's performance. Once you have configured alerts to notify users automatically, alerts may make it possible to resolve issues before they have a serious impact on performance and become critical problems.

InterSystems IRIS can automatically send an alert message to users when specified thresholds are exceeded, when specified events occur, or when user code explicitly generates alerts. You can process alerts in a number of ways:

- Alerts are only written to a log file and there is no automatic notification.
- A simple alert notification system, where all alerts get sent to a list of users.
- Routing alert notification where selected alerts are sent to different users depending on the kind of alert and the component that generated it.
- An alert management framework that notifies users about alerts, escalates unresolved alerts, and documents the current state and history of actions taken to resolve the alert.

In configuring any alert notification system, it is important to calibrate the level that triggers the alert and ensure that the users being notified understand the alert and know how to respond. If the trigger level is set too high, problems may already have a significant impact on performance before InterSystems IRIS notifies users. But, if the trigger level is set too low, InterSystems IRIS sends out many notifications during the normal operation of the production and users tend to ignore these notifications and may not respond to the few critical ones among them.

Alerts are messages of type `Ens.AlertRequest` that can be generated by any business service, process, or operation in a production. InterSystems IRIS always stores alerts messages in the log. If there is a production component named `Ens.Alert`, InterSystems IRIS sends all alert messages to it. `Ens.Alert` typically is an operation, such as `EnsLib.Email.AlertOperation`, a routing process, or the Alert Manager, which has the class `Ens.Alerting.AlertManager`.

15.2 Choosing How to Handle Alerts

To choose how to handle alerts in your production, you should first answer the following questions:

- Do you want alert notifications to be automatically sent to users or do you want no automatic notification and require the user to view the alerts in the log?
- Do you want to send all alerts to the same group of users by the same transmission mechanism or do you want to select alerts to go to different sets of users possibly by different mechanisms and possibly not send some alerts to any users?
- Do you want to assign an owner to an alert, track whether the issue has been dealt with and the alert closed, possibly escalate and reassign the alert, and be able to view the alert status and history including how long it took to resolve the issue?

In all cases, you should define what conditions generate alerts as described in [Calibrating Alert Sensitivity](#). Once you have done that:

1. If you don't want automatic notification, you are done. Your production should not have a component named `Ens.Alert`. InterSystems IRIS will write alerts to the log file but will not do anything else with them.
2. If you want to send all alerts to a single list of users by the same mechanism but do not want to track and manage alerts, add an operation with a class such as `EnsLib.Email.AlertOperation` and name the component `Ens.Alert`. InterSystems IRIS sends all alerts to the operation and it notifies the configured users. See [Configuring Simple Notifications](#).
3. If you want the capability to route alerts to a set of users and other alerts to other users or to none but do not want to track and manage alerts, add a routing engine to your production and name it `Ens.Alert`. You will also need to add alert operations, such as `EnsLib.Email.AlertOperation`. See [Configuring Alert Routing](#).
4. Finally, if you want to manage your alerts so that you can assign alerts to users, track the status of alerts, and manage the alerts, add an Alert Manager, Notification Manager, one or more Alert operations, and, optionally, an Alert Monitor to your production. See [Configuring Alert Management](#).

15.3 Calibrating Alert Sensitivity

Ideally you would like to generate alerts only for conditions that require investigation and resolution and not generate alerts when the production is behaving normally, but in order to generate alerts for all serious conditions, you typically will also get some alerts from the normal variation of production execution. For example, you could set the inactivity timeout for a business service at 300 seconds. During peak hours, this business service may get many requests during a 300 second interval and, if no requests come in during that interval, it probably indicates a problem that should generate an alert. However during off-peak hours, there may be no requests for longer periods with all systems operating correctly. To set the system to catch the important alerts during the peak period, you will generate false positive alerts during the off-peak period. If you are using a router or the Alert Manager, you can suppress notifications for these off-peak alerts.

Each business service, process, and operation in a production can generate alerts when it encounters an error or exceeds a limit. You calibrate alert sensitivity by configuring the alert and error settings for each business service, process, and operation. After you configure these production settings, you should monitor the production during normal operation. If there are large numbers of false positive alerts or missed alerts for serious conditions, you should adjust the settings.

The following settings specify the conditions under which InterSystems IRIS generates alerts:

Alert On Error

Check this option if you want the component to generate an alert when it encounters an error. Other production settings control what conditions are considered errors. These settings are described later in this section.

Do not check **Alert On Error** on any component that is involved in delivering or processing alerts.

Alert Grace Retry Period

This is a time in seconds that the component will retry sending its output before issuing an alert. This setting is most commonly used for business operations. If the component is retrying and eventually succeeds within this time there will be no alert. Setting this to a value such as 60 seconds will suppress alerts on transient issues such as a dropped network connection that fixes itself, but won't wait too long before alerting you to a real problem.

Inactivity Timeout

This is a time in seconds that the component will wait for a request before issuing an alert. This is typically used for business services. If you set it to a value such as 300 seconds for a busy system you will be alerted fairly quickly if you stop receiving messages. For quieter systems you might want a longer interval. This value applies all day, so you might get false positives on off-peak times, when traffic is much lower than normal, but you can filter these in your alert handler if necessary.

Queue Wait Alert

This is a time in seconds that a message can stay on a queue before it generates an alert. Setting this to a value such as 300 seconds would be a good starting point. For critical systems, 5 minutes might be too long, but for other less critical systems a longer interval may be appropriate.

Queue Count

Specifies the number of items on a queue. When the queue size reaches this number InterSystems IRIS generates an alert. Setting this to a value such as 10 causes an alert when a queue starts to build on a critical item indicating some delay. But some queues may get this large during normal operation and if a component receives a nightly batch of work, setting this parameter may cause unnecessary alerts.

Alert On Bad Message

In routers that provide validation, this setting specifies that any message that fails the specified validation generates an alert. This alert is in addition to sending the original message to the bad message handler.

There are many settings that control what conditions InterSystems IRIS treats as errors. If Alert On Error is checked, these settings control what conditions generate alerts. The following are some commonly used settings that control error conditions:

Stay Connected

If this is a positive integer, the connection is dropped and an error is issued after that number of seconds with no activity. Setting this to -1 means never disconnect and never cause an error on a disconnect from the other end. A large value such as 99999 means the connection will be dropped after an extremely long period of inactivity, but has the side effect of not causing an error if the other end drops the connection.

Failure Timeout

Specifies the number of seconds to retry sending a message before failing and considering it an error. Setting this property to -1 instructs InterSystems IRIS to continue to retry sending the message indefinitely and to not fail. Typically, this is the setting to use for critical messages that must be processed in FIFO order. If Failure Timeout is set to a positive integer, the operation fails after this number of seconds, discards the current message and attempts to process the next message.

Replycode Action

This setting determines how the operation responds when the target application returns an error reply code. This is a critical setting that determines the operation behavior for a failure. The values are fairly complex but hover text help is available by clicking on the 'Replycode Action' label in config settings tab. Typically an operation should retry indefinitely if there is an error sending the message. To ensure indefinite retries after all NACKs set FailureTimeout to -1 and ReplyCodeAction to :?R=RF and :?E=RF. If the target application rejects the message (AR) retrying will probably have the same results so you might want to do something different. However applications can't always be relied on to use the ACK codes correctly and each application should be considered individually. One option is to disable the business operation after a rejected message but that stops all traffic. Suspending rejected messages until the problem can be fixed will allow other messages to flow but will break the FIFO ordering.

15.4 Configuring Alert Monitoring

Alerts are messages generated by production components. InterSystems IRIS automatically writes the alerts to a log file and sends them to the production component named Ens.Alert. If your production does not have a component named Ens.Alert, then InterSystems IRIS writes alerts to the log file but does not send them to any component. The component named Ens.Alert can be of any class. The most frequently used classes for Ens.Alert are:

- An operation class that sends the alert via email or another mechanism. See [Configuring Simple Notifications](#).
- A router class that can direct selected alerts to one or more operations. See [Configuring Alert Routing](#).
- The Alert Manager class that provides a mechanism to document and track the progress in handling the problem indicated by the alert. See [Configuring Alert Management](#).

This section discusses:

- [Configuring Simple Notifications](#)
- [Configuring Alert Routing](#)
- [Configuring Alert Management](#)
 - [Configuring Alert Management in Production Settings](#)
 - [Defining Alert Groups](#)
 - [Adding and Configuring the Alert Manager](#)
 - [Adding the Alert Manager and Defining Its Rule](#)
 - [Adding the Notification Manager and Defining Its Data Transformation](#)
 - [Adding and Configuring Notification Operations](#)
 - [Adding the Optional Alert Monitor and Defining Its Rule](#)

15.4.1 Configuring Simple Notifications

If you can handle all the alerts via the same output mechanism and all alerts are to be sent to the same list of users, you can use an operation class as the component named Ens.Alert. To send alerts by email, use the EnsLib.Email.AlertOperation class. To use another mechanism, you must develop a new operation. See [Using a Simple Outbound Adapter Alert Processor](#) for details.

If you are using the EnsLib.Email.AlertOperation class, you should specify the following configuration settings:

- **SMTP Server**—specifies the address of the email server.
- **SMTP Port**—specifies the port that the SMTP server uses.
- **Credentials**—specifies the production credentials that provide access to the SMTP server.
- **Recipients**—specifies the list of email addresses where the alerts are to be sent. You can separate the email addresses with a comma or semicolon.
- **Cc**—specifies the list of email addresses that should receive a copy of the message.
- **UseDetailedSettings**—if checked, the email subject is “InterSystems IRIS Alert from configuration item *component-name* on system *InterSystemsIRIS-Instance-Name* and the message body includes the following information in the email message:
 - Alert Text
 - Alert Time
 - Production
 - Source
 - Session
 - System
 - Instance
 - Node

If **UseDetailedSettings** is not checked, the email message contains only the alert text and the email subject is “InterSystems IRIS Alert from configuration item *InterSystemsIRIS-Instance-Name:component-name*, The default is to not check this setting for compatibility with previous versions.

- **SubjectPrefix**— if **UseDetailedSettings** is checked, this setting specifies text that is prepended to the email subject.
- **IncludeNodeinSubject**—if **UseDetailedSettings** is checked, this setting specifies that the server address should be included in the email subject.
- **IncludeManagedAlertHistory**—this setting is not used when configuring simple notifications.
- **SystemName**— if **UseDetailedSettings** is checked, this setting specifies text to be used in place of the *InterSystems IRIS-Instance-Name*.

15.4.2 Configuring Alert Routing

If you need to contact users via multiple output mechanisms or you need to send alerts selectively to specified users, add a business process named `Ens.Alert` with a `EnsLib.MsgRouter.RoutingEngine` class. In this case, your production must also contain a business operation for each output mechanism, and the alert processor forwards messages to those business operations.

The business process would examine the messages and forward them to different business operations, depending on the alert contents and any logic that you include.

Your logic may need to consider the following factors:

- Different requirements for various users
- Different requirements depending on the time of day
- The organization’s problem-solving policies and procedures

The `EnsLib.MsgRouter.RoutingEngine` class provides the setting **Business Rule Name**. If you specify this setting as the name of a routing rule set, this business host uses the logic in that rule set to forward all the messages that it receives. To use the routing rule to specify the addresses to send the alert, you can add a transformation that sets the `AlertDestination` property of the `Ens.AlertRequest` class. The addresses specified in the `AlertDestination` property are added to any addresses specified in the **Recipients** setting.

15.4.3 Configuring Alert Management

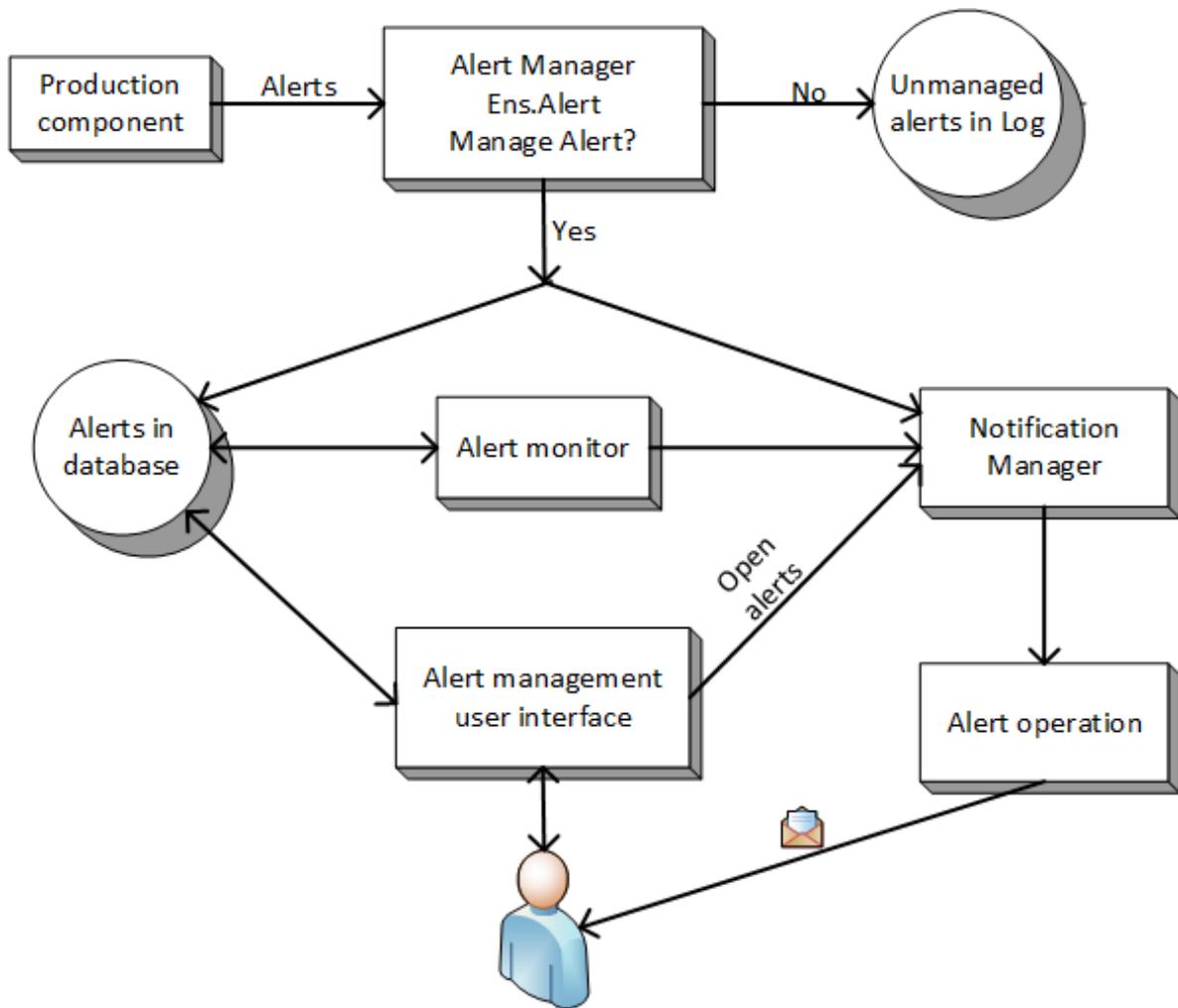
Managed alerts are persistent messages that provide a record of what problems occurred in a production, who responded to the problems, what they did to resolve the problems, and how much time it took to resolve the problems. Alert Management can notify key personnel of alerts that are not resolved promptly.

Alert management provides alert routing capability plus the tools needed to track and resolve alerts. Alert management allows you to assign an alert to a specific user, track whether the alert has been resolved or escalated, and report the time that it took to resolve the alert. Alert management can be added to a production using the InterSystems IRIS management portal including the rule and transformation editors without writing custom code. For specialized requirements, it is possible to add custom code in the alert management production components. See [Adding Custom Code to Alert Management](#) for more information.

The Alert Management framework consists of the following business services, processes, and operations:

- Alert Manager
 - Typically is named `Ens.Alert`.
 - Receives alerts generated by business services, processes, and operations in the production.
 - Converts them to managed alerts and assigns an owner using a business rule.
 - Sends the managed alerts to the Notification Manager.
- Notification Manager
 - Receives managed alerts from Alert Manager and Alert Monitor.
 - Sends them to alert operation so that the specified users are notified using a transformation.
- Alert operation
 - Sends alert notifications to users using email or another mechanism.
- Alert Monitor
 - Queries database for managed alerts that have passed the next action deadline without being updated or closed.
 - Sends a reminder notification, updates the `NextMonitorTime`, and escalates the alert using a business rule.
- **Interoperability > Monitor > Alerts** page displays the status of alerts. If you
 - Display and update open alerts.
 - Tabs allow you to see your alerts, unassigned alerts, and all alerts. Alerts are organized by the alert's next action time.
- **Interoperability > View > Managed Alerts** page provides read-only access to managed alerts. You can view alerts but you cannot update them. You can search for alerts based on owner, open status, time, escalation level, source, and alert group.

The following figure illustrates how the components in the alert management framework are connected.



The `%EnsRole_AlertAdministrator` role allows a user to update any alert, including an alert that is assigned to another user. The `%EnsRole_AlertOperator` role allows a user to update any alert assigned to that user and to update unassigned alerts.

The following sections describe how to add and configure the alert management components:

- [Configuring Alert Management in Production Settings](#)
- [Defining Alert Groups](#)
- [Adding the Alert Manager and Defining Its Rule](#)
- [Adding the Notification Manager and Defining Its Data Transformation](#)
- [Adding and Configuring Notification Operations](#)
- [Adding the Optional Alert Monitor and Defining Its Rule](#)

15.4.3.1 Configuring Alert Management in Production Settings

The production settings **Alerting Control** group is used only for alert management. If you are not using alert management, you can leave these fields blank. If you are using alert management, set these fields as follows:

- **Alert Notification Manager**—Enter the name that of the Notification Manager.
- **Alert Notification Operation**—Enter the name of the email alert operation.

- **Alert Notification Recipients**—Enter valid email addresses, separated by commas. By default, the alert management sends all alert notifications to this email address list. If you use the Alert Notification Manager rule to specify destinations for the messages, this field is not used.
- **Alert Action Window**—Enter a number of minutes. This is the default number of minutes that a user has to resolve and close an alert before the next reminder message is sent. If you include the Alert Monitor in your production, by default it sends a reminder after the specified number of minutes have expired and resets the notification time for the managed alert by adding the specified number of minutes to the current time.

If you are sending alert notifications to different distribution lists based on the component that generated the alert, it is useful to specify what alert groups each component belongs to.

15.4.3.2 Defining Alert Groups

If you are sending alert notifications to different distribution lists based on the component that generated the alert, it is useful to specify what alert groups each component belongs to. For large productions with many components, it is more practical to select a subset of alerts based on alert groups than on the individual component names. You specify the alert groups for a component as a string containing a list of alert groups separated by commas. You specify a component's alert groups in the `AlertGroups` property. Once you have defined an alert group for one component, you can select it using the check box for another component.

15.4.3.3 Adding the Alert Manager and Defining Its Rule

The alert processor must be a business process named `Ens.Alert`. Typically, if you are using the Alert Manager, you add a business process named `Ens.Alert` with the class `Ens.Alerting.AlertManager`. If you are adding alert management to a production that already has a router alert processor, you could keep the router named `Ens.Alert` and have it send some or all of the alerts to the Alert Manager business process.

If you do not define a rule for the Alert Manager, it promotes all alerts to managed alerts, leaves alerts unassigned, sets the deadline based on the number of minutes specified in the **Alert Action Window**, and sends all managed alerts to the Notification Manager.

To use a rule for the Alert Manager, create a rule and specify the **Creation Rule for Managed Alert** type in the rule wizard. This creates a rule with a `Ens.Alerting.Context.CreateAlert` context. The alert context provides access to:

- `AlertRequest`—the incoming alert. You only have read access to the alert. If the rule makes any changes to the alert, they are ignored.
- `AlertGroups`—the alert groups configured for the component that originated the alert.
- `BusinessPartner`—the business partner configured for the component that originated the alert.
- `Owner`—if the rule sets this property, the Alert Manager assigns the managed alert to the specified user.

The rule can suppress promoting the alert to a Managed Alert by returning 0 or can promote the alert to a Managed Alert by returning 1.

The rule can check whether the alert is a repeat occurrence of a previous alert that is represented by a currently open managed alert. To do this, the rule uses the `Ens.Alerting.Rule.FunctionSet.IsRecentManagedAlert()` function. The `IsRecentManagedAlert()` function tests if there is a recent open managed alert that is from the same component and has the same text as the specified alert. You can optionally specify that the function adds a `reoccurs` action to the existing managed alert.

After you have defined the rule, you specify the rule name in the Alert Manager configuration as the `CreateManagedAlertRule` property. If you need to customize the Alert Manager in ways that the rule does not allow, you can implement a subclass of `Ens.Alerting.AlertManager` and override the `OnProcessAlertRequest()` method. See [Adding Custom Code to Alert Management](#).

15.4.3.4 Adding the Notification Manager and Defining Its Data Transformation

To add the Notification Manager, add a business process with class `Ens.Alerting.NotificationManager`. If you do not define a rule, the Notification Manager sends all managed alert messages and reminders to the email addresses set in the **Alert Notification List** using the operation set in the **Alert Notification Operation**.

To use a data transformation with the Notification Manager, create a data transformation following these instructions:

- Specify the Source Class as `Ens.Alerting.NotificationRequest`.
- Specify the Target Class as `Ens.Alerting.Context.Notify`.
- On the **Transform** tab of the data transformation editor, set the **Create** property to **existing**.

Since the Notification Manager sets the target `NotificationRequest` before executing the data transformation, you do not need to copy any of the alert information from the source to the target. You should set the following in the target:

- `target.Notify`—set to 1 to send a notification and set to 0 to suppress the notification.
- `target.Targets`—add an element to the collection for each different alert operation that you are using. If you are only using one alert operation, there should only be one element in `Targets`. Each element contains:
 - `TargetConfigName`—specifies the name of the alert operation.
 - `AlertDestinations`—is a collection where each element specifies a single destination address for the alert operation. The format of the address depends on the requirements of the alert operation. Operations with the class `EnsLib.Email.AlertOperation` take email addresses, but an operation that sends text messages could take a phone number.

Your rule should not modify `target.NotificationRequest`. If you add any destinations to the `NotificationRequest`, they are ignored.

Once you have defined the data transformation, on the production configuration page, select the Notification Manager and set the **NotificationTransform** to the transformation that you have defined.

If you need to customize the Notification Manager in ways that the data transformation does not allow, you can implement a subclass of `Ens.Alerting.NotificationManager` and override the `OnProcessNotificationRequest()` method. See [Adding Custom Code to Alert Management](#).

15.4.3.5 Adding and Configuring Notification Operations

To use the email alert operation provided with InterSystems IRIS, add an operation with the class `EnsLib.Email.AlertOperation`, and enter the following settings in the **Basic Settings** and the **Additional Settings** group:

- **SMTP Server**—Specify the name of the server.
- **SMTP Port**—Update the port if the server does not use the standard port.
- **Credentials**—You have to create credentials using the **Interoperability > Configure > Credentials** page to specify a username and password that can use the SMTP server to send email. Then specify the credentials in this field.
- **Recipient** and **Cc** fields—You can leave these fields blank. If you enter email addresses here, all alerts that are sent through this operation will always be sent to these addresses in addition to any addresses specified by the production-wide settings or by the Notification Manager.
- **From**—Enter a valid email address.
- **IncludeDetails**—This field is used only for messages of type `Ens.AlertRequest`, which are unmanaged alerts. For unmanaged alerts checking this setting includes additional information in the email. This setting is ignored for managed alerts.

- **SubjectPreface**—Specify text that is prefixed to the beginning of subject lines on the alert email message. By default the subject line is “InterSystems IRIS ManagedAlert from configuration item '*ComponentName*' on system '*InterSystems IRISProcessName*'”.
- **IncludeNodeInSubject**—If checked, the node name (computer name) is included in the subject line.
- **IncludeManagedAlertHistory**—Controls whether the managed alert update history is included in the email message and whether they are list oldest or newest update first.
- **SystemName**—Replaces the process name in the subject line.
- **IncludeUTCTimes** check box—if checked, the email message includes the UTC time as well as the local time.

15.4.3.6 Adding the Optional Alert Monitor and Defining Its Rule

The Alert Monitor is optional. It controls whether overdue alerts are escalated and whether reminder notices are to be sent. To add an alert monitor, add a Business service with class `Ens.Alerting.AlertMonitor`. If you do not include the alert monitor, there are no automatic reminders and no automatic escalations.

If you do not define a rule, the alert monitor sends out reminder notices when a managed alert is still open and its `NextMonitorTime` has passed. It resets the `NextMonitorTime` by incrementing it with the number of minutes specified in the **Alert Action Window** production setting. It does not escalate alerts.

To use a rule for the Alert Monitor, create a rule and specify the **Overdue Rule for Managed Alert** type in the rule wizard. This creates a rule with a `Ens.Alerting.Context.OverdueAlert` context. The alert context provides access to:

- `ManagedAlert`—provides read access to the managed alert.
- `CurrentTime`—provides the current time in UTC format.
- `NewNextActionTime`—allows you to set the `NextActionTime` to a UTC format date-time value.
- `NewEscalationLevel`—allows you to set the escalation level of the managed alert.

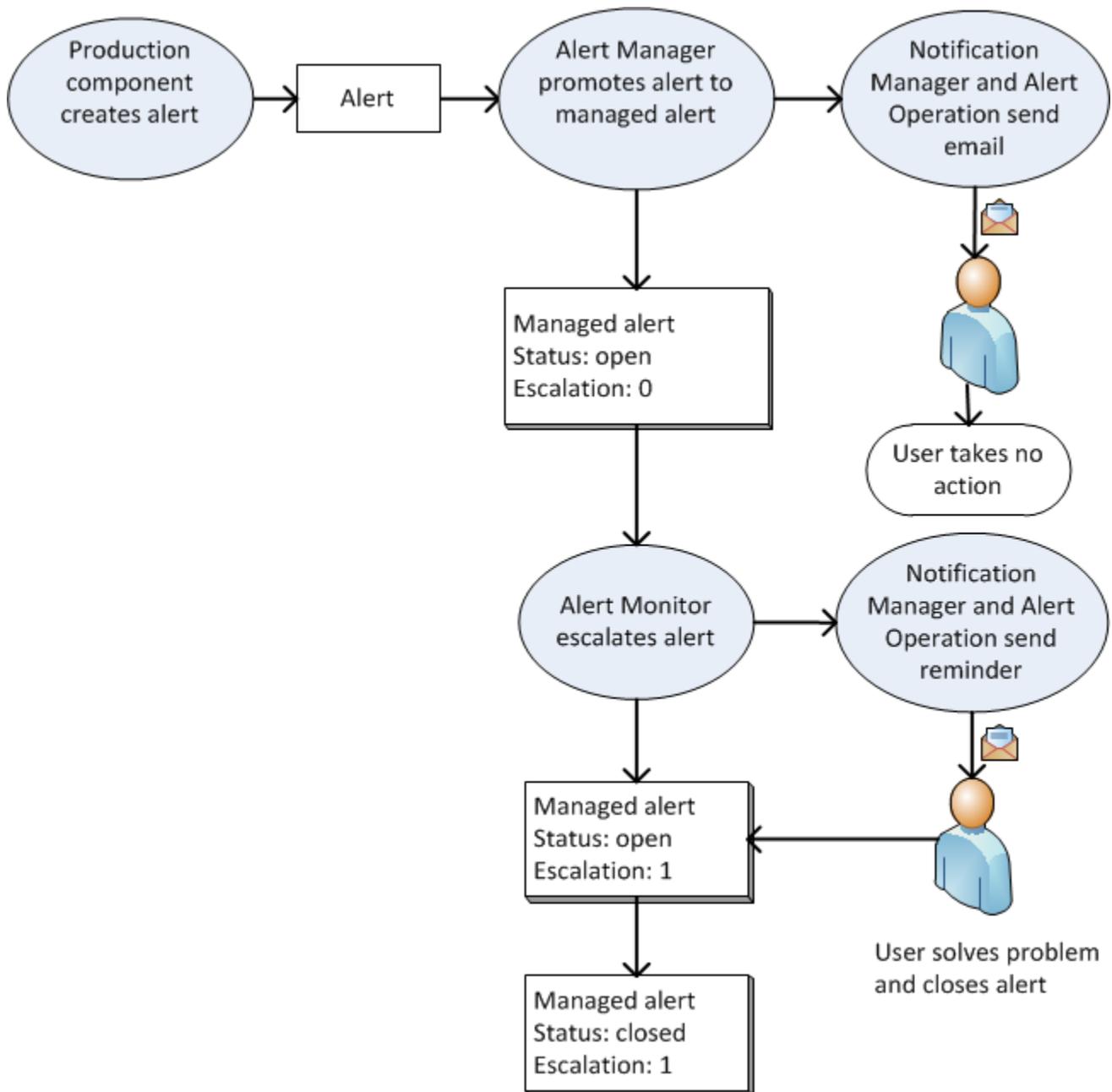
If the rule returns 1, the Alert Monitor sends the managed alert to the Notification Monitor. If the rule returns 0, no reminder message is sent.

If you set the `New Next Action Time`, the Alert Monitor sets the `NextMonitorTime` to the same time. If you do not set the `New Next Action Time`, the Alert Monitor takes its default action, which is to set the `NextMonitorTime` to the current time plus the number of minutes specified in the **Alert Action Window** production setting.

If you need to customize the Alert Monitor in ways that the rule does not allow, you can implement a subclass of `Ens.Alerting.AlertMonitor` and override the `OnProcessOverdueAlert()` method. See [Adding Custom Code to Alert Management](#).

15.5 Monitoring, Tracking, and Resolving Managed Alerts

Managed alerts are a special kind of persistent message. The Alert Manager generates a managed alert when it receives an alert that meets the specified conditions. The following figure illustrates the life cycle of a managed alert: from the component creating the alert to a user resolving the problem indicated by the alert and closing the managed alert.



This figure illustrates the life cycle of a typical managed alert:

1. A business service, process, or operation encounters a specified condition and generates an alert.
2. The alert is sent to the Alert Manager, which is a business process named Ens.Alert. The alert manager promotes the alert to a managed alert, assigns it to a user, and sends it to the notification manager.
3. The Notification Manager determines what group of users to contact and how to contact them. It sends the Managed Alert to an alert operation, which sends notifications to a group.
4. The owner of the managed alert does not solve the problem or update the managed alert.
5. The alert monitor queries for alerts that are still open when the alert's NextMonitorTime has been reached. It finds the managed alert. It escalates the alert and sends it to the notification manager.
6. The Notification Manager determines what group of users to contact and how to contact them. Since the alert is escalated it sends it to a different distribution list. It sends the Managed Alert to an alert operation, which sends email to a group.

7. In this case the user is able to solve the problem that caused the initial alert. The user updates the managed alert to close the alert.
8. The managed alert is now inactive but contains the alert history and remains available for reports and analysis.

15.5.1 Acting on Alerts by Viewing My Managed Alerts

After you have received an email or other message indicating that there is a managed alert that requires your action, you can view the open managed alerts that are assigned to you or that are unassigned by selecting **Interoperability**, **Monitor**, and **My Managed Alerts**.

Managed Alerts									
Server: jgoldman6420 Namespace: DOCDEMO Switch		User: _SYSTEM Licensed to: Internal Keys for Sales Engineers Instance: DOCDEMO2014P1B504							
My Alerts (3)	Overdue (3)	Alert Text	Next Action Time	Last Action Time	Escalation Level	Source	Production	SessionId	Current Owner
Unassigned Alerts (3)	Today (4)	ERROR #5007: Directory name 'C:\Practice\linzzl' is invalid	2013-10-01 15:55	2013-10-01 16:07	1	ABC_HL7FileService	Demo.HL7.MsgRouter.Production		LabManager
All Alerts (7)	Tomorrow (0)	ERROR #5007: Directory name 'C:\Practice\lnaaaa' is invalid	2013-10-01 15:56	2013-10-01 16:08	2	ABC_HL7FileService	Demo.HL7.MsgRouter.Production		_SYSTEM
	This Week (0)	ERROR #5007: Directory name 'C:\Practice\lnqqq' is invalid	2013-10-01 15:56	2013-10-01 14:56	0	XYZ_HL7FileService	Demo.HL7.MsgRouter.Production		Unassigned
	Later (0)								

You can view **My Alerts**, **Unassigned Alerts**, or **All Alerts**. You can select alerts that are:

- Overdue—the Next Action Time has past.
- Today—the Next Action Time is today.
- Tomorrow—the Next Action Time is tomorrow.
- This Week—the Next Action Time is in the next 7 days.
- Later—the Next Action Time is after the next 7 days.

The table displays the following information about the alerts:

- Alert Text—the text defined for the alert.
- Next Action Time—the deadline for resolving the issue causing the alert. If the alert is not closed by this deadline, the alert monitor will evaluate the alert and may escalate or reassign the alert.
- Last Action Time—the previous time the managed alert was updated.
- Escalation Level—Alerts by default are created with a 0 Escalation Level. When the alert is escalated, the Escalation Level field is colored to indicate the escalation level:
 - 0: No color
 - 1: Yellow
 - 2: Orange
 - 3: Red
- Source—name of the component causing the alert.
- Production—name of the production.

- SessionId—not used.
- Current Owner—current owner or shown as “Unassigned”.

To display the alert details and to update the alert, select the alert in the list. The **Managed Alert Details** form is displayed.

Managed Alert Details

ID	2	
Alert Time	2013-10-01 14:56:11.962	
Production	Demo.HL7.MsgRouter.Production	
Source	ABC_HL7FileService	
Alert Text	ERROR #5007: Directory name 'C:\Practice\naaaaa' is invalid	
Alert Groups	ABCGroup	
Open	<input checked="" type="checkbox"/>	
Current Owner	Me ▾	
Escalation Level	2 ▾	
Last Action Time	2013-10-01 16:08:14.562	
Next Action Time	2013-10-01 15:56:11.994 ▾	
Next Monitor Time	2013-10-01 17:08:14.563	
[-] Actions [+]		
▶ Action 1		
▶ Action 2		
▼ Action 3		
Action Time	2013-10-01 16:08:14.562	
Username	_SYSTEM	
Action	Change Escalation Level	
Reason	yes	
Property	Old Value	New Value
EscalationLevel	1	2

The **Managed Alert Details** form displays the following fields. You can update the **Open**, **Current Owner**, **Escalation Level**, and **Next Action Time** fields.

- **Update Alert** button and alert update reason comment field—after you update a field in the details form, the comment field is displayed. You must enter a comment and then click the **Update Alert** button to update the managed alert.
- **ID**, **Alert Time**, **Production**, **Source**, and **Alert Text**—display the message ID, time of the initial alert, name of the production, name of the component causing the alert, and the text message defined for the alert.
- **Alert Groups**—displays the alert groups associated with the alert.
- **Open** check box—to close the alert, clear the check box, enter the reason you are closing the alert in the comment field, and click the **Update Alert** button.

- **Current Owner**—you can set the current owner to yourself, to one of the listed users, or to unassigned. The user list includes all users who have any of the following roles: `%EnsRole_Administrator`, `%EnsRole_AlertAdministrator` and `%EnsRole_AlertOperator`.
- **Escalation Level**—you can keep the escalation level unchanged, de-escalate the alert (which decrements the alert level), or escalate the alert (which increments the alert level).
- **Last Action Time**—the previous time the alert was updated.
- **Next Action Time**—the deadline for the alert to be updated or closed. You can leave the deadline unchanged, make the deadline earlier, or postpone the deadline by making it later. You can update the Next Action Time relative to its current value or relative to the current time.
- **Next Monitor Time**—the next time the alert monitor will check the managed alert and possibly escalate it or send a reminder notification..
- **Actions**—displays the history of updates to the managed alert. You can show or hide the details of each action by clicking on the triangle for that action. Clicking on the + (plus sign) expands all of the actions and clicking on the – (minus sign) hides the details of all actions. The actions can include a reoccurs action, which indicated that an identical alert was generated by the same component within a specified time period. The `IsRecentManagedAlert()` function adds this action to a managed alert.

15.5.2 Viewing Managed Alerts

The **Managed Alert Viewer** allows you to search and view all managed alerts that are stored in the database, including closed alerts and alerts assigned to other users, but you cannot update alerts from the **Managed Alert Viewer**. To access the **Managed Alert Viewer**, select **Interoperability, View, and Managed Alerts**.

The screenshot shows the InterSystems Managed Alert Viewer interface. The top navigation bar includes 'Menu', 'Home | About | Help | Logout', and 'Interoperability > Managed Alert Viewer'. The main header displays 'Managed Alert Viewer' and system information: Server: norwood, Namespace: MARY, Switch, User: _SYSTEM, Licensed to: Internal Keys for Sales Engineers, Instance: KERINS393. The InterSystems IRIS Data Platform logo is in the top right.

Below the header is a search and navigation bar with buttons for 'Search', 'Reset', 'Previous', and 'Next'. The main content area is divided into a left sidebar and a right table.

Quick Search Sidebar:

- Auto-Refresh: None
- Page: 1
- Sort Order: Newest First
- Page Size: 10
- Time Format: Complete
- Open State: All
- Owner: Unassigned or Me
- Search Managed Alerts By...:
 - Start Time: [input]
 - Start ID: [input]
 - End Time: [input]
 - End ID: [input]
 - Minimum Escalation Level: [input]
 - Maximum Escalation Level: [input]
 - Source Config Item: [dropdown]
 - Alert Group: [dropdown]

Alerts Table:

ID	Alert Time	Open	Escalated	Current Owner	Last Action Time	Source	Alert Text
6	2013-06-28 14:15:57.422	Open	0	_SYSTEM	2013-07-17 12:13:20.499	DDPAlerting.AlertCreatorBS	Test Alert created at 2013-06-28 18:15:57.422 UTC
5	2013-06-28 14:14:27.416	Open	0	(Unassigned)	2013-06-28 14:14:27.416	DDPAlerting.AlertCreatorBS	Test Alert created at 2013-06-28 18:14:27.416 UTC
3	2013-06-28 14:11:27.435	Open	1	_SYSTEM	2013-07-17 14:03:22.580	DDPAlerting.AlertCreatorBS	Test Alert created at 2013-06-28 18:11:27.435 UTC
2	2013-06-28 14:09:57.391	Closed	2	(Unassigned)	2013-07-09 16:52:15.145	DDPAlerting.AlertCreatorBS	Test Alert created at 2013-06-28 18:09:57.391 UTC
1	2013-06-28 14:08:26.580	Open	3	_SYSTEM	2013-07-17 12:09:55.225	DDPAlerting.AlertCreatorBS	Test Alert created at 2013-06-28 18:08:26.580 UTC

You can specify the search criteria in the left pane:

- **Quick Search**
 - **Sort Order**—specifies whether InterSystems IRIS sorts the list based on the initial alert time or the escalation level.
 - **Page Size**—specifies the number of alerts to display on a page.
 - **Time Format**—specifies whether InterSystems IRIS displays the full date and time or just the time.

- **Open State**—specifies whether InterSystems IRIS searches for only open alerts, only closed alerts, or all alerts.
- **Owner**—specifies whether InterSystems IRIS searches for only alerts owned by the current user, only unassigned alerts, or all alerts.
- **Search Managed Alerts By ...**
 - **Start Time** and **End Time**—specify the range of the date and time of the initial alert.
 - **Start ID** and **End ID**—specify the range of the alert ID.
 - **Minimum Escalation Level** and **Maximum Escalation Level**—specify the range of escalation levels.
 - **Source Config Item**—specifies the component that sent the initial alert.
 - **Alert Group**—specifies the alert group.

If you select an alert, the alert details are displayed in a panel to the right. The alert details panel displays the same information as described in the previous section, but you cannot update any of the values. Instead of displaying the alert state as a check box, the panel displays an open alert as 1 and a closed alert as 0.

15.6 Managed Alerts Example

You can start with any production with a router and a few different file Business Services bit that does not have alert code. Follow the instructions in this section to demonstrate alert management. In order to complete this example you must have access to an SMTP server to send email.

Note: Because this is an example of a complex feature, it covers the important steps in the procedure but does not explicitly describe every user action. For example, it assumes that the readers know that they must enable each component in the production and respond to dialog windows.

15.6.1 Open a Sample Production and Delete Any Alert Processor

Open the production.

You will be modifying this production. If you want to retain the original code, you should export the production and then import it into another namespace. To export a production, select **Production Settings, Actions** tab, and **Export** button. To import a production, select **System Explorer, Classes**, and the **Import** button.

Before you continue on the example, you should make the following preparations:

- Ensure you have access to an SMTP server. You'll need to know the name and port of the server and have a username and password that provides access to the server.
- Define credentials in InterSystems IRIS with the username and password to access the SMTP server. Navigate to the **Interoperability > Configure > Credentials** page, and then specify an ID to identify the credentials, a username and a password.
- Define a user to handle alerts. You can use a user that you've already created on your system or define a new user. To define a new user, select **System Administration, Security**, and **Users**. Then click the **Create New User** button. In the example, we are using the username LabManager, but you can use any name. Give the user the following roles: `%EnsRole_AlertAdministrator` or `%EnsRole_AlertOperator`. The `%EnsRole_AlertAdministrator` role allows a user to update any alert, including an alert that is assigned to another user. The `%EnsRole_AlertOperator` role allows a user to update any alert assigned to that user and to update unassigned alerts.

15.6.2 Adding the Alert Manager, Notification Manager, Alert Monitor, and Alert Operation

Add the following components to your production:

- Business process that must be named `Ens.Alert` with class `Ens.Alerting.AlertManager`.
- Business process named `NotifyMan` with class `Ens.Alerting.NotificationManager`.
- Business operation named `EMailAlertOperation` with class `EnsLib.EMail.AlertOperation`. You can skip this step if the production already has this business operation.
- Business service named `AlertMon` with class `Ens.Alerting.AlertMonitor`.

All component names in this example are arbitrary except `Ens.Alert`, which is a required name.

15.6.3 Configuring the Production

Select **Production Settings** and the **Settings** tab. The following settings are in the **Alerting Control** group:

- **Alert Notification Manager**—Enter the name that you specified for the Notification Manager. For this example it is `NotifyMan`.
- **Alert Notification Operation**—Enter the name you specified for the email alert operation. In this example it is `EMailAlertOperation`.
- **Alert Notification Recipients**—Enter valid email addresses, separated by commas. By default, the alert management sends all alert notifications to this email address list.
- **Alert Action Window**—Enter a number of minutes. This is the default number of minutes that a user has to resolve and close an alert before the next reminder message is sent. For this example, you can leave this setting at the default 60 minutes.

For this and the other settings in this example, click **Apply**.

Select the `EMailAlertOperation` operation, and enter the following settings in the **Basic Settings** and the **Additional Settings** group:

- **SMTP Server**—Specify the name of the server.
- **SMTP Port**—Update the port if the server does not use the standard port.
- **Credentials**—Enter the ID of the credentials that you defined in preparatory steps.
- **Recipient** and **Cc** fields—You can leave these fields blank. If you enter email addresses here, all alerts that are sent through this operation will always be sent to these addresses in addition to any addresses specified by the production-wide settings. Ensure that any email addresses are valid.
- **From**—Enter a valid email address.
- **IncludeManagedAlertHistory**—Set to `Oldest First`.

You can leave the **Alerting Control** settings at their default values. You should ensure that the **Alert On Error** check box is not checked on the `EMailAlertOperation` operation or any of the alerting business processes or business operations.

If you are sending alert notifications to different distribution lists based on the component that generated the alert, it is useful to specify what alert groups each component belongs to. For large productions with many components, it is more practical to select a subset of alerts based on alert groups than on the individual component names. For this example, assign

the alert groups, ABCGroup, XYZGroup, and NotImportantAlertGroup to the different business services. You should assign multiple groups to at least one business service.:

15.6.4 Starting the Production and Managing Alerts

You have completed adding and configuring the Managed Alert service, processes, and operation. You have not yet defined a rule or transformation so your alert management components provide their default behavior. This is:

- Alert Manager promotes all alerts to managed alerts, leaves alerts unassigned, sets the deadline based on the number of minutes specified in the **Alert Action Window**, and sends all managed alerts to the Notification Manager.
- Notification Manager sends all managed alert messages and reminders to the email addresses set in the **Alert Notification Recipients** using the operation set in the **Alert Notification Operation**. Both of these fields are in the **Production Settings**.
- Alert Monitor queries for open managed alerts that have passed their deadline, resets the next notification time by adding the number of minutes specified in the **Alert Action Window**, sends a reminder notification, but does not escalate the alert.
- Alert operation sends the email message to the distribution list and includes the managed alert history in the message.

The **Alert Groups** settings are not used with the default behavior. You will use them when you add rules and the transformation.

Start the production if it is not already running. In order to use the alert management system, you need to first generate alerts. One easy way to do this is to modify a file service **File Path** to point to a nonexistent directory. For example:

1. Modify the **File Path** on a file Business Service to specify an nonexistent directory and click **Apply**. The component should turn red.
2. Repeat with another file Business Service.
3. The production should have sent email to the addresses set in **Alert Notification Recipients**. Check and see if the email has been delivered to this account.
4. Select **Interoperability > Monitor > My Managed Alerts**. The two managed alerts should be displayed after you select the **Unassigned** and **Today** tabs. Select an alert. You can now update by reassigning the alert to yourself or another user, by making the next action time earlier or later, by escalating the alert, or by closing the alert. Once you have updated a field, you must enter a reason before you click the **Update** button.
5. If you do not close the alerts, the Alert Monitor will send a reminder message and update the NextMonitorTime when the current NextMonitorTime is reached.
6. You can also go to the Managed Alert Viewer by selecting **Interoperability > View > Managed Alerts**. This page allows you to query for alerts including alerts that are closed.

Once you have completed exploring the managed alert user interface, ensure that all managed alerts are closed. If there are any open managed alerts and the Alert Monitor is enabled, it will continue sending reminder messages.

15.6.5 Customizing Alert Management with Rules and Transformations

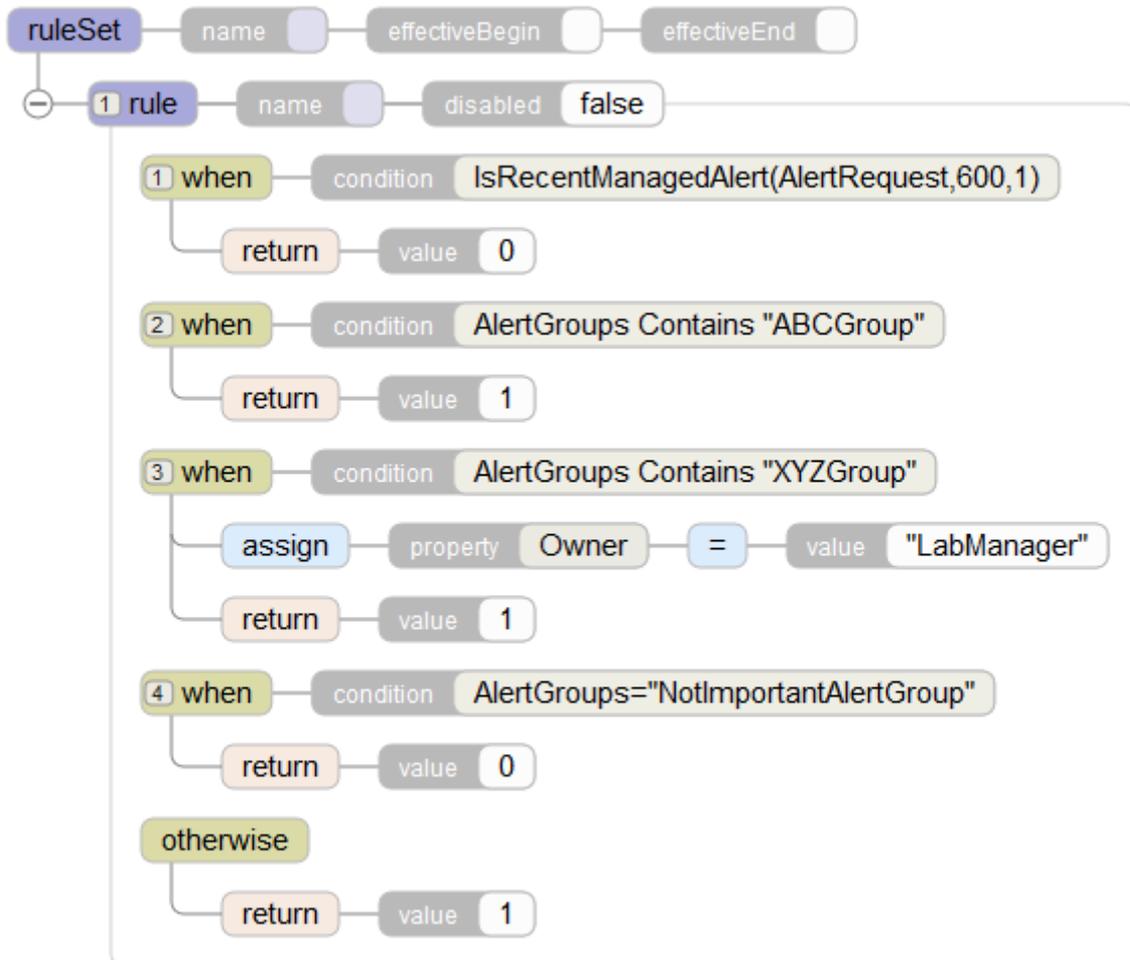
In this section you customize the Alert Manager and Alert Monitor by defining rules and customize the Notification Manager by defining a transformation.

15.6.5.1 Create an Alert Manager Rule

The Alert Manager rule controls whether a managed alert is created for an alert and can set some properties, such as the alert owner. To create a rule for the Alert Manager, follow these steps:

1. Select **Interoperability > List > Business Rules**.

2. Click **New** to create a new rule for the Alert Manager.
 - Enter the package name for the production.
 - Name the rule. For this example, name it AlertManCreationRule.
 - Select the type **Creation Rule for Managed Alerts**. This sets the context to `Ens.Alerting.Context.CreateAlert`.
3. Use the rule editor to enter the following rule. Replace LabManager with an InterSystems IRIS username on your system.



4. Save the rule.
5. In the production configuration page, select `Ens.Alert` and set the **CreateManagedAlertRule** property to `package-name.router-name.AlertManCreationRule`.

Once you have added this rule, the alert management has the following behavior:

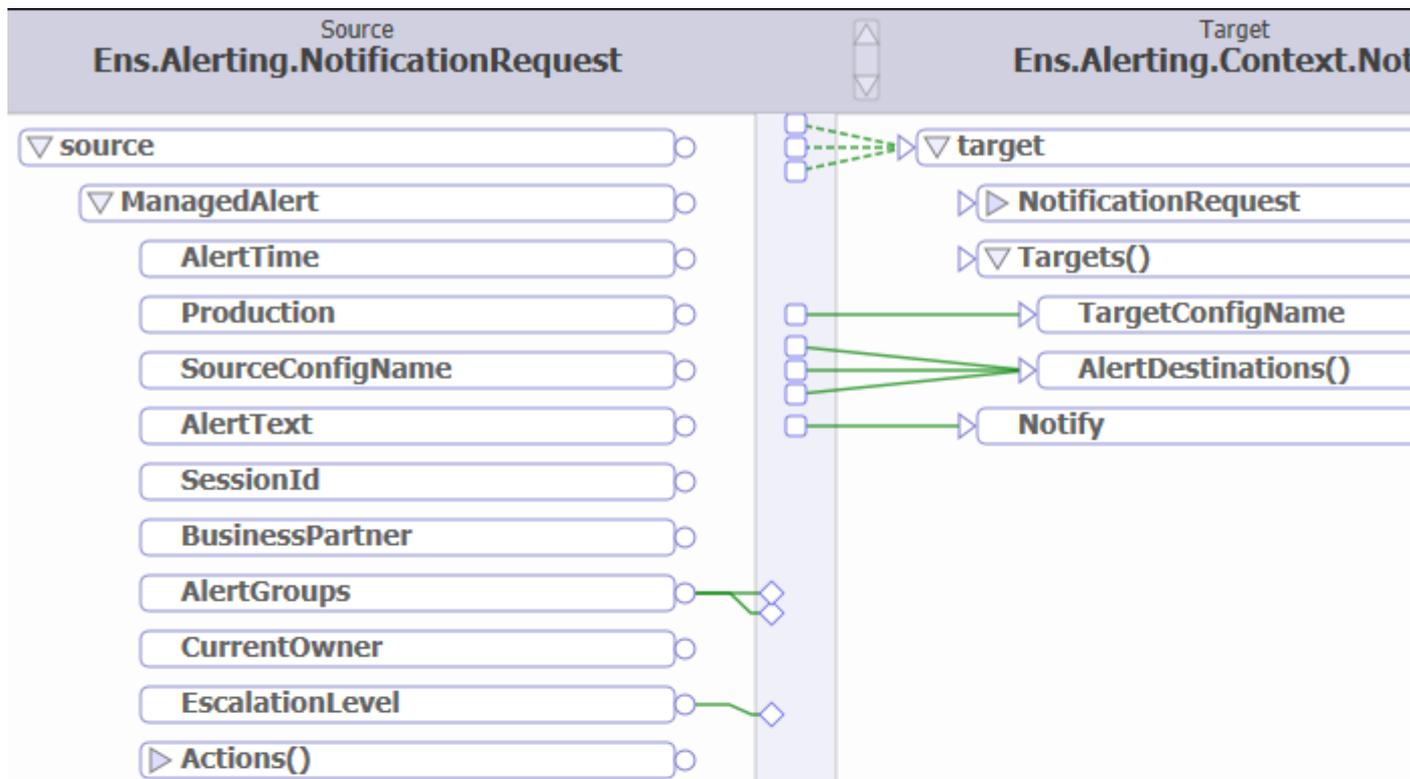
- If the new alert has a corresponding open managed alert that was caused by the same production component, has the same alert text, and was created within the previous 600 seconds, the Alert Manager adds a reoccurs action to the existing managed alert and does not create a new managed alert.
- Alerts in the group ABCGroup create unassigned managed alerts.
- Alerts in the group XYZGroup create managed alerts assigned to the specified user.

- Alerts in the NotImportantAlertGroup do not create a managed alert and are only written to the log. To test this, create an error in the operation that receives a message in this group and send it a message.

15.6.5.2 Creating a Notification Manager Transformation

The Notification Manager data transformation controls the operations that the targets for a notification and the destination addresses for the message. To create a transformation for the Notification Manager, follow these steps:

1. Select **Interoperability**, **List**, and **Data Transformations** .
2. Click **New** to create a new Data Transformation for the Notification Manager.
 - Enter the package name for the production.
 - Name the data transformation. For this example, name it NotifyManTransform.
 - Specify the Source Class as Ens.Alerting.NotificationRequest.
 - Specify the Target Class as Ens.Alerting.Context.Notify.
3. On the **Transform** tab, set the **Create** property to **existing**.
4. Add the actions shown in the following illustration.



Actions

#	Action	Condition	Property	Value
1	set	ABCEmail	target.Targets.(1).AlertDestinations	"jane.michelle.adams@example.com"
2	set	XYZEmail	target.Targets.(1).AlertDestinations	"john.michael.adams@example.com"
3	set	EscalatedEmail	target.Targets.(1).AlertDestinations	"bobby.jones@example.com"
4	set	target.Targets.(1).TargetConfigName	target.Targets.(1).AlertDestinations	"EMailAlertOperation"
5	set	target.Notify	target.Targets.(1).AlertDestinations	1
6	if	..Contains(source.ManagedAlert.AlertGroups,"ABCGroup")		
7	append	target.Targets.(1).AlertDestinations	target.Targets.(1).AlertDestinations	ABCEmail
8	else			
9	endif			
10	if	..Contains(source.ManagedAlert.AlertGroups,"XYZGroup")		
11	append	target.Targets.(1).AlertDestinations	target.Targets.(1).AlertDestinations	XYZEmail
12	else			
13	endif			
14	if	source.ManagedAlert.EscalationLevel > 0		
15	append	target.Targets.(1).AlertDestinations	target.Targets.(1).AlertDestinations	EscalatedEmail
16	else			
17	endif			

5. Save and compile the transformation.

- On the production configuration page, select NotifyMan and set the **NotificationTransform** to the transformation you created.

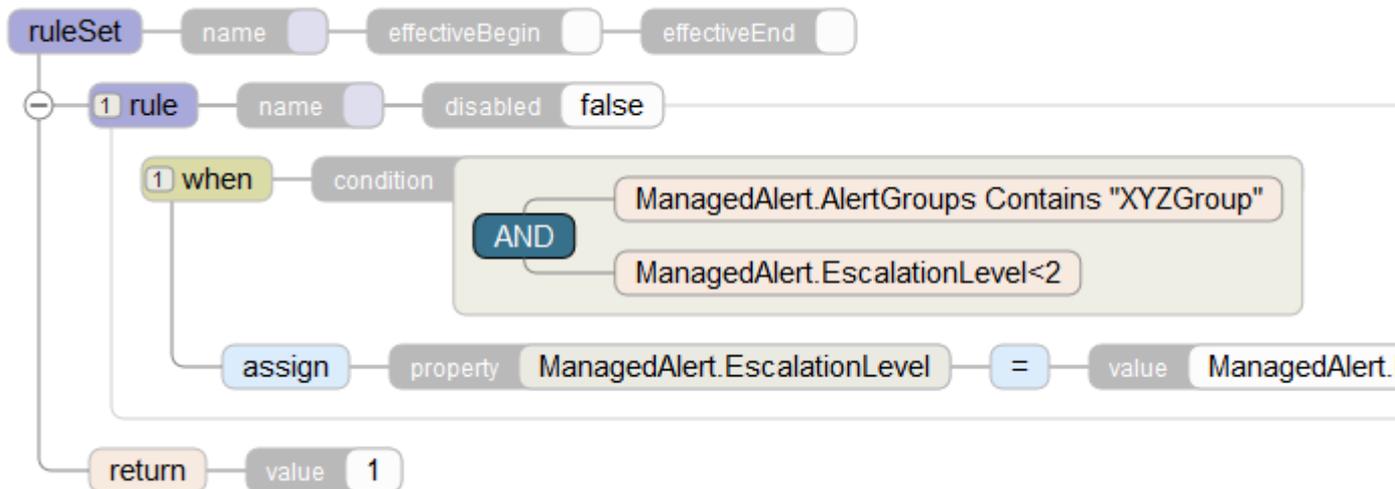
Once you have added this data transformation, the production has the following behavior:

- Managed alerts with “ABCGroup” in AlertGroups are sent to the email address in ABCEmail.
- Managed alerts with “XYZGroup” in AlertGroups are sent to the email address in XYZEmail.
- Managed alerts that have an EscalationLevel 1 or greater are sent to the email address in EscalatedEmail.

15.6.5.3 Creating an Alert Monitor Rule

The Alert Monitor rule controls whether overdue alerts are escalated and whether reminder notices are to be sent. To create a rule for the alert monitor, follow these steps:

- Select **Interoperability . List > Business Rules**.
- Click **New** to create a new rule for the Alert Monitor.
 - Enter the package name for the production.
 - Name the rule. For this example, name it AlertMonitorRule.
 - Select the type **Overdue Rule for Managed Alert**. This sets the context to Ens.Alerting.Context.OverdueAlert.
- Use the rule editor to enter the following rule:



- Save the rule.
- In the production configuration page, select AlertMon and set the **OverdueAlertRule** property to rule you created.

Once you have added this rule to the production, it has the following behavior:

- Any managed alert in “XYZGroup” with an escalation level of 0 or 1 will have its escalation level incremented when it passes through the alert monitor.
- Since the rule does not assign a new value to NewNextActionTime, the Alert Monitor has its default behavior, which is to set the NextNotificationTime to the current time plus the number of minutes specified in the **AlertActionWindow** property.

16

Monitoring Activity Volume

The Activity Volume Statistics and Monitoring package provides short-term monitoring of system performance and long-term reporting on message traffic.

16.1 Activity Monitoring Overview

Activity monitoring can be useful for tasks such as:

- Monitoring the system health—Using the dashboard provides a quick window into your InterSystems IRIS® system performance. If the message duration or queue size is growing, it may indicate a performance issue.
- Trouble shooting problems—Using the dashboard can help diagnose a current or past problem. You can use it to determine if a specific configuration component was the primary cause of a performance bottleneck.
- Tracking performance and activity growth to aid in capacity planning—By reviewing long-term changes in message volume you may be able to estimate future growth. You can plan for increased capacity before encountering a significant performance issue.

The Activity Monitoring package provides:

- A centralized store for message statistics.
- A data model that makes it easy to analyze and report on the statistics using SQL or MDX.
- A dashboard showing message current message rates and response times for each interface.
- Variable granularity for long term and short term statistics.
- Long term storage of message statistics available for historic reporting.
- Custom statistic collection using application specific metrics.

This package stores summary statistics that contain information such as the number of messages that pass through a configuration component and the average time to process the message. This summary information is stored in a compact, efficient manner and can be maintained over very long periods of time without requiring extensive amounts of storage.

The monitor provided with this feature allows you to display the current data over several different time periods. But the statistics stored in the database provide a richer set of data. You can use the analysis and reporting tools of your choice to analyze long-term trends or to compare the volume trends during peak traffic times. This capability allows you to analyze and troubleshoot problems with overloaded components and to track long-term load changes so that you can provide additional resources before problems develop.

All classes that inherit from `Ens.BusinessService`, `Ens.BusinessProcess`, or `Ens.BusinessOperation` can use the built-in activity monitoring. In addition, you can use custom code to include custom data in your activity monitoring.

The Activity Volume Statistics and Monitoring package allows you to monitor multiple namespaces running on a single instance of InterSystems IRIS and collect the statistics from these namespaces in a single database.

Note: The Analytics dashboard user interface supports the ability to display statistics from multiple instances of InterSystems IRIS, but the mechanism to gather statistics from multiple instances is experimental and should not be used in production environments.

16.2 Enabling Activity Monitoring

You can monitor activity for a single namespace or for multiple namespaces that are running on the same instance of InterSystems IRIS. To enable activity monitoring, follow this procedure:

1. For each namespace that you want to monitor:
 - a. Add the `Ens.Activity.Operation.Local` business operation to the production in the namespace.
 - b. Configure the following settings for the operation:

StorageNamespace

Namespace where InterSystems IRIS stores the statistics that it collects.

RecordStatsInterval

How frequently in seconds InterSystems IRIS moves the statistics that it collects from temporary storage to the [Activity Monitor database tables](#). You can view and query the statistics only after they are written to a table. A value less than or equal to 0 indicates that InterSystems IRIS does not store the statistics.

- c. Configure the remaining settings. For more information, see [Settings in All Business Operations](#).
- d. Enable the operation.
- e. To enable statistics collection for all configuration items in the production, call the **EnableStatsForProduction()** method or, to enable statistics collection for individual configuration items, call the **EnableStatsForConfig()** method. For example, to enable statistics collection for all production configuration items in the MYDEMO namespace, enter the following in the Terminal:

```
set $namespace="MYDEMO"  
do ##class(Ens.Util.Statistics).EnableStatsForProduction()
```

2. If your business service calls **SendRequest** methods directly, you must add the statistics recording APIs as described in [Writing Custom Code to Record Activity](#). If your business service uses **OnProcessInput**, you can skip this step.
3. Create or select an existing interoperability-enabled namespace to use for data collecting. If you are only collecting activity data from a single namespace, you can select that namespace to collect the data or you can create a new one. If you are collecting data from multiple namespaces, we recommend that you create a new namespace and only use it for collecting the statistics.
4. Make it possible to use Analytics to access to the data by enabling Analytics in the namespace's default web application. To do this:
 - a. Select **System Administration > Security > Applications > Web Applications**.

- b. Select the default web application for the namespace. For example, if the namespace is WATCHACTIVITY, the default web application is typically /csp/watchactivity.
- c. Select the **Analytics** check box.
- d. Select **Save**.

16.3 Using the Activity Monitor Dashboard

The Activity Monitor Dashboard is an Analytics dashboard that displays the activity statistics. To go to the dashboard, ensure that you are in the namespace being used to collect statistics and select **Interoperability > Monitor > Activity Volume and Duration**. The dashboard is defined in the class `Ens.DeepSee.ActivityVolumeAndDurationDashboard`.

The dashboard displays current activity information for each production configuration item.

Name	Site Dimension	Total Count	Count Trend	Avg. Duration	Std. Deviation	Duration Trend	Avg. Queue Time	Queue Trend
1 ABC_HL7FileService (ENSDEMO)	All	24		0.011	0.004		0.000	
2 ABC_Router (ENSDEMO)	All	24		0.000	0.000		0.000	
3 ORM_O01_FileOperation (ENSDEMO)	All	24		0.004	0.002		0.000	
4 Semester_Data_FileOperation (NEWDEMO)	All	24		0.011	0.005		0.001	
5 Semester_Data_FileService (NEWDEMO)	All	24		0.032	0.008		0.000	
6 Semester_Data_Router (NEWDEMO)	All	24		0.001	0.003		0.000	
7 Semester_FixedClassBatch_FileOperation (NEWDEMO)	All	24		0.007	0.001		0.003	
8 Semester_FixedStudentBatch_FileOperation (NEWDEMO)	All	48		0.004	0.002		0.003	
9 Semester_FixedStudent_BatchCreator (NEWDEMO)	All	24		0.000	0.000		0.000	
10 Semester_Summary_FileOperation (NEWDEMO)	All	24		0.010	0.004		0.001	
11 Total		264						

You can select the statistics to display by time period, instance, namespace, and site dimension:

- **Period of Time**—After selecting the time period, select the check mark to set it. The options are:
 - Minute—displays the activity in the previous minute.
 - Hour—displays the activity in the previous hour.
 - Day—displays the activity in the previous day.
 - Week—displays the activity in the previous week.
 - Month—displays the activity in the previous month.
 - Year—display the activity in the previous year.
 - All—displays all the stored statistics.
- **Instance**—You can select the instance of InterSystems IRIS that you want to view the activity. If you select the instance, then the instance name is not included in the name column. This reduces the width of the table and helps it fit on the screen. After selecting the instance, select the check mark to set it.

Note: The Analytics dashboard user interface supports the ability to display statistics from multiple instances of InterSystems IRIS, but the mechanism to gather statistics from multiple instances is experimental and should not be used in production environments.

- **Namespace**—You can select the namespace that you want to view the activity. If you filter on a namespace, then the namespace does not appear in the name column, reducing the width of the display.
- **Site Dimension**—Custom property set by code. See the `RecordStats()` method or to the `SetStatsUserDimension()` method for information on setting the site dimension.

You can sort the statistics by: Name, Total Count, Avg. Duration, or Avg. Queue Time.

The dashboard automatically refreshes every 60 seconds. You can also refresh it by selecting **Refresh**. The **Reset** button resets the selection fields to their initial default values.

For each configuration item reporting statistics, the dashboard displays the following information:

- **Name**—The configuration item name in the production. The instance and namespace are included in parentheses. If you have filtered activity based on instance or namespace, that item is omitted.
- **Site Dimension**—Identifying information that can be included by custom code. If you filter by the site dimension, this column displays the site dimension value. Otherwise it displays “All”.
- **Total Count**—Total number of messages during the specified time period.
- **Count Trend**—Graphic representation of the count within the specified time period. For example, if the time period is a week, the graph shows the count for each day in the week.
- **Average Duration**—Average time to process the message in the component.
- **Standard Deviation**—Standard deviation on the times needed to process the message in the component.
- **Duration Trend**—Graphic representation of the average duration within the specified time period.
- **Average Queue Time**—Average time message remained on the queue during the specified time period.
- **Queue Trend**—Graphic representation of the average queue wait time within the specified time period.

Although this dashboard can only display activity for the previous minute, hour, day, week, month, or year, you can design your own dashboard with more flexibility. For example, you could create a dashboard that displays the activity from 9AM to 6PM for a specified day.

16.4 Writing Custom Code to Record Activity

In addition to using the built-in statistics mechanism, you can write custom code to:

- Fill in the site dimension field of the recorded statistics. This allows you to provide additional information in the statistics.
- Explicitly record custom statistics to be stored in the database. In this case, you don’t activate statistics for the component. You are using the mechanism that aggregates the data and transfers the statistics data from the temporary storage to the permanently stored database.

To specify the site dimension to be recorded with the statistics, use the **SetStatsUserDimension()** method. For example, the following code first checks that statistics are enabled and then it sets the site dimension to “CriticalAction”.

ObjectScript

```
If ##class(Ens.Util.Statistics).StatsStarted(..%ConfigName) {  
    Do ##class(Ens.Util.Statistics).SetStatsUserDimension(..%ConfigName,"CriticalAction")  
}
```

The **RecordStats()** method writes the specified statistics data to the temporary storage. The data will be aggregated to the three tables. Consider the following example:

```
Do ##class(Ens.Util.Statistics).RecordStats(0,"IncomingMsgSrcv","ActiveMsgs",1,4087,35)
```

The parameters have the following meaning:

- 0—specifies the unknown host type.

- "IncomingMsgSrcv"—used as the configuration item name. This does not have to match the component's configuration item name.
- "ActiveMsgs"—used for the site dimension.
- 1—specifies to release temporary memory after writing the statistics.
- 4087—specifies that 4087 messages were processed.
- 35—specifies a total duration for the messages of 35 seconds.

16.5 Accessing Activity Monitor Tables

The activity statistics are stored in these three tables. The three tables contain the data about the same activity, but using a different time period to aggregate the data. The three tables are:

- `Ens_Activity_Data.Seconds`—aggregates activity over 10-second intervals.
- `Ens_Activity_Data.Hours`—aggregates activity over 1-hour intervals.
- `Ens_Activity_Data.Days`—aggregates activity over 1-day intervals.

This redundancy in storage provides the flexibility to minimize the long-term storage required for the statistics without losing the ability to examine historic data. For example, you can use the `Ens_Activity_Data.Seconds` table to closely examine activity over the previous two days but purge data after two days to minimize storage. The `Ens_Activity_Data.Hours` and `Ens_Activity_Data.Days` tables store less data and can be purged much less frequently. You can use the `Ens_Activity_Data.Hours` table to examine how activity changes over the course of a day. For example, you could use it to generate a report of the peak activity periods during each day of the week and the impact it has on delays and queue sizes.

16.6 Purging Activity Monitor Tables

Although the tables storing the activity statistics data are much smaller than the total size of the corresponding messages, you should purge the activity statistics tables on a regular basis. The `Ens.Util.Tasks.PurgeActivityData` task purges the specified activity table. You specify the amount of data to keep by specifying a number and a time unit. For example, you could retain 7 days of data for the `Seconds` table, 12 months of data for the `Hours` table, and 3 years of data for the `Days` table.

For details on how to create a task, see [Using the Task Manager](#).

16.7 Failovers and Restarts

Certain statistics displayed by the Activity Monitor are stored in temporary globals, and will not be available in a failover or instance restart scenario.

The Production Monitor activity graph uses persistent data and so is available after a restart. The Production Monitor data must be mirrored to be viewed after a failover. If the database is mirrored, then unless a custom global mapping has been used such that the activity data is stored in a non-mirrored databases, the data will be available.

The data shown in the **Activity Volume and Duration** graph is stored in persistent tables (`Ens.Activity...`), so if these tables are in a mirrored database, they are available after a failover. However, the metrics are briefly held in temporary

globals before being saved to those tables, so there is a chance that a few seconds' worth of metrics data might not be contained in the persistent tables at the point of failover.

17

Managing Port Usage

Large, complex configurations can use a large number of ports. The Port Authority searches for items in productions that have a setting with the name of `*PORT`. It can access port information from multiple namespaces, instances, and servers and stores the collected data in a Document Database (%DocDB) Database/table. The resulting report enables you to determine which ports are configured for use. It does not reflect whether the port is actually being used when the report is generated. This information is useful when you need to select ports to use when adding productions to the configuration. The functionality provided is for reporting purposes only. Any data created or functionality added is not used in the processing of production messages. Consolidate report requires USE permissions for %Ens_Portal due to the call to %SYS.Ensemble::GetStatusAll() to find all local interoperable namespaces. Privileges to call %DocDB APIs are also required.

17.1 Configuring the Port Authority

The Port Authority consolidates information into a table in a single namespace. To select the namespace that contains this table, select **Interoperability > Manage > Configuration > Setting Report Application Configuration**. Choose a namespace from the drop-down list and select **Apply**. This page is protected by the resource %Ens_SettingsReportConfig. By default, read and write permission is given to %EnsRole_Administrator and read permission to %EnsRole_Operator.

17.1.1 Configuring a Port Authority Task

In order to generate a Port Authority report through the Management Portal, you need to create a task. Select **System Operation > Task Manager > New Task**. You can generate the Port Authority report on demand, or as a scheduled task.

For general information on how to create a task, see Using the Task Manager. The following list describes settings specific to a new Port Authority task.

- **Namespace to run task in**—choose from the list of defined namespaces in which to run the task. You should select the same namespace you set as the location for the data table.
- **Task type**—select **Interoperability Productions Settings Report**. Selecting this value opens the following list of task-specific settings.
 - **SettingReportClass**—Select **Port Settings** from the drop-down list.
 - **AllNamespaces**—Whether to include all available namespaces in the report. The default value is **True**.
 - **SpecificNamespace**—The specific namespace to include in the report if **AllNamespaces** is **False**.
 - **IncludeExternalClients**—Whether to include external clients that are marked as REST clients in the report. The default value is **False**. If **True** and **SpecificExternalClientRegistryID** is blank, the report includes all external clients.

All clients included in the report must be able to run the Port Authority and be configured to run their own Port Authority report.

- **SpecificExternalClientRegistryID**—If **IncludeExternalClients** is **True**, provides the registry ID for a single external client to include in the report. The external client registry ID is of the format: *name||domain||version*, for example, *DevPorts||IRISInteroperabilityPorts||1*. The report is limited to this external client. For more information on configuring an external client, see [Configuring a Port Authority External-Service Registry](#).
 - **ExternalClientRESTPath**—Lets you specify an optional REST path for an external client, which overrides the default REST path.
 - **LogExternalCallErrors**—If the REST call returns a non-200 status, log a warning entry in the event log. The default value is **False**.
 - **PostSaveProcessing**—Whether to run the code to look for conflicts, free ports and reservations that are used. The default value is **True**.
- **Run task as this user**—Choose from the list of defined users. To choose a different user than the one you are logged in as, you must have the **%Admin_Secure:Use** privilege. The user running the report needs permissions to access all namespaces that run productions and to access the data.
 - **Open output file when task is running** and **Output file**—An output file is not required because output is collected in the report table.

17.1.2 Configuring a Port Authority External-Service Registry

To configure an external client for use by the Port Authority use the External-Service Registry. Select **Interoperability > Configure > External-Service Registry** and select **New Service**. For general information on the External-Service Registry, see [Administering the External Service Registry](#). The following list shows the properties and their values:

- **Name** – User specified.
- **Domain** – Use the DocDBName. For Ports this is **IRISInteroperabilityPorts**.
- **Version** – 1
- **Service Protocol** – REST
- **Lifecycle Stage** – To disable querying, set to **Defunct**. All other options are currently treated as equal.
- **Endpoint** – The URI of DocDB endpoint. Can be configured as per user requirements. The default, using the `<baseURL>` for your instance, is: `http<s>://<baseURL>/api/docdb/v1/<namespace>/find/IRISInteroperabilityPorts`.
- **Attributes** – Name/Value pairs that are used to set properties of the adapter used by `EnLib.REST.GenericOperation`.
 - **Credentials** with a value equal to an Interoperability Credentials ID entry.
 - If the external endpoint is https then **SSLConfig** with a value equal to an existing TLS system configuration to use.
 - If the external endpoint is https then **SSLCheckServerIdentity** could be used as appropriate.

17.2 Using the Port Authority Report

The report is a snapshot of the state of the system the last time the report was generated. To view the report generated by the Port Authority, select **Interoperability > View > Port Authority Report**. This page and the %DocDB database are protected

by the resource %Ens_PortSettingsReport. By default, read and write permission is given to %EnsRole_Administrator and read permission to %EnsRole_Operator.

The report view has the following tabs:

- [Production Ports](#)
- [Port Reservations](#)
- [Port Usage Advice](#)
- [Inbound Production Conflicts](#)
- [Ranges not used in Productions](#)

Each tab presents a table containing report data. At the top of each table column is a field which lets you filter the table contents based on the value of the column. In addition, buttons are provided at the top of the report page:

- **Export Current Page**—Exports the current page content in tab-delimited format to a file with a .csv extension.
- **Import Data**—Imports data from a tab-delimited .csv file. Enabled only for the Reservations and Advice tables. The first line of the file contains column headers, subsequent lines provide table records. You can export a Reservations or Advice report, edit the resulting file, or create one having the same format, and import. If the import source file provides a value for Reservation ID that matches a record already in the table, the original record is silently overwritten.
- **Reset Column Filters**—Removes filtering from all columns in the table.
- **Refresh Page**—The refresh button () refreshes the page content.

17.2.1 Production Ports

The **Production Ports** tab lists all the ports found that are configured for use, with additional information about how they are being used. The content of the report reflects status at the time the report is run. It gathers information from all active productions, including those that are stopped.

- **Server/Mirror**—Each port is used by a production running on a server or a mirror, so one or the other of these two columns contains a value.
- **Instance**—The name of the InterSystems IRIS instance from which the data point was retrieved. If an instance is in a mirror, then the report includes data from one instance per mirror/namespace combination.
- **Production**—The name of the InterSystems IRIS Production from which the data point was retrieved.
- **ItemName**—The name of the item in the production that is configured to use the port.
- **Port**—The port number. Two text fields and a **Find** button at the top of the column let you limit the ports displayed to those falling between specified beginning and ending port numbers.
- **Direction**—Direction of port traffic. Available values are **Inbound** and **Outbound**.
- **Interface**—The network interface, if any, that the port is bound to.
- **IPAddress**—The IP address of the server the port is attached to, for outbound connections.
- **Enabled**—Whether the Item was enabled when the data point was retrieved. Available values are **Yes** and **No**.
- **Categories**—The category of the Item from which the data point was retrieved.
- **Namespace**—The name of the InterSystems IRIS Namespace that from which the data point was retrieved.
- **Mode**—The instance mode, for example, LIVE or DEVELOPMENT.
- **Partner**—The Specific Business Partner ID.

17.2.2 Port Reservations

The **Port Reservations** tab enables you to reserve ports for future use. This reservation feature records your intention to use the ports. It is purely informational and does not configure the ports or in any way prevent their use by others. This part of the report warns you if ports you are trying to reserve are already configured for use or reserved for future use by other users.

A number of columns on this tab have the same name and function as on the **Production Ports** tab. New columns on this tab are:

- **Mode (extended)**—Reports both the four system modes, Live, Test, Development, and Failover, and any modes added for the site.
- **Comment**—A comment about the reservations.
- **User**—The InterSystems IRIS Username of the user making the reservation.
- **LastModified**—Date when this reservation was last modified.
- **Expiry**—The expiration date for the reservations.
- **In Use**—A flag to indicate whether the reserved port is in use.
- **ReservationID**—A unique ID number assigned to each reservation.

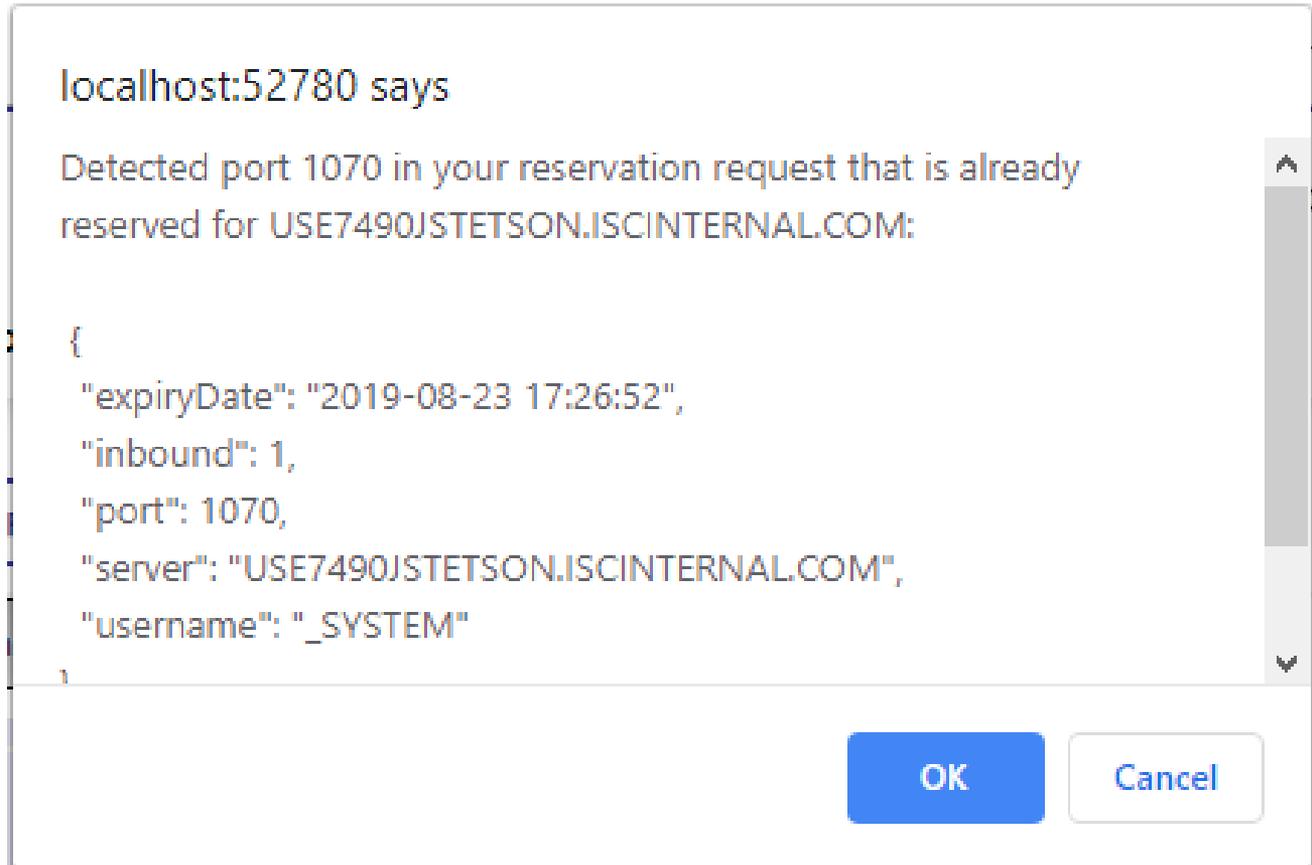
Edit and **Delete** buttons at the end of each row enable you to edit and delete the reservation.

To create a new reservation, select the *Add* button () and fill in the form:

- **Server/Mirror**—Select a value for the Server or Mirror from the drop-down list. If an instance is a mirror member then use the mirror name.
- **Instance**—Select the instance from the drop-down list.
- **Production**—Select the production from the drop-down list.
- **Mode (extended)**—Enter the instance mode. In addition to entering one of the system specified, modes Live, Test, Development, and Failover, it is possible to enter any text to use as the site requires.
- **Number of Consecutive Ports**—Along with **Start Port** and **End Port**, provide ways to specify a range of consecutive ports. Range requests are valid only for **Inbound** ports. If you use this field to supply the required number of consecutive ports, the form automatically sets **Start Port** and **End Port** to values that provide the first occurrence of the requested number of ports within the searched range. You can use the **Reservation Boundary**, set on the **Port Usage Advice** tab, to bound the range searched. The default range is 1074 to 65535. An individual reservation table entry is created for each reserved port.
- **Start Port**—The starting port for a group of consecutive ports. Can be set automatically in response to **Number of Consecutive Ports**, or you can set it directly.
- **End Port**—The ending port for a group of consecutive ports. Can be set automatically in response to **Number of Consecutive Ports** and **Start Port**, or you can set it directly. If you specify both **Start Port** and **End Port**, **Number of Consecutive Ports** is ignored.
- **Direction**—Specify **Inbound** or **Outbound**.
- **Interface**—If the port is bound to a network interface, enter it here.
- **IPAddress**—Enter the IP address of the server the port is attached to, for outbound connections.
- **ItemName**—Enter a name for the item in the production that is configured to use the port. Cannot be used when configuring a range of ports.

- **Comment**—A comment describing the reservations.
- **User**—The InterSystems IRIS Username of the user making the reservation.
- **Partner**—The Specific Business Partner ID.
- **Expiry**—Enter an expiration date for the reservations. The default is 45 days from the creation of the reservation.

Select **Save** to create the specified reservations. If a port you are trying to reserve is already in use or reserved you receive a warning to that effect:



Select **Cancel** to abort the **Save** and avoid reserving an unavailable port.

17.2.3 Port Usage Advice

The **Port Usage Advice** tab enables you to limit the search to specified groups of port numbers when creating port reservations, and serves as a general advice repository. A number of columns on this tab have the same name and function as on the **Production Ports** and **Port Reservations** tabs. New columns on this tab are:

- **Classification**—Enter arbitrary text, or select the value **Reservation Boundary** from the available list. **Reservation Boundary** identifies boundary suggestions for inbound reservations. Boundary identification is based on server or mirror and optional production, instance & mode fields.

The default used to bound an inbound reservation range request is 1074 to 65535.

You can enter other site-specific **Classification** entries as required.

- **Start Port**—The starting port for a group of consecutive ports.
- **End Port**—The ending port for a group of consecutive ports.

- **AdviceID**—A unique ID number assigned to each advice record.

To create a new usage advice record, select the *Add* button () and fill in the form:

- **Classification**—Either select **Reservation Boundary** or enter a site-specific classification.
- **Server/Mirror**—Select a value for the Server or Mirror from the drop-down list.
- **Instance**—Select the instance from the drop-down list.
- **Production**—Select the production from the drop-down list.
- **Mode (extended)**—Enter the instance mode.
- **Start Port**—Specify the starting port for a group of consecutive ports.
- **End Port**—Specify the ending port for a group of consecutive ports.
- **Direction**—Specify **Inbound** or **Outbound**.
- **Comment**—A comment describing the reservations.
- **User**—The InterSystems IRIS Username of the user making the reservation.
- **Partner**—The Specific Business Partner ID.

17.2.4 Inbound Production Conflicts

The **Inbound Production Conflicts** tab shows you ports that have potential conflicts calculated at the time the report is run. Columns on this tab have the same name and function as on previously described tabs. The table is populated with items containing ports that are used more than once. This information allows you to anticipate potential port-usage conflicts. Note that only port values from production settings are used.

17.2.5 Ranges not used in Productions

The **Ranges not used in Productions** tab shows you ranges of unused port numbers calculated at the time the report is run. Columns on this tab have the same name and function as on previously described tabs. The table is populated with ranges of port numbers that are not used in any production. This information helps you to select groups of consecutive ports when configuring port advice or port reservations. Note that only port values from production settings are used.