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Introduction

The Mirth Solutions Mission

Mirth Solutions help many of the nation’s largest, most respected healthcare entities streamline their care-management processes to satisfy the demands of a regulatory, competitive healthcare industry. With Mirth Solutions, NextGen Healthcare's goal is to provide the healthcare community with a secure, efficient, cost-effective means of sharing health information. The natural product of this aim is a family of applications – which includes Mirth Connect – flexible enough to manage patient information, from small practices to large HIEs, so our clients and users can work confidently and effectively within the healthcare-delivery system.

About Mirth Connect

Like an interpreter who translates foreign languages into the one you understand, Mirth Connect translates message standards into the one your system understands. Whenever a “foreign” system sends you a message, Mirth Connect's integration capabilities expedite the following:

- Filtering – Mirth Connect reads message parameters and passes the message to or stops it on its way to the transformation stage.
- Transformation – Mirth Connect converts the incoming message standard to another standard (e.g., HL7 to XML).
- Extraction – Mirth Connect can “pull” data from and “push” data to a database.
- Routing – Mirth Connect makes sure messages arrive at their assigned destinations.

Users manage and develop channels (message pathways) using the interface known as the Administrator.

The Healthcare Interoperability Challenge / Solution

Most often, patient data is exchanged via computer systems (e.g., a doctor's office sends patient records to a hospital, a clinic sends a prescription request to a pharmacy). Such communication is not foolproof. Data can be delayed or lost, and privacy is not always assured, making the transaction less efficient and reliable than it could be. Contributing factors include:

- protocol conflicts between sites
- mismatched versions of record-keeping software
- costly software licensing
HIPAA privacy and security
incompatible data due to varied software and communication methods
lack of control and flexibility related to software use.

In the following diagram, you can see Mirth Connect's flexibility. In it, a lab's data system sends an HL7 message to Mirth Connect via a Minimal Lower Layer Protocol (MLLP). Mirth Connect inserts patient data into an Electronic Health Record (EHR) database, creates a PDF (portable document format) file, and sends an email message with the PDF file attached.

The next diagram shows how Mirth Connect reads patient data from a hospital's Electronic Medical Record (EMR) system. With elements mapped in its own channel, Mirth Connect generates an HL7 message and sends it to a client for outpatient care. Multiple configurations are available depending on how the channel is constructed.

Using Open Source Software

Mirth Connect is licensed under Mozilla Public License 1.1. Because it is open source, customers benefit from a vast array of contributions and testing from scores of healthcare professionals that comprise a vibrant public community. Many issues are resolved quickly, and community input is adapted to make Mirth Solutions more helpful and user friendly. If you are hesitant about using open-source software, be assured that NextGen Healthcare fully backs its entire open source suite with:

- support services to match every need level and budget
- professional services to complete your integration project quickly and correctly
- hosting services that offer you HIPAA (Health Insurance Portability and Accountability Act)-grade security
- an array of physical and virtual appliances to save you time and resources so you can deploy on a standardized, reliable platform.

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Getting Started

A stand-alone instance of Mirth Connect comes with an installer for Windows, Linux, and Mac OS X / macOS.

This section mainly pertains to the standalone version of Mirth Connect. If you have purchased a Mirth appliance, you may disregard the download/install procedures.

This section is separated into the following topics:

- System Requirements
- Download and Installation
- The Mirth Connect Server Manager
- Launching the Mirth Connect Administrator
- The Web Dashboard
- Changing the Database Type
- Using Java 9 or greater

System Requirements

The Mirth Connect Server is a fully standalone application that does not require any sort of application server. You do not need to install any sort of container service like Tomcat, Glassfish, etc.

Java Requirements

The Mirth Connect Server, Command Line Interface, and Administrator are cross-platform applications that only require a JRE/JDK (Java installation). As of version 3.7, OpenJDK is supported in addition to the official Oracle JRE /JDK. OpenJDK has many different distributions from various organizations, but the one we recommend using is the official Oracle OpenJDK distribution.

Supported Java versions for each Mirth Connect version appear in this table:

<table>
<thead>
<tr>
<th>Java Version</th>
<th>3.0.2 - 3.1.x</th>
<th>3.2.x - 3.4.x</th>
<th>3.5.x</th>
<th>3.6.x</th>
<th>3.7.x+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java 6</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Java 7</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Java 8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Java 9</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Java 10</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Java 11+</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Database Requirements

The Mirth Connect Server requires a database for its configuration and message store. For quick deployment, development, and testing, Mirth Connect already includes an embedded database (Apache Derby). For production, the latest version of Mirth Connect supports the following databases:

- PostgreSQL 8.3+
- MySQL 5.0+
- Oracle 10gR2+
- SQL Server 2005+

Note that the above database requirements only apply to what is used for the configuration and message store of the Mirth Connect Server, and have no impact on which databases Mirth Connect can interface with.

When using Java 9 or greater, there are some additional JVM options that need to be set. See Using Java 9 or greater for more info.
Download and Installation

The Mirth Connect installer (for Windows, Linux, and Mac OS X / macOS) automatically upgrades the previous version of the software installed on your system.

1. Click this link: https://www.mirth.com/.
2. On the Mirth Open Source page, click **DOWNLOAD NOW**.
3. On the **Downloads** page, click the appropriate installer link for your system.

4. When the download is complete, double-click the download file, then double-click the **Mirth Connect Installer** icon.

5. On the **Mirth Connect Setup Wizard**, click **Next >**.

   **Yes, update the existing installation** is the default selection. If you’d like to install Mirth Connect elsewhere on your system, select **No, install into a different directory**, and install Mirth Connect in your desired location.

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6. In the **License Agreement** window, read the license agreement, select **I accept the agreement**, then click **Next >**.

7. In the **Destination directory** section, click **Browse...**, find and select the folder in which you want to install Mirth Connect, then click **Next >**.

- If you selected **Yes...** in step 5 (you're updating a previously installed version of Mirth Connect), continue to step 8.

- If you selected **No...** in step 5 (you're installing Mirth Connect for the first time), complete step 7.
8. On the Select Components dialog, select the Mirth Connect components you want to install, then click Next >.

The Mirth Connect Server component is greyed out because it is not an option, but you can select /deselect Mirth Connect Server Manager or Mirth Connect CLI.

9. On the Server Settings – Network Ports dialog, enter the web start and administrator port values as needed, then click Next >.
10. On the **Security Settings – Password Requirements** dialog, set your password parameters, then click **Next >**.

11. On the **Server Settings – Paths** dialog, set the server-settings paths for the Application Data and Logs, then click **Next >**.

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![Server Settings dialog](image1)

13. Once Mirth Connect installs, the **Completing the Mirth Connect Setup Wizard** dialog appears; select/deselect the options as desired, then click Finish.

![Completing the Mirth Connect Setup Wizard](image2)

Depending on the options you chose in the Setup Wizard, the Mirth Connect Server Manager or the README file – or both – appear.
13. The Mirth Connect Server Manager

Windows and Mac OS X versions install a **Mirth Connect Server Manager**, an application that resides in the system tray (Windows) or in the Applications > Mirth Connect folder (Mac). The **Mirth Connect Server Manager** dialog consists of **Server**, **Database**, and **Info** pages.

**Server Page**

The Server page allows you to enter details about your ports, server memory, log levels, and view log files. The following fields are available on the Server page.

<table>
<thead>
<tr>
<th><strong>Function</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Start Port</td>
<td>Accesses the launch page for the Mirth Connect Administrator.</td>
</tr>
<tr>
<td><strong>Default:</strong> 8080</td>
<td></td>
</tr>
<tr>
<td>Administrator Port</td>
<td></td>
</tr>
<tr>
<td><strong>Default:</strong> 8443</td>
<td></td>
</tr>
<tr>
<td>Server Memory (mb)</td>
<td></td>
</tr>
<tr>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Log Files</td>
<td></td>
</tr>
<tr>
<td>mirth.log</td>
<td></td>
</tr>
</tbody>
</table>

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This port is used by the Mirth Connect Administrator to communicate with the Mirth Connect Server.

**Default:** 8443

**Server Memory (mb)**
The server’s maximum available memory (Java max heap size). By default this is 256 MB, but for large production instances you will typically want to increase this value.

**Main Log Level**
These fields allow you to select the applicable log level from the drop-down menus. Available options include:

- **ERROR**
- **WARN**
- **INFO**
- **DEBUG**
- **TRACE**

Depending on the log level, messages of the selected level or lower will pass into that level's log when the system logs a certain-level message.

**Refresh**
Select this button to update the most recent list of log files identified in the Log Files area.

**View File**
Select this button to display a selected log file. This field is grayed out if a file is not selected.

**Administrator**
(PC only) Opens the Mirth Connect login page (inactive on Macs; see Launching the Mirth Connect Administrator)

**OK**
Saves your changes and exits the Mirth Connect Server Manager.

**Cancel**
Exits the Mirth Connect Server Manager without saving your changes.

**Apply**
Applies changes to the field and drop-down settings but does not exit the Mirth Connect Server Manager. This button is grayed out unless changes have been made to the page settings.

---

**Database Page**

---

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The Database page allows you to manage Mirth Connect's internal database. The following fields are available on the Server page.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Select the database on which Mirth Connect will store data.</td>
</tr>
<tr>
<td>URL</td>
<td>The Java Database Connectivity (JDBC) URL string associated with selected type.</td>
</tr>
<tr>
<td>Username/Password</td>
<td>The user's unique personal identifier/access code</td>
</tr>
</tbody>
</table>

Mirth Connect's default database, Apache Derby, is included only to help you set up quickly. Because it is not a production-level database, Mirth Corporation strongly recommends that you **not** use Derby for production.

**Info Page**

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The Info page shows the Mirth Connect server and Java versions as well as the server ID and a link to the Mirth Corporation website.

Launching the Mirth Connect Administrator

The Mirth Connect Administrator is used to develop and manage all channels and can be run anywhere in relation to the Mirth Connect server. The Mirth Connect Administrator consists of menus and view panels that change depending on the task (e.g., Dashboard, Channel, Edit Channel, Settings).

Install the Administrator Launcher

1. Open a web browser and navigate to your launch page. This is usually http://localhost:8080 or https://localhost:8443, though you may need to edit the IP or port depending on your settings.
2. Click on the cog icon next to the blue "Download Administrator Launcher" button.
3. Choose the operating system for your local machine that you want to install the Administrator Launcher on.
4. Click the blue "Download Administrator Launcher" button to download the installer file. See here for instructions on installing: Administrator Launcher Installation

Launch the Administrator

Use the following steps to log in to the Mirth Connect Administrator.
1. **Using the Server Manager**: On Windows/Linux, you can launch the Mirth Connect Administrator using the Administrator button in the bottom-left corner of the Mirth Connect Server Manager – Server page.

![Server Manager Screenshot]

2. **Using the Launch web page**:
   1. Open a web browser and navigate to your launch page. This is usually http://localhost:8080 or https://localhost:8443, though you may need to edit the IP or port depending on your settings.
   2. Click the blue “Download Administrator Launcher” button to download the installer file. See here for instructions on installing: Administrator Launcher Installation

![Installer Screenshot]

3. The Access Secure Site button takes you to the Web Dashboard Sign In page. For more information, go here: The Web Dashboard

### Login Dialog

When you first launch the Administrator view, you'll be taken to the login dialog:

![Login Dialog Screenshot]
The Server URL should be pre-filled with the correct IP address and port, but you can change them here if needed. If this is your first time logging into Mirth Connect, the default username is "admin" and the default password is "admin". Click Login to continue.

**First Login Dialog**

If this is your first time logging into Mirth Connect, you'll be presented with a registration dialog to set your username / password and other details.

After logging in, go here to learn more about using the Administrator: Mirth Connect Administrator
The Web Dashboard

The Web Dashboard is a quick and easy way to view channel / connector statistics across your server without needing to launch the Administrator. It runs in a web browser, and is also supported on mobile devices.

To login to the Web Dashboard:

- In the address field of your browser, type `localhost:` followed by the Web Start Port number. (See the Server Manager – Server page; default: 8080.)
- Click the Access Secure Site button for Web Dashboard Sign in, the page changes, prompting you to enter a Username and Password.

Once you’re logged in, you’ll see all your deployed channels in a table. To view connector-level statistics, expand the arrow next to your channel name. You can also switch between current and lifetime statistics.

From the Web Dashboard you can launch the Administrator interface by clicking on the arrow next to the user avatar in the top-right, and selecting Launch Administrator. You can also logout of the Web Dashboard from this drop-down menu.

Changing the Database Type

By default, Mirth Connect is configured to connect to an embedded Apache Derby database for quick deployment, development, and testing. When using Mirth Connect in production environments, we recommend changing the underlying database to one of the supported servers:

- PostgreSQL 8.3+
- MySQL 5.0+
Backup Current Server Configuration

A Server Configuration file is a snapshot of your current server settings, including all channels, alerts, scripts, and other properties. This configuration may be backed up from one Mirth Connect server and restored into a different server. If you've just installed Mirth Connect and you don't yet have any channels or other configurations, you can skip this section. To backup your server configuration:

1. Log into the Mirth Connect Administrator (instructions here).
2. In the Mirth Connect pane, click Settings.
3. Select the Server tab.
4. In the Server Tasks pane, click Backup Config.
5. Enter a location to save the server configuration XML file, then click Save.
6. Review the Information message, then click OK.

The Server Configuration file does not include Users, Events, or Message / Attachment data. To export events, go here. To export message / attachment data, go here.

Change Database Settings

Using the Mirth Connect Server Manager (Windows / Linux):

1. Double-clicking the Mirth icon in your system tray to open the Server Manager.
2. Go to the **Database** tab.

![Mirth Connect Server Manager - Database Tab](image)

3. In the **Type** field, select the database server you want to connect to from the pull-down menu. The JDBC URL field will be auto-populated with a sample URL.
4. In the **URL** field, change the IP, port, and database name as needed.
5. Enter the **Username** and **Password**, if needed.

![Mirth Connect Server Manager - Database Type and URL](image)

6. Click **Apply**.
7. Click **OK** to exit the Server Manager.

**Editing the Properties File Directly (Windows / Linux / Mac):**

1. Navigate to the directory where you installed Mirth Connect.

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2. Open the `mirth.properties` file inside the "conf" folder.

![mirth.properties file](image)

```java
# options: derby, mysql, postgres, oracle, sqlserver
database = postgres

# examples:
# Derby
# database.url = jdbc:derby://dir.appdata/mirthdb;create=true

# PostgreSQL
# database.url = jdbc:postgresql://localhost:5432/mirthdb

# MySQL
# database.url = jdbc:mysql://localhost:3306/mirthdb

# Oracle
# database.url = jdbc:oracle:thin:@localhost:1521/orcl

# SQL Server
# database.url = jdbc:jtds:sqlserver://localhost:1433/mirthdb

# if using a custom driver, specify it here
# database.driver = 

# maximum number of connections allowed for the connection pool
# database.max-connections = 20

# database credentials
# database.username = user
# database.password = pass
```

3. Edit the following properties as needed:
   - "database": The type of database server to connect to (derby, mysql, postgres, oracle, sqlserver)
   - "database.url": The JDBC URL connection string
   - "database.driver": If you need to use a custom JDBC Driver class, enter that fully-qualified class name here.
   - "database.username": Username for the database connection.
   - "database.password": Password for the database connection.

4. Save the file.

**Restart the Mirth Connect Server**

1. If you are on a Windows or Linux operating system and you have Mirth Connect installed as a service /daemon, open the Server Manager (instructions above).

   ![Mirth Connect Server Manager](image)

   2. Click **Restart** and verify the server has started up successfully.

**Restore Server Configuration**

1. Launch the Mirth Connect Administrator (instructions [here](#)).
2. In the Mirth Connect pane, click **Settings**.
3. Select the **Server** tab if not already selected.
4. In the Server Tasks pane, click **Restore Config**.

5. Select the server configuration XML file you exported earlier, then click **Open**.
6. You'll be prompted to confirm your action. You can also choose whether or not you want channels to automatically be deployed after the restore finishes.
7. Click **Yes** to begin the restore process.
8. Once the restore process is complete, a dialog appears indicating whether the restore was successful or not.
9. Click **OK** to close the information message.

### Using Java 9 or greater

As documented in the System Requirements, Mirth Connect version 3.7 supports Java 8 at minimum. In order to use Java 9 or greater, you'll first need to perform an extra manual step.

In the **Installation Directory**, there should be a **docs** folder. Inside, there is a file called **mcservice-java9+.vmoptions**. This contains some extra JVM options that allow Mirth Connect to run with Java 9 or greater without errors or warnings.

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Copy the contents into either the `mcserver.vmoptions` or `mcservice.vmoptions` file, depending on whether your deployment uses mcserver or mcservice. Then restart Mirth Connect.
The Fundamentals of Mirth Connect

This section is separated into the following topics:

- About Channels and Connectors
- About Message Data
- The Message Processing Lifecycle
- About Data Types
- About Filters
- About Transformers

About Channels and Connectors

As explained in the Introduction section, Mirth Connect is an integration engine that can receive data from a variety of sources and take powerful actions on that data, including sending the data out to multiple external systems. It can also transform data from one format to another, or extract pieces of the data that you can act on or send outbound. The interfaces you configure that perform these jobs are called channels.

A Mirth Connect channel consists of multiple connectors. A connector is a piece of a channel that does the job of getting data into Mirth Connect (a source connector), or sending data out to an external system (a destination connector). Every channel has exactly one source connector, and at least one destination connector. Because a channel may have multiple destination connectors, it can be thought of as a process that obtains data from a particular source, and sends it out to many different places. For example you may receive data over HTTP, then write the data out to a file somewhere, and also insert pieces of the data into your custom database.

Channel Components

General Channel Properties

General Channel properties are configured on the Summary Tab within the Edit Channel View and include:

- Unique ID, name, and description.
- Links to Code Template Libraries: These let the channel know which custom functions are available in specific JavaScript contexts.
- Links to Library Resources: These let the channel know which custom Java classes are available in specific connectors and/or JavaScript contexts.
- Deploy / Start Dependencies: These determine which channels are dependent on this one, and also which channels are dependencies for this one. This way you can have some channels deploy and start before others.

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Attachment Handler: This allows you to extract pieces of any incoming message and store them separately. As a message processes through a channel, multiple copies of it will be held in memory at once (for the raw / transformed / encoded versions of a message). Attachments are stored only once, so by using them you can greatly reduce your channels’ memory footprint.

Message Storage Settings: These determine how much message data to store / retain and whether to encrypt content. These settings affect the performance of the channel and also determine whether you can enable persistent queuing on your connectors.

Message Pruning Settings: These determine how long to keep message data around before automatically removing it with the Data Pruner. You can also decide to archive data out to a file somewhere before pruning it.

Custom Metadata Columns: These allow you to extract pieces of data from your message and store them in dedicated columns in the internal Mirth Connect database. You can then view and search on them in the Message Browser.

Source Connector

Every channel has exactly one source connector gets data into Mirth Connect from an external system. The source connector is configured on the Source Tab within the Edit Channel View. In addition to the standard Connector Components, source connectors include:

- A Source Queue that can be enabled or disabled. When enabled, the channel acts as a store-and-forward service that can receive messages and send acknowledgements immediately to the originating system, without having to wait for the message to process through the entire channel.
- A Batch Processor that can be enabled or disabled. When enabled, the channel will take any incoming data and split it into multiple messages that each proceed discretely through the channel. More information here: Batch Processing
- A Response Selector that determines what response to send back to the originating system, if applicable. You can choose to auto-generate a response based on the inbound data type of the source transformer. You can also return the response from a specific destination, or a completely custom response.
- A Max Processing Threads option. By default this is set to 1, meaning that only one message can be processed through a channel at any given time (does not include asynchronous processes like the destination queue). Increasing this setting can greatly improve channel performance / throughput, at the cost of message order preservation.

Destination Connectors

Every channel has at least one destination connector that sends data out to an external system. Destination connectors are configured on the Destinations Tab within the Edit Channel View. In addition to the standard Connector Components, destination connectors include:

- An Enabled flag that determines whether the destination is currently being used. A channel must have at least one destination enabled at any given time.
- A Wait for previous destination setting that determines what chain a destination connector belongs to. (For additional information, see Destination Chains.)
- A Response Transformer. This is like a regular transformer, except it has its own response inbound data type and response outbound data type, and does the job of modifying the response that an external system returned to a destination connector. It also allows you to decide when to queue / force-error a message. (For additional information, see Response Transformers.)

Channel Scripts

Channel Scripts can be configured on the Scripts Tab within the Edit Channel View. There are four special scripts associated with a channel:

- Deploy Script: This runs once right before a channel is deployed.
- Preprocessor Script: This runs once for every message, after the source connector sends a message to the channel and after the attachment handler has optionally extracted data, but before the message has reached the source filter/transformer. The job of the preprocessor is to modify the incoming message.
• **Postprocessor Script:** This runs once for every message, after the source connector and all destinations have completed (excluding asynchronous processes like the destination queue), but before the source connector sends a response back to the originating system. The postprocessor script has access to responses from all executed destination, and can return custom response that the source connector can use.

• **Undeploy Script:** This runs once right before a channel is undeployed.

### Connector Components

#### General Connector Properties

Every connector has a name and a "metadata ID." For a source connector, the name is always "Source" and the metadata ID is always zero (0). For a destination connector, the name is configurable and the metadata ID is some value greater than zero. The first destination connector in your channel starts at metadata ID one (1), the next one will be two, and so on. Even if you rename a destination connector, the metadata ID will remain the same.

#### Connector-Specific Properties

Every connector has its own custom set of properties. The properties you configure for a TCP Listener will be different from a Database Writer and so on. Here is a list of source and destination connectors supported by Mirth Connect:

• **Source Connectors**
  - Channel Reader
  - DICOM Listener
  - Database Reader
  - File Reader
  - HTTP Listener
  - JMS Listener
  - JavaScript Reader
  - TCP Listener
  - Web Service Listener

• **Destination Connectors**
  - Channel Writer
  - DICOM Sender
  - Database Writer
  - Document Writer
  - File Writer
  - HTTP Sender
  - JMS Sender
  - JavaScript Writer
  - SMTP Sender
  - TCP Sender
  - Web Service Sender

Additional connectors are made available as commercial extensions:

• Email Reader
• Serial Connector
• Mirth Results Connector

### Filter

A filter is the piece of a connector that decides whether a message should proceed to the next step or not. It is configured on the **Edit Filter View** within either the **Source Tab** or **Destinations Tab** within the **Edit Channel View**. For additional information, see **About Filters**
Transformer

A transformer is the piece of a connector that modifies a message, converts a message from one format to another, and extracts pieces of the message for later use. It is configured on the Edit Transformer View within either the Source Tab or Destinations Tab within the Edit Channel View. For additional information, see About Transformers.

All transformers have an inbound data type and an outbound data type used to determine how data is parsed and converted. For additional information on data types, see About Data Types

About Message Data

In Mirth Connect, a message refers to a single overall dispatch of data through the source connector and destination connectors within a channel. Messages are further separated into connector messages which is the piece of the message that flows through a single connector. For example if your channel has two destinations, then a single message as it processes through your channel will have three connector messages associated with it: One for the source connector, and two more for the two destination connectors. These connector messages correspond to the rows of data you see in the Metadata Table within the Message Browser.

Note that messages don't always correspond 1-to-1 with a file that you read in, or a particular stream of data. As explained in the About Channels and Connectors section, the source connector may contain a batch processor which takes a raw inbound stream of data and splits it into multiple messages. So if you have a single file containing 100 HL7 v2.x messages, your channel could read that in and process 1 message or 100 messages, depending on how the source connector is configured.

Message Metadata

Metadata typically refers to important information about the message, but not the actual message content. Most important is the message ID. For any given channel, every message has a unique integer ID associated with it. This ID is used to organize data in the message browser and join connector messages together.

Each connector has it's own ID, referred to as the connector metadata ID. The source connector always has a metadata ID of zero (0). Destination connector metadata IDs start at one (1) and increments for each new destination you add to the channel.

Each connector message has a status, which tells the channel the current processing state. For example, the status could be RECEIVED, which means the raw data has been committed to the database, but the message is in the middle of being processed. It could be QUEUED, which may mean it's sitting in a queue waiting to be processed, or it has been attempted to be processed one or more times but hasn't yet been successful.

Metadata also includes important timestamps which you can use to analyze and diagnose issues. Every connector message stores a received date, which is the time at which its data was committed to the database. For destination connectors, the send date and response date let you know the time a message was dispatched outbound, and the time a response was received from the external system. The differences between these timestamps can give insights into your channel performance.

This also includes custom metadata columns. These are configurable from the Summary Tab within the Edit Channel View, and allow you to create your own columns that show up in the Metadata Table and are searchable in the Message Browser.

All of this information and more is visible in the Metadata Table within the Message Browser.

Message Content

Message content is the actual data that gets processed. As a message flows through your channel, different versions of the data are stored for each connector, depending on the modifications your channel needs to make.
• **Raw** – The state of the message as it enters the connector.
• **Processed Raw** – The state of the message after passing through the preprocessor script.
• **Transformed** – The serialized internal representation of the message, which exists only if a connector has a filter or transformer configured.
• **Encoded** – The state of the message as it exits the transformer (includes changes made to the transformed data).
• **Response** – The message sent back to the originating system (at the very end, after all destinations finish).

**Destination Connector**

• **Raw** – The state of the message as it enters the connector. For a destination connector, this is the same as the source encoded data.
• **Transformed** – The serialized internal representation of the message, which exists only if a connector has a filter or transformer configured.
• **Encoded** – The state of the message as it exits the transformer (includes changes made to the transformed data).
• **Sent** – The message/connector properties used by the destination connector to send messages to the outbound system.
• **Response** – The message received from the outbound system after the destination sends the message.
• **Response Transformed** – The serialized internal representation of the response, which exists only if a destination connector has a response transformer configured.
• **Processed Response** – The state of the response as it exits the response transformer (includes changes made to the transformed data).

These pieces of content are specific to each individual connector message. So a source connector will have Raw / Transformed / Encoded data, and each destination connector will have it’s own Raw / Transformed / Encoded data.

When a message flows from the source connector to the destination connectors, the Encoded Data from the source becomes the Raw Data for each destination. **However**, Raw Data is not "daisy-chained" from destination to destination. If you have three destinations, the Raw Data for each and every destination will be identical to the Encoded Data from the source connector message.

More additional information on the various content types, see Message Content Types, Variable Maps, Error Content Types.

**Message Attachments**

An attachment is a piece of data extracted from the raw incoming message and stored separately. Attachments are not associated with connector messages, but instead with the overall message. The extraction happens at the very beginning of the message lifecycle, even before the preprocessor script runs. When a destination connector dispatches data outbound, any attachments associated with the message will be automatically re-inserted into the outgoing data. In this way, attachment data is only stored once, and multiple copies of it for each connector and for each content type (e.g. Raw / Transformed / Encoded) will not be stored. Using attachments can greatly improve the memory footprint of your channels.

More additional information on attachments and how they are extracted, see Attachment Handlers.

**The Message Processing Lifecycle**

As explained in the About Message Data section, each source and destination connector has various versions of the message data as it flows through the channel. The raw inbound message enters Mirth Connect, is received by the source connector, is filtered and **transformed, then encoded** and sent to the destination connector. From the source connector, the raw inbound message can be passed through multiple destination connectors where it can again be influenced by filters and transformers before it is processed, encoded, and sent on.
Source Processing Steps

1. A message or stream of data is received by the source connector.
2. The batch processor decides whether to split the message into multiple messages. If so, the below steps are repeated for each message returned by the batch processor.
3. The attachment handler extracts and/or stores any attachment data.
4. The post-attachment-handler content (after any attachments have been extracted) is stored as raw data.
5. The content runs through the preprocessor script and is stored as processed raw data.
6. The content is serialized (converted) to the internal representation of the inbound data type (e.g. XML).
7. The content runs through the filter, and the message is either accepted or filtered. If the message gets filtered, flow stops here and jumps down to the Final Processing Steps.
8. The content runs through the transformer, where it may be modified.
9. The post-transformer content is stored as the transformed data.
10. The content is deserialized (converted) from the outbound data type's internal representation (e.g. XML) into the actual outbound format (HL7, EDI, etc.).
11. The content is stored as encoded data.

If no filter or transformer are configured, there will not be any transformed or encoded data. In that case, the content used from here on will just be the raw data (or processed raw data if a preprocessor modified it).

12. The resulting content is passed on to the first destination connector of each destination chain.

Destination Processing Steps

These steps are repeated for each destination connector that a message flows through.

1. The encoded content from the source connector is used by each destination connector as its raw data.
2. The content is serialized (converted) to the internal representation of the inbound data type (e.g. XML).
3. The content runs through the filter, and the message is either accepted or filtered. If the message gets filtered, flow stops for the current destination here. If there are additional destinations in the current chain, these steps are repeated for the next destination. Otherwise, assuming all other destination chains have finished, flow jumps down to the Final Processing Steps.
4. The content runs through the transformer, where it may be modified.
5. The post-transformer content is stored as the transformed data.
6. The content is deserialized (converted) from the outbound data type's internal representation (e.g. XML) into the actual outbound format (HL7, EDI, etc.).
7. The content is stored as encoded data.
8. The destination connector builds a message from all available previous content, stores it as sent data, and sends it to the outbound system.

9. A response is received by the destination connector and stored as the response data.

10. If a response transformer is configured, the response content is serialized (converted) to the internal representation of the response inbound data type (e.g., XML).

11. The response content runs through the response transformer, where it may be modified.

12. The post-response-transformer content is stored as the response transformed data.

13. The response content is deserialized (converted) from the response outbound data type's internal representation (e.g., XML) into the actual outbound format (HL7, EDI, etc.).

14. The response content is stored as processed response data.

Final Processing Steps

This point is reached when all destination chains have finished processing the message. If the message was filtered or errored out on the source connector, then flow will immediately jump down here.

1. The postprocessor script is executed. It can return a response that the source connector may use.

2. The source connector decides what response to send back to the originating system, if any. This may be an auto-generated value, the response payload from a destination connector dispatch, a response returned from the postprocessor script, or a completely custom value residing in the response map.

3. The selected response is stored as the source connector's response data and is sent back to the originating system, if needed.

Destination Chains

A channel's destinations are grouped into one or more destination chains. Each destination chain processes simultaneously with respect to each other, however in any particular chain, a message will flow through each destination in order. It looks something like this:
In the above example, there are 5 total destinations. However Destination 3 does not wait on Destination 2, so it marks the beginning of a new chain. If each destination takes 1 second to process, then the overall time it takes the message to process through the channel will not be 5 seconds, but rather 3 seconds. When flowing through the destination connectors, a message will take only as long as the longest destination chain.

**About Data Types**

A **data type** tells a filter / transformer how to parse a certain format. The **inbound** data type **serializes** the incoming **raw data** into its internal representation. Then the filter / transformer executes, possibly modifying this internal representation, or even completely overwriting it with a different internal representation. Finally, the **outbound** data type takes this **transformed data** and **deserializes** it into the proper outbound format (the **encoded data**).

For example, the **HL7 v2.x data type** serializes ER7 data like this:

```
|MSH|~&<\^& ADT|SHI|SHIADT|SHI|200812091126|SECURITY|ADT^A01^ADT_A01|MSG000
|EWN|A01|200812091126|
|PID|1|1001|1001^5^M11^ADT|MR^SHI^123456789^~^|USSSA^SS|OHALAHAN^COLEEN
|NK1|OHALAHAN^BRITTANY^SIS^SISTER|N|N^NEXT^OF^KIN
|PV1|I|2006^2012^01|||001122^201DEERG^JOHN|||SUR||1|A0|
```

Into this:

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In this case, the internal representation is XML. That's because for HL7 v2.x, the message object you use or manipulate in a filter / transformer is an E4X XML object. However not all data types use XML for their internal representation. The JSON data type uses JSON as you might expect, and the object you use in a filter / transformer is just a regular JavaScript Object. The Raw data type does no serialization or deserialization, so its internal representation is identical to the inbound message, and the object used in the filter / transformer is just a Java String.

For additional information, see Data Types. Mirth Connect supports the following data types:

- Delimited Text Data Type
- DICOM Data Type
- EDI / X12 Data Type
- HL7 v2.x Data Type
- HL7 v3.x Data Type
- JSON Data Type
- NCPDP Data Type
- Raw Data Type
- XML Data Type
- Batch Processing
- JavaScript Batch Script

The following additional data type is made available as a commercial extension: ASTM E1394 Data Type
About Filters

The filter is the piece of a connector that decides whether a message should proceed to the next step or not. It is configured on the Edit Filter View within either the Source Tab or Destinations Tab within the Edit Channel View.

A filter returns true or false. When the filter returns true, the message is said to have been accepted. When the filter returns false, the message is said to have been filtered.

- If the source connector filters out a message, it will not flow through the source transformer, and will not be processed by any of the destination connectors.
- If a destination connector filters out a message, it will not flow through the destination transformer, and will not be dispatched outbound by that destination connector. However other destinations may still process the message.

A filter is comprised of multiple rules. Each rule is joined together with an operator, which can be AND or OR. For example a filter may look like this:

- Accept the message if: Rule 1 returns true OR Rule 2 returns true AND Rule 3 returns true

The standard order-of-operations means that AND takes logical precedence over OR, like this:

![Diagram of filter logic with rule 1, rule 2, rule 3, AND, OR, true, false, accept the message, filter the message]

The "msg" Object

In order to decide whether a message needs to be filtered or not, you will typically need to test pieces of the incoming message. As mentioned in the About Data Types section, when the message enters a filter / transformer, it gets serialized into an internal representation. This is the variable msg, which may be an E4X XML Object, a JavaScript Object, or a Java String, depending on the data type implementation.

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Filter Rule Types

Mirth Connect supports the following filter rule types:

- Rule Builder Filter Rule
- JavaScript Filter Rule
- External Script Filter Rule
- Iterator Filter Rule

About Transformers

A transformer is the piece of a connector that modifies a message, converts a message from one format to another, and extracts pieces of the message for later use. It is configured on the Edit Transformer View within either the Source Tab or Destinations Tab within the Edit Channel View.

A transformer has an inbound data type, and an outbound data type. These may be the same (e.g. HL7 v2.x to HL7 v2.x), or they could be different (e.g. HL7 v2.x to JSON). For additional information on data types, see About Data Types.

A transformer is also comprised of multiple steps. Each transformer step modifies the message, extracts a piece of the message, or performs some other general task.

The "msg" Object

This is the same as in a filter. For more information, see About Filters.

The "tmp" Object

This is similar to msg, except that it is the internal representation of the outbound template configured in your transformer settings. It will only be available in the transformer when you have an outbound template configured.

The tmp variable is used when you want to convert a message from one format to a completely different format (e.g. HL7 v2.x to JSON). Or, it can be used to selectively include pieces of the incoming message and map them into the outbound message.

Response Transformers

The Response Transformer is a special type of transformer specific to destination connectors. It works the same as a regular transformer, except that the data being transformed is not the message flowing through the channel, but instead the response payload that the destination connector received from the external system (if applicable). For additional information, see Response Transformers.

A destination response is comprised not only of the response data, but also the status (e.g. SENT, ERROR), status message, and error message. Response transformers can be used to modify these latter pieces as well. For example if a message gets set to ERROR by the destination connector, in the response transformer you can choose to override that and set the status to SENT instead based on some custom logic.

Response transformers will only execute if there is an actual response payload to transform. For example if you are using an HTTP Sender destination and it fails to connect to the remote server, then obviously there is no response payload. The one exception to this rule is if the response inbound data type is set to Raw. In that case, because the Raw data type does not need to perform any serialization, the response transformer will always execute even if there is no response payload.
Transformer Step Types

Mirth Connect supports the following transformer step types:

- Mapper Transformer Step
- Message Builder Transformer Step
- JavaScript Transformer Step
- External Script Transformer Step
- XSLT Transformer Step
- Destination Set Filter Transformer Step
- Iterator Transformer Step
The Administrator Launcher

Introduction / Installation

The Administrator is the graphical user interface (GUI) that is used to login to a NextGen Connect server and create / modify / deploy channels. In previous versions this was launched on your local desktop with Java Web Start. However in Java 11 and later, Java Web Start was completely removed from Java.

The Administrator Launcher is a replacement for Java Web Start, and can be used to launch the Administrator on your local desktop. It can be used regardless of which version of NextGen Connect you’re using or which version of Java it’s running on.

Download

The Administrator Launcher comes bundled with your Connect installation. When you go through the graphical installer for Connect itself, you are given the option to also install the Administrator Launcher at the same time.

However you may also want to install the Administrator Launcher on your local workstation. In a web browser, navigate to your main 8080/8443 launch page. For example, http://localhost:8080. Note that your IP/DNS or port may be different depending on your mirth.properties configuration.

Click on the cog icon next to Download Administrator Launcher to select the operating system you’re using on your local system:
Finally, click the blue **Download Administrator Launcher** button to download the installer.

The installers for the Administrator Launcher are also available separately on our public downloads page: https://www.mirth.com/Downloads

When downloading the Administrator Launcher, the page first looks to see if you have an installer file in public_html/installers. If none exists the button will simply point to the public download link. If you're on a network with no internet access, you can still allow downloading the Administrator Launcher by placing the appropriate installer files in public_html/installers.

**Installation**

Follow the prompt and click **Next** to start. You'll be asked to view and accept an end-user license agreement, and then you'll be asked where you want to install the Administrator Launcher to:

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Next, you'll be asked whether you want to associate JNLP files with the Administrator Launcher. In previous versions Java Web Start would have been used, but since that has now been removed from Java, it's recommended to check this box.

Note: This will update your operating system file preferences, but you may still want to update your web browser file associations to open JNLP files with the Administrator Launcher.

After clicking Next, the installation process will run, and you can choose to start the Administrator Launcher immediately after exiting the installer.
The Launcher Interface

On the left-hand side you see all your currently saved connections. You can click on the name to select the connection, and double-click to edit its name. You can also launch the Administrator immediately by clicking the icon next to the connection name.

On the right-hand side you see the current connection settings:

<table>
<thead>
<tr>
<th>Field</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Address</th>
<th>The address of your Connect server. This may be either the plain HTTP (8080) or HTTPS (8443) address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java Home</td>
<td>Bundled</td>
</tr>
<tr>
<td></td>
<td>The Administrator Launcher comes bundled with JRE 8. By default the Administrator will launch using this bundled JRE. You can also choose to launch with the system default JRE, or a specific Java installation.</td>
</tr>
<tr>
<td>Max Heap Size</td>
<td>512m</td>
</tr>
<tr>
<td></td>
<td>The maximum amount of memory to allocate for the Administrator Java virtual machine.</td>
</tr>
<tr>
<td>Show Java Console</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>If enabled, a separate console dialog will pop-up along with the Administrator. You can use this console to see exception stacktraces and other system information.</td>
</tr>
<tr>
<td>Icon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>You can use the icon to help you quickly identify different connections in the left-hand table.</td>
</tr>
<tr>
<td>SSL Protocols</td>
<td>Default</td>
</tr>
<tr>
<td></td>
<td>The SSL protocols to use when connecting to the server.</td>
</tr>
<tr>
<td>SSL Cipher Suites</td>
<td>Default</td>
</tr>
<tr>
<td></td>
<td>The SSL cipher suites to use when connecting to the server.</td>
</tr>
<tr>
<td>Use Legacy DH Settings</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Enables legacy Diffie-Hellman settings that allow smaller key sizes. This may be needed when connecting to older 2.x versions of Connect.</td>
</tr>
</tbody>
</table>

At the bottom there are buttons you can use to create a **New** connection, **Save** the currently selected connection, save the current connection settings as a new connection (**Save As...**), or delete the currently selected connection.
Mirth Connect Administrator

The Mirth Connect Administrator is the graphical user interface (GUI) that is used to login to a Mirth Connect server and create/modify/deploy channels. It is launched via the Administrator Launcher and can be accessed from the main launch page in a browser. For additional information on launching the Administrator, see Launching the Mirth Connect Administrator.

This section is separated into the following topics:

- Administrator Layout
- Working With Tables
- Monitoring Views
- Management Views
- Editing Views
- Other Tasks

Administrator Layout

Main view selections and context-specific tasks are located on the left-hand side of the window. On the right side is the currently selected view. After you login to the Administrator, you'll first be taken to the Dashboard View.
Working With Tables

Many of the tables throughout the Mirth Connect Administrator share the same general control scheme. Common operations include:

Arranging Columns

- Click and hold the header of the column you’d like to move.
- Drag the column to its new location. As you drag a column, the next columns automatically slide in the opposite direction, to make room for the column you are moving.
Showing / Hiding Columns

- Right-click the table header:

- OR, click the table control button in the top-right portion of the table:

Sorting Tables By Column

Not all tables support sorting, but for the ones that do:

- Click one of the table headers to sort ascendingly.
- Click the same table header a second time to sort descendingly:

Expanding / Collapsing Rows
• Click the plus/minus icons:

• OR, right-click the table header:

Multi-selecting Rows

Not all tables support multi-row selection, but for the ones that do:

• Click one of the rows in the table.
• To select contiguous rows, hold down the Shift key and select a different row.
  • While keeping the Shift held down, press the Up/Down arrow keys to select additional rows.
• To select discontiguous rows, hold down the Ctrl (or ⌘) key and select a different row.

Searching Table Content

You can quickly scroll the table to a particular row by searching on a particular string.
• Press Ctrl+F (or +F) to open the Find Dialog.

• Click the Find button. If a matching row is found, it will be selected and scrolled to.

Deleting Rows
Not all tables support row deletion. But for the many that do, you can simply select the row(s) you wish to delete, and press the Delete button:
Monitoring Views

This section is separated into the following topics:

- Dashboard View
- Message Browser View
- Alerts View
- Events View

Dashboard View

This is the default view you will see after logging into the Mirth Connect Administrator. The dashboard gives you an overall view of all your deployed channels, and also allows you to start/stop specific channels and connectors.

Navigation

To reach the Dashboard View from a different location, click on the Dashboard link in the Mirth Connect task panel in the upper-left:

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This section is separated into the following topics:

- Dashboard Table
- Filtering By Channel Name or Tag
- Server Log
- Connection Log
- Global Maps
- Dashboard Tasks

Dashboard Table

This is the main section of the dashboard that shows the current status and statistics for your deployed channels. For general information about working with tables in Mirth Connect, see Working With Tables.

### Dashboard Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td></td>
</tr>
</tbody>
</table>

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The status of the deployed channel. Common statuses include:

- **Deploying**: The channel is in the middle of being deployed. If the channel appears to be stuck in this state, it may mean a deploy script is taking a long time.
- **Undeploying**: The channel is in the middle of being undeployed. If the channel appears to be stuck in this state, it may mean a shutdown script is taking a long time.
- **Starting**: The channel is in the middle of starting up. If the channel appears to be stuck in this state, it may be in the middle of recovering unfinished messages.
- **Started**: The channel is currently started. If the node color is orange instead of green, it means that not all connectors underneath the channel are started.
- **Pausing**: The channel is in the middle of pausing. The source connector is in the middle of stopping, and will wait until all currently processing messages have finished before doing so.
- **Paused**: The channel is currently paused. The source connector is currently stopped, which means the channel will no longer receive messages from its configured source, but messages queued up on destinations may still flow outbound. You can still manually send or reprocess messages while a channel is paused.
- **Stopping**: The channel is in the middle of stopping. All currently processing messages will be finished first before the channel stops. If the channel appears to be stuck in this state, it may mean a message is taking a long time to finish processing.
- **Stopped**: The channel is currently stopped. No messages will be received or sent out from the channel.

When the row is a Group rather than a Channel, the group status will be combined from all the channel statuses. For example if some channels are **Started** and some are **Starting**, the overall group status will be **Starting**. In other cases where channels have differing statuses you will see the **Mixed** group status.

<table>
<thead>
<tr>
<th>Name</th>
<th>The name of the connector, channel, or group. This column also shows any tags associated with a channel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rev</td>
<td>The number of times the channel was saved since it was last deployed. This value will be highlighted if it is greater than 0, or if any code templates linked to the channel have changed since the channel was last deployed.</td>
</tr>
<tr>
<td>Last Deployed</td>
<td>The time this channel was last deployed. This value will be highlighted if it is within the last two minutes.</td>
</tr>
</tbody>
</table>

| Rev = Channel Revision - Deployed Revision |

December 19, 2018
<table>
<thead>
<tr>
<th><strong>The number of messages received and accepted by the channel's source connector.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filtered</strong></td>
</tr>
<tr>
<td><strong>Queued</strong></td>
</tr>
<tr>
<td><strong>Sent</strong></td>
</tr>
<tr>
<td><strong>Errored</strong></td>
</tr>
<tr>
<td><strong>Connection</strong></td>
</tr>
</tbody>
</table>

- **Idle**: The source connector is not currently in the process of receiving a message.
- **Reading**: The source connector is currently reading a message into the channel. Generally used by polling source connectors.
- **Writing**: The destination connector is currently dispatching a message outbound.
- **Polling**: The source connector is currently polling for messages to read in.
- **Receiving**: The source connector is currently receiving a message from an external system.
- **Sending**: The destination connector is currently dispatching a message outbound.
- **Waiting For Response**: The destination connector has sent the message outbound and is waiting on a response from the remote system.
- **Connected**: The source connector currently has one or more clients connected to it. This generally will also include a number indicating how many clients are currently connected.

If the connection status is highlighted in red, it typically means that the source connector has reached its configured maximum number of allowed clients. Currently connected clients will be allowed to send messages but no new clients will be able to connect.

**Viewing Messages For a Channel**

To view messages for a particular channel, you can select the channel and then click the **View Messages** task, as described in **Dashboard Tasks**. An alternative method is to simply double-click the channel from the dashboard table.
Show or Hide Channel Groups

By default the channels will be organized under top-level group nodes in the tree. All channels that are not part of a group will be organized underneath [Default Group]. If you only want to see the channels without group organization, click on the control icons at the bottom-right of the table:

Change How Tags Are Displayed

By default tags will be displayed as bubble-text next to the channel names in the table. To change this to a small icon instead, click on the control icons at the bottom-right of the table:

To not show tags in the table at all, simply click the currently selected icon again to deselect it.

Filtering By Channel Name or Tag

The Filter field, located at the bottom-left of the table, allows you to quickly search for channels, only showing channels that match the name / tag entered in the Filter field.

View All Available Tags / Names

To view all tags / channel names in a list, select the Filter field so it has focus, and then press the Down arrow key.
Note that channel tags will show up in the list with the tag icon:

Channel names will show up in the list with the channel icon:

**Auto-Complete Tags / Names**

Start typing into the field, and all tags / channel names that partially match will automatically show up in the drop-down list:

**Filter By Channel Tags**

To apply a channel tag filter:

- Select a channel tag from the drop-down list, then hit the Enter key,
- OR double-click a channel tag from the drop-down list,
- OR type a tag into the text field, then hit the Enter key.

The tag will show up in the filter field, and channels in the table will be filtered down to only those that have the matching tag:
When a filter is present, the status label next to the Filter field will display the total/visible/filtered counts for both channel groups and channels.

You can filter by multiple tags. Simply select the field and follow the instructions above to add another tag. When multiple tags are present in the filter, the resulting channels in the table will be those that match all filtered tags.

### Filter By Channel

To filter down to a specific channel:

- Select a channel name from the drop-down list, then hit the **Enter** key,
- OR double-click a channel name from the drop-down list,
- OR type a channel name into the field, then hit the **Enter** key.
Filter By Partial Channel Name

To filter down to all channels that partially match a certain string:

- Type your search string into the Filter field.
- Hit the **Enter** key.

If the string you wish to filter by already matches the beginning of a channel name, then that channel will automatically be selected instead. If you don't want that to happen:

- Type your search string into the Filter field.
- Press the **Esc** key to close the drop-down list.
- Press the **Enter** key.

Filter By Multiple Criteria

You can filter by both channel tags and channel names at the same time. Follow the instructions above to add both tags and search strings to the field:

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Clear Filter Criteria

To clear specific tags / channel name searches from the filter criteria, click the X button next to the box inside the field:

To clear all filter criteria, click the red X button next to the Filter field:

Server Log

The Server Log tab in the Dashboard is a place to view the latest entries that have been written to the server logs. These entries mirror what gets written to the logs folder in the installation directory. For additional information, see Installation Directory.

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The entries shown in the Server Log tab follow a standard format:

- The current timestamp. Example: [2017-04-10 08:31:50,938]
- The severity level of the log entry: OFF, FATAL, ERROR, WARN, INFO, DEBUG, TRACE, ALL
- The category/class name and line number, if available. Example: (com.mirth.connect.server.Mirth:446):
- The actual log message.

For long messages, the value shown in the table will be truncated. To show the entire message for these entries, simply double-click on the row:

By default a maximum of 99 entries will be shown at once in the Server Log tab. Newly received entries will cause the oldest entries to automatically be removed. If you want to reduce the number of log entries that may be shown at one time:

- Edit the Log Size field in the bottom-right.
- Click the check icon.

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To clear the logs shown in your Administrator session, click the X button in the bottom-left.

To start/pause the logs from being updated in your Administrator session, click the start/pause button in the bottom-left. While the Server Log tab is paused, new entries will not be pulled from the server. This allows you to analyze a particular log entry without fear of it being evicted from your session due to the max log size.

**Connection Log**

The Connection Log is a detailed view of events that occur as messages flow through your channels. When a message is received or sent out, various events get logged here. It is an ephemeral log, so it is kept in memory only and not written to a file anywhere.

The message shown in the **Info** column depends on the type of channel / connector used. For example, for a TCP Sender destination this will typically show the connected socket information:

- `<local IP>`: `<local port>` —> `<remote IP>`: `<remote port>`

By default a maximum of 250 entries will be shown at once in the **Connection Log** tab. Newly received entries will cause the oldest entries to automatically be removed. If you want to change the number of log entries that may be shown at once (up to a maximum of 999):

- Edit the **Log Size** field in the bottom-right.
Click the check icon:

To clear the logs shown in your Administrator session, click the X button in the bottom-left.

To start/pause the logs from being updated in your Administrator session, click the start/pause button in the bottom-left. While the [Connection Log] tab is paused, new entries will not be pulled from the server. This allows you to analyze a particular log entry without fear of it being evicted from your session due to the max log size.

Global Maps

The Global Maps tab allows you to view the current state of the Global Map and the Global Channel Maps specific to particular channels. For additional information on these maps, see Variable Maps.
The Global Maps table shows all current global map entries, and all current global channel map entries for the channels that are currently selected in the dashboard table. You can multi-select channels to view global channel map entries across multiple channels at once.

**Global Maps Table Columns**

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>This will either be the channel name, or &quot;&lt;Global Map&gt;&quot; if the entry refers to the global map rather than a global channel map.</td>
</tr>
<tr>
<td>Key</td>
<td>The string used to uniquely identify the entry within the given map.</td>
</tr>
<tr>
<td>Value</td>
<td>The string representation of the current value residing in the map entry. Note that although the Global Maps table will show the string representation, the actual object resides in memory on the server side. If the object has no string representation you may see an entry like &quot;java.lang.Object@123abc&quot; instead.</td>
</tr>
</tbody>
</table>

For values with long string representations, the value shown in the table will be truncated. To show the entire message for these entries, simply double-click on the value cell:

---

### Dashboard Tasks

---

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The following context-specific tasks are available from the Dashboard View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄 Refresh</td>
<td>Refresh</td>
<td>Updates the dashboard table and the currently selected dashboard tab. Note that the dashboard automatically refreshes at an interval defined in the Administrator Settings.</td>
</tr>
<tr>
<td>📩 Send Message</td>
<td>Send Message</td>
<td>Sends a message to the selected channel.</td>
</tr>
<tr>
<td>📜 View Messages</td>
<td>View Messages</td>
<td>View messages for the selected channel. Enters the Message Browser View.</td>
</tr>
<tr>
<td>🗑️ Remove All Messages</td>
<td>Remove All Messages</td>
<td>Removes all messages and attachments stored for the selected channel(s). This action cannot be undone.</td>
</tr>
<tr>
<td>🔄️ Clear Statistics</td>
<td>Clear Statistics</td>
<td>Resets the current statistics to zero for the selected channel(s) / connector(s). This option is only available when Current Statistics is selected in the dashboard table.</td>
</tr>
<tr>
<td>🕳️ Start</td>
<td>Start</td>
<td>Starts or resumes the selected channel(s) / connector(s). Note that the Channel Dependencies workflow may apply to this task.</td>
</tr>
<tr>
<td>⏯️ Pause</td>
<td>Pause</td>
<td>Pauses the selected channel(s). This is equivalent to stopping the source connector. Note that the Channel Dependencies workflow may apply to this task.</td>
</tr>
<tr>
<td>⏪ Stop</td>
<td>Stop</td>
<td>Stops the selected channel(s) / connector(s). Any currently processing messages will first be...</td>
</tr>
</tbody>
</table>

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### Send Message

When you click the **Send Message** task, a dialog will pop up allowing you to select the message to send. You can type in a custom message, or select a file from disk to process. When reading a file, you can choose to open it as a "Text" file, which will use the default Java charset encoding. Or, you can open it as a "Binary" file, which will paste in the Base64-encoded contents of the actual file bytes.

When sending a message to a channel, you can use the destinations table to select in advance which destinations you want to process the message through.

If your channel logic is dependent on specific source map variables, you can also inject values for those in this dialog.

Once you’re ready to send the message, click on the **Process Message** button.

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Halt" /> Halt</td>
<td>Attempts to stop the selected channel(s) immediately. Any messages currently processing through the channel will be left incomplete. The channel will attempt to recover unfinished messages when it is started back up.</td>
</tr>
<tr>
<td><img src="image" alt="Undeploy Channel" /> Undeploy Channel</td>
<td>Removes the channel from the list of deployed channels. Once undeployed, the channel will no longer appear on the dashboard, and instead will only be visible from the Channels View. When undeploying, the channel will first be gracefully stopped, and any currently processing messages will first be finished. Note that the Channel Dependencies workflow may apply to this task.</td>
</tr>
</tbody>
</table>
Remove All Messages

When you click the **Remove All Messages** task, a confirmation dialog pops up. Note that this action removes all messages and attachments for all currently selected channels.

- **Include selected channels that are not stopped (channels will be temporarily stopped while messages are being removed)**
  - You may only Remove All Messages for channels that are currently stopped. If you select a channel that is not stopped and remove all messages without checking this check box, nothing will happen. When this option is checked, any channels not currently stopped will be stopped prior to removing the messages. After the removal finishes, the channels will automatically be started back up.

- **Clear statistics for affected channel(s)**
  - If checked, all channels that have messages removed will also have their current statistics reset to zero. This option is checked by default.

After clicking **Yes** to continue, you’ll see the following additional dialog:

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This is an additional layer of security to make sure you don't remove message data accidentally. To proceed you must type in “REMOVEALL” in all capital letters and click OK. If this additional layer of security is annoying, you can disable it in the Administrator Settings Tab.

**Clear Statistics**

When you click the Clear Statistics task, a confirmation dialog pops up. Select the statistics you wish to reset to zero. You can quickly select all values by clicking the Invert Selection button. When you're ready, click the OK button to proceed.

Note that this only resets current statistics. To reset lifetime statistics, go to the Server Settings Tab.
Message Browser View

The Message Browser allows you to view and search historical and actively processing messages for your channels. It also has options for importing, exporting, removing, and reprocessing messages.

Navigation

From the Dashboard

Click on the Dashboard link in the Mirth Connect task panel in the upper-left:
Then select the channel you want to view messages for, and click the **View Messages** task in the left task list. For additional information, see **Dashboard Tasks**:

1) Select a channel

OR, double-click the channel in the **Dashboard Table**.

**From the Channels View**

Click on the **Channels** link in the **Mirth Connect** task panel in the upper-left:

Then select the channel you want to view messages for, and click the **View Messages** task in the left task list. For additional information, see **Channel Tasks**:
This section is separated into the following topics:

- Metadata Table
- Message Content Tab
- Mappings Tab
- Errors Tab
- Attachments Tab
- Searching Messages
- Message Browser Tasks
### Metadata Table

This table shows metadata (e.g., ID, status, timestamps) about the messages that match your current search window. The number of messages shown in the table at once is determined by the Page Size option (additional information about the page size option, see Searching Messages). When you first enter the Message Browser, by default the latest 20 messages (by ID) will appear.

**Adding a Column to the Metadata Table**

By default eight default columns are shown: *Id, Connector, Status, Received date, Response Date, Errors, Source, and Type*. You can add columns to and remove columns from the list one at a time using the Column Options icon /menu in the list's column header.

All Messages Lists for all channels have the same column configuration; that is, any columns added to /removed from the Messages List of one channel are added to/removed from the Messages List of all channels. You can add as many available columns as you like, though not all will be visible onscreen at once. If all columns cannot be viewed onscreen, a horizontal scroll bar appears below the Messages List. Scroll left or right to view the desired columns/data.

Removing a column does not remove its data; the data reappears when you add the column back to the Messages List.

Use the following steps to add a column to the Message List.

1. At the far-right end of the Message Lists' column header, click the **Column Options** icon.

---

**Metadata Table**

<table>
<thead>
<tr>
<th>Id</th>
<th>Connector</th>
<th>Status</th>
<th>Received Date</th>
<th>Response Date</th>
<th>Errors</th>
<th>Source</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Observations</td>
<td>FILTERED</td>
<td>2017-04-11 10:42:24:260</td>
<td>--</td>
<td>--</td>
<td>TX 02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>With Observations</td>
<td>FILTERED</td>
<td>2017-04-11 10:42:20:287</td>
<td>--</td>
<td>--</td>
<td>FACILITY A</td>
<td>TX 02</td>
</tr>
<tr>
<td></td>
<td>With Observations</td>
<td>FILTERED</td>
<td>2017-04-11 10:42:18:394</td>
<td>--</td>
<td>--</td>
<td>FACILITY A</td>
<td>TX 02</td>
</tr>
<tr>
<td></td>
<td>With Observations</td>
<td>FILTERED</td>
<td>2017-04-11 10:42:18:732</td>
<td>--</td>
<td>--</td>
<td>FACILITY A</td>
<td>TX 02</td>
</tr>
</tbody>
</table>
2. On the Column Options menu, select or deselect the column(s) you would like to add or remove from the column header.

The following list-related tasks are also available on the Column Options menu:

- **Collapse All** – Shows only the Source Connector row of each message in the Messages List.
- **Expand All** – Shows the Source Connector row and Destination row(s) of each message in the Messages List (as in the previous graphic).
- **Restore Default** – Reconfigures the Messages List to contain the eight default columns (see the introductory paragraph in this section).

You can pause the pointer on a column header to reveal a tool-tip with a description of that column’s function.

For general information about working with tables in Mirth Connect, go here: Working With Tables

### Metadata Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id</td>
<td>The unique ID that identifies the message within the current channel. Note that a single message can have multiple connector messages for each connector (source / destinations) in the channel. Each connector message row is organized by this column in the table.</td>
</tr>
<tr>
<td>Connector</td>
<td>The name of the connector. (e.g. “Source”, “Destination 1”)</td>
</tr>
<tr>
<td>Status</td>
<td>The current status of the connector message. Valid values include:</td>
</tr>
<tr>
<td></td>
<td><strong>Source connector statuses:</strong></td>
</tr>
<tr>
<td></td>
<td>- <strong>Received</strong>: If the <strong>SOURCE</strong> message is received, it means the message has been committed to the</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
database and added to the source queue, but has not yet been processed. If the source queue is disabled, this means the message has not yet finished processing through the source connector.

- **Filtered**: The message has been rejected by the source filter, and will not flow any further through the channel.
- **Transformed**: The message has passed the source filter/transformer, and the source encoded data has been dispatched to any destinations.
- **Error**: An error occurred while processing the message through the source connector. This typically means that the preprocessor or source filter/transformer script failed.

**Destination connector statuses:**

- **Received**: The inbound data for the destination connector has been committed to the database, but the destination has not yet finished processing the message.
- **Filtered**: The message has been rejected by the destination filter, and will not be dispatched by this destination. Other destinations may still dispatch this message.
- **Sent**: The message has been successfully dispatched / written out by the destination connector.
- **Queued**: The message either has not been attempted to be dispatched yet, or it has failed to dispatch and is waiting in the queue to be attempted again.
- **Error**: An error occurred while processing the message through the destination connector. This could mean that an error occurred in the destination filter/transformer, that the destination failed to dispatch the message outbound, or that the destination was able to dispatch the message but the outbound system returned a failure response (such as an HTTP 500). If the error occurred in the destination filter/transformer, then the message will not process through the rest of the connectors in the current destination chain. If the error occurred in the dispatcher, the message may still be processed through subsequent destinations in the current chain.
- **Pending**: The destination was able to dispatch / write the message outbound, but has not yet finished processing the message through the response transformer.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orig. Received Date</td>
<td>The date and time the original message was received. This value is not updated if the message gets overwritten by a reprocess operation.</td>
</tr>
<tr>
<td>Received Date</td>
<td>The date and time the message was received by the source/destination connector. This value may update if the message gets overwritten by a reprocess operation.</td>
</tr>
<tr>
<td>Send Attempts</td>
<td>December 19, 2018</td>
</tr>
</tbody>
</table>
- **Source Connector**: The number of times the connector attempted to send the response back to the point of origin.
- **Destination Connector**: The number of times the connector attempted to send the message outbound.

### Send Date
- **Source Connector**: N/A
- **Destination Connector**: The date and time immediately before the most recent send attempt.

### Response Date
- **Source Connector**: The date and time immediately before the connector attempted to send the response back to the point of origin.
- **Destination Connector**: The date and time immediately after the connector received and stored the response from the outbound system.

### Errors
Indicates whether an error exists for this message. It is possible for a message to have errors associated with it even if the message status is not ERROR. Possible values include:

- **Processing**: An error occurred during a user-script, such as the preprocessor or the filter/transformer.
- **Response**: An error occurred generating the response, or sending the response from the source connector to its point of origin.
- **Postprocessor**: An error occurred during the postprocessor script.
- **Multiple**: Two or more of the above errors occurred.

### Server Id
The ID of the server that processed the message through the connector.

### Original Server Id
The ID of the server that originally processed the message, in the case that the current message has been imported or taken over by another server.

### Original Id
The original ID of the reprocessed message. This value only exists for reprocessed messages.

### Import Id
The original ID of an imported message. This value only exists for imported messages.

### Import Channel Id
The original channel ID of an imported message. This value only exists for messages imported from a different channel.

**Custom Metadata Columns**

*Custom Metadata Columns* for the current channel will also show up in the metadata table. These columns will vary depending on the channel. By default the **Source** and **Type** columns are added for all new channels, though this can be changed in the **Server Settings**.
<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Sending Facility value in MSH.4.1.</td>
</tr>
<tr>
<td>Type</td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Type and Trigger values in MSH.9.1 and MSH.9.2.</td>
</tr>
<tr>
<td>Version</td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Version value in MSH.12.1. Note that this custom metadata column is not added to new channels by default, though this may be changed in the Server Settings Tab.</td>
</tr>
</tbody>
</table>

Note that the above values are only the defaults, and that users can change those values inside of a transformer.

**Message Content Tab**

The Messages tab in the Message Browser shows the actual content of the message at various states as it processed through the selected connector message.

**Viewing Message Content**

- Select a connector message in the Metadata Table.
- Select the Messages tab (located below the Metadata Table).
- Select the radio button corresponding with the content type you want to view.

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### Message Content Types

<table>
<thead>
<tr>
<th>Content Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw</td>
<td>The inbound message as received and stored by channel, after the attachment handler has extracted any attachments but before the preprocessor script has modified the message.</td>
</tr>
<tr>
<td>Processed Raw</td>
<td>The altered inbound message after the preprocessor script has executed.</td>
</tr>
<tr>
<td>Transformed</td>
<td>When a message enters a transformer, the raw (or processed raw) data is serialized into an internal representation, which may be XML, JSON, or Raw depending on the inbound data type. The transformer then has a chance to alter this serialized data. This content is the internal representation of the message after the transformer has executed.</td>
</tr>
<tr>
<td>Encoded</td>
<td>After a message leaves the transformer, the Transformed Data (internal representation of the message) is deserialized into the outbound data type. This is referred to as the Encoded Data. The encoded data for a source connector is equivalent to the raw data for a destination connector.</td>
</tr>
<tr>
<td>Sent</td>
<td>A snapshot of the destination connector properties immediately before the destination connector attempts to dispatch the message.</td>
</tr>
</tbody>
</table>
Response | The Response object returned by the destination connector after a dispatch has been attempted. This will include the response status, the status message, and the actual response payload (if present).

Response Transformed | This is the same as the Transformed content, except that it is for the response data. This will be the internal representation of the response content, serialized into the response inbound data type.

Processed Response | This is the same as the Encoded content, except that it is for the response data. This will be the internal serialized representation of the response content, deserialized into the response outbound data type.

**Formatting Messages**

The Format Messages check box allows you to pretty-print XML and JSON messages with whitespace and indentation so that it’s easier to read. Note that this does not alter the actual message content, only how it is displayed in the Administrator.

**Mappings Tab**

The Mappings tab shows all entries stored in variable maps for the selected connector message.

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Viewing Mappings

- Select a connector message in the Metadata Table.
- Select the Mappings tab (located below the Metadata Table).
- Double-click entries in the table to view the values in a separate dialog.

Mappings Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>The type of map the entry is stored in. For additional information, see Variable Maps.</td>
</tr>
<tr>
<td>Variable</td>
<td>The unique key identifying the entry within the given map.</td>
</tr>
<tr>
<td>Value</td>
<td>The actual value of the entry.</td>
</tr>
</tbody>
</table>

December 19, 2018
Errors Tab

If any error content exists for a connector message, a separate Errors tab will be present in the message browser when you select that row in the Metadata Table. You can tell beforehand whether a connector message has error content by looking at the Errors column in the metadata table. For additional information, see Metadata Table.

Viewing Message Errors

- Select a connector message in the Metadata Table.
- Select the Errors tab (located below the Metadata Table). Note that this tab is only available if the connector message actually has error content.
- Select the radio button corresponding to the content type you want to view.
**Error Content Types**

<table>
<thead>
<tr>
<th>Content Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing Error</td>
<td>An error occurred during a user-script, such as the preprocessor or the filter / transformer.</td>
</tr>
<tr>
<td>Response Error</td>
<td>An error occurred generating the response, or sending the response from the source connector to its point of origin.</td>
</tr>
<tr>
<td>Postprocessor Error</td>
<td>An error occurred during the postprocessor script.</td>
</tr>
</tbody>
</table>

**Attachments Tab**

If a message has attachments associated with it, a separate Attachments tab will be visible when selecting any of the connector message rows within the message in the Metadata Table.

**Attachment Table Columns**

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>The sequence numbers associated with the attachment(s). This usually starts at 1 and increase for every attachment in the table. In some cases for DICOM messages you may see a range of numbers in this column, indicating that...</td>
</tr>
</tbody>
</table>
### Viewing Attachments

To view attachment content:

- Double-click the row in the Attachments table,
- OR, select the row in the Attachments table, then click the **View Attachment** task to the left:

  ![Attachment Table Example]

A confirmation dialog pop up, asking you what type of viewer to use:

![Select Attachment Viewer Dialog]

There are four types of attachment viewers: Text, Image, DICOM, and PDF. The dialog will try to pre-select the viewer for you based on the Type of the attachment. If you need to override that selection and choose a different viewer, you can do that by using the drop-down menu.

If you want to bypass this dialog and have the Message Browser always automatically open the viewer based on the Type of the attachment, you can check the "Always choose" check box. This setting can be reset later in the **Administrator Settings Tab**.

Once you've chosen a viewer, click the **OK** button to proceed.
Use this for text/* type attachments. A dialog pops up with the textual representation of the data:

The data is assumed to be base Base64 encoded, so by default the Decode Base64 Data check box is checked. To view the raw data, uncheck that check box:

**Image Attachment Viewer**

Use this for image/* type attachments. A dialog pops up and render the image for you:

If the image cannot be rendered for any reason, an error dialog appears instead of the image:

**DICOM Attachment Viewer**

December 19, 2018
Use this for DICOM attachments. A dialog pops up to show the image data for the DICOM message as well as some metadata about it:

If the attachment has multiple image slices, use the horizontal scroll bar at the bottom to switch between them:

**PDF Attachment Viewer**

Use this for application/pdf type attachments. A PDF viewer pops up, allowing you to switch between pages, print the document, and more. If the PDF has a table of contents included, that is shown in a separate dialog to the side, allowing you to browse the outline and skip directly to a particular section:

December 19, 2018
Searching Messages

The Message Browser supports a wide range of searches, from a general search using a few filters, to finely grained searches using many filters and including the Advanced... dialog. The Advanced dialog allows you to enter a number of ID, content, and metadata filters to fine-tune your searches.

Message Search Options

December 19, 2018
<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Start/End Time</td>
<td>Use the Calendar icons to populate these fields with the start/end dates of the desired messages; use the Hour fields to restrict the search to a range of hours, or check the <strong>All Day</strong> box to include messages that started/ended at all hours of the day.</td>
</tr>
<tr>
<td>B</td>
<td>Regex</td>
<td>Search all textual message content that matches the regular expression pattern given in the Text Search field. Regex matching could be a very costly operation and should be used with caution, especially with a large amount of messages. Any message content that was encrypted by this channel will not be searchable. The Regex option is only supported on PostgreSQL, Oracle, and MySQL databases.</td>
</tr>
<tr>
<td>C</td>
<td>Page Size</td>
<td>The maximum amount of messages that will appear in the Metadata Table at once. The default value is 20, but you can change that in the <strong>Administrator Settings Tab</strong>.</td>
</tr>
<tr>
<td>D</td>
<td>Text Search</td>
<td>Enter text (e.g., patient name, IP address) to include message content, metadata, and connector names containing the entered text. When you enter text in this field and click the <strong>Search</strong> button, the <strong>Select an Option</strong> dialog appears, informing you that <strong>Text searching may take a long time, depending on the amount of messages being searched</strong>, then asks <strong>Are you sure you want to proceed?</strong> Click the <strong>Yes</strong> or <strong>No</strong> button as desired.</td>
</tr>
</tbody>
</table>
**confirmation dialog in the Administrator Settings Tab.**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Advanced…</td>
<td>Reveals the Advanced Search Filter dialog consisting of more specific search-filter options. If any advanced search options have been set, this button will appear in bold text.</td>
</tr>
<tr>
<td>F</td>
<td>Reset</td>
<td>Removes all filters from the previous search and resets all search options to their defaults.</td>
</tr>
<tr>
<td>G</td>
<td>Search</td>
<td>Performs the message search with the currently set search options.</td>
</tr>
<tr>
<td>H</td>
<td>Statuses</td>
<td>Check these boxes to search for messages with RECEIVED, TRANSFORMED, FILTERED, QUEUED, SENT, and/or ERROR statuses.</td>
</tr>
<tr>
<td>I</td>
<td>Current Search (Filters)</td>
<td>The filters you selected for your search. The Current Search box displays various data relative to the most recent search. Note that when you perform a search, the server returns the Max Message ID that matched your search criteria, and that is shown as an additional criterion in this box. This is so that your search remains consistent and does not include new messages since your last search when you perform one of the Refresh / Export / Reprocess / Remove tasks. For additional information on tasks, see Message Browser Tasks.</td>
</tr>
<tr>
<td>J</td>
<td>Count</td>
<td>Performs a COUNT query on the server, and returns how many of the channel's messages match the search criteria. This number may be greater than the total number of messages currently shown in the Metadata Table because of the Page Size option.</td>
</tr>
<tr>
<td>K</td>
<td>Page</td>
<td>(Multi-page lists) Activates when you click the Count button Enter a value (coinciding with the page range) in this field, and click the Go button to display the desired page.</td>
</tr>
<tr>
<td>L</td>
<td>&lt; Prev / Next &gt;</td>
<td>(Multi-page lists) Click the &lt; Prev button to go back one page or the Next &gt; button to advance one page. December 19, 2018</td>
</tr>
</tbody>
</table>
Advanced Search Filter

Click the "Advanced..." button in the message browser search pane to display the Advanced Search Filter. (See Option E in the previous section.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| A    | Connectors Table | Use this table to include only certain connectors in the search criteria. The Id column refers to the metadata ID of the connector, where the Source connector is always 0, and destination connectors will have metadata IDs greater than zero. The Current Connector Name column shows the current name of each connector. Even if a destination gets renamed, the metadata ID will remain static, and will be used for the search.

The Deleted Connectors row refers to historical connector messages associated with destinations that have since been deleted. |
| B    | Select/Deselect All | Click to select/deselect all connectors in the Connectors... |
| C | Message Id | The minimum and maximum message IDs to include in the search. This could refer to the current ID (Message Id), the original ID of a reprocessed message (Original Id), or the original ID of an imported message (Import Id).
For example with Message Id, enter 1 in the first field and 10 in the second field to find messages 1-10. Enter 1 in both the first and second field to narrow the search down to only message 1. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Original Id</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Import Id</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Server Id</td>
<td>The ID of the server that processed the message.</td>
</tr>
<tr>
<td>G</td>
<td>Send Attempts</td>
<td>Enter min (first field) / max (second field) values to find messages with the number of send attempts in that range.</td>
</tr>
<tr>
<td>H</td>
<td>Has Attachment</td>
<td>If checked, the search only includes messages with one or more attachments.</td>
</tr>
<tr>
<td>I</td>
<td>Has Error</td>
<td>If checked, the search only includes messages with one or more errors.</td>
</tr>
</tbody>
</table>
| J | Content Search Table | Click the box's New button to add a search filter, then click the row in the Content Type column, and select a menu option.
Double-click the row in the Contains column, and enter your search string. When multiple rows are present in this table, only connector messages that match all entries will be included in the search.
The available content types include message content, variable map content, and error content. |
| K | Metadata | Click the box's New button to add a search filter, then click the row in the Metadata column, and select a custom-metadata menu option.
Click the row in the Operator column, and select a search |
operator (=, \textit{CONTAINS}, \textit{STARTS WITH}, \textit{ENDS WITH}), which determines the metadata to search for.

Double-click the row in the Value column and enter your search string.

\textbf{Ignore Case}: If checked, the search is not case-sensitive.

When multiple rows are present in this table, only connector messages that match all entries will be included in the search.

<table>
<thead>
<tr>
<th>L</th>
<th>OK / Cancel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click the OK button to save or the Cancel button to discard your changes.</td>
<td></td>
</tr>
</tbody>
</table>

### Message Browser Tasks

The following context-specific tasks are available from the Message Browser View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| Refresh   | Refresh   | Updates messages within the current search page. Note that this is different from clicking the Search button. The Search operation performs a completely new search without a Max Message Id and resets the count and pagination options. The Refresh task re-performs the search using the existing Max Message Id, so that no new messages since the last Search will be included. Also, it preserves December 19, 2018.
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Send Message</td>
<td>Sends a message to the current channel. For additional information, see <a href="#">Send Message</a>.</td>
</tr>
<tr>
<td>Import Messages</td>
<td>Imports messages from a file. Note that imported messages are only directly stored in the channel's message data, and not actually processed through the channel.</td>
</tr>
<tr>
<td>Export Results</td>
<td>Exports all messages that match the current search criteria. Note that this will include messages on all pages, not just the messages in the current page. To see how many messages will be exported, click the Count button.</td>
</tr>
<tr>
<td>Remove All Messages</td>
<td>Removes all messages and attachments stored for the current channel.</td>
</tr>
<tr>
<td>Remove Results</td>
<td>Removes all messages that match the current search criteria. Note that this will include messages on all pages, not just the messages in the current page. To see how many messages will be removed, click the Count button.</td>
</tr>
<tr>
<td>Remove Message</td>
<td>Removes a single connector message. Note that removing a Source connector message will also remove all of its associated destination connector messages.</td>
</tr>
<tr>
<td>Reprocess Results</td>
<td>Reprocesses all messages that match the current search criteria. Note that this will include messages on all pages, not just the messages in the current page. To see how many messages will be reprocessed, click the Count button.</td>
</tr>
<tr>
<td>Reprocess Message</td>
<td>Reprocesses a single message. You can choose to copy and send the message as a completely new message, or to overwrite the current message.</td>
</tr>
<tr>
<td>View Attachment</td>
<td>Opens up a viewer dialog to display the attachment in the Administrator. This task is only visible when an attachment is present.</td>
</tr>
</tbody>
</table>
Import Messages

Note that only messages that have been exported with the "XML serialized message" option are able to be imported.

The message appears on the list with its contents in the Messages window at the bottom of the page.
A unique identifier for each imported message appears in the Import Channel Id column. This alphanumeric code lets you readily identify messages that have been imported into the channel.

- If you import a message into the channel from which it originated, an Import Channel Id is not assigned, and the row in that column will show a dash (—), by which you can identify the message as original to the selected channel.

The Import Channel Id column (and others) can be chosen via the Column Options icon at the rightmost side of the Message Lists' column header. For additional information, see Showing / Hiding Columns.

### Export Results

When you click the Export Results task, an options dialog pops up. Note that **all** messages matching the current search criteria will be exported, not just the ones shown on the current page.
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Encrypt</td>
<td>If checked, the exported message content will be encrypted with the server's encryption key.</td>
</tr>
<tr>
<td>C</td>
<td>Include Attachments</td>
<td>If checked and the content type is set to <strong>XML serialized message</strong>, the exported file will contain all attachments associated with the message.</td>
</tr>
<tr>
<td>D</td>
<td>Compression</td>
<td>When compression is enabled, the files/folders created according to the File Pattern will be put into a compressed file in the Root Path. The following compression types are supported: ZIP, tar.gz, tar.bz2</td>
</tr>
<tr>
<td>E</td>
<td>Password Protect</td>
<td>Only available if ZIP compression is enabled. If <strong>Yes</strong> is chosen, the resulting ZIP file will be protected with the given password. You can also choose what encryption algorithm to use when password-protecting files. The following algorithms are supported: Standard, AES-128, AES-256</td>
</tr>
<tr>
<td>F</td>
<td>Password</td>
<td>If password protection is enabled, this password will be used.</td>
</tr>
<tr>
<td>G</td>
<td>Export To</td>
<td>Export messages directly on the server running Mirth Connect, or pull messages from the server and store them locally on the machine from which you are running the Administrator.</td>
</tr>
<tr>
<td>H</td>
<td>Root Path</td>
<td>The root path to store the exported files/folder or compressed file. If messages are being exported directly to the server, relative paths will be resolved against the Mirth Connect Server home directory.</td>
</tr>
<tr>
<td>I</td>
<td>File Pattern</td>
<td>The file/folder pattern in which to write the exported message files. The file pattern may use variables from the list on the right side of the dialog.</td>
</tr>
<tr>
<td>J</td>
<td>Variables</td>
<td>Contains several common variables to aid in populating the File Pattern. For additional information, see <a href="#">Velocity Variable Replacement</a>.</td>
</tr>
<tr>
<td>K</td>
<td>Export</td>
<td>Click <strong>Export</strong> to perform the export operation.</td>
</tr>
</tbody>
</table>
**Remove Results**

When you click the Remove Results task, a confirmation dialog pops up. Note that all messages and associated attachments matching the current search criteria will be removed, not just the ones shown on the current page. Also, removing a Source connector message will also automatically remove all of its associated destination connectors as well.

![Warning](image)

Warning: This will remove all results for the current search criteria, including those not listed on the current page. To see how many messages will be removed, close this dialog and click the Count button in the upper-right.

Warning: Removing a Source message will remove all of its destinations.

Are you sure you would like to remove all messages that match the current search criteria (including QUEUED) in this channel/Channel must be stopped for unfinished messages to be removed.

![Yes No](image)

After clicking Yes to continue, you'll see the following additional dialog:

![Remove Results](image)

This will remove all messages that match the current search criteria. To see how many messages will be removed, close this dialog and click the Count button in the upper-right.

Type REMOVEALL and click the OK button to continue.

![OK Cancel](image)

This is an additional layer of security to make sure you don't remove message data accidentally. To proceed you must type in “REMOVEALL” in all capital letters and click OK. Note, if you find this additional layer of security tedious, it can be disabled in the Administrator Settings Tab.

**Reprocess Results**

When you click the Reprocess Results task, a confirmation dialog pops up. Note that all messages and associated attachments matching the current search criteria will be reprocessed, not just the ones shown on the current page.
Other than the additional warning, the options here are the same as in the Reprocess Message task.

After clicking Yes to continue, you'll see the following additional dialog:

This is an additional layer of security to make sure you don't reprocess a large amount of messages accidentally. To proceed you must type in "REPROCESSALL" in all capital letters and click OK. Note, if you find this additional layer of security tedious, it can be disabled in the Administrator Settings Tab.

Reprocess Message

When you click the Reprocess Message task, a confirmation dialog pops up. You are given the option to overwrite the existing message or process the data through the channel as a completely new message. You can also choose to exclude certain destinations from being executed during the reprocess operation. Note that the message will always flow through the Source connector first, regardless of which destinations you exclude.
When a message is reprocessed, two new Source Map variables will be injected into the message:

- **reprocessed**: Boolean indicating that the current message is the result of a reprocess operation. When present, the value of this variable will always be `true`.
- **replaced**: Boolean indicating that the current message has been overwritten as a result of a reprocess operation.

## Export Attachment

When you click the Export Attachment task, a confirmation dialog pops up:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Type</td>
<td>Choose <strong>Binary</strong> to write the raw bytes of the attachment out to file. Choose <strong>Text</strong> to write the Base64 encoded representation of the attachment out.</td>
</tr>
<tr>
<td>Export To</td>
<td>Choose <strong>Server</strong> to export the attachment directly to the machine running the Mirth Connect Server. Choose <strong>My Computer</strong> to pull the attachment down to the client side and write it out to a location on the machine running the Administrator.</td>
</tr>
<tr>
<td>File</td>
<td>The location where the attachment will be saved.</td>
</tr>
</tbody>
</table>
Alerts View

An alert is a process that listens for certain types of events and triggers based on configurable settings. From these triggers you can take various actions, like dispatching an e-mail to a user or specific address, or sending a message to a channel. Mirth Connect comes with a built-in, Error-based, alerting system that listens for error events from selected channels. The Advanced Alerting extension adds on this by also including powerful metric-based alerts, escalation levels, scheduling, notification throttling, and other advanced features.

The Alerts View is like a dashboard for your currently configured alerts. You can view which ones are enabled and how many times an alert has triggered since it was last enabled.

### Navigation

Click the Alerts link in the Mirth Connect task panel at the upper-left:

This section is separated into the following topics:

- Alerts Table
- Alerts Tasks
Alerts Table

This is the main section of the Alerts View that shows the current status and action counters for all your configured alerts. For general information about working with tables in Mirth Connect, see, Working With Tables.

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Indicates whether the alert is enabled or disabled.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the alert.</td>
</tr>
<tr>
<td>Id</td>
<td>The unique ID for the alert.</td>
</tr>
<tr>
<td>Alerted</td>
<td>For enabled alerts, the number of times the alert has taken action (e.g. sent an e-mail) since it was last enabled.</td>
</tr>
</tbody>
</table>

Alerts Table Columns

Alerts Tasks

The following context-specific tasks are available from the Alerts View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refresh</td>
<td>Refresh</td>
<td>Updates the Alerts Table. Note that the Alerts view automatically refreshes at an interval defined in the Administrator Settings.</td>
</tr>
<tr>
<td>New Alert</td>
<td>New Alert</td>
<td>Creates a new alert and enters the Edit Alert View.</td>
</tr>
<tr>
<td><strong>Import Alert</strong></td>
<td><strong>Export All Alerts</strong></td>
<td><strong>Export Alert</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Import Alert</strong></td>
<td><strong>Export All Alerts</strong></td>
<td><strong>Export Alert</strong></td>
</tr>
<tr>
<td>Imports an alert from an XML file on disk.</td>
<td>Exports all alerts to separate XML files on disk.</td>
<td>Exports a single alert to an XML file on disk.</td>
</tr>
</tbody>
</table>
Events View

The Event Browser allows you to view and search all user / system events that have occurred on your server. This includes any user actions like logging in and modifying / deploying channels. It also include system events like startup / shutdown, and the Data Pruner.

Navigation

Click on the Events link in the Mirth Connect task panel in the upper-left:
This section is separated into the following topics:

- Events Table
- Event Attributes Table
- Searching Events
- Event Tasks

### Events Table

This table shows metadata (ID, timestamp, operation name) about each event that has been stored by the server. The Page Size option dictates the number of events shown in the table simultaneously (for additional information, see Searching Events). When you first enter the Event Browser, by default the latest 100 events appear. For general information about working with tables in Mirth Connect, see Working With Tables.

#### Metadata Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>The unique ID of the event in the database. This column is hidden by default. For additional information, see Showing / Hiding Columns.</td>
</tr>
<tr>
<td>Level</td>
<td>An icon indicating the event's severity level (Information, Warning, or Error).</td>
</tr>
<tr>
<td>Date &amp; Time</td>
<td>The date and time the event was logged.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the logged operation or error.</td>
</tr>
</tbody>
</table>

---

NextGen Connect User Guide

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Server ID
The unique ID of the server from which the event was logged.

User
If the event originated from a user action, this will be both the user ID and user name. If no user is associated with the event, it will show 0 (System).

Outcome
For user requests and server tasks, this icon indicates whether the action was successful or not. For example a failed user login attempt will show a failure icon.

IP Address
For user requests, the IP address of the originating client.

Event Attributes Table
The attributes table at the bottom of the Event Browser shows more detailed information about a particular event. This will typically include the channel ID / name, if the event is a channel operation like start/stop/deploy. If the event is an error, the attributes table will typically show any exception associated with the event.

If an attribute value is too long and is truncated in the table, you can double-click the table row to display the value in a separate dialog.
Searching Events

The Event Browser search capabilities are very similar to the Message Browser. For information on many of these shared components, see Searching Messages.

The following search options are unique to the Event Browser:

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Name</td>
<td>The operation name or a short description of the event's warning / error. All events that contain this string somewhere in the name (case-insensitive) will be returned.</td>
</tr>
<tr>
<td>B</td>
<td>Level</td>
<td>Check these boxes to search for events with the INFORMATION, WARNING, and/or ERROR levels.</td>
</tr>
</tbody>
</table>

**Advanced Search Filter**

Click on the "Advanced..." button in the event browser search pane to open the Advanced Search Filter:

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>User</td>
<td>The user associated with the event. The system user is reserved for events where no user</td>
</tr>
</tbody>
</table>
### Event Tasks

The following context-specific tasks are available from the Events View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄 Refresh</td>
<td>Refresh</td>
<td>Updates events within the current search page. Note that this is different from clicking the Search button. The Search operation performs a completely new search without a Max Event Id and resets the count and pagination options. The Refresh task re-performs the search using the existing Max Event Id, so that no new events since the last Search will be included. Also, it preserves the current page being viewed instead of reverting back to the first page.</td>
</tr>
<tr>
<td>🗂 Export All Events</td>
<td>Export All Events</td>
<td>Exports all events to a file in the Application Data Directory.</td>
</tr>
<tr>
<td>🗑 Remove All Events</td>
<td>Remove All Events</td>
<td>Deletes all events from the database. You will be prompted to optionally export all events first.</td>
</tr>
</tbody>
</table>

**Export All Events**

**December 19, 2018**
When you click this task, a confirmation dialog appears:

![Confirmation Dialog]

Click **Yes** to continue. A comma-separated value (CSV) file will be written into an "exports" folder inside your Application Data Directory.
### Management Views

This section is separated into the following topics:

- Channels View
- Users View
- Settings View
- Extensions View

### Channels View

The Channels view is the main management screen for all channels configured on your Mirth Connect server. From this view you can create, delete, import / export, clone, enable / disable, and deploy channels. It also serves as a management interface for channel groups.

#### Channels

<table>
<thead>
<tr>
<th>Status</th>
<th>Data Type</th>
<th>Name</th>
<th>ID</th>
<th>Description</th>
<th>Name</th>
<th>Source</th>
<th>Last Deployed</th>
<th>Last Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>Default Group</td>
<td>Default Group</td>
<td>--</td>
<td>Channels not part of...</td>
<td>--</td>
<td>--</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
</tr>
<tr>
<td>Enabled</td>
<td>Create and Write PDF</td>
<td>Create and Write PDF</td>
<td>5</td>
<td>--</td>
<td>5</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
<tr>
<td>Enabled</td>
<td>URL (based on 22M)</td>
<td>URL (based on 22M)</td>
<td>3</td>
<td>--</td>
<td>3</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
<tr>
<td>Enabled</td>
<td>Audit Results Sender R2OD</td>
<td>Audit Results Sender R2OD</td>
<td>3</td>
<td>--</td>
<td>3</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
<tr>
<td>Enabled</td>
<td>HL7 Segment Reader - FHIR</td>
<td>HL7 Segment Reader - FHIR</td>
<td>7</td>
<td>--</td>
<td>7</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
<tr>
<td>Enabled</td>
<td>test</td>
<td>test</td>
<td>42</td>
<td>--</td>
<td>42</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
<tr>
<td>Enabled</td>
<td>test2</td>
<td>test2</td>
<td>73</td>
<td>--</td>
<td>73</td>
<td>2017-04-12 22:57</td>
<td>2017-04-12 22:57</td>
<td></td>
</tr>
</tbody>
</table>

#### Navigation

Click the Channels link in the Mirth Connect task pane at the top-left:
This section is separated into the following topics:

- Channel Table
- Channel Tasks
- Group Tasks

Channel Table

This is the main section of the Channels view that shows the status and metadata for your currently configured channels. For general information about working with tables in Mirth Connect, see Working With Tables.
Channel Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Indicates whether the channel is enabled or disabled. A channel may only be deployed once it is enabled. When the Mirth Connect server starts up, all enabled channels are automatically deployed. For channel groups, this column is <strong>Enabled</strong> if all channels underneath the group are enabled, <strong>Disabled</strong> if all channels underneath the group are disabled, and <strong>Mixed</strong> if some channels are enabled and others are disabled.</td>
</tr>
<tr>
<td><strong>Data Type</strong></td>
<td>The inbound data type of the channel's source connector.</td>
</tr>
<tr>
<td><strong>Name</strong></td>
<td>The name of the channel and the column also shows any tags associated with a channel.</td>
</tr>
</tbody>
</table>
A special [Default Group] group is present in the table and may not be removed. When viewing the channel table in group-level mode, all channels that are not part of a group will be organized into this group.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id</td>
<td>The unique ID of the channel / group.</td>
</tr>
<tr>
<td>Local Id</td>
<td>The unique numeric ID of a channel used to identify the set of tables associated with the channel's messages, attachments, and statistics.</td>
</tr>
<tr>
<td>Description</td>
<td>The description for the channel / group.</td>
</tr>
</tbody>
</table>
| Rev         | The number of times the channel was saved since it was last deployed. This value will be highlighted if it is greater than 0, or if any code templates linked to the channel have changed since the channel was last deployed.  
  \[ Rev = Channel \text{ Revision} - Deployed \text{ Revision} \] |
| Last Deployed | The time this channel was last deployed. This value will be highlighted if it is within the last two minutes. |
| Last Modified | The time this channel was last modified. |

**Show or Hide Channel Groups**

For information on how to show / hide channel groups, see Show or Hide Channel Groups.

**Change How Tags Are Displayed**

For information on how to change how tags are displayed in the channel table, see Change How Tags Are Displayed.

**Filtering By Channel Name or Tag**

For information on how to filter the channel table down to specific channels based on names or tags, see Filtering By Channel Name or Tag.

**Dragging and Dropping**

**Get the Channel Name / ID**

You can quickly copy channel names / IDs by selecting rows in the channel table and dragging them into the text editor of your choice:
Assign Channels to a Group

To move channels to a specific group, select the channel rows in the table and drag them onto the group row:
Import Channels / Groups Using Drag-and-Drop

Importing channels / groups may be done using the corresponding Import task (for additional information see Channel Tasks and Group Tasks), or by simply dragging the XML files you wish to import from a folder into the channel table directly:

For channel files, the Import Channel workflow applies. For group files, the Import Group workflow applies.

Unlike when using the task operations, importing using drag-and-drop also allows you to import multiple channels or multiple groups simultaneously, by multi-selecting XML files from a folder and dragging them into the channel table.

Channel Tasks

December 19, 2018
The following context-specific tasks for channels are available from the Channels View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄 Refresh</td>
<td>Refresh</td>
<td>Updates the channel table.</td>
</tr>
<tr>
<td>🔄 Redeploy All</td>
<td>Redeploy All</td>
<td>Undeploys all channels, then deploys all currently enabled channels.</td>
</tr>
<tr>
<td>🔄 Deploy Channel</td>
<td>Deploy Channel</td>
<td>Deploys the currently selected channel(s). If a group is selected, deploys all channels underneath that group. Note that the Channel Dependencies workflow may apply to this task.</td>
</tr>
<tr>
<td>🖥 Edit Global Scripts</td>
<td>Edit Global Scripts</td>
<td>Enters the Edit Global Scripts View.</td>
</tr>
<tr>
<td>🌱 New Channel</td>
<td>New Channel</td>
<td>Creates a new channel and enters the Edit Channel View. The channel is not yet saved.</td>
</tr>
<tr>
<td>🌱 Import Channel</td>
<td>Import Channel</td>
<td>Imports a channel from an XML file and enters the Edit Channel View. The channel is not yet saved.</td>
</tr>
<tr>
<td>🌱 Export Channel</td>
<td>Export Channel</td>
<td>Exports the selected channel(s) to their own respective XML files. December 19, 2018</td>
</tr>
<tr>
<td>🌱 Delete Channel</td>
<td>Delete Channel</td>
<td>Removes the selected channel(s)</td>
</tr>
</tbody>
</table>
from the server. All message / attachment data will also be deleted.

Clone Channel

Clones the channel and enters the Edit Channel View. The channel is not yet saved. Note that you will be prompted to give the channel a new unique name first.

Edit Channel

Enters the Edit Channel View for the selected channel. This can also be accessed by double-clicking the channel row.

Enable Channel

Mark this channel as ready to be deployed. Enabled channels will automatically be deployed when the server starts up or when the Redeploy All task is performed.

Disable Channel

Mark this channel as not ready to be deployed. The channel may not be deployed until it is re-enabled. However, if the channel was already deployed, then disabling it will not automatically undeploy it.

View Messages

Enters the Message Browser View for the selected channel.

Import Channel

When importing channels, you have the option to include all code template libraries associated with the channel as well. A special dialog pops up for this purpose if any code template libraries were included: Importing Code Templates / Libraries

If the channel you’re importing has the same name as an existing channel on the server, a warning dialog will be shown:

![Warning Dialog]

You will then be asked whether you want the imported channel to overwrite the existing channel with the same name:
If **No** is chosen, you will then be prompted to enter a new unique name for the imported channel:

```
Select an Option

Would you like to overwrite the existing channel? Choose 'No' to create a new channel.

Yes  No
```

**Export Channel**

When exporting channels, you have the option to include all **code template libraries** associated with the channel as well:

```
Select an Option

The following code template libraries are linked to this channel:

- Miscellaneous Functions
- HL7 Helper Functions

Do you wish to include these libraries in the channel export?

- [ ] Always choose this option by default in the future (may be changed in the Administrator settings)

Yes  No  Cancel
```

If **Yes** is chosen, the code template libraries shown in the dialog will be included and embedded into the channel export XML. If you want to automatically make the same choice (Yes or No) for all future exports, you can check the "Always choose" check box. You can change this again later in the **Administrator Settings Tab**.

**Group Tasks**

December 19, 2018
The following context-specific tasks for channel groups are available from the Channels View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Save Group Changes" /></td>
<td>Save Group Changes</td>
<td>Saves all changes made to channel groups and refreshes the Channels view.</td>
</tr>
<tr>
<td><img src="image" alt="Assign To Group" /></td>
<td>Assign To Group</td>
<td>Moves the selected channel(s) into a specific group.</td>
</tr>
<tr>
<td><img src="image" alt="New Group" /></td>
<td>New Group</td>
<td>Creates a new channel group and adds it to the table. The user is prompted for the group name and description as described in the Edit Group Details task.</td>
</tr>
<tr>
<td><img src="image" alt="Edit Group Details" /></td>
<td>Edit Group Details</td>
<td>Allows the user to edit the group name and description. This can also be accessed by double-clicking the group row.</td>
</tr>
<tr>
<td><img src="image" alt="Import Group" /></td>
<td>Import Group</td>
<td>Imports a channel group from an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Export All Groups" /></td>
<td>Export All Groups</td>
<td>Exports all channel groups in the table to their respective XML files. The Export Group workflow applies here.</td>
</tr>
<tr>
<td><img src="image" alt="Export Group" /></td>
<td>Export Group</td>
<td>Exports the selected channel group (s) to their respective XML files.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Group" /></td>
<td>Delete Group</td>
<td>Removes the channel group from the table. All channels that were within this group are automatically moved to the [Default Group] group.</td>
</tr>
</tbody>
</table>

**Edit Group Details**

A dialog is shown allowing you to edit the group name and description:

December 19, 2018
**Import Group**

The import group workflow follows the Import Channel workflow for each channel in the group.

**Export Group**

Similar to exporting channels, when exporting channel groups you have the option to include all associated code template libraries:

If **Yes** is chosen, the code template libraries shown in the dialog will be included and embedded into the channel group export XML. Whether you choose Yes or No, if you want to automatically make the same choice for all future exports, you can check the "Always choose" check box. That setting may be changed later in the Administrator Settings Tab.
Users View

The Users view is the main management screen for all users that have access to login to Mirth Connect, whether it’s via the Administrator, the Command Line Interface, or the REST API. In this view you can add / remove / edit users. If you’re looking for information on how to restrict access to specific operations to specific user roles, see User Authorization.

### Navigation

Click the Users link in the Mirth Connect task pane at the top-left:

This section is separated into the following topics:

- Users Table
- Users Tasks
Users Table

This is the main section of the Users view that shows details about all the users configured on your server. For general information about working with tables in Mirth Connect, see Working With Tables.

### Users Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Username</td>
<td>The unique name the user will use to login with.</td>
</tr>
<tr>
<td>First Name</td>
<td>The user's first (given) name.</td>
</tr>
<tr>
<td>Last Name</td>
<td>The user's last (family) name.</td>
</tr>
<tr>
<td>Email</td>
<td>The e-mail address of the user. When sending an alert to a user, this e-mail address will be used.</td>
</tr>
<tr>
<td>Phone Number</td>
<td>The user's phone number.</td>
</tr>
<tr>
<td>Organization</td>
<td>The user's organization.</td>
</tr>
<tr>
<td>Industry</td>
<td>The user's work field / industry (e.g. HIE, Hospital, Lab).</td>
</tr>
<tr>
<td>Last Login</td>
<td>The date and time of the user's last successful login.</td>
</tr>
<tr>
<td>Description</td>
<td>A description or additional details for the user.</td>
</tr>
</tbody>
</table>

### Users Tasks

The following context-specific tasks are available from the Users View:

- **Refresh**
- **New User**
- **Edit User**
- **Delete User**
<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Refresh" /></td>
<td>Refresh</td>
<td>Updates the users table.</td>
</tr>
<tr>
<td><img src="image" alt="New User" /></td>
<td>New User</td>
<td>Creates a new user and adds it to the table.</td>
</tr>
<tr>
<td><img src="image" alt="Edit User" /></td>
<td>Edit User</td>
<td>Edits the details of an existing user.</td>
</tr>
<tr>
<td><img src="image" alt="Delete User" /></td>
<td>Delete User</td>
<td>Removes the user from the server.</td>
</tr>
</tbody>
</table>

**Creating / Editing Users**

When creating a new user or editing an existing user, the following dialog appears:

![New User Dialog](image)

In general the fields shown here are the same as the columns displayed in the Users Table.

If a new user is being created, then the New Password and Confirm New Password fields is required as well as the username. The value in both password fields must match exactly.

December 19, 2018
Settings View

This view encompasses a wide variety of management settings / tasks for your Mirth Connect server. Some of the settings are channel-specific (e.g. channel tags), and others are more general (e.g. default e-mail settings).

Navigation

Click the Settings link in the Mirth Connect task pane at the top-left:

December 19, 2018
This section is separated into the following topics:

- Server Settings Tab
- Administrator Settings Tab
- Tags Settings Tab
- Configuration Map Settings Tab
- Database Tasks Settings Tab
- Resources Settings Tab
- Data Pruner Settings Tab
- Settings Tasks

**Server Settings Tab**

This tab shows general global settings that pertain to the server or default channel properties.

![Server Settings Tab Diagram]

### General Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment name</td>
<td>Production</td>
<td></td>
</tr>
<tr>
<td>Server name</td>
<td>Prod Server 1</td>
<td></td>
</tr>
<tr>
<td>Provide usage statistics</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Channel

- Clear global map on redeploy: Yes |
- Default Queue Buffer Size: 1000 |
- Default Metadata Columns: Source, Type |

### Email

- SMTP Host: smtp.gmail.com
- SMTP Port: 587
- Send Timeout (ms): 5000
- Default From Address: myappliance@hiemazi
- Secure Connection: STARTTLS
- Require Authentication: Yes |
- Username: lance@hiemazing.com
- Password: ********
<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Environment name</td>
<td>The name of this Connect environment. This is tied to the database, so there is only one environment per database / cluster.</td>
</tr>
<tr>
<td>B</td>
<td>Server name</td>
<td>The server name which will appear in the Administrator title, taskbar /dock and desktop shortcut. This setting applies for all users on this server.</td>
</tr>
<tr>
<td>C</td>
<td>Provide usage statistics</td>
<td>Toggles sending usage statistics to Mirth. These statistics do not contain any PHI or channel/script implementations. They help Mirth determine which connectors or areas of Mirth Connect are most widely used.</td>
</tr>
</tbody>
</table>

**Channel Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Clear global map on redeploy</td>
<td>Toggles clearing the global map when redeploying all channels. Default = Yes.</td>
</tr>
<tr>
<td>E</td>
<td>Default Queue Buffer Size</td>
<td>The default source/destination queue buffer size to use for new channels. Default = 1000 (messages).</td>
</tr>
<tr>
<td>F</td>
<td>Default Metadata Columns</td>
<td>Source, Type, Version : these check boxes determine which custom metadata columns will be added by default when a user creates a new channel. The user can choose to remove the column on the channel's Summary tab. For additional information, see Custom Metadata Columns.</td>
</tr>
</tbody>
</table>

**Email Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>SMTP Host</td>
<td>SMTP host used for global e-mail settings (e.g. alerts). The Send Test Email button next to this field uses the currently configured settings to send a simple testing e-mail to the Default From Address.</td>
</tr>
<tr>
<td>H</td>
<td>SMTP Port</td>
<td>SMTP port used for global e-mail settings (e.g. alerts).</td>
</tr>
<tr>
<td>I</td>
<td>Send Timeout (ms)</td>
<td>SMTP socket connection timeout in milliseconds. Default = 5000</td>
</tr>
</tbody>
</table>
(ms) or 5 secs.

<table>
<thead>
<tr>
<th>J</th>
<th>Default From Address</th>
<th>Default address to use in the &quot;From&quot; field for e-mails. Sending a test e-mail will also dispatch to this address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Secure Connection</td>
<td>Determines whether to use implicit TLS (SSL), explicit TLS (STARTTLS), or no encryption at all for dispatching e-mails.</td>
</tr>
<tr>
<td>L</td>
<td>Require Authentication</td>
<td>Toggles authentication for sending e-mails.</td>
</tr>
<tr>
<td>M</td>
<td>Username</td>
<td>The username to authenticate as.</td>
</tr>
<tr>
<td>N</td>
<td>Password</td>
<td>The password to authenticate with.</td>
</tr>
</tbody>
</table>

**Tasks**

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Backup Config Icon" /></td>
<td>Backup Config</td>
<td>Exports a snapshot of your current server settings, including all channels, alerts, scripts, and other properties. This configuration may be backed up from one Mirth Connect server and restored into a different server.</td>
</tr>
<tr>
<td><img src="image" alt="Restore Config Icon" /></td>
<td>Restore Config</td>
<td>Overwrites all server settings, including all channels, alerts, scripts, and other properties, with the ones in a given XML file.</td>
</tr>
</tbody>
</table>
Clear All Statistics

Note that if a channel currently exists on your server and the same channel is present in the server configuration file, the message/attachment data for that channel will not be modified.

Clear All Statistics

Restores the current and lifetime message statistics for all channels on your server.

**Restore Config**

After selecting a server configuration XML file to restore, you'll be presented with the following dialog:

Click **Yes** to proceed, and optionally choose whether you want all resulting enabled channels to automatically be deployed.

**Clear All Statistics**

After clicking this task a confirmation dialog will be shown:

As a safeguard you must type "CLEAR" in all capital letters to proceed with the operation.

December 19, 2018
Administrator Settings Tab

This tab shows settings specific to the client machine running the Mirth Connect Administrator. The settings in this tab apply to any and all Administrator instances you login to.

### System Preferences

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Dashboard refresh interval</td>
<td>Interval in seconds at which to refresh the Dashboard and Alerts views. Reduce this for faster updates, and increase it for servers with more channels or when you have high latency between the client and server.</td>
</tr>
<tr>
<td>B</td>
<td>Message browser page size</td>
<td>Sets the default page size for the message browser.</td>
</tr>
<tr>
<td>C</td>
<td>Event browser page size</td>
<td>Sets the default page size for the event browser.</td>
</tr>
<tr>
<td>D</td>
<td>Format text in message browser</td>
<td>Pretty print XML/JSON messages in the message browser by default.</td>
</tr>
<tr>
<td>E</td>
<td>Message browser text search confirmation</td>
<td>Show a confirmation dialog in the message browser when attempting a text search, warning users that the query may take a long time depending on the amount of message being searched.</td>
</tr>
</tbody>
</table>
### Filter/Transformer Iterator dialog
Show a confirmation dialog in the filter/transformer views when dragging and dropping elements from the message tree, asking users whether to use an Iterator.

### Message browser attachment type dialog
Show a selection dialog in the message browser when viewing attachments to allow the user to select a specific attachment viewer. If No is selected, the attachment viewer will be automatically chosen from the MIME type.

### Reprocess/remove messages confirmation
Show a confirmation dialog in the message browser when reprocessing or removing multiple messages that forces the user to type in "REPROCESSALL" or "REMOVEALL" first before proceeding.

### Import code template libraries with channels
When attempting to import channels that have code template libraries linked to them, select Yes to always include them, No to never include them, or Ask to prompt the user each time.

### Export code template libraries with channels
When attempting to export channels that have code template libraries linked to them, select Yes to always include them, No to never include them, or Ask to prompt the user each time.

## User Preferences
Settings in this section are specific to the currently logged in user on the current server.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Check for new notifications on login</td>
<td>Checks for notifications from Mirth (e.g., announcements, available updates) relevant to this version of Mirth Connect whenever the user logs in.</td>
</tr>
</tbody>
</table>

## Code Editor Preferences

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Auto-Complete Characters</td>
<td>The auto-completion popup will be triggered after any of these characters are typed. If the Include Letters check box is selected, the autocomplete will include letters.</td>
</tr>
</tbody>
</table>

December 19, 2018
checked, auto-completion will also be triggered after any letter (a-z) is typed.

| M | Activation Delay (ms) | The amount of time to wait after typing an activation character before opening the auto-completion popup menu. |
| N | Shortcut Key Mappings | This table shows common code editor actions and their corresponding shortcut key sequence. To change the key mapping for any action, double-click the Shortcut Key Mapping column, press Escape to clear the current value, enter the new key sequence, and press the Enter key. The Restore Defaults button will restore all shortcut key mappings back to the default settings. |

Tasks

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Restore Defaults](Restore Defaults)</td>
<td>Restore Defaults</td>
<td>Restores all locally-stored Administrator settings to their defaults. This includes everything in the System Preferences and Code Editor Preferences, as well as other hidden settings like dashboard table column/sort order.</td>
</tr>
</tbody>
</table>

December 19, 2018
Tags Settings Tab

This tab provides a general management view for all channel tags configured on your server. You can edit tag names /colors, and easily include multiple tags across multiple channels with just a few clicks.

Tags Table

This is the table located in the top half of the Tags tab. The table has the following columns:

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of the tag. Double-click this column to edit the name.</td>
</tr>
<tr>
<td>Color</td>
<td>The color of the tag, shown when tags are rendered inside the Dashboard / Channels views. Click the colored box in the middle of the column to change the tag color.</td>
</tr>
<tr>
<td>Channel Count</td>
<td>The number of channels that currently include this tag.</td>
</tr>
</tbody>
</table>
For general information on working with tables, see Working With Tables.

**Adding a Tag**

To add a new tag, click the **Add** button at the top-right of the tags table:

A new row will be added to the table. Double-click the **Name** column to change the name, and click the colored box in the middle of the **Color** column to change the color. Then use the **Channels table** down below to select which channels should include the new tag.

**Removing a Tag**

To remove tags, select the rows you wish to delete and then click the **Delete** button at the top-right of the tags table:

**Channels Table**

This table shows a list of all channels currently configured on your server. Click one of the column headers at the top of the table to sort by selection status or channel name. Click the check boxes to include the selected tags on specific channels.

You can use the **Select All / Deselect All** links to quickly include or exclude the selected tags on all currently filtered channels.

**Indeterminate Check Boxes**

If a check box in the table shows a grey box, it means that you have multiple tags selected in the tags table above, and the channel in question is included on **only some** of the selected tags.

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If you click on the check box while it's in this state it will change to the checked state, meaning that all of the selected tags are now included on the channel.
Configuration Map Settings Tab

The configuration map is one of the available Variable Maps that can be used from within channel properties or scripts. It is unique in the fact that it is stored in the Application Data Directory as a flat file. It is intentionally not included in server config exports. This way you can use variables from this map in your channel properties, and the same channel can be used across multiple Mirth Connect servers without having to edit the channel for each server.

By default the values in the table are not immediately shown. Click the Show values button to reveal all of them on screen.

This tab allows you to edit the entries in the configuration map for the current server. Double-click on any of the cells in the table to edit the values. Click the Add/Remove buttons at the top-right to add/remove entries from the table.

### Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>The unique key the identifies this entry within the configuration map.</td>
</tr>
<tr>
<td>Value</td>
<td>The actual value of this entry.</td>
</tr>
<tr>
<td>Comment</td>
<td>For documentation purposes only.</td>
</tr>
</tbody>
</table>

### Tasks

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Import Map" /></td>
<td>Import Map</td>
<td>Overwrites all entries in the table with the ones in the given properties file.</td>
</tr>
<tr>
<td><img src="image" alt="Export Map" /></td>
<td>Export Map</td>
<td>Exports all entries in the table to a properties file.</td>
</tr>
</tbody>
</table>
Database Tasks Settings Tab

Occasionally in new versions of Mirth Connect certain things change in the underlying database, but depending on the implications those changes are not always automatically performed when you upgrade. Or, old tables are left behind and no longer used, but those tables are not automatically deleted in case you want to keep them or back them up first.

This tab shows you all cleanup or optimization tasks for the internal Mirth Connect database. If no tasks show up in the table, then that means your database is up to date.

Database Tasks Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td></td>
</tr>
</tbody>
</table>

- **Idle**: The task is available to run.
- **Running**: The task is in the middle of running.

**December 19, 2018**
**Affected Channels Table**

This table only applies to database tasks that are performed on specific channel tables. It will show all channels that will be affected by the selected task if it gets executed. Note that some tasks require that channels be Stopped first before the task will actually be performed.

**Running a Database Task**

To run a database task, simply click the task row in the table above, then click on the **Run Task** link to the left:

1. Select the task to execute
2. Click on Run Task

Depending on the task, a confirmation dialog may be shown:
Resources Settings Tab

Resources are shared services that can be used in specific channels / connectors or in other places throughout the Mirth Connect server. They may include custom Java libraries to use within scripts, or services to handle outbound connections.

## Resources Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of the resource. Double-click this column to edit the name. Note that the [Default Resource] cannot be renamed or removed.</td>
</tr>
<tr>
<td>Type</td>
<td>The type of resource / service. The [Default Resource] type cannot be changed.</td>
</tr>
<tr>
<td>Global Scripts</td>
<td>If checked, any libraries included with the resource will automatically be made available for use in the Global Scripts.</td>
</tr>
</tbody>
</table>
Tasks

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Add Resource" /></td>
<td>Add Resource</td>
<td>Adds a new resource to the table.</td>
</tr>
<tr>
<td><img src="image" alt="Remove Resource" /></td>
<td>Remove Resource</td>
<td>Removed the selected resource from the table.</td>
</tr>
<tr>
<td><img src="image" alt="Reload Resource" /></td>
<td>Reload Resource</td>
<td>Reloads the selected resource on the server.</td>
</tr>
</tbody>
</table>

Reload Resource

The actual implementation of this task depends on the type of resource. For Directory resources the directory will be re-scanned for files, and all channels / connectors using the resource will have their respective classloaders destroyed and recreated with the new list of libraries.

When clicking this task a confirmation dialog will be shown:

Directory Resource

The Directory resource allows you to easily load Java libraries (or other files) so that they can be used in a channel or connector.

December 19, 2018
## Directory Settings

**A**
Directory
- **Name**: Directory
- **Description**: The path to the directory to load files from. If a relative path is used, the path will be relative to the Mirth Connect installation directory.

**B**
Include All Subdirectories
- **Name**: Include All Subdirectories
- **Description**: Select Yes to traverse directories recursively and search for files in each one.

**C**
Description
- **Name**: Description
- **Description**: A description for the resource.

**D**
Loaded Libraries
- **Name**: Library
- **Description**: All files currently loaded and ready for use by channels / connectors. If you've saved the resource but don't see any libraries in this table yet, try using the Refresh task to the left.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Directory</td>
<td>The path to the directory to load files from. If a relative path is used, the path will be relative to the Mirth Connect installation directory.</td>
</tr>
<tr>
<td>B</td>
<td>Include All Subdirectories</td>
<td>Select Yes to traverse directories recursively and search for files in each one.</td>
</tr>
<tr>
<td>C</td>
<td>Description</td>
<td>A description for the resource.</td>
</tr>
<tr>
<td>D</td>
<td>Loaded Libraries</td>
<td>All files currently loaded and ready for use by channels / connectors. If you've saved the resource but don't see any libraries in this table yet, try using the Refresh task to the left.</td>
</tr>
</tbody>
</table>

## Using Resources in Channels / Connectors

Once you've added a resource, the next step is to include it on a channel or connector. For more information on how to do that, see Library Resources.

December 19, 2018
Data Pruner Settings Tab

This tab allows you to configure the global data pruner / archiver settings. In addition to seeing the current status of the pruner, you can set a specific schedule for it, and decide whether message data should be archived out to disk before being pruned.

Note that message / attachment data for channels will not be pruned unless the corresponding pruning settings on the channel have been enabled. For additional information, see Message Pruning Settings.

Status

Click the Refresh task to update the status.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Current State</td>
<td>Indicates whether the Data Pruner is currently running or not.</td>
</tr>
<tr>
<td>A</td>
<td>Current Process</td>
<td>Displays the start time of the currently executing pruning job, how many channels have been processed, and how long the job has been running.</td>
</tr>
<tr>
<td>A</td>
<td>Last Process</td>
<td>Displays the start time of the last executed pruning job, how many channels were processed, and how long the job took to run.</td>
</tr>
<tr>
<td>A</td>
<td>Next Process</td>
<td>Shows the date and time of the next scheduled pruning job.</td>
</tr>
</tbody>
</table>

Schedule

December 19, 2018
### Prune Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Enable</td>
<td>Determines whether the Data Pruner will run on a recurring schedule. If this is disabled, the Data Pruner may will be executed manually.</td>
</tr>
<tr>
<td>C</td>
<td>Schedule Type</td>
<td>The type of schedule to use for the pruner. Possible types include Interval, Time, and Cron. For additional information, see Polling Settings.</td>
</tr>
<tr>
<td>D</td>
<td>Time</td>
<td>When the Time schedule type is used, this will be the time of day the Data Pruner will execute. If a different schedule type is used, this field may be different. For additional information, see Polling Settings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Block Size</td>
<td>The number of messages that will be pruned at a time. This value must be between 50 and 10,000. The recommended value for most servers is 1,000. Larger values will use more memory but typically will cause the pruner to perform more quickly.</td>
</tr>
<tr>
<td>F</td>
<td>Prune Events</td>
<td>If enabled, event records older than the Prune Event Age will be pruned.</td>
</tr>
<tr>
<td>G</td>
<td>Prune Event Age</td>
<td>Events older than this number of days will be pruned if Prune Events is enabled.</td>
</tr>
</tbody>
</table>

### Archive Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Enable Archiving</td>
<td>Determines whether message / attachment data will be saved to disk first before being pruned.</td>
</tr>
<tr>
<td>I</td>
<td>Archiver Block Size</td>
<td>The number of messages that will be cached by the archiver. Increase this value to improve performance. Decrease this value to reduce memory usage. This value must be between 1 and 1,000. The recommended value for most servers is 50.</td>
</tr>
<tr>
<td>J</td>
<td>Content</td>
<td>The type of content to export from the messages. Note that <strong>XML serialized message</strong> is the only type that can be re-imported, and it includes all content across the message in a single XML file.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K</td>
<td>Encrypt</td>
<td>If checked, the exported message content will be encrypted with the server's encryption key.</td>
</tr>
<tr>
<td>L</td>
<td>Include Attachments</td>
<td>If checked and the content type is set to <strong>XML serialized message</strong>, the exported file will contain all attachments associated with the message.</td>
</tr>
<tr>
<td>M</td>
<td>Compression</td>
<td>When compression is enabled, the files/folders created according to the File Pattern will be put into a compressed file in the Root Path. The following compression types are supported: ZIP, tar.gz, tar.bz2</td>
</tr>
<tr>
<td>N</td>
<td>Password Protect</td>
<td>Only available if ZIP compression is enabled. If <strong>Yes</strong> is chosen, the resulting ZIP file will be protected with the given password below. You can also choose what encryption algorithm to use when password-protecting files. The following algorithms are supported: Standard, AES-128, AES-256</td>
</tr>
<tr>
<td>O</td>
<td>Password</td>
<td>If password protection is enabled above, this password will be used.</td>
</tr>
<tr>
<td>P</td>
<td>Root Path</td>
<td>The root path to store the exported files/folder or compressed file. Relative paths will be resolved against the Mirth Connect Server home directory.</td>
</tr>
<tr>
<td>Q</td>
<td>File Pattern</td>
<td>The file/folder pattern in which to write the exported message files. Variables from the list to the right may be used in the pattern.</td>
</tr>
<tr>
<td>R</td>
<td>Variables</td>
<td>Contains several common variables you can use to populate the File Pattern with. For additional information, see <strong>Velocity Variable Replacement</strong>.</td>
</tr>
</tbody>
</table>

**Tasks**

December 19, 2018
<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="View Events" /></td>
<td>View Events</td>
<td>View events specific to the Data Pruner. This leaves the Settings View and enters the Events View.</td>
</tr>
<tr>
<td><img src="image" alt="Prune Now" /></td>
<td>Prune Now</td>
<td>Manually starts a pruning / archiving job.</td>
</tr>
<tr>
<td><img src="image" alt="Stop Pruner" /></td>
<td>Stop Pruner</td>
<td>Stops the currently running pruning job prematurely.</td>
</tr>
</tbody>
</table>
Settings Tasks

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Refresh]</td>
<td>Refresh</td>
<td>Updates the currently selected settings tab.</td>
</tr>
<tr>
<td>[Save]</td>
<td>Save</td>
<td>Saves all configured settings on the currently selected settings tab.</td>
</tr>
</tbody>
</table>
Extensions View

The Extensions view allows you to manage all plugins and connectors installed on your Mirth Connect server. This is where you would go to install any Commercial Support / Extensions. From this view you can install / uninstall / enable / disable extensions, and view properties such as the build number or description.

Navigation

Click the Extensions link in the Mirth Connect task pane at the top-left:
This section is separated into the following topics:

- Installed Connectors Table
- Installed Plugins Table
- Installing a New Extension
- Extension Tasks

**Installed Connectors Table**

The Installed Connectors table at the top of the Extensions view shows all source or destination connectors that are installed for your Mirth Connect server. A connector is a type of extension, but are separated here into their own table for simplicity. Double-click a row in the table to view properties for an installed connector. For general information about working with tables in Mirth Connect, see Working With Tables.

### Installed Connectors Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Indicates whether the connector is enabled or disabled.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the connector.</td>
</tr>
<tr>
<td>Author</td>
<td>The development author of the connector. This will be Mirth Corporation for all official extensions.</td>
</tr>
<tr>
<td>URL</td>
<td>A link to the author website.</td>
</tr>
<tr>
<td>Version</td>
<td>The version of the connector installed. This will usually be the same as the Mirth Connect version, but there may also be a build number associated with the extension, indicating more granular versioning.</td>
</tr>
</tbody>
</table>

**Installed Connectors Table**

<table>
<thead>
<tr>
<th>Status</th>
<th>Name</th>
<th>Author</th>
<th>URL</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>Channel Reader</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Channel Writer</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Database Reader</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Database Writer</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>DECIM Listener</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>DECIM Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Document Writer</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>File Reader</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>File Writer</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>HTTP Listener</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>HTTP Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Javascript Reader</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>JavaScript Writer</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>JMS Listener</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>JMS Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>SFTP Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>TCP Listener</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>TCP Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Web Service Listener</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
<tr>
<td>Enabled</td>
<td>Web Service Sender</td>
<td>Mirth Corporation</td>
<td><a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>3.5.0.6232</td>
</tr>
</tbody>
</table>

**Installed Plugins Table**

December 19, 2018
The Installed Plugins table at the top of the Extensions view shows all plugins that are installed for your Mirth Connect server. Plugins are extensions, but separated from connectors for simplicity. Double-click a row in the table to view properties for an installed plugin. For general information about working with tables in Mirth Connect, see Working With Tables.

### Installed Plugins Table Columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Indicates whether the plugin is enabled or disabled.</td>
</tr>
<tr>
<td>Name</td>
<td>The name of the plugin.</td>
</tr>
<tr>
<td>Author</td>
<td>The development author of the plugin. All official extensions are by Mirth Corporation.</td>
</tr>
<tr>
<td>URL</td>
<td>A link to the author website.</td>
</tr>
<tr>
<td>Version</td>
<td>The version of the plugin installed. Usually the same as the Mirth Connect version, but there may also be a build number.</td>
</tr>
</tbody>
</table>

### Installing a New Extension

Extensions are packaged into ZIP files. To install an extension in Mirth Connect:

1. Navigate to the installation section at the bottom of the Extensions view.
2. Click the “Browse...” button and select the ZIP file of the extension to install.

![Browse... Install](file-system.png)

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3. Click the **Install** button. If the extension ZIP was valid, you’ll see a notification telling you to restart the server:

4. Restart the Mirth Connect server and launch the Mirth Connect Administrator again.

5. You’ll see the new extension listed in either the **Installed Connectors Table** or **Installed Plugins Table**, depending on what type of extension you installed.

### Extension Tasks

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄 Refresh</td>
<td>Refresh</td>
<td>Updates the installed connectors and installed plugins tables.</td>
</tr>
<tr>
<td>✅ Enable Extension</td>
<td>Enable Extension</td>
<td>Enables the extension so that it can be used in your Mirth Connect installation. This requires a restart of the server.</td>
</tr>
<tr>
<td>🚫 Disable Extension</td>
<td>Disable Extension</td>
<td>Disables the extension so that it can no longer be used in your Mirth Connect installation. This requires a restart of the server.</td>
</tr>
</tbody>
</table>

Channels / alerts / resources that depend on an extension that you disable may stop...
Show Properties

Clicking on the Show Properties task will show a dialog with more information on the extension:

<table>
<thead>
<tr>
<th>Name: HTTP Authentication Settings</th>
<th>Type: Plugin</th>
<th>Priority: Installed</th>
<th>Author: Mirth Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version: 3.5.0.0232</td>
<td>URL: <a href="http://www.mirthcorp.com">http://www.mirthcorp.com</a></td>
<td>Description: This plugin provides advanced authentication support for HTTP-based source connectors.</td>
<td></td>
</tr>
</tbody>
</table>
Editing Views

This section is separated into the following topics:

- Edit Channel View
- Edit Filter / Transformer Views
- Edit Global Scripts View
- Edit Code Templates View
- Edit Alert View

Edit Channel View

The Edit Channel view is where channels are configured. General settings and other properties not specific to a connector are configured on the Summary Tab. Connector-specific settings are configured on the Source and Destinations tabs. Channel-level scripts not specific to connectors are configured on the Scripts Tab.

Navigation

Click the Channels link in the Mirth Connect task pane at the top-left to enter the Channels View:

In the Channel Table, select the channel you wish to edit, and click the Edit Channel task to the left:
OR, just double-click the channel row in the table.

This section is separated into the following topics:

- Summary Tab
- Source Tab
- Destinations Tab
- Scripts Tab
- Edit Channel Tasks
Summary Tab

The Summary tab is what you first see when entering the Edit Channel View. This is where general settings not specifically tied to connectors are configured, like the channel name, initial state, storage settings, and description.

Configuration of channel properties in the Summary Tab is separated into the following sections:

- Channel Properties
- Message Storage Settings
- Message Pruning Settings
- Custom Metadata Columns
- Channel Description
## Channel Properties

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Name</td>
<td>The name of the channel. Only alphanumeric (a-z / 0-9) characters, spaces, hyphens, and underscores are allowed.</td>
</tr>
<tr>
<td>B</td>
<td>Enabled</td>
<td>Indicates whether the channel is ready to be deployed. All enabled channels will automatically be deployed with the Mirth Connect server starts up. If there is an error in your channel configuration, this will automatically be unchecked.</td>
</tr>
<tr>
<td>C</td>
<td>Set Data Types</td>
<td>Configure data types across your entire channel, from the source connector to each of your destination connectors. Allows easy bulk editing of data type properties. For additional information, see Set Data Types Dialog.</td>
</tr>
<tr>
<td>D</td>
<td>Clear global channel map on deploy</td>
<td>If checked, the global channel map for this channel will be cleared out whenever the channel is redeployed.</td>
</tr>
<tr>
<td>E</td>
<td>Set Dependencies</td>
<td>Configures Code Template Libraries, Library Resources, and Deploy / Start Dependencies for this channel. For more information, see Set Dependencies Dialog.</td>
</tr>
<tr>
<td>F</td>
<td>Initial State</td>
<td>Determines what state the channel should be in after it gets deployed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Started: The entire channel (source and destination connectors) will be started.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Paused: Only the destination connectors will be started. The channel will not automatically receive new messages, but existing messages will still dispatch outbound.</td>
</tr>
</tbody>
</table>
• **Stopped**: The channel will be stopped. No messages will be received or dispatched outbound.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td><strong>Attachment Handler</strong></td>
<td>Determines how the channel will extract and store attachments. Each attachment handler does this in a different way. Select the handler to use from the drop-down menu, and click the Properties button to edit the configuration for that handler. For additional information, see <strong>Attachment Handlers</strong>.</td>
</tr>
<tr>
<td>H</td>
<td><strong>Store Attachments</strong></td>
<td>If checked, any attachments that are extracted will be stored in the database and available for reattachment. If unchecked, attachments may be extracted from the incoming message but are not stored.</td>
</tr>
<tr>
<td>I</td>
<td><strong>Tags</strong></td>
<td>The list of channel tags included on this channel. Type into this field to auto-complete currently existing tags. Or, type a new tag name and hit Enter to create a whole new tag. More information here: <strong>Filtering By Channel Name or Tag</strong>. When new tags are created here, the color is chosen at random. This may be changed later in the tag management view: <strong>Tags Settings Tab</strong>.</td>
</tr>
<tr>
<td>J</td>
<td><strong>Id</strong></td>
<td>The ID of the channel. This field can be selected for copy/paste purposes.</td>
</tr>
<tr>
<td>K</td>
<td><strong>Revision</strong></td>
<td>The current revision of the channel. Every time the channel is saved, the revision will automatically increment if anything actually changed. This does not apply to certain metadata items like the Enabled flag, the Last Modified date, pruning settings, and tags.</td>
</tr>
<tr>
<td>L</td>
<td><strong>Last Modified</strong></td>
<td>The date and time the channel was last successfully saved.</td>
</tr>
</tbody>
</table>

**Set Data Types Dialog**

This is the main management dialog for all data types configured across your entire channel. You can see at a glance and easily configure what data format you’re expecting to receive, what formats you’re converting it into for...
each outbound destination, and what response formats you're receiving from external systems. You can also configure various properties for each data type, which determines how your data can be used inside of filters / transformers and elsewhere. For additional information on data types, see About Data Types and Data Types.

**Selecting Data Types**

The table at the top of the dialog shows all currently configured connectors for your channel. Since response transformers have their own inbound / outbound data types, for destination connectors you can expand the node in the tree and view the Response row underneath a particular destination.

By default for a new channel, all data types are set to HL7 v2.x. They can be changed in two ways. First, the connector table has Inbound and Outbound columns with drop-down menus. Click the arrow next inside of the cell and make a selection:

Or, use the drop-down menu in the Inbound Properties or Outbound Properties sections:
Changing Data Type Properties

After selecting a connector / response row in the table above, the Inbound Properties and Outbound Properties sections below will show all currently configured properties for the respective data types. Click on the rows in the properties table to view descriptions of categories or specific properties:

Since a message flows from the source connector directly to each destination connector, every destination inbound data type is always equal to the source outbound data type. Therefore, you may notice that the inbound data type is not editable for destination rows. In order to change the destination inbound data type, change the source outbound data type.

Depending on the connector row chosen above, the data type itself, and whether the data type being used as inbound or outbound, the categories of properties shown in the table will vary. For additional information on data type properties and options for specific data types, see Data Types.

Any properties you've changed or that are not equal to the default value will be shown in **bold**. To revert any changes you make back to the defaults for the selected data type, click on the **Restore Defaults** button above the properties table:
Bulk Edit Mode

The above instructions so far have assumed that Single Edit is selected at the top-left of the dialog. This means that only a single connector / response row can be modified at a time. However you can also make common changes to multiple connectors all at once.

1. Click the Bulk Edit button at the top-left of the dialog:

2. After entering Bulk Edit mode, the drop-down menu arrows in the Inbound / Outbound columns disappear, and a new check box column appears at the left of the table.
3. Select the connector / response rows you want to edit by checking the check box in the table next to the name. Once you’ve selected at least one, the Inbound / Outbound Properties sections below will become activated.

4. For either the Inbound or Outbound Properties section, if the data type is the same across all of the currently selected rows, then you have the option to edit properties. Any changes you make while in this mode will be applied across all of the currently selected connector / response rows.

5. If the data types are different, then you cannot bulk edit the properties. However, you can change the data type across all selected rows at once so that they are now the same, and then properties may be edited.

6. The All, Destinations, and Responses check boxes at the top are convenient ways to select multiple types of rows at once.

**Set Dependencies Dialog**

This dialog allows you to configure external dependencies for your channel / connectors. This may include Code Template Libraries or Library Resources you wish to use inside your channel, or even other channels that should be labeled as dependents / dependencies of this channel.
The Set Dependencies Dialog is separated into the following sections:

- Code Template Libraries
- Library Resources
- Deploy / Start Dependencies

**Code Template Libraries**

This tab allows you to link code template libraries to the current channel you're editing. Note that this accomplishes the same thing as including channels on the Edit Library Panel within the Edit Code Templates View. It's included here as well within the Edit Channel View for convenience.

The tree within this tab is organized such that Libraries are the top-level nodes, and each Code Template underneath is a child of that library. Click on any library or code template row, and if a description is available, it will show in the bottom section of the dialog.

**Linking Code Template Libraries**

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To include a library of code templates on the current channel, simply check the check box next to the library name. Then click the OK button. A confirmation dialog will be shown:

Because code template library / channel links are stored outside of the actual channel itself, when closing the Set Dependencies Dialog it prompts you to save those changes immediately. Click Yes to accept the changes and exit the dialog.

**Library Resources**

Resources are shared services that can be used in specific channels / connectors or in other places throughout the Mirth Connect server. They may include custom Java libraries to use within scripts, or services to handle outbound connections. This tab allows you to include resources throughout your entire channel, or in more specific contexts such as the channel scripts or certain connectors.

The Library Context tree in the top section of the tab allows you to select a specific context, or the Channel root-level node which represents all contexts across your channel at once. The following library contexts are available:

<table>
<thead>
<tr>
<th>Library Context</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>This is the root-level node of the tree, and includes all contexts below it. If one of the resource check boxes in the table below is in the indeterminate state (grey box), it means that it is currently included on some but not all of the sub-contexts.</td>
</tr>
<tr>
<td>Channel Scripts</td>
<td>This includes the deploy, undeploy, preprocessor,</td>
</tr>
</tbody>
</table>
postprocessor, attachment, and batch scripts.

### Source Connector

This includes the source filter / transformer script, as well as the source connector itself. For example if you're using a Database Reader and you include a resource containing a custom JDBC Driver JAR, that will be available for use on the connector.

### Destination Connectors

This includes the filter / transformer scripts, the response transformer scripts, and the destination connector itself. For example if you're using a JavaScript Writer and you include a resource containing custom Java classes, those will be available for use inside the destination script.

---

**Deploy / Start Dependencies**

**Channel Dependencies** allow you to mark one channel as a "dependency" of another channel. This means that the **dependency** channel should be started / deployed before the **dependent** channel. This could be for a variety of reasons, but one common use-case is when you have one channel sending to another channel. The upstream channel is the **dependent**, and the downstream would be the **dependency**.

The tree in the top-half of the dialog shows **dependencies of** the current channel. In other words, channels that show up in the top tree are those that the current channel depends upon. By expanding nodes in this tree, you can see descendant dependencies, or "dependencies of the dependencies".

The tree in the bottom-half of the dialog shows channels that are **dependent on** the current channel. By expanding nodes in this tree, you can see descendant dependents, or "channels that are dependent on the channel that is dependent on the current channel".

Click the **Add** / **Remove** buttons next to either tree to add or remove direct links.

Only **direct** dependencies / dependents can be added or removed from this dialog. Descendants of the channels you add will be grey, and selecting them will disable the **Remove** button:
Deploying / Starting Channels

When you start a channel, the Mirth Connect Administrator will automatically check if there are any dependencies of the channel that should be started first. If there are, they will be shown in a special dialog:

By default only the channels you've selected will be bolded in the dialog, meaning that only they will be started. If you want to start the other channels in the dependency chain as well, check the "Start/resume # additional channels" check box before clicking the OK button. Upon pressing OK the channels will be deployed in the numeric order shown in the dialog.

The numbered list in this dialog indicates the different "tiers" in the dependency graph. Any downstream dependencies will be deployed / started first, and only then will their dependent channels be deployed / started. In the example picture above, if the checkbox is checked, the channel labeled 1. will be started first, then the channel labeled 2., and then finally the channel labeled 3., which was the original channel selected from the Dashboard Table. If the checkbox remains unchecked, only the originally selected channel(s) will be started. You can always tell which channels will be affected, because they will appear as bold in the list.
Deploying channels is very similar in behavior, except that the chain of channels shown in the dialog will include both dependents and dependencies:

This is because deploying a channel may entail undeploying any selected channels first, and then redeploying them. So when (re)deploying a particular channel, this sequence is followed:

- All dependent channels are undeployed
- The selected channel is undeployed
- All dependency channels are undeployed
- All dependency channels are deployed
- The selected channel is deployed
- All dependent channels are deployed

Pausing / Stopping / Undeploying Channels

This follows similarly from deploying / starting channels, except that the logic is reversed. When pausing / stopping / undeploying a channel, the operation is performed on dependent channels (channels that are dependent on the selected channel) first.

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As in the deploy / start case, by default only the channels you’ve selected will be **bolded** in the dialog, meaning that only they will be paused / stopped / undeployed. If you want to perform this action on the other channels in the dependency chain as well, check the **“additional channels”** check box before clicking the **OK** button. Upon pressing **OK** the channels will be paused / stopped / undeployed in the numeric order shown in the dialog.

**Attachment Handlers**

An Attachment Handler allows you to extract pieces of any incoming message and store them separately. As a message processes through a channel, multiple copies of it will be held in memory at once (for the raw / transformed / encoded versions of a message, etc.). Attachments are stored only once, so by using them you can greatly reduce your channels' memory footprint. These are configured in the **Channel Properties** section of the **Summary Tab** within the **Edit Channel View**.

By default the attachment handler is set to **None**, meaning no attachments will be extracted. To extract attachments choose an attachment handler type from the drop-down menu, and click the **Properties** button to configure the handler.

**Extraction**

When an attachment handler extracts data from a message, it leaves behind an attachment replacement token like this:

This value tells the destination connector where in your message the attachment should be re-inserted right before dispatching to an outbound system. If multiple attachments were extracted for a message, then there will be multiple replacement tokens in the raw data.
Reattachment

Right before a destination connector dispatches a message to the external system, it scans the outbound message for attachment replacement tokens and automatically re-inserts the actual attachment data. You can prevent a destination from reattaching data by disabling the **Reattach Attachments** option in the Destination Settings.

**Expanded Replacement Tokens**

The standard attachment replacement token only includes the attachment ID, and is implicitly assumed to be tied to the current message / channel. However if you disable **Reattach Attachments** in the Destination Settings, the destination will replace the token with the actual attachment data, but instead with an **expanded token**:

```
Expanded Attachment Replacement Token
```

The expanded token contains the channel ID, message ID, and attachment ID, so that you can uniquely identify an attachment even from a completely different channel or message. Because of this, you can use this replacement token in downstream channels and reattach attachments from earlier, upstream channels.

**Attachment MIME Types**

As explained in the **Attachments Tab** section, there are four types of attachment viewers in the Message Browser: Text, Image, DICOM, and PDF. The **types** of attachment corresponding with these viewers are:

- **text/***: Plain textual data.
- **image/***: Image data (JPGs, PNGs, etc.).
- **DICOM**: A special (not strictly MIME) type reserved for DICOM attachment data.
- **application/pdf**: PDF data.

The * is a wildcard, signifying that anything can be present there. For example, if you're reading in RTF data, the appropriate MIME type would be **text/rtf**, which matches the **text/*** type when the message browser is searching for an attachment viewer.

Note that when extracting / creating attachments, you can use any type you want. It has no effect on how the data is stored or reattached (except for the DICOM special case), only how it's displayed in the message browser.

**Attachment Handler Properties**

The following attachment handlers are supported:

- **Entire Message Attachment Handler Properties**
- **Regex Attachment Handler Properties**
- **DICOM Attachment Handler Properties**
- **JavaScript Attachment Handler Properties**
- **Custom Attachment Handler Properties**
This attachment handler takes the entire incoming message data and stores it as a single attachment. The Raw message data afterwards will just be the attachment token.

The handler has a single property, **MIME Type**, which specifies what type of attachment data you expect to receive. You can use a specific value like "text/plain", or you can use **Velocity replacement** to inject source map variables. For example if you’re using an **HTTP Listener**, you can use the MIME type coming in the Content-Type header:

**Regex Attachment Handler Properties**

This attachment handler extracts data from the incoming message using regular expressions. You can specify multiple expressions, each with their own MIME type. There are also options to replace certain values on the extracted attachment data before storing it in the database, and replace values in the attachment data right before reinserting it into the message for outbound dispatching.
Regular Expressions Table

The table at the top of the Regex Attachment Handler dialog shows the current regular expressions you have configured. The **first capture group** is used to determine what data to extract, so if you have other groups in the expression, make sure to include "?:" to make then non-capturing. There is an example that shows how to extract data from the OBX.5.5 component in an HL7 v2.x message:

- `(?:OBX|(?:[^|]*|$)(?:[^|]*|\^){4})([^|\^\r\n\]+$)`

Click the **New / Delete** buttons to add or remove regular expressions from the table.

For each regular expression you can also specify a MIME type. This supports **Velocity Variable Replacement**, so you can use source map variables here.

String Replacement Tables

The bottom section of the dialog has two tables, for **Inbound Replacements** and **Outbound Replacements**. The inbound table determines what replacements will be made on the attachment data after it’s extracted from the
message, but before it gets stored in the database. The outbound table determines what replacements will be made on the attachment data right before it gets reinserted into the message when a destination connector is about to dispatch data to an external system.

DICOM Attachment Handler Properties

The DICOM attachment handler does not have properties to configure. When used, the handler will automatically take the incoming DICOM data and extract all pixel data into one or more attachments. The resulting raw data will not have an attachment replacement token, but instead will be the Base64 encoded representation of the DICOM message without the pixel data. If the DICOM Data Type is used in a filter / transformer, it will automatically serialize this Base64 data into an XML message containing all header / tag data.

Because there is no attachment replacement token, to reattach DICOM messages on the destination connector side a special token is used:

- ${DICOMMESSAGE}

This indicates to the destination connector that the encoded data should be merged with any pixel data attachments into a final binary representation before being dispatched to the external system.

JavaScript Attachment Handler Properties

This attachment handler allows you to write a custom JavaScript script to handle extracting attachments. For additional information on how to work with JavaScript in Mirth Connect, see Mirth Connect and JavaScript and Attachment JavaScript Functions.

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Scope Variables

In addition to the standard global scope variables, the following are available from within the JavaScript attachment handler script:

- **message**: This is the raw inbound message string. If the data was passed in as a raw byte array, this variable will be the Base64 encoded string representation of the data.
- **binary**: This is a boolean that indicates whether the inbound data was passed in as a raw byte array.
- **sourceMap**: You have access to any variables in the source map. For additional information, see Variable Maps.

Extracting Attachments

Use the following method to extract and store attachments from the attachment script:

addAttachment(data, type)

Creates and stores an attachment for the current message.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>data</td>
<td>String or Byte array</td>
</tr>
</tbody>
</table>
representation of the actual attachment data.

<table>
<thead>
<tr>
<th>type</th>
<th>String</th>
<th>The MIME type of the attachment. For additional information see Attachment Handlers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Return Value&gt;</td>
<td>Attachment</td>
<td>The inserted Attachment object.</td>
</tr>
</tbody>
</table>

The resulting Attachment object contains the ID you need to inject back into the message. For more information, look at the User API. The return value for the JavaScript attachment script should be the final message string, with any attachments extracted out and replaced with attachment replacement tokens.

**Custom Attachment Handler Properties**

This attachment handler gives you full control over the attachment extraction process by allowing you to provide a custom Java implementation of MirthAttachmentHandlerProvider. In the properties you specify the class name, and any properties you want to pass in.

### Properties

This is a map of string keys / string values that gets passed into your custom attachment handler implementation. When receiving a message, the entire RawMessage object including source map data will be available, but it will be up to your custom implementation to actually replace source map variables.

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Message Storage Settings

This section of the Summary Tab allows you to determine how much message data your channel will store, whether to encrypt content, and whether to automatically delete content after messages are finished processing. Changing these settings may affect the availability of certain features, like queuing.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Storage Slider</td>
<td>Use this slider bar to change how much data to store as messages process through the channel. The options are:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Development</strong>: All data will be stored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Production</strong>: Everything except Processed Raw, Transformed, Response Transformed, and Processed Response content will be stored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Raw</strong>: Only Raw / Source Map content and attachments will be stored. Destination queuing is not supported in this mode, but source queuing is still supported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Metadata</strong>: No message content or attachments will be stored, only metadata (for additional information, see About Message Data). Source and destination queuing are not supported in this mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Disabled</strong>: No message metadata, content, or attachments will be stored. Source and destination queuing are not supported in this mode.</td>
</tr>
<tr>
<td>B</td>
<td>Content</td>
<td>Shows what message content will</td>
</tr>
<tr>
<td></td>
<td></td>
<td>December 19, 2018</td>
</tr>
</tbody>
</table>
### Metadata
Metadata shows what message metadata will be stored for the currently selected storage settings. Includes custom metadata columns.

### Durable Message Delivery
Durable Message Delivery shows whether **Durable Message Delivery** is currently enabled based on the selected message storage settings. If enabled, unfinished messages will automatically be recovered and processed if the channel gets halted, or if the server suddenly goes down for any reason. If set to **Reprocess only**, unfinished messages will not be automatically reprocessed, but you still have the option of manually reprocessing them from the message browser.

### Performance
Performance shows a relative estimation of performance for each storage option. When storage is **Disabled**, performance is highest, at the cost of not having durable message delivery, or the ability to view messages in the message browser.

### Encrypt message content
If enabled, content stored in the database will be encrypted. Messages that are stored while this option is enabled will still be viewable in the message browser, but the content will not be searchable.

### Remove content on completion
Remove message content once the message has completed processing. Not applicable for messages that are errored or queued. If **Filtered only** is also checked, only content for filtered connector messages will be removed.

### Remove attachments on completion
Remove message attachments once the message has completed processing. Not applicable for messages that are errored or queued.

## Message Pruning Settings
These settings allow you to decide when to prune and archive message data (if at all). Note that pruning does not happen automatically unless you enable the scheduler in the Data Pruner Settings Tab. For more information about message data in general, see About Message Data.
### Message Pruning

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Store indefinitely</td>
<td>If selected, message metadata will never be pruned.</td>
</tr>
<tr>
<td>B</td>
<td>Prune metadata</td>
<td>If selected, the field here determines how long to retain message metadata before it gets pruned.</td>
</tr>
<tr>
<td>C</td>
<td>Prune when metadata is removed</td>
<td>If selected, message content will follow the same pruning options set above for the metadata.</td>
</tr>
<tr>
<td>D</td>
<td>Prune content</td>
<td>If selected, the field here determines how long to retain message content before it gets pruned.</td>
</tr>
<tr>
<td>E</td>
<td>Allow message archiving</td>
<td>If checked and the data pruner and archiver are enabled, messages in this channel will be archived first before being pruned.</td>
</tr>
</tbody>
</table>

### Custom Metadata Columns

Custom metadata columns are user-created columns that show up in the Metadata Table in the Message Browser, and that are also searchable. As messages process through a channel, these columns are populated from the Variable Maps using a configurable map key.

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column Name</td>
<td>The name of the actual database column. This name will also be shown in the metadata table when viewing the message browser for the channel.</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Type</td>
<td>The type of column to create.</td>
</tr>
<tr>
<td></td>
<td>• STRING: A textual string value.</td>
</tr>
<tr>
<td></td>
<td>• NUMBER: A numeric value. This may be an integer or floating point value.</td>
</tr>
<tr>
<td></td>
<td>• BOOLEAN: A true/false value.</td>
</tr>
<tr>
<td></td>
<td>• TIMESTAMP: A date/time value.</td>
</tr>
<tr>
<td>Variable Mapping</td>
<td>The key to look up values in all available variable maps for each connector. As explained in the Variable Maps section, the following maps (if available) will be checked in this order:</td>
</tr>
<tr>
<td></td>
<td>• Response</td>
</tr>
<tr>
<td></td>
<td>• Connector</td>
</tr>
<tr>
<td></td>
<td>• Channel</td>
</tr>
<tr>
<td></td>
<td>• Source</td>
</tr>
<tr>
<td></td>
<td>• Global Channel</td>
</tr>
<tr>
<td></td>
<td>• Global</td>
</tr>
<tr>
<td></td>
<td>• Configuration</td>
</tr>
</tbody>
</table>

**Modifying Custom Metadata Columns**

Use the **Add** / **Delete** buttons to create and remove entries from the table. At any time you can press the **Revert** button which will restore the table back to the state it was when you first entered the Edit Channel View.

Renaming, deleting or changing the type of existing custom metadata columns will delete all existing data for that column. This takes effect the next time the channel is deployed.

**Channel Description**

This is a general description text area for your channel, allowing you to describe the channel's purpose, who created it, who to contact in case of problems, etc.
Source Tab

This is where the source connector is configured. This includes the source connector properties, and the source filter / transformer scripts.

Choose a Source Connector

This is done simply by selecting a connector type from the drop-down menu at the very top of the tab:

After selecting a source connector type, the settings shown here are broken up into different categories depending on the type of connector chosen:

- Listener Settings
- Polling Settings
- Source Settings
- HTTP Authentication Settings
- Source Connector Properties

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Listener Settings

These properties are shown when the connector is a TCP socket-based listener (server), and allow you to specify the local network interface and port to listen on. Supported connectors include the DICOM Listener, HTTP Listener, TCP Listener, and Web Service Listener.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Local Address</td>
<td>If All interfaces is selected, the connector will listen on all interfaces, using address 0.0.0.0. If Specific interface is selected, the connector will listen on the specific network interface address given in the accompanying field.</td>
</tr>
<tr>
<td>B</td>
<td>Local Port</td>
<td>The TCP port on which to listen for connections.</td>
</tr>
</tbody>
</table>

Polling Settings

These settings are for connectors that do not listen passively for messages, but instead actively poll according to a specific schedule. This may be once every few seconds, at a specific time of day, or something more complex. Supported connectors include the Database Reader, File Reader, and JavaScript Reader.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Schedule Type</td>
<td>Determines how the polling schedule is set. This could be on a specific interval, a time of day, or a custom expression.</td>
</tr>
<tr>
<td>B</td>
<td>Next poll at</td>
<td>Given the current polling settings, shows the next date and time that the source connector will poll for new messages (assuming it is</td>
</tr>
<tr>
<td>C</td>
<td>Poll Once on Start</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Interval</td>
<td></td>
</tr>
</tbody>
</table>

Revised: 12/19/2018
deployed). This value is updated once when you navigate to the Source Tab, or when you update the schedule settings. It does not continue to update automatically.

C  
**Poll Once on Start**  
Select Yes to immediately poll once when the channel is started. All subsequent polling will follow the specified scheduling settings.

D  
**Schedule Settings**  
These are settings specific to the schedule type. This will be one of:
- Interval Schedule Settings
- Time Schedule Settings
- Cron Schedule Settings

### Interval Schedule Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Value</td>
<td>The number of units to wait in between polling windows. The value, when resolved with the unit type, must be less than 24 hours of time.</td>
</tr>
</tbody>
</table>
| B    | Unit | The unit of time to use in conjunction with the value to determine how long to wait in between polling windows. Available units are:  
  - Milliseconds  
  - Seconds  
  - Minutes  
  - Hours |
| C    | Advanced | Allows configuring day-of-week / day-of-month settings and time ranges. For additional information, see Advanced Settings. |
Only one polling window will ever be active at any given time for a given source connector. For example, if you have a channel set to poll every 5 seconds, but a single message takes 6 seconds to process, a new polling job will not begin while the first one is still working. In this example the "effective" polling interval would be 10 seconds, because every other poll trigger gets skipped.

The interval does not "start counting down" from the time when the channel is deployed/started. Instead, it starts on a consistent schedule based on the start of the time range set in the Advanced Settings (or 12:00 AM if the default value of All Day is selected).

**Example:** To poll every hour on the hour, you can just leave the advanced settings as their defaults (All Day range), and choose 1 hour for your interval.

**Example:** To poll every hour on the 30 minute mark (12:30, 1:30, etc.), leave the interval as 1 hour, and set the Active Time Range to 12:30 AM - 11:30 PM.

### Cron Schedule Settings

This schedule type gives you full control to enable advanced, nuanced polling schedules using Cron-like expressions. Click the Add / Delete buttons to add or remove entries from the table. The expressions must abide by the following format:

<table>
<thead>
<tr>
<th>Field</th>
<th>Required?</th>
<th>Allowed Values</th>
<th>Special Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>Yes</td>
<td>0-59</td>
<td>, - */</td>
</tr>
<tr>
<td>Minutes</td>
<td>Yes</td>
<td>0-59</td>
<td>, - */</td>
</tr>
</tbody>
</table>

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### Special Characters

<table>
<thead>
<tr>
<th>Special Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>All values</td>
</tr>
<tr>
<td>?</td>
<td>No specific range</td>
</tr>
<tr>
<td>-</td>
<td>Used to specify ranges</td>
</tr>
<tr>
<td>,</td>
<td>Used to specify list of values</td>
</tr>
<tr>
<td>/</td>
<td>Used to specify increments</td>
</tr>
<tr>
<td>L</td>
<td>Used to specify the “last of”</td>
</tr>
<tr>
<td>W</td>
<td>Used to specify the nearest weekday</td>
</tr>
<tr>
<td>#</td>
<td>Used to specify the Nth day of the month</td>
</tr>
</tbody>
</table>

**Example:** The expression "0 */5 8-17 * * ?" means to poll every 5 minutes starting at 8 AM and ending at 5 PM every day.

Specifying both a day-of-week and day-of-month is not supported. A "?" character must be used in one of these fields.

### Advanced Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Active Days: Weekly</td>
<td>Select the days of the week that are active.</td>
</tr>
<tr>
<td>B</td>
<td>Active Time: All Day</td>
<td>Select the active time.</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>B</td>
<td>Active Days: Monthly</td>
<td>Select this option to only poll on the specified day of the month.</td>
</tr>
<tr>
<td>C</td>
<td>Active Time: All Day</td>
<td>If selected, polling may occur at any time during the day.</td>
</tr>
<tr>
<td>D</td>
<td>Active Time: Range</td>
<td>If selected, polling will only occur during the specified time range.</td>
</tr>
</tbody>
</table>
Source Settings

These are general settings that apply to all source connectors. It includes configuring the source queue, the response to send back to originating systems, batch processing, and maximum processing threads.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Source Queue</td>
<td>This determines whether the source queue is enabled. It also determines when the selected response will be sent back to the originating system.</td>
</tr>
<tr>
<td></td>
<td>OK (Respond after processing)</td>
<td>• OFF (Respond after processing): Selecting OFF will process the message before sending the response. In this scenario you may use the response from destinations, the response map, or the post-processor. This is the Default selection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ON (Respond before processing): Selecting ON will queue messages and immediately send a response. In this scenario you may only choose to not respond with anything, or to use an auto-generated response.</td>
</tr>
<tr>
<td>B</td>
<td>Queue Buffer Size</td>
<td>The buffer size for the source queue, only apply when Source Queue = ON. Up to this many connector messages may be held in memory at once when queuing. Default = 1000.</td>
</tr>
<tr>
<td>C</td>
<td>Response</td>
<td>Determines what response to send back to the originating system. You may choose not to respond with a response, the post-processor</td>
</tr>
</tbody>
</table>

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return value, a response map variable, an auto-generation option, or None indicating that you don't want to send a response back at all.

Select **Auto-generate** to send a response generated by the inbound data type using the raw message:

- **Before processing**: Response generated before the channel processes the message (SENT status)
- **After source transformer**: Response generated after the channel processes the message (source connector status)
- **Destinations completed**: Response generated after the channel processes the message, with a status based on the destination statuses, using a precedence of **ERROR, QUEUED, SENT, FILTERED**.

<table>
<thead>
<tr>
<th>D</th>
<th>Process Batch</th>
<th>Select Yes to enable batch processing. Batch messages are only supported if the source connector's inbound properties contains a <strong>Batch</strong> section. More information here: <a href="#">Batch Processing</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Batch Response</td>
<td>Each message in the batch contains its own response that is generated via the method selected above. Select either the response from the first or last message in the batch to be sent back to the originating system.</td>
</tr>
<tr>
<td>F</td>
<td>Max Processing Threads</td>
<td>The maximum number of messages that can process through the channel simultaneously. By default this is set to 1, meaning that only one message can process through a channel at any given time (does not include asynchronous processes like the destination queue). Increase this setting can greatly improve channel performance / throughput, at the cost of message order preservation.</td>
</tr>
</tbody>
</table>
HTTP Authentication Settings

These are for HTTP-based source connectors, and provide automatic user authentication with a variety of supported mechanisms.

Choose an Authentication Type

This is done simply by selecting a type from the drop-down menu at the top of the settings:

After selecting an authentication type, the settings shown below will change. The following authentication types are supported:

- Basic HTTP Authentication
- Digest HTTP Authentication
- JavaScript HTTP Authentication
- Custom Java Class HTTP Authentication
- OAuth 2.0 Token Verification

Basic HTTP Authentication

Provides Basic Authentication support for HTTP-based source connectors.
### Item  
#### Name  
#### Description

<table>
<thead>
<tr>
<th>A</th>
<th>Realm</th>
<th>The protection space for this server.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Credentials</td>
<td>Username and password pairs to authenticate users with. At least one pair is required.</td>
</tr>
</tbody>
</table>

### Digest HTTP Authentication

Provides **Digest Authentication** support for HTTP-based source connectors.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Realm</td>
<td>The protection space for this server.</td>
</tr>
<tr>
<td>B</td>
<td>Algorithms</td>
<td>Specifies the digest algorithms supported by this server.</td>
</tr>
</tbody>
</table>
|      |         | - **MD5**: The security data A1 will contain the username, realm, and password.  
|      |         | - **MD5-sess**: The security data A1 will also contain the server and client nonces. |

| C    | QOP Modes | auth auth-int |

| D    | Opaque    | ${UID} |

<table>
<thead>
<tr>
<th>E</th>
<th>Credentials</th>
<th>Username</th>
<th>Password</th>
<th>New</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>user1</td>
<td>*****</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>user2</td>
<td>*****</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## QOP Modes

The quality of protection modes to support.

- **auth**: Regular auth with client none and count in the digest.
- **auth-int**: Same as auth, but also with message integrity protection enabled.

## Opaque

A string of data that should be returned by the client unchanged. *Velocity Variable Replacement* is supported in this field. The default value, `{{UUID}}`, means that a randomly generated *universally unique identifier* will be sent back on each digest challenge.

## Credentials

Username and password pairs to authenticate users with. At least one pair is required.

### JavaScript HTTP Authentication

Allows you to authenticate users with a custom JavaScript script. With this script you have access to source map variables, and can choose whether to send a challenged or failure response back to the client.

<table>
<thead>
<tr>
<th>HTTP Authentication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication Type:</td>
<td>JavaScript</td>
</tr>
<tr>
<td>Script:</td>
<td><code>&lt;Default Script Set&gt;</code></td>
</tr>
</tbody>
</table>

The default script simply allows all requests to pass. The **Script** field will show `<Default Script Set>` if the default script is currently being used. If you've made any modification to the script, the **Script** field will show `<Custom Script Set>`. Click on the **Script** field to edit the JavaScript:

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This script expects either a boolean (true to accept the request, false to send back a failure response) or an AuthenticationResult object to be returned (for additional information, see User API). There are three types of results you can return:

- **AuthenticationResult.Success()**: The request will be accepted and processed through the channel.
- **AuthenticationResult.Challenged(authenticateHeader)**: The request will not be processed through the channel. A 401 response will be sent back to the client, with a given WWW-Authenticate header value.
- **AuthenticationResult.Failure()**: The request will not be processed through the channel. A 401 response will be sent back to the client, without any WWW-Authenticate header or any additional information.

If a Challenged/Failure result is returned, the AuthenticationResult object also allows you to add custom headers to include on the HTTP response sent back to the client.

For more information on using JavaScript within Mirth Connect, see Mirth Connect and JavaScript.

**Custom Java Class HTTP Authentication**

This authentication method gives you full control by allowing you to specify your own custom-developed Authenticator implementation.
**OAuth 2.0 Token Verification**

This feature performs a GET request to an external HTTP endpoint, passing an OAuth access token as either a request header or query parameter. If the response code from this endpoint is >= 400, the request will be rejected and not processed through the channel.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Class Name</td>
<td>The fully-qualified Java class name of the Authenticator class to use.</td>
</tr>
<tr>
<td>B</td>
<td>Properties</td>
<td>Custom string properties to pass into your class.</td>
</tr>
</tbody>
</table>

**HTTP Authentication**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Access Token Location</td>
<td>Determines where the access token is located in client requests.</td>
</tr>
<tr>
<td>B</td>
<td>Verification URL</td>
<td>The HTTP URL to perform a GET request to for access token.</td>
</tr>
</tbody>
</table>

- **Request Header**: The field to the right specifies the HTTP header to pull the access token from. This same header will be sent in the request to the verification URL.
- **Query Parameter**: The field to the right specifies the query parameter to pull the access token from. This same parameter will be sent in the request to the verification URL.
verification. If the response code is \( \geq 400 \), the authentication attempt is rejected by the server, and the request will not process through the channel.

Source Connector Properties

This section refers to the actual connector-specific settings. Here is a list of source connectors supported by Mirth Connect:

- Source Connectors
  - Channel Reader
  - DICOM Listener
  - Database Reader
  - File Reader
  - HTTP Listener
  - JMS Listener
  - JavaScript Reader
  - TCP Listener
  - Web Service Listener

Additional source connectors are made available as commercial extensions:

- Email Reader
- Serial Connector
Destinations Tab

This is where destination connectors are configured. This includes the destination connector properties, the destination filter / transformer scripts, and the response transformer scripts. From this tab you can rename / reorder / enable / disable / clone destinations, and decide which ones belong in separate destination chains.

Configuration of destination connectors is separated into the following sections:

- Destination Table
- Destination Tasks
- Destination Settings
- Destination Connector Properties
- Destination Mappings
**Destination Table**

This table shows you all currently configured destinations for your channel. You can see at a glance the type of each destination, whether it's enabled, what chain it belongs to, and more.

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Indicates whether the destination is enabled or disabled. Only enabled destinations may process messages on a deployed channel. A channel must have at least one destination enabled.</td>
</tr>
<tr>
<td>Destination</td>
<td>Double-click this cell to edit the name of the destination. Note that while a destination may be renamed, its metadata ID will remain the same.</td>
</tr>
<tr>
<td>Id</td>
<td>The metadata ID that uniquely identifies this destination within the current channel.</td>
</tr>
<tr>
<td>Connector Type</td>
<td>The type of destination connector. To change this, select the destination from the table and choose a new type from the drop-down menu directly below the table.</td>
</tr>
<tr>
<td>Chain</td>
<td>The chain this destination connector belongs to. The first destination in the table is automatically placed into chain #1. To start a new chain, select a subsequent destination from the table, and uncheck the <strong>Wait for previous destination</strong> check box directly below the table. For additional information, see The Message Processing Lifecycle.</td>
</tr>
</tbody>
</table>

**Destination Tasks**
In addition to the general *Edit Channel Tasks*, several context-specific tasks are unique to the *Destinations Tab*:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="New Destination" /></td>
<td>New Destination</td>
<td>Creates a new destination and adds it to the table above.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Destination" /></td>
<td>Delete Destination</td>
<td>Deletes the currently selected destination and removes it from the table above. Note that a channel must have at least one enabled destination.</td>
</tr>
<tr>
<td><img src="image" alt="Clone Destination" /></td>
<td>Clone Destination</td>
<td>Copies the currently selected destination and adds it to the table above.</td>
</tr>
<tr>
<td><img src="image" alt="Enable Destination" /></td>
<td>Enable Destination</td>
<td>Marks this destination as ready to process messages at deploy time.</td>
</tr>
<tr>
<td><img src="image" alt="Disable Destination" /></td>
<td>Disable Destination</td>
<td>Marks this destination as not ready to process messages at deploy time. Note that a channel must have at least one enabled destination.</td>
</tr>
<tr>
<td><img src="image" alt="Move Dest. Up" /></td>
<td>Move Destination Up</td>
<td>Moves the currently selected destination one row higher in the table above.</td>
</tr>
<tr>
<td><img src="image" alt="Move Dest. Down" /></td>
<td>Move Destination Down</td>
<td>Moves the currently selected destination one row lower in the table above.</td>
</tr>
<tr>
<td></td>
<td>Edit Response</td>
<td>Enters the <em>Edit Transformer View</em></td>
</tr>
</tbody>
</table>
Destination Settings

These are general settings that apply to all destination connectors. They include configuring the destination queue, whether to validate responses, and whether to re-attach attachments on outbound messages.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| A    | Queue Messages | - Never: Disable the destination queue.  
- On Failure: Attempt to send the message first before queuing it. This will allow subsequent destinations and the Postprocessor to use the response from this destination if it successfully sends before queuing.  
- Always: Immediately queue the message. Subsequent destinations and the Postprocessor will always see this destination's response as QUEUED. |
| B    | Advanced Queue Settings | Configure how often to re-attempt queued messages, increase queue threads, and more. |
| C    | Validate Response | Select Yes to validate the response. Responses can only be validated if the response transformer’s inbound properties contains a Response Validation section. If validation fails, the message will be marked as queued or errored. For additional information, see Data Types. |
| D    | Reattach Attachments | If enabled, replacement tokens using the ${ATTACH:...} syntax will be automatically replaced with the...|
associated attachment content before the message is sent. If disabled, the tokens will be expanded to the full `${ATTACH:channelId:messageId:attachmentId}` syntax which can then be reattached in downstream channels. For additional information, see Attachment Handlers.

**Advanced Queue Settings**

![Advanced Queue Settings](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Retry Count Before Queue/Error</td>
<td>The maximum number of times the connector will attempt to send the message before queuing or erroring.</td>
</tr>
<tr>
<td>B</td>
<td>Retry Interval (ms)</td>
<td>The amount of time (in milliseconds) that should elapse between retry attempts to send messages. This interval applies to both the queue and initial retry attempts.</td>
</tr>
<tr>
<td>C</td>
<td>Rotate Queue</td>
<td>If enabled, when any message fails to be sent from the queue, the connector will place the message at the end of the queue and attempt to send the next message. This will prevent a single message from holding up the entire queue. If the order of messages processed is important, this should be disabled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>D</td>
<td>Regenerate Template</td>
<td>Regenerate the template and other connector properties by replacing variables each time the connector attempts to send the message from the queue. If this is disabled, the original variable replacement will be used for each attempt.</td>
</tr>
<tr>
<td>E</td>
<td>Include Filter/Transformer</td>
<td>If enabled, the filter and transformer will be re-executed before every queue send attempt. This is only available when the Regenerate Template setting is enabled.</td>
</tr>
<tr>
<td>F</td>
<td>Queue Threads</td>
<td>The number of threads that will read from the queue and dispatch messages simultaneously. Message order is <strong>NOT</strong> guaranteed if this value is greater than one, unless an assignment variable is used below.</td>
</tr>
<tr>
<td>G</td>
<td>Thread Assignment Variable</td>
<td>When using multiple queue threads, this map variable determines how to assign messages to specific threads. If rotation is disabled, messages with the same thread assignment value will always be processed in order.</td>
</tr>
<tr>
<td>H</td>
<td>Queue Buffer Size</td>
<td>The buffer size for the destination queue. Up to this many connector messages may be held in memory at once when queuing.</td>
</tr>
</tbody>
</table>

**Destination Connector Properties**

This section refers to the actual connector-specific settings. The section is labeled according to the connector type, e.g. "HTTP Sender Settings", "JavaScript Writer Settings". Here is a list of destination connectors supported by Mirth Connect:

- Destination Connectors
  - Channel Writer
  - DICOM Sender
  - Database Writer
  - Document Writer
  - File Writer
  - HTTP Sender
  - JMS Sender
  - JavaScript Writer
  - SMTP Sender
  - TCP Sender
  - Web Service Sender

Additional destination connectors are made available as commercial extensions:

- Serial Connector

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Destination Mappings

This section is to the right of the destination connector properties, and allows you to easily drag-and-drop common variables / templates into fields of the connector properties. **Standard** variables / templates are available across all destination connectors. **Custom** mapper variables come from the Mapper Steps you have added in the current destination or in any previous destinations. For additional information on Velocity replacement, see **Velocity Variable Replacement**.

---

**Standard Variables / Templates**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel ID</td>
<td>The unique ID of the current channel.</td>
</tr>
<tr>
<td>Channel Name</td>
<td>The name of the current channel.</td>
</tr>
<tr>
<td>Message ID</td>
<td>The unique ID of the current message.</td>
</tr>
<tr>
<td>Raw Data</td>
<td>The raw content of the destination connector message (equal to the encoded content of the source connector message).</td>
</tr>
<tr>
<td>Transformed Data</td>
<td>The serialized internal representation of the post-transformer message data.</td>
</tr>
<tr>
<td>Encoded Data</td>
<td>The state of the message data after it has passed through the transformer.</td>
</tr>
<tr>
<td><strong>Message Source</strong></td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Sending Facility value in MSH.4.1.</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Message Type</strong></td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Type and Trigger values in MSH.9.1 and MSH.9.2.</td>
</tr>
<tr>
<td><strong>Message Version</strong></td>
<td>Depends on the inbound data type for the connector. For HL7 v2.x messages this will usually be the Version value in MSH.12.1.</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>The current date and time, printed using a standard format.</td>
</tr>
<tr>
<td><strong>Formatted Date</strong></td>
<td>The current date and time, printed using a custom user-specified format.</td>
</tr>
<tr>
<td><strong>Timestamp</strong></td>
<td>The current epoch time represented in milliseconds.</td>
</tr>
<tr>
<td><strong>Unique ID</strong></td>
<td>An auto-generated universally unique identifier string.</td>
</tr>
<tr>
<td><strong>Original File Name</strong></td>
<td>Only applicable when the source connector is a File Reader. The name of the file currently being processed.</td>
</tr>
<tr>
<td><strong>Count</strong></td>
<td>A number that automatically starts at 1 when the channel is deployed, and increments for each message, or for each time $\text{COUNT}$ is used.</td>
</tr>
<tr>
<td><strong>XML Entity Encoder</strong></td>
<td>Automatically encodes any special XML characters (like &quot;&amp;&quot;) into entities (like &quot;&amp;&quot;). Useful when your message template is XML and you want to inject a custom variable into the inner text of a node.</td>
</tr>
<tr>
<td><strong>XML Pretty Printer</strong></td>
<td>Automatically indents and normalizes whitespace for the given XML string.</td>
</tr>
<tr>
<td><strong>Escape JSON String</strong></td>
<td>Automatically escapes any special JSON characters (like &quot;&quot;) with backslashes (like &quot;\&quot;). Useful when your message template is JSON and you want to inject a custom variable into a string property.</td>
</tr>
<tr>
<td><strong>JSON Pretty Printer</strong></td>
<td>Automatically indents and normalizes whitespace for the given JSON string.</td>
</tr>
<tr>
<td><strong>CDATA Tag</strong></td>
<td>Inserts a CDATA tag, inside which you can place custom data without having to encode entities.</td>
</tr>
<tr>
<td><strong>DICOM Message Raw Data</strong></td>
<td>A special replacement token telling the destination connector to merge the destination connector message with any DICOM pixel data attachments and dispatch the fully merged bytes to the outbound endpoint. Typically used by the DICOM Sender destination.</td>
</tr>
</tbody>
</table>
Scripts Tab

This is where channel-level scripts are configured. Select a script type from the drop-down and edit the script in the text area below. If a number appears next to “Scripts” in the tab, that number represents how many scripts have been edited from the default values. There is also a Reference List to the right for easy drag-and-drop of common helper methods / code templates.

The following channel-level script types can be edited:

- **Deploy Script:** This script executes once when the channel is deployed. You have access to the global / global channel / configuration maps here. Typically this script is used to perform a one-time operation for the given channel, like load a properties file from disk, or instantiate a database connection.

- **Undeploy Script:** This script executes once when the channel is undeployed. You have access to the global / global channel / configuration maps here. Typically this script is used to cleanup any data created from the deploy script, such as closing a database connection.

- **Preprocessor Script:** This script executes once for every message, after the attachment handler has run but before the message reaches the source filter/transformer. You have access to "message", a string variable containing the incoming data. Whatever you return from the preprocessor script will be stored as the Processed Raw content and used to feed into the source filter/transformer.

- **Postprocessor Script:** This script executes once for every message, after all destinations have completed processing (not including queued messages which are processed asynchronously). You have access to "message", which is an ImmutableMessage object containing information about the state of all connector messages. This script may be used as a general tool to perform a custom cleanup script. It can also be used to return a custom response that may be sent back to the originating system.
The following context-specific tasks are available throughout the **Edit Channel View**:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Save Changes" /></td>
<td>Save Changes</td>
<td>Saves a new revision of the current channel, if anything was actually changed.</td>
</tr>
<tr>
<td><img src="image" alt="Validate Connector" /></td>
<td>Validate Connector</td>
<td>Validates the currently viewed connector, ensuring that all connector properties are valid and able to be saved.</td>
</tr>
<tr>
<td><img src="image" alt="Edit Filter" /></td>
<td>Edit Filter</td>
<td>Enters the <strong>Edit Filter View</strong> for the currently viewed connector.</td>
</tr>
<tr>
<td><img src="image" alt="Edit Transformer" /></td>
<td>Edit Transformer</td>
<td>Enters the <strong>Edit Transformer View</strong> for the currently viewed connector.</td>
</tr>
<tr>
<td><img src="image" alt="Import Connector" /></td>
<td>Import Connector</td>
<td>Imports a connector from an XML file into the current channel. For source connectors, this completely overrides all source connector properties and the source filter /transformer. For destination connectors a new destination will be added to the table.</td>
</tr>
<tr>
<td><img src="image" alt="Export Connector" /></td>
<td>Export Connector</td>
<td>Exports the currently viewed connector to an XML file. This will include all connector properties and the connector’s filter /transformer.</td>
</tr>
<tr>
<td><img src="image" alt="Export Channel" /></td>
<td>Export Channel</td>
<td>Exports the current channel to an XML file. The channel must be saved first. For additional information, see <strong>Channel Tasks</strong>.</td>
</tr>
<tr>
<td><img src="image" alt="Deploy Channel" /></td>
<td>Deploy Channel</td>
<td>Deploy...</td>
</tr>
</tbody>
</table>
Edit Filter / Transformer Views

This is where filter rules and transformer steps are configured. Although Edit Filter and Edit Transformer are different views, they are very similar and so are combined into this section. Also, the filter and transformer are actually executed together as a single script for each connector.

Navigation

Click the Channels link in the Mirth Connect task pane at the top-left to enter the Channels View:

In the Channel Table, select the channel you wish to edit, and click the Edit Channel task to the left:

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OR, just double-click the channel row in the table.

Once in the Edit Channel View, click on either the Source Tab or Destinations Tab. Select a destination if necessary. Then, click on the Edit Filter, Edit Transformer, or Edit Response tasks to the left. The Edit Response task (for editing the response transformer) will only be visible for destination connectors.

This section is separated into the following topics:

- Message Templates Tab
- Message Trees Tab
- Reference Tab
- Creating New Rules / Steps
- Rule / Step Table
- Filter Rule Properties
- Transformer Step Properties
- Response Transformers
- Working With Iterators
- Viewing Generated Script
- Filter Tasks
- Transformer Tasks

**Message Templates Tab**

This is located on the right-hand side of the Edit Filter / Transformer View and allows you to edit the inbound /outbound message templates for your filter or transformer. Both templates can be used in the filter / transformer for easy reference and drag-and-drop capabilities, but only the outbound template has any effect on message processing. If an outbound template is specified, you'll see the Message Templates title appear bold in the tab list.
Editing Data Types

A filter only has access to the inbound data type, while a transformer has access to both inbound and outbound data types. Additionally, when editing the destination transformer the inbound data type may not be changed, since it must remain the same as the source connector's outbound data type. However, you can still edit the properties for the destination transformer's inbound data type.

When clicking the Properties button, a dialog will open allowing you to edit the various inbound or outbound properties for the data type. This is a subset of the view shown in the Set Data Types Dialog. For additional information, see About Data Types and Data Types.

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Specifying a Template

You can use the folder icon button next to the Properties button to select a message from your local filesystem. Or, simply type / paste a message into the text area.

Message Trees Tab

This is located on the right-hand side of the Edit Filter / Transformer View and allows you to view a tree representation of your inbound/outbound message templates set in the Message Templates Tab.
The Outbound template tree is only visible for transformers and response transformers. When you edit a connector’s filter, you’ll only see the Inbound template tree.

**Filter By Node Name / Description**

You can quickly find a particular part of your message by using the Filter field at the top:

---

*Create a Rule Builder Rule or Mapper Step*
When editing a filter, you can create a Rule Builder Filter Rule directly from the message tree. When editing a transformer, you can create a Mapper Transformer Step in the same way.

**Method 1:**

Right-click the node you wish to filter on or map, and select either Filter by Value or Map to Variable:

1) Right-click a tree node...

2) ...and select Filter by Value

A dialog may be shown asking whether you want to add the rule/step as part of an Iterator. More information here: Working With Iterators

A Rule Builder or Mapper will automatically be added to the table with the selected node populated appropriately:
Method 2:

Drag the node you wish to filter on or map from the tree into the table:

The same steps follow as in Method 1.

Create a Message Builder Step

When editing a transformer, you can create a Message Builder Transformer Step directly from the message tree.

Method 1:

Right-click the node you want to modify, and select Map to Message:

A dialog may be shown asking whether you want to add the step as part of an Iterator. For additional information, see Working With Iterators.

A Message Builder will automatically be added to the table with the selected node populated appropriately.
Method 2:

Drag the node you wish to map from the inbound message tree, and drop it into the node you wish to map to in the outbound message tree:

1) Drag a tree node from the inbound tree...

2) ...and drop it into a node on the outbound tree

The same steps follow as in Method 1.

Drag-and-Drop Field Values

The message tree also allows you to easily populate values into your filter rules or transformer steps. Simply drag a node from the inbound or outbound tree, and drop it into any editable field:
Reference Tab

This is located on the right-hand side of the Edit Filter / Transformer View and provides helpful variables / templates you can use within your filter rules / transformer steps.

- Reference List
- Available Variables

Reference List

The Reference List contains code templates (both built-in and custom) that you can drag into your filter rules / transformer steps. These include common operations like serializing to/from XML, performing a manual database query, or generating a unique ID. For additional information on code templates, see Code Template Libraries.

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Use the **Category** and **Filter** components at the top to quickly find the template you're looking for. For custom code templates, choose the **User Defined Functions** or **User Defined Code** options.

Hover your mouse over an item in the list to view its description:

*Drag items from this table into the rule/step properties*

To use an item, simply drag it from the table into your rule/step properties window:
The corresponding code template / function call will automatically be pasted into the field / text area:

```javascript
var dbConn;
var result;

try {
    dbConn = DatabaseConnectionFactory.createDatabaseConnection('driver', 'address', 'username
result = dbConn.executeCachedQuery('expression', paramList);
}

finally {
    if (dbConn) {
        dbConn.close();
    }
}
```

**Available Variables**

This is a convenience list shown in the Edit Transformer View when the Reference Tab is selected. It's automatically populated with the variables set in previous Mapper steps, allowing you to easily drag them into subsequent steps.

**Creating New Rules / Steps**
As outlined in the Message Trees Tab section, new rules / steps can be generated easily from the inbound/outbound message trees. They can also be created manually as well however.

- Click the Add New Rule/Step task to the left:
  - A new rule/step will be created and added to the table. To change the type of rule/step, double-click the cell in the Type column:
  - To change the name, double-click the cell in the Name column:
  - Some rule/step types have names auto-generated from the properties and so don't allow editing in the table:

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If you’re creating a filter rule, you can change the operator of the rule by clicking the AND/OR button next to the name:

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Accept message if all of the item literals are true for each msg[P.ID]</td>
</tr>
<tr>
<td>0-0</td>
<td>Accept message if at least one of the item literals is true for each msg[P.ID][P.ID.3]</td>
</tr>
<tr>
<td>0-0-0</td>
<td>Accept message if msg[P.ID][P.ID.3][P.ID.3.1] theString() equals '1' or '4'</td>
</tr>
<tr>
<td>0-0-1</td>
<td>Accept message if msg[P.ID][P.ID.3][P.ID.3.2] theString() equals 'dummy'</td>
</tr>
<tr>
<td>0-1</td>
<td>Accept message if $&quot;sourcedId&quot; exists</td>
</tr>
<tr>
<td>0-2</td>
<td>New Rule</td>
</tr>
</tbody>
</table>

Rule / Step Table

The table in the top half of the Edit Filter / Transformer Views shows all the rules / steps you currently have configured. If you have Iterators, the elements will be organized into a tree-table with the children underneath each Iterator.

<table>
<thead>
<tr>
<th>Enabled</th>
<th>#</th>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️</td>
<td>0</td>
<td>Accept message if all of the item literals are true for each msg[P.ID]</td>
<td>Iterator</td>
</tr>
<tr>
<td>✔️</td>
<td>0-0</td>
<td>Accept message if at least one of the item literals is true for each msg[P.ID][P.ID.3]</td>
<td>Iterator</td>
</tr>
<tr>
<td>✔️</td>
<td>0-0-0</td>
<td>Accept message if msg[P.ID][P.ID.3][P.ID.3.1] theString() equals '1' or '4'</td>
<td>Rule Builder</td>
</tr>
<tr>
<td>✔️</td>
<td>0-0-1</td>
<td>Accept message if msg[P.ID][P.ID.3][P.ID.3.2] theString() equals 'dummy'</td>
<td>Rule Builder</td>
</tr>
<tr>
<td>✔️</td>
<td>0-1</td>
<td>Accept message if $&quot;sourcedId&quot; exists</td>
<td>Rule Builder</td>
</tr>
<tr>
<td>✔️</td>
<td>0-2</td>
<td>New Rule</td>
<td>JavaScript</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>Determines whether the rule/step is currently enabled. When disabled, rules/steps are not executed at all, and act as if they were never there in the first place. For filters, this could change behavior as it follows the AND/OR order of operations. When all rules in a filter are disabled, the filter acts as if no rules exist, and is not executed at all.</td>
</tr>
<tr>
<td>#</td>
<td>This is the sequence number of the rule / step, starting at 0 for the first one. For child elements underneath an Iterator, this will be multiple numbers separated by a dash, to indicate the child index of each depth level.</td>
</tr>
<tr>
<td>Name</td>
<td>This is the name of the rule / step. If the type of rule / step allows user editing, you can double-click the cell to edit the name. For filter rules, you can also click on the AND / OR icon next to the name to change the operator.</td>
</tr>
<tr>
<td>Type</td>
<td>The type of rule / step. Double-click this cell to change to a different type.</td>
</tr>
</tbody>
</table>

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Filter Rule Properties

The following Filter Rules are supported by Mirth Connect:

- Rule Builder Filter Rule
- JavaScript Filter Rule
- External Script Filter Rule
- Iterator Filter Rule

Rule Builder Filter Rule

This rule allows you to build simple accept logic for a specific message field or expression.

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td>This is always set to “Accept”, meaning that if the logical expression below evaluates to true, the message will be accepted.</td>
</tr>
<tr>
<td>Field</td>
<td>The message field or expression to test.</td>
</tr>
<tr>
<td>Condition</td>
<td>Determines how to test the Field set above. The following conditions are supported:</td>
</tr>
</tbody>
</table>

- **Exists**: Returns true if the length of the field is greater than 0.
- **Not Exist**: Returns true if the length of the field is 0.
- **Equals**: If the Values table is empty, returns true if the field is equal to an empty string. If the Values table is not empty, returns true if the field matches any of the values in the Values table below.
- **Not Equal**: If the Values table is empty, returns true if the field is not equal to an empty string. If the Values table is not empty, returns true if the field matches none of the values in the Values table below.
- **Contains**: Returns true if the field contains any of the values in the Values table below.
- **Not Contain**: Returns true if the field contains none of the values in the Values table below.
Values

A table of expressions that may be used in conjunction with the Condition to test the given field and decide whether or not to filter the message.

**JavaScript Filter Rule**

This rule allows you to write a completely custom script to decide whether to filter the message or not. For more information about using JavaScript, see [Using JavaScript in Mirth Connect](#).

```javascript
var mnr = mng['PID']['PID.3']['PID.3.1'].toString();
var dbConn;
try {
    dbConn = DatabaseConnectionFactory.createDatabaseConnection("org.postgresql.Driver", "jdbc:
    var params = Lists.asList(mnr);
    var result = dbConn.executeQuery('SELECT enabled FROM patients WHERE id = ?', params)
    if (result.next()) {
        return result.getBoolean(1);
    }
} finally {
    if (dbConn) {
        dbConn.close();
    }
}
return false;
```

**External Script Filter Rule**

This rule functions the same way as the JavaScript Filter Rule, except that the script is read from an external file when the channel is deployed. If the given path is not absolute, it will be relative to the Mirth Connect installation directory.

**Iterator Filter Rule**

This is a special type of rule that allows you to decide whether to filter a message or not by iterating through an array or list of XML nodes. The child rules underneath the Iterator determine the accept/filter behavior of the overall rule. For additional information, see [Working With Iterators](#).

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<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterate On</td>
<td>The element to iterate on. This may be a list of E4X XML nodes, or a Java / JavaScript array.</td>
</tr>
<tr>
<td>Index Variable</td>
<td>The index variable to use for each iteration.</td>
</tr>
<tr>
<td>Accept Message If</td>
<td>Determines how to logically combine each iteration into the overall accept / filter behavior.</td>
</tr>
<tr>
<td>Break Early</td>
<td>If this is enabled, the iterator loop will terminate as quickly as possible. For example if &quot;At Least One&quot; is chosen above, the loop will terminate as soon as the first iteration returns true.</td>
</tr>
<tr>
<td>Drag-and-Drop Substitutions</td>
<td>When drag-and-dropping values into the children underneath this Iterator, the index variable (e.g. &quot;[i]&quot;) will be injected after any of these prefixes.</td>
</tr>
</tbody>
</table>

For example if your index variable is i and you have msg[PID] in the Drag-and-Drop Substitutions table, when you drag the value msg[PID][PID.3][PID.3.1].toString() from the Message Trees Tab into a child rule, it will automatically be replaced with msg[PID][i][PID.3][PID.3.1].toString().
Transformer Step Properties

The following Transformer Steps are supported by Mirth Connect:

- Mapper Transformer Step
- Message Builder Transformer Step
- JavaScript Transformer Step
- External Script Transformer Step
- XSLT Transformer Step
- Destination Set Filter Transformer Step
- Iterator Transformer Step

Mapper Transformer Step

This step extracts data from a field in the message (or an expression) and places it into one of the available Variable Maps. Depending on the scope of the map, this variable will be available in subsequent steps, in the destination connector properties, or even in subsequent connectors.

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>The variable name / key to use when inserting into the map. The <strong>Add to</strong> drop-down menu to the right determines which map to place the variable in. For additional information, see <strong>Variable Maps</strong>.</td>
</tr>
<tr>
<td>Mapping</td>
<td>The value to place into the map. This may be a field from the message, or any JavaScript expression.</td>
</tr>
<tr>
<td>Default Value</td>
<td>If the Mapping is not found or evaluates to an empty string, this value / expression will be used instead.</td>
</tr>
<tr>
<td>String Replacement</td>
<td>This table allows you to perform replacements on the value before it gets inserted into the map.</td>
</tr>
</tbody>
</table>

- **Regular Expression**: A Java-style regular expression to test against the value. This will implicitly set the global regex flag.
- **Replace With**: The value to replace any matched regions with.
Message Builder Transformer Step

This step extracts data from a field in the message (or an expression) and maps it into a specific field in the inbound or outbound message. This can be used to simply modify a field in the inbound message, copy a field from one place to another, or map data from the inbound message to the outbound message.

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Segment</td>
<td>The field/location in the inbound or outbound message to place the value into.</td>
</tr>
<tr>
<td>Mapping</td>
<td>The value to place into the given message segment. This may be a field from the message, or any JavaScript expression.</td>
</tr>
<tr>
<td>Default Value</td>
<td>If the Mapping is not found or evaluates to an empty string, this value / expression will be used instead.</td>
</tr>
<tr>
<td>String Replacement</td>
<td>This table allows you to perform replacements on the value before it gets inserted.</td>
</tr>
</tbody>
</table>

- **Regular Expression**: A Java-style regular expression to test against the value. This will implicitly set the global regex flag.
- **Replace With**: The value to replace any matched regions with.

JavaScript Transformer Step

This step allows you to write a completely custom script to extract / transform data, or to perform almost any intermediate action you need to. For additional information about using JavaScript, see Using JavaScript in Mirth Connect.

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External Script Transformer Step

This step functions the same way as the JavaScript Transformer Step, except that the script is read from an external file when the channel is deployed. If the given path is not absolute, it will be relative to the Mirth Connect installation directory.

XSLT Transformer Step

This step allows you to apply an XSLT (eXtensible Stylesheet Language Transformations) stylesheet to a given XML document. This may be msg/tmp (the internal XML representation of your message data), or some other variable containing an XML string. The result of the transformation will be stored in the channel map.
### Item Name | Description
--- | ---
Source XML String | The XML string to transform.
Result | The key to use when storing the result into the channel map.
Transformer Factory | Select **default** to use the Java platform default TransformerFactory implementation class. Select **custom** to provide a custom TransformerFactory implementation class.
XSLT Template | The XSLT stylesheet to use to transform the source XML string.

### Destination Set Filter Transformer Step

Destination Set Filtering is a powerful feature of the source transformer that allows you to decide in advance which destinations to exclude from message processing. Using each individual destination's filter to control where a message goes is still a valid workflow, but when you have many destinations all with mutually exclusive filters, the performance of the channel can be affected because message data will be stored to the database for each destination connector. Also filtered connector messages can clutter up the message browser, making it harder to find what you’re looking for. The advantage to using Destination Set Filtering in this case is that filtered destinations **will not** have any message data stored, and **will not** show up in the message browser. This can greatly increase message throughput.

Destination Set Filtering can be done manually with JavaScript (look at DestinationSet in the User API). However this step allows easier access to the feature without having to write any JavaScript.
Item Name | Description
--- | ---
Behavior | Determines which destinations will be removed from the destination set (and so will not be processed).
  - **the following**: The selected destinations will be filtered if the condition below evaluates to true.
  - **all except the following**: All destinations (even new ones created after this step was created) except the selected ones will be filtered if the condition below evaluates to true.
  - **all**: All destinations (even new ones created after this step was created) will be filtered if the condition below evaluates to true.

Destinations | Select the destinations to exclude or *not* exclude, depending on the behavior above. Even if the destination is renamed later, these selections will still be correct since the metadata ID is used.

Field | The message field or expression to test.

Condition | Determines how to test the Field set above. The following conditions are supported:
  - **Exists**: Returns true if the length of the field is greater than 0.
  - **Not Exist**: Returns true if the length of the field is 0.
  - **Equals**: If the Values table is empty, returns true if the field is equal to an empty string. If the Values table is not empty, returns true if the field matches *any* of the values in the Values table below.
  - **Not Equal**: If the Values table is empty, returns true if the field is not equal to an empty string. If the Values table is not empty, returns true if the field matches *none* of the values in the Values table below.
  - **Contains**: Returns true if the field contains *any* of the values in the Values table below.
  - **Not Contain**: Returns true if the field contains *none* of the values in the Values table below.
Values

A table of expressions that may be used in conjunction with the Condition to test the given field and decide whether or not to filter the selected destinations.

**Iterator Transformer Step**

This is a special type of step that allows you to perform extract / transform operations while iterating through an array or list of XML nodes. For additional information, see Working With Iterators.

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterate On</td>
<td>The element to iterate on. This may be a list of E4X XML nodes, or a Java / JavaScript array.</td>
</tr>
<tr>
<td>Index Variable</td>
<td>The index variable to use for each iteration.</td>
</tr>
<tr>
<td>Drag-and-Drop Substitutions</td>
<td>When drag-and-dropping values into the children underneath this Iterator, the index variable (e.g. &quot;[i]&quot;) will be injected after any of these prefixes. For example if your index variable is i and you have msg[&quot;PID&quot;] in the Drag-and-Drop Substitutions table, when you drag the value msg[&quot;PID&quot;][&quot;PID.3&quot;][&quot;PID.3.1&quot;].toString() from the Message Trees Tab into a child step, it will automatically be replaced with msg[&quot;PID&quot;][][][&quot;PID.3.1&quot;].toString().</td>
</tr>
</tbody>
</table>
Response Transformers

The response transformer is a special type of transformer only editable for destination connectors on the Destinations Tab. It works the same as a regular transformer, except that the data being transformed is not the message flowing through the channel, but instead the response payload that the destination connector received from the external system (if applicable). For additional information about transformers, see About Transformers.

A destination response is comprised not only of the response data, but also the status (e.g. SENT, ERROR), status message, and error message. Response transformers can be used to modify these latter pieces as well. For example if a message gets set to ERROR by the destination connector, in the response transformer you can choose to override that and set the status to SENT instead based on some custom logic.

Response transformers will only execute if there's an actual response payload to transform. For example if you're using an HTTP Sender destination and it fails to connect to the remote server, then obviously there is no response payload. The one exception to this rule is if the response inbound data type is set to Raw. In that case, because the Raw data type doesn't need to perform any serialization, the response transformer will always execute even if there is no response payload.

Modifying the Response

Modifying the actual response data is done by using the normal features and steps available to a transformer. The internal representation of the response data is msg, while the internal representation of the outbound template (if set) is tmp. When the response transformer finishes processing, it will use the value of tmp (or msg if no outbound template is set) to create the Processed Response content.

There are three other pieces of the response that you can modify in the response transformer:

- **responseStatus**: This is the status that will be used to update the message after the response message finishes. You may set the status to SENT, QUEUED, or ERROR. If the status is set to QUEUED and queuing is not enabled for the destination connector, it will automatically be changed to ERROR.
- **responseStatusMessage**: This is a brief one-line message that displays alongside the status in the message browser. It's typically used to give a reason for the status.
- **responseErrorMessage**: This is the full error message associated with a response. Typically this is used to display large stacktrace messages.

In addition to the above variables, you have access to response, which is an ImmutableResponse object. For additional information, see the User API.

Common Scenarios

**Re-queue a message if the HL7 ACK has an AE code**

```java
if (msg['MSA']['MSA.1']['MSA.1.1'].toString() == 'AE') {
    responseStatus = QUEUED;
    responseStatusMessage = 'Application Error NACK received.';
    responseErrorMessage = msg['MSA']['MSA.3']['MSA.3.1'].toString();
}
```

**Force a queuing message to error if the number of send attempts exceeds some threshold**

```java
if (count > threshold) {
    responseStatus = ERROR;
    responseStatusMessage = 'Too many send attempts.';
    responseErrorMessage = 'Error occurred during send attempts.';
}
```
if (responseStatus == QUEUED && connectorMessage.getSendAttempts() >= 5) {
    responseStatus = ERROR;
    responseStatusMessage = 'Maximum send attempts exceeded.';
}

**Route the response data to a downstream channel**

if (responseStatus == SENT) {
    router.routeMessageByChannelId('channel ID here', response.getMessage());
}

**Working With Iterators**

An Iterator is a special type of step that allows you to loop (iterate) through an array or list of XML nodes. For each array element or XML node (each "iteration"), you can execute multiple filter rules or transformer steps (the "children").

For example, let's say you're mapping inbound HL7 v2.x messages to an outbound HL7 v2.x template, and you want to copy OBR.16.1 (ordering provider) component to a the PV1.9.1 (consulting doctor) component in the outbound template.

![Diagram of OBR.16.1 and PV1.9.1 components]

Typically you would do this with a **Message Builder Transformer Step**.
This works so far when there’s only one OBR segment and one OBR.16 field. But what if you want to handle multiple segments or repeating fields? This is where Iterators come into play.

**Creating Iterators From Drag-and-Drop**

As explained in the Message Trees Tab section, new rules and steps can be created by right-clicking the node in the message tree, by dragging a node into the filter/transformer table, or by dragging a node from the inbound tree and dropping it onto a node in the outbound tree. In all of these cases, you will be presented with a prompt asking whether you want to create an Iterator automatically.

If Yes is chosen, the Iterator Wizard dialog will be shown:
In this wizard dialog you can select your iteration target (what to iterate on). If you've dragged from inbound to the outbound template, you will also have the option to select which part of the outbound (tmp) expression corresponds to the inbound (msg) target being iterated on. These options correspond directly to the drag-and-drop substitutions shown at the bottom of the dialog. You're essentially telling the wizard "where the "goes".

Once you click OK, the Iterator and subsequent rule/step will be created:

So far it's only iterating at one level though. In the example for this section, we wanted to iterate not only through each OBR segment, but also through each OBR.16 field repetition. So we want to take the current selected step and assign it to an additional, nested Iterator.

**The Assign To Iterator Task**

This task takes the currently selected rule/step, and either moves it to an existing Iterator, or creates an entirely new Iterator and puts the rule/step within it. When clicking on the task a dialog is shown:
The **Choose Existing Iterator** option allows you to take the currently selected rule/step and move it underneath a specific pre-existing iterator. If your rule/step already belongs to an Iterator, by default this option will be selected and the current parent will be selected in the drop-down menu.

The **Create New Iterator** option is the same dialog shown before, where you have the option of choosing what to iterate on:

Note that in this case, the variable \(j\) was automatically chosen, because the wizard detected that the currently selected step is part of a parent Iterator that is already using the \(j\) index variable. We can then choose to iterate through each **OBR.16** field instead of on each OBR segment:
After clicking **OK**, the step will now be placed inside a new nested Iterator. You can see from the below screenshot that OBR.16.1 is being mapped into PV1.9.1, but now it's being done for each OBR segment, and in turn for each OBR.16 field repetition.

### Removing From Iterators

If you decide later that a rule or step shouldn't be part of an Iterator, it's easy to undo those changes. Select the rule or step, and click the **Remove From Iterator** task. The rule/step will be moved one level higher in the tree. So if the rule/step is currently nested under multiple Iterators, click the task multiple times until it's at the depth you want.

### Viewing Generated Script

For all rule / step types, the properties panel shown in the bottom half of the screen is actually split up into two tabs: **Rule/Step**, and **Generated Script**. Clicking on the Generated Script tab shows the equivalent JavaScript that will execute when your channel is deployed and a message is sent through:

---

**December 19, 2018**
The script pane is not editable, but you can still select code and expand/collapse code folds. As shown in the screenshot above, selecting an Iterator rule/step will show you the script for the Iterator and all of its children at once.

**External Script rules/steps are an exception and will not** show the actual script that resides on the server:

- **Step 1**: Generated Script
  - var _mrrArray = Lists.list();
  - for (var i = 0; i < getArrayOrNlArrayLength(msg['PID']); i++) {
  -   for (var j = 0; j < getArrayOrNlArrayLength(msg['PID'][i]['PID.3']); j++) {
  -     var mapping;
  -     try {
  -       mapping = msg['PID'][i]['PID.3'][j]['PID.3.1'].toString();
  -       catch (e) {
  -         logger.error(e);
  -         mapping = '';
  -       }
  -       _mrrArray.add(validate(mapping, '', new Array()));
  -     }
  -   }
  -   charnUMap.put('mrrArray', _mrrArray.toArray());

- **Step 2**: External Script
  - // External script will be loaded on deploy
  - // Path: /folders/scripts/load-providers.js

**Filter Tasks**

---

Revised: 12/19/2018
Copyright ©2018 QSI Management, LLC. All Rights Reserved.
Private and Confidential - Do No Distribute.
The following context-specific tasks are available throughout the Edit Filter View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add New Rule</td>
<td>Add New Rule</td>
<td>Adds a new filter rule to the table. If an Iterator rule or any rule that is a child of an Iterator is currently selected, the new rule will be placed at the end of the children of the most immediate parent Iterator. Otherwise, the new rule will be placed at the very end of the list at the bottom of the table.</td>
</tr>
<tr>
<td>Delete Rule</td>
<td>Delete Rule</td>
<td>Removes the currently selected rule from the table. If an Iterator rule is deleted, all of its children will be deleted as well.</td>
</tr>
<tr>
<td>Assign To Iterator</td>
<td>Assign To Iterator</td>
<td>Adds the selected rule to a new or existing Iterator. For additional information, see Working With Iterators.</td>
</tr>
<tr>
<td>Remove From Iterator...</td>
<td>Remove From Iterator</td>
<td>Removes the selected rule from its current Iterator. For additional information, see Working With Iterators.</td>
</tr>
<tr>
<td>Import Filter</td>
<td>Import Filter</td>
<td>Imports a filter from an XML file. You can choose to completely replace the current filter, or simply append the rules to the current table.</td>
</tr>
<tr>
<td>Export Filter</td>
<td>Export Filter</td>
<td>Exports the current filter (all rules) to an XML file.</td>
</tr>
<tr>
<td>Validate Filter</td>
<td>Validate Filter</td>
<td>Validates the entire filter and all rules. This includes property validation as well as script syntax validation.</td>
</tr>
</tbody>
</table>
### Validate Rule
Validates the currently selected rule. This includes property validation and script syntax validation.

### Move Rule Up
Moves the currently selected rule one slot higher in the table. If the rule is inside of an Iterator and is currently the first rule in the Iterator's children, this task will move the rule up and **out of** the Iterator, similar to the *Remove From Iterator* task. For additional information, see *Working With Iterators*.

### Move Rule Down
Moves the currently selected rule one slot lower in the table. If the rule is inside of an Iterator and is currently the last rule in the Iterator's children, this task will move the rule down and **out of** the Iterator, similar to the *Remove From Iterator* task. For additional information, see *Working With Iterators*.

### Import Filter
When this task is clicked, you'll be presented with a prompt:

![Select an Option](image)

Would you like to append the rules from the imported filter into the existing filter?

- **Yes**
- **No**

If **Yes** is chosen, the rules from the filter will be added at the end of the current list at the bottom of the table. If **No** is chosen, all rules currently in the table will be deleted and replaced with the rules from the imported filter.

### Transformer Tasks

---

*December 19, 2018*
The following context-specific tasks are available throughout the **Edit Transformer View**:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Add New Step" /></td>
<td>Add New Step</td>
<td>Adds a new transformer step to the table. If an Iterator step or any step that is a child of an Iterator is currently selected, the new step will be placed at the end of the children of the most immediate parent Iterator. Otherwise, the new step will be placed at the very end of the list at the bottom of the table.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Step" /></td>
<td>Delete Step</td>
<td>Removes the currently selected step from the table. If an Iterator step is deleted, all of its children will be deleted as well.</td>
</tr>
<tr>
<td><img src="image" alt="Assign To Iterator" /></td>
<td>Assign To Iterator</td>
<td>Adds the selected step to a new or existing Iterator. For additional information, see <a href="#">Working With Iterators</a>.</td>
</tr>
<tr>
<td><img src="image" alt="Remove From Iterator" /></td>
<td>Remove From Iterator</td>
<td>Removes the selected step from its current Iterator. For additional information: <a href="#">Working With Iterators</a></td>
</tr>
<tr>
<td><img src="image" alt="Import Transformer" /></td>
<td>Import Transformer</td>
<td>Imports a transformer from an XML file. You can choose to completely replace the current transformer, or simply append the steps to the current table.</td>
</tr>
<tr>
<td><img src="image" alt="Export Transformer" /></td>
<td>Export Transformer</td>
<td>Exports the current transformer (inbound/outbound data types and all steps) to an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Validate Transformer" /></td>
<td>Validate Transformer</td>
<td>Validates the entire transformer and all steps. This includes property validation and script syntax validation.</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Validate Step</td>
<td>Validates the currently selected step. This includes property validation and script syntax validation.</td>
<td></td>
</tr>
<tr>
<td>Move Step Up</td>
<td>Moves the currently selected step one slot higher in the table. If the step is inside of an Iterator and is currently the first step in the Iterator's children, this task will move the step up and out of the Iterator, similar to the Remove From Iterator task. For additional information, see Working With Iterators.</td>
<td></td>
</tr>
<tr>
<td>Move Step Down</td>
<td>Moves the currently selected step one slot lower in the table. If the step is inside of an Iterator and is currently the last step in the Iterator's children, this task will move the step down and out of the Iterator, similar to the Remove From Iterator task. For additional information, see Working With Iterators.</td>
<td></td>
</tr>
</tbody>
</table>

**Import Transformer**

When this task is clicked, you'll be presented with a prompt:

Select an Option

Would you like to append the steps from the imported transformer into the existing transformer?

Yes  No

If Yes is chosen, the steps from the filter will be added at the end of the current list at the bottom of the table. If No is chosen, all steps currently in the table will be replaced with the steps from the imported filter, and the inbound / outbound data type / template settings will be overwritten.

December 19, 2018
Edit Global Scripts View

This view is similar to the Scripts Tab in the Edit Channel View, except that the scripts here are global across all channels.

Navigation

Click the Channels link in the Mirth Connect task pane at the top-left to enter the Channels View:

Click the Edit Global Scripts task to the left:

Editing Global Scripts

Select a script type from the drop down and edit the script in the text area below. The Reference List on the right for easy drag-and-drop of common helper methods / code templates.
The following global script types can be edited:

- **Deploy Script**: This script executes once whenever any channel or set of channels is deployed. You have access to the global / configuration maps here. Typically this script is used to perform a one-time operation, like load a properties file from disk, or instantiate a database connection.

- **Undeploy Script**: This script executes once whenever any channel or set of channels is undeployed. You have access to the global / configuration maps here. Typically this script is used to cleanup any data created from the deploy script, such as closing a database connection.

- **Preprocessor Script**: This script applies across all channels, and executes once for every message, after the attachment handler has run but before the message reaches the source filter/transformer. You have access to "message", a string variable containing the incoming data. Whatever you return from the preprocessor script will be stored as the Processed Raw content and used to feed into the source filter/transformer. First the global preprocessor will be executed, and then the channel-level preprocessor.

- **Postprocessor Script**: This script applies across all channels, and executes once for every message, after all destinations have completed processed (not including queued messages which are processed asynchronously). You have access to "message", which is an ImmutableMessage object containing information about the state of all connector messages. The channel-level postprocessor script will execute first, and then the global postprocessor. If the channel-level postprocessor returned a response, that will be available as the variable "response" in the global postprocessor. This script may be used as a general tool to perform a custom cleanup script. It can also be used to return a custom response that may be sent back to the originating system.

### Tasks

The following context-specific tasks are available:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save Scripts</td>
<td>Save Scripts</td>
<td>Saves all global scripts.</td>
</tr>
<tr>
<td>Validate Script</td>
<td>Validate Script</td>
<td>Validates the currently viewed script, ensuring that there are no syntax errors.</td>
</tr>
<tr>
<td>Import Scripts</td>
<td>Import Scripts</td>
<td>Imports all global scripts from an XML file.</td>
</tr>
<tr>
<td>Export Scripts</td>
<td>Export Scripts</td>
<td>Exports all global scripts to an XML file.</td>
</tr>
</tbody>
</table>

December 19, 2018
Edit Code Templates View

A code template is a function or snippet of code that can be used across multiple channels. A code template library is a group of code templates that is linked to one or more channels. When a library is linked to a channel, all code templates in the library will be available to the channel. This view is where code templates and libraries are configured for your Mirth Connect server.

Navigation

Click the Channels link in the Mirth Connect task pane at the top-left to enter the Channels View:

Click the Edit Code Templates link in the Channel Tasks task pane to the left:
This section is separated into the following topics:

- Code Template Library Table
- Edit Library Panel
- Edit Code Template Panel
- Code Template Tasks

Code Template Library Table

The table in the top section of the Edit Code Templates View shows all currently configured code templates and libraries. The name column is displayed as a tree, showing libraries at the hierarchical top level, and all child code templates at a lower level. The filter field at the bottom allows you to easily filter down to a particular code template or library by typing in all or part of the name. The status label to the left of the filter displays how many total code templates / libraries are configured, and how many are currently shown with the given filter. For additional information on tables in Mirth Connect, see Mirth Connect Administrator.

<table>
<thead>
<tr>
<th>Code Template Library Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of the code template or library. This column is displayed as a tree, showing libraries at the hierarchical top level, and all child code templates at a lower level. <strong>Double-click on this column</strong> to edit the name.</td>
</tr>
<tr>
<td>Id</td>
<td>additional</td>
</tr>
<tr>
<td>Type</td>
<td>Only applicable for code templates, this is the type of template (Function, Drag-and-Drop Code Block, Compiled Code Block). For more information, see Edit Code Template Panel.</td>
</tr>
</tbody>
</table>
Description | A description for the code template or library.
Revision | The current revision for the code template or library. When code templates are modified in any way and saved, the revision is incremented. When libraries are modified in any way or when any code template is added or removed from the library and then saved, the library revision is incremented.
Last Modified | The timestamp at which the code template or library was last updated.

**Edit Library Panel**

When any library is selected in the Code Template Library Table, the Edit Library Panel is shown below. This allows you to change the description of the library, and decide which channels to include the library in.

**Linking Libraries to Channels**

In order to use code templates within channels, the library must be linked to the channel. This is important because it allows you to "namespace" your code so that the same function name may appear in multiple libraries but serve different purposes. It also allows a degree of isolation, so that a particularly expensive code template need not be included in all channels, but instead only in the channels it needs to be. To edit the links between code template libraries and channels, use the Channels table on the right-hand side of this panel:
The [New Channels] check box indicates that the library should be included not only for the currently checked channels, but also on all new channels that get created later. For example if you have a library that you wish to always include on all channels no matter what, check this option.

Note that these links are the same as what is configured in the Code Template Libraries dependency tab in the Summary Tab of the Edit Channel View.

Edit Code Template Panel

When any code template is selected in the table above, the Edit Code Template Panel is shown below. This allows you to change which library it belongs to, the type of template, which contexts to include the code in, and the actual code.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Library</td>
<td>The library that the current code template belongs to.</td>
</tr>
<tr>
<td>B</td>
<td>Type</td>
<td>The type of code template to create.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Function</strong>: The template will be compiled in with scripts, and the drag-and-drop will include the function signature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>Drag-and-Drop Code Block</strong>: The template will not be compiled in with scripts, and the drag-and-drop will include the entire code block verbatim (except for the initial documentation block). Use this option for snippets of boilerplate code.</td>
</tr>
</tbody>
</table>
code you can drag into JavaScript scripts.

- **Compiled Code Block**: The template will be compiled in with scripts, but drag-and-drop will not be available at all. Use this to declare initial variables or anything else you want to have executed at the beginning of your scripts.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Code</td>
<td>The actual code to use. At the top of the code you may optionally provide a JSDoc comment block explaining the purpose and function of the template. This comment will be shown as the description for the template.</td>
</tr>
<tr>
<td>D</td>
<td>Context</td>
<td>Select which scripts should have access to this code template. Limiting contexts to only those scripts where a code template is actually needed can help optimize memory usage. For additional information, see Code Template Contexts.</td>
</tr>
<tr>
<td>E</td>
<td>Update JSDoc</td>
<td>Generates / updates a JSDoc at the beginning of your code, with parameter / return annotations as needed. For additional information, see Using JSDoc in Code Templates.</td>
</tr>
</tbody>
</table>

### Code Template Contexts

![Code Template Contexts Diagram]

Similar to how a code template library can be included only on specific channels, code templates can further be isolated to specific scripts. This can be helpful for ensuring that there are no conflicts between function names, and also for better memory usage, since not all code templates need to be compiled in with all scripts across your entire...
server. The script contexts are organized into groups, allowing you to easily include a code template in, for example, all global scripts, in a single click. The following groups are displayed:

- **Global Scripts**: The global deploy/undeploy/preprocessor/postprocessor scripts, not specific to any particular channel. For additional information, see Edit Global Scripts View.
- **Channel Scripts**: The channel-level deploy/undeploy/preprocessor/postprocessor scripts (more info here), as well as the JavaScript Attachment Handler and JavaScript Batch Adapter (for additional information, see Data Types).
- **Source Connector**: The source filter/transformer script, and any script associated with the source connector. Examples of this include the JavaScript Reader, Database Reader (in JavaScript mode), and the JavaScript HTTP Authentication script.
- **Destination Connector**: The destination filter/transformer script, the response transformer, and any script associated with the destination connector. Examples of this include the JavaScript Writer and Database Writer (in JavaScript mode).

### Using JSDoc in Code Templates

A JSDoc is a type of comment block used to annotate JavaScript scripts. For code templates in Mirth Connect, this is used not only for good documentation, but also for the code template description and the information that shows up in the auto-completion dialog in the JavaScript Editor.

When you create a new code template, a sample JSDoc is created for you:

![JSDoc in Code Templates](image)

The first portion of the comment block is used for the description of the code template, and may contain multiple lines and blank lines. Following that, you can include any JSDoc annotations, your own custom annotations, or whatever you want, as long as it follows correct JavaScript syntax. Only the following annotations are recognized by Mirth Connect for the purpose of populating the auto-completion dialog in the JavaScript Editor:

- **@param**: Documents the input arguments for your function, in the order that they appear. If you have multiple function arguments, you will want to add multiple @param annotations. The format is:

  ```
  @param {Type} Name - Description
  ```

  Note that the type doesn't have to be an actual JavaScript type. It can be anything you want as long as it doesn't contain the "({}" characters, like "MyObject", "String/Number", etc.

- **@return**: Documents the return value for your function, if applicable. The format is:

  ```
  @return Description
  ```

If you change the names or number of arguments in your function, you can use the Update JSDoc button at the bottom of the editor. This will automatically inject or update @param annotations as needed. You will also need to change the Type and Description as needed.
Once you’ve filled out your JSDoc appropriately, the function will appear in the auto-completion dialog accessible from the JavaScript Editor:

The following context-specific tasks are available throughout the Edit Code Templates View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Refresh</td>
<td>Refreshes the list of code</td>
</tr>
<tr>
<td></td>
<td>NextGen Connect User Guide</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Refresh" /></td>
<td>Refresh</td>
<td>refreshes templates / libraries. If there are unsaved changes, you will be prompted to save first before refreshing.</td>
</tr>
<tr>
<td><img src="image" alt="Save Changes" /></td>
<td>Save Changes</td>
<td>saves all changes made to templates / libraries. Changes to a code template will cause its revision to increment. Changes to a library, or adding/removing code templates to/from the library, will cause its revision to increment.</td>
</tr>
<tr>
<td><img src="image" alt="New Code Template" /></td>
<td>New Code Template</td>
<td>creates a new code template in the currently selected library. If there are currently no libraries configured for your server, you must first create a new library before this task will become available.</td>
</tr>
<tr>
<td><img src="image" alt="New Library" /></td>
<td>New Library</td>
<td>creates a new code template library and adds it to the table. By default the library will not be included in any channels. Use the Channels table in the Edit Library Panel to link the library to specific channels.</td>
</tr>
<tr>
<td><img src="image" alt="Import Code Templates" /></td>
<td>Import Code Templates</td>
<td>imports a single code template or a list of code templates from an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Import Libraries" /></td>
<td>Import Libraries</td>
<td>imports a single code template library or a list of libraries (including any code templates within) from an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Export Code Template" /></td>
<td>Export Code Template</td>
<td>exports the currently selected code template to an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Export Library" /></td>
<td>Export Library</td>
<td>exports the currently selected code template library to an XML file.</td>
</tr>
<tr>
<td><img src="image" alt="Export All Libraries" /></td>
<td>Export All Libraries</td>
<td>exports all libraries in the table to separate XML files.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Code Template" /></td>
<td>Delete Code Template</td>
<td>deletes the currently selected code template, removing it from the table.</td>
</tr>
<tr>
<td><img src="image" alt="Delete Library" /></td>
<td>Delete Library</td>
<td>deletes the currently selected code template library, and all code templates belonging to the library.</td>
</tr>
<tr>
<td><img src="image" alt="Validate Script" /></td>
<td>Validate Script</td>
<td>validates the currently selected code template, ensuring that all properties are valid, and that the actual code has proper syntax.</td>
</tr>
</tbody>
</table>
Importing Code Templates / Libraries

When importing code templates / libraries, either in the Edit Code Templates View or when importing a channel containing libraries, you’ll be presented with a confirmation dialog.

All libraries and code templates contained in the import file/channel will be displayed in the dialog. From here you can choose to import everything, or individually select specific entries to import. Once you’ve made your selections, click the Import button to actually perform the import operation.

- If a code template or library already exists in your Mirth Connect server, you will see the Overwrite column display a checkbox. If checked, the entry will overwrite the current code template / library rather than creating a new one. If there are multiple entries with such conflicts, you can easily choose to overwrite all or none of them with the All / None links at the top-right of the dialog.
- If the library or code template has a name that conflicts with another entry in your current table, you will see the Conflicts column show a red error icon. In this case, you must choose to either overwrite the current entry, or update its name by double-clicking on the Name column.
- If a code template already exists in a different library than the one you’re trying to import into, you’ll see a yellow warning icon. In this case, you can choose to overwrite the current template, ignore the warning and continue, or simply cancel the operation.

When importing just code templates by themselves, you must first select a library to import them into:
Please select a parent library in order to import the selected code template.
Edit Alert View

An alert is a process that listens for certain types of events and triggers based on configurable settings. From these triggers you can take various actions, like dispatching an e-mail to a user or specific address, or sending a message to a channel. Mirth Connect comes with a built-in Error-based alerting system that listens for error events from selected channels. The Advanced Alerting extension adds on this by also including powerful metric-based alerts, escalation levels, scheduling, notification throttling, and other advanced features.

The Edit Alert view is where alerts are configured / modified. Once saved, an alert will be displayed on the Alerts View, which is like a dashboard for your currently configured alerts.

Navigation

Click the Alerts link in the Mirth Connect task panel at the upper-left:

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Select the alert you want to edit, and click the Edit Alert task in the panel on the left:

OR, simply double-click the alert from the Alerts Table.

This section is separated into the following topics:

- Alert Error Types and Regex
- Alert Enabled Channels
- Alert Actions
- Edit Alert Tasks

Alert Error Types and Regex

This section of the Edit Alert View allows you to decide what type of errors you want your alert to trigger on. This includes choosing among categories of error types, and optionally using a regular expression that only allows events whose error source, error message, or exception stacktrace matches to cause an alert trigger to occur.
Alert Error Categories

- **Any**: Select this option to trigger on all error categories.
- **Source Connector**: An error that originated from the source connector during deploy/start, receiving a message, or sending a response.
- **Destination Connector**: An error that originated from a destination connector during deploy/start, dispatching a message, or receiving a response.
- **Serializer**: An error that originated from the source or destination filter/transformer script, specifically when serializing the message to the internal representation (e.g. XML), or deserializing the message to the outbound data type format.
- **Filter**: An error that originated from a source or destination filter rule.
- **Transformer**: An error that originated from a source or destination transformer step.
- **User Defined Transformer**: An error that originated from a user-defined call to AlertSender (alerts.sendAlert) from any script. For additional information, see [The User API (Javadoc)](https://example.com).
- **Response Validation**: An error that originated from a destination connector after a response has been received, when the response fails validation. For example, an HL7 v2.x negative acknowledgement (NACK).
- **Response Transformer**: An error that originated from a destination connector response transformer step.
- **Attachment Handler**: An error that originated from an Attachment Handler.
- **Deploy Script**: An error that originated from a channel deploy script.
- **Preprocessor Script**: An error that originated from a global or channel preprocessor script.
- **Postprocessor Script**: An error that originated from a global or channel postprocessor script.
- **Undeploy Script**: An error that originated from a channel undeploy script.

Alert Enabled Channels

This section of the Edit Alert View allows you to decide which channels and connectors may trigger an alert. You can choose to, for example, only listen for error events coming from source connectors, and ignore those coming from destination connectors.
The [New Channels] option indicates that you want an alert to listen for error events on any new channels that are created for a channel after the alert was initially created. Similarly, the [New Destinations] option indicates that you want an alert to listen for error events on any new destinations that are created for a channel after the alert was initially created.

### Alert Actions

This section of the Edit Alert View allows you to decide what actions to take after your alert has been triggered. You can take multiple actions all at once for a single trigger event, which may include sending e-mails to multiple users and dispatching messages to multiple channels.

### Alert Variables

- **alertId**: The unique ID of the alert.
- **alertName**: The name of the alert.
- **serverId**: The unique ID of the server.
- **globalMapVariable**: Indicates that you can use any variable in the global or configuration maps.
- **date**: The current date, formatted as a human-readable string.
- **systemTime**: The current epoch time in milliseconds.
- **error**: The full error message, including (where applicable) the source code, line number, and error details.

---

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errorMessage: If an exception is associated with the error event, this will be the message or detail of the exception.
errorType: The category of the error. For additional information, see Alert Error Types and Regex.
channelId: The ID of the channel associated with the error, if applicable.
channelName: The name of the channel associated with the error, if applicable.
connectorName: The name of the connector associated with the error, if applicable.
connectorType: The type of the connector associated with the error, if applicable.
messageId: The ID of the message associated with the error, if applicable.

Edit Alert Tasks

The following context-specific tasks are available throughout the Edit Alert View:

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Save Alert]</td>
<td>Save Alert</td>
<td>Saves all changes made to the current alert. If the alert is enabled, it will automatically be listening for new events to trigger on. Note that since many alerts rely on dispatching e-mails, you will be warned if your global SMTP settings aren't configured on the Server Settings Tab.</td>
</tr>
<tr>
<td>![Export Alert]</td>
<td>Export Alert</td>
<td>Exports the current alert to an XML file.</td>
</tr>
</tbody>
</table>
### Other Tasks

The following tasks are available at any time at the bottom-left of the task pane throughout the Mirth Connect Administrator.

<table>
<thead>
<tr>
<th>Task Icon</th>
<th>Task Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>📨 🎨</td>
<td>Notifications</td>
<td>View all notifications received from Mirth Connect headquarters. This allows you to be notified when there is a new version of Mirth Connect available, or for other news. The number shown in this task indicates how many unread or unarchived notifications you currently have. For additional information, see Notifications.</td>
</tr>
<tr>
<td>📐</td>
<td>View User API</td>
<td>Opens the User API (Javadoc) documentation in your default browser.</td>
</tr>
<tr>
<td>📐</td>
<td>View Client API</td>
<td>Open the Mirth Connect REST API documentation in your default browser.</td>
</tr>
<tr>
<td>🕵️</td>
<td>Help</td>
<td>Opens the Mirth Connect Wiki page in your default browser.</td>
</tr>
<tr>
<td>📞</td>
<td>About Mirth Connect</td>
<td>Opens the About dialog for Mirth Connect, which displays the current version, build date, server ID, version of Java being used, copyright information, and third-party acknowledgements. Note that the third-party libraries shown in this dialog are not an exhaustive list; look at the &quot;docs/thirdparty&quot; folder in the Installation Directory for a more complete list.</td>
</tr>
<tr>
<td>🏛️</td>
<td>Visit mirthcorp.com</td>
<td>Opens the Mirth website in your default browser.</td>
</tr>
</tbody>
</table>
Notifications

This dialog shows all messages you've received from Mirth Connect headquarters. This allows you to be notified when a new version of Mirth Connect is available, or for other news.

As you read notifications, you can choose to archive them, which means they will not show up as bold anymore, and will not be counted in the number shown in the Other Tasks pane.

By default, this dialog will automatically pop-up when logging into the Administrator if there are new items. To turn this off, open the dialog and uncheck "Show new notifications on login".

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Data Types

This section describes the various common properties configurable across data types, and specific properties for each data type. For an introduction to data types in general, see About Data Types.

Whether a data type is used as inbound or outbound, and whether it is tied to a source connector, destination connector, or destination response, affects what properties it needs. The following groups of properties may be displayed in the Set Data Types Dialog depending on the data type and context:

**Inbound Properties**

- **Serialization Properties:** Determines how to convert data from the raw inbound format to the internal representation (e.g. XML). If a data type doesn't have serialization properties present, it either doesn't need any (DICOM, JSON), or it doesn't actually do any serialization (Raw).
- **Batch Properties:** Determines how to split an incoming message into multiple messages. Only supported when Process Batch is enabled in the Source Settings. This will only be displayed for source connectors. Not all data types support batch processing (DICOM).
- **Response Generation Properties:** When an auto-generation option is chosen for the response on the Source Settings, these properties determine how to generate an automatic response. This will only be displayed for source connectors. Not all data types support automatic response generation.
- **Response Validation Properties:** Determines how to validate responses received by a destination after dispatching a message. Only supported when Validate Response is enabled in the Destination Settings. This will only be displayed for destination responses. Not all data types support automatic response generation.

**Outbound Properties**

- **Deserialization Properties:** After a transformer finishes, these properties determine how to convert data from the final internal representation (e.g. XML) into the outbound data format. If a data type doesn't have deserialization properties present, it either doesn't need any (DICOM, EDI/X12, XML, JSON) or it doesn't actually do any deserialization (Raw).
- **Template Serialization:** If an outbound template is specified for the transformer, these properties determine how to convert that template to its corresponding internal representation (e.g. XML).

Mirth Connect supports the following data types:

- Delimited Text Data Type
- DICOM Data Type
- EDI / X12 Data Type
- HL7 v2.x Data Type
- HL7 v3.x Data Type
- JSON Data Type
- NCPDP Data Type
- Raw Data Type
- XML Data Type
- Batch Processing
- JavaScript Batch Script

An additional data type is made available as a commercial extension: ASTM E1394 Data Type

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Delimited Text Data Type

The Delimited Text data type is a very powerful and flexible data type that can satisfy many common formats like CSV, but also many proprietary formats that are dependent on custom delimiters, fixed-width columns, or other nuances. The following properties are configurable:

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column Delimiter</td>
<td>,</td>
<td>If column values are delimited, enter the characters that separate columns. For example, this is a comma in a CSV file.</td>
</tr>
<tr>
<td>Record Delimiter</td>
<td>\n</td>
<td>Enter the characters that separate each record (a message may contain multiple records). For example, this is a newline (\n) in a CSV file.</td>
</tr>
<tr>
<td>Column Widths</td>
<td></td>
<td>If the column values are fixed width, enter a comma separated list of fixed column widths. By default, column values are assumed to be delimited.</td>
</tr>
<tr>
<td>Quote Token</td>
<td>&quot;</td>
<td>Enter the quote characters that are used to bracket delimit column values containing embedded special characters like column delimiters, record delimiters, quote characters and/or message delimiters. For example, this is a double quote (&quot;) in a CSV file.</td>
</tr>
<tr>
<td>Double Quote Escaping</td>
<td>Enabled</td>
<td>By default, two consecutive quote tokens within a quoted value are treated as an embedded quote token. Uncheck to enable escaped quote token processing (and specify the Escape Tokens).</td>
</tr>
<tr>
<td>Escape Token</td>
<td>\</td>
<td>Enter the characters used to escape embedded quote tokens. By default, this is a back slash. This option has no effect unless Double Quote Escaping is unchecked.</td>
</tr>
<tr>
<td>Column Names</td>
<td></td>
<td>To override the default column names (column1, ..., columnN), enter a comma separated list of column names.</td>
</tr>
<tr>
<td>Numbered Rows</td>
<td>Disabled</td>
<td>Check to number each row in the XML representation of the message.</td>
</tr>
<tr>
<td>Ignore Carriage Returns</td>
<td>Enabled</td>
<td>Ignores carriage return (\r)</td>
</tr>
</tbody>
</table>
Batch Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Batch By</td>
<td>Record</td>
<td>Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Record</strong>: Treat each record as a message. Records are separated by the record delimiter from the serialization properties.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Delimiter</strong>: Use the Batch Delimiter to separate messages.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Grouping Column</strong>: Use a column to group multiple records into a single message. When the specified column value changes, this signifies the boundary between messages.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>JavaScript</strong>: Use JavaScript to split messages. For additional information, see JavaScript Batch Script.</td>
</tr>
<tr>
<td>Number of Header Records</td>
<td>0</td>
<td>The number of header records to skip. By default, no header records are skipped.</td>
</tr>
<tr>
<td>Batch Delimiter</td>
<td></td>
<td>The delimiter that separates messages. The batch delimiter may be a sequence of characters.</td>
</tr>
<tr>
<td>Include Batch Delimiter</td>
<td>Disabled</td>
<td>Check to include the batch delimiter in the message returned by the batch processor. By default, batch delimiters are consumed.</td>
</tr>
<tr>
<td>Grouping Column</td>
<td></td>
<td>The name of the column used to group multiple records into a single message. When the specified column value changes, this signifies the boundary between messages.</td>
</tr>
<tr>
<td>JavaScript</td>
<td></td>
<td>Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a</td>
</tr>
</tbody>
</table>

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null/empty string to indicate end of input. For additional information, see JavaScript Batch Script.
DICOM Data Type

This data type works in conjunction with the DICOM Listener / DICOM Sender and the DICOM Attachment Handler to consume and transformer DICOM messages. It has no configurable data type properties, but will automatically convert binary DICOM data to and from an XML format specified by the dcm4che parser library.

Example XML snippet:

```xml
<dicom>
  <tag00020000 len="4" tag="00020000" vr="UL">212</tag00020000>
  <tag00020001 len="2" tag="00020001" vr="OB">00\01</tag00020001>
  <tag00020002 len="26" tag="00020002" vr="UI">1.2.840.10008.5.1.4.1.1.4</tag00020002>
  <tag00020003 len="60" tag="00020003" vr="UI">1.2.840.10008.1.2</tag00020003>
  <tag00020010 len="18" tag="00020010" vr="UI">1.3.46.670589.17.1</tag00020010>
  <tag00020012 len="14" tag="00020012" vr="SH">ARCVTS04NOV99</tag00020012>
  <tag00020016 len="14" tag="00020016" vr="AE">VTS_DCM_STORE</tag00020016>
  <tag00080005 len="10" tag="00080005" vr="CS">ISO_IR 100</tag00080005>
  <tag00080008 len="26" tag="00080008" vr="CS">ORIGINAL\PRIMARY\M_SE\M\SE</tag00080008>
</dicom>
```

Each node in the XML document contains the attribute length, tag code, value representation, and actual value. These can be used or modified within transformers, and the DICOM data type will automatically convert the finished XML to the native DICOM binary format.
ED1 / X12 Data Type

This data type handles both UN/EDIFACT and ASC X12 data formats, as well as custom formats similar to EDI / X12 that use a segment / element / subelement delimiter.

### Serialization / Template Serialization / Deserialization Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Delimiter</td>
<td>~</td>
<td>Characters that delimit the segments in the message.</td>
</tr>
<tr>
<td>Element Delimiter</td>
<td>*</td>
<td>Characters that delimit the elements in the message.</td>
</tr>
<tr>
<td>Subelement Delimiter</td>
<td>:</td>
<td>Characters that delimit the subelements in the message.</td>
</tr>
<tr>
<td>Infer X12 Delimiters</td>
<td>Enabled</td>
<td>This property only applies to X12 messages. If checked, the delimiters are inferred from the incoming message and the delimiter properties will not be used.</td>
</tr>
</tbody>
</table>

### Batch Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Batch By</td>
<td>JavaScript</td>
<td>Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>JavaScript</strong>: Use JavaScript to split messages. For additional information, see JavaScript Batch Script.</td>
</tr>
<tr>
<td></td>
<td>JavaScript</td>
<td>Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see JavaScript Batch Script.</td>
</tr>
</tbody>
</table>
HL7 v2.x Data Type

This data type allows powerful and flexible parsing and manipulation of HL7 v2.x messages. It features two modes, strict and non-strict. The strict mode parses messages into and from XML according to the official XSD, and allows automatic validation against the HL7 specifications. The non-strict mode parses messages into a simple, consistent XML structure consisting of the segment/field/component/subcomponent hierarchy, and allows quick and easy transformation in most use-cases.

The data type also features an automatic response (ACK) generator, and a response validator that can mark messages as failed when a negative acknowledgement is received or when the message control IDs don't match. It also has a batch adapter that can split messages based on the MSH segment, even while streaming over a TCP connection.

<table>
<thead>
<tr>
<th>Serialization / Template Serialization / Deserialization Properties</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parse Field Repetitions</td>
<td>Enabled</td>
<td></td>
<td>Parse field repetitions (applies to Non-Strict Parser only).</td>
</tr>
<tr>
<td>Parse Subcomponents</td>
<td>Enabled</td>
<td></td>
<td>Parse subcomponents (applies to Non-Strict Parser only).</td>
</tr>
<tr>
<td>Use Strict Parser</td>
<td>Disabled</td>
<td></td>
<td>Parse messages based upon strict HL7 specifications.</td>
</tr>
<tr>
<td>Validate in Strict Parser</td>
<td>Disabled</td>
<td></td>
<td>Validate messages using HL7 specifications (applies to Strict Parser only).</td>
</tr>
<tr>
<td>Strip Namespaces</td>
<td>Enabled</td>
<td></td>
<td>Strips namespace definitions from the transformed XML message (applies to Strict Parser only).</td>
</tr>
<tr>
<td>Segment Delimiter</td>
<td>\r</td>
<td></td>
<td>This is the input delimiter character(s) expected to occur after each segment.</td>
</tr>
<tr>
<td>Convert Line Breaks</td>
<td>Enabled</td>
<td></td>
<td>Convert all styles of line breaks (CRLF, CR, LF) in the raw message to the segment delimiter.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Batch Properties</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Split Batch By</td>
<td>MSH Segment</td>
<td>Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>MSH Segment</strong>: Each MSH Segment indicates the start of a new message in the batch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- <strong>JavaScript</strong>: Use JavaScript to split messages. For additional information, see JavaScript Batch Script.</td>
</tr>
<tr>
<td><strong>JavaScript</strong></td>
<td>Enter JavaScript that splits the batch, and returns the next message. This script has access to <code>reader</code>, a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see JavaScript Batch Script.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment Delimiter</td>
<td>'r'</td>
<td>These are the delimiter character(s) that will be used after each segment. This option has no effect unless an &quot;Auto-generate&quot; item has been selected in the response settings.</td>
</tr>
<tr>
<td>Successful ACK Code</td>
<td>AA</td>
<td>The ACK code to respond with when the message processes successfully. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>Successful ACK Message</td>
<td></td>
<td>The ACK message to respond with when the message processes successfully. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>Error ACK Code</td>
<td>AE</td>
<td>The ACK code to respond with when an error occurs during message processing. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>Error ACK Message</td>
<td>An Error Occurred Processing Message.</td>
<td>The ACK message to respond with when an error occurs during message processing. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>Rejected ACK Code</td>
<td>AR</td>
<td>The ACK code to respond with when the message is filtered. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>Rejected ACK Message</td>
<td>Message Rejected.</td>
<td>The ACK message to respond with when the message is filtered. This value supports Velocity Variable Replacement with values from the current connector message.</td>
</tr>
<tr>
<td>MSH-15 ACK Accept</td>
<td>Disabled</td>
<td>This setting determines if Mirth should check the MSH-15 field of an incoming message to control the acknowledgment conditions. The MSH-15 field specifies if a message should be always acknowledged, never acknowledged, or only acknowledged on error.</td>
</tr>
</tbody>
</table>
### Date Format

| Date Format     | yyyyMMddHHmmss.SSS | This setting determines the date format used for the timestamp in the generated ACK. The default value is "yyyyMMddHHmmss.SSS". |

### Response Validation Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful ACK Codes</td>
<td>AA,CA</td>
<td>The ACK code(s) to expect when the message is accepted by the downstream system. By default, the message status will be set to SENT. Specify multiple codes with a list of comma separated values.</td>
</tr>
<tr>
<td>Error ACK Codes</td>
<td>AE,CE</td>
<td>The ACK code(s) to expect when an error occurs on the downstream system. By default, the message status will be set to ERROR. Specify multiple codes with a list of comma separated values.</td>
</tr>
<tr>
<td>Rejected ACK Codes</td>
<td>AR,CR</td>
<td>The ACK code(s) to expect when the message is rejected by the downstream system. By default, the message status will be set to ERROR. Specify multiple codes with a list of comma separated values.</td>
</tr>
<tr>
<td>Validate Message Control Id</td>
<td>Enabled</td>
<td>Select this option to validate the Message Control Id (MSA-2) returned from the response.</td>
</tr>
<tr>
<td>Original Message Control Id</td>
<td>Destination Encoded</td>
<td>Select the source of the original Message Control Id used to validate the response. If Destination Encoded is selected, the Id will be extracted from the MSH-10 field of the destination's encoded content. If Map Variable is selected, the Id will be retrieved from the destination's connector map or the channel map.</td>
</tr>
<tr>
<td>Original Id Map Variable</td>
<td></td>
<td>This field must be populated if the Original Message Control Id is set to Map Variable. The Id will be read from this variable in the destination's connector map or the channel map.</td>
</tr>
</tbody>
</table>
HL7 v3.x Data Type

This data type handles HL7 v3.x messages. No actual serialization or deserialization is needed because the data format is the same as the internal representation format (XML), but it still has options to strip namespaces if needed.

### Serialization / Template Serialization Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip Namespaces</td>
<td>Enabled</td>
<td>Strips namespace definitions from the transformed XML message. Will not remove namespace prefixes. If you do not strip namespaces your default xml namespace will be set to the incoming data namespace. If your outbound template namespace is different, you will have to set &quot;default xml namespace = 'namespace';&quot; via JavaScript before template mappings.</td>
</tr>
</tbody>
</table>

### Batch Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| Split Batch By      | JavaScript    | Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:  
  - **JavaScript**: Use JavaScript to split messages. For additional information, see JavaScript Batch Script. |
| JavaScript          |               | Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see JavaScript Batch Script. |
JSON Data Type

This data type allows seamless integration between JSON messages and the filter/transformer scripts which are JavaScript-based. When using the JSON data type, the `msg` / `tmp` variables will be a standard JavaScript object, as opposed to an E4X XML object which some other data types use. Since JSON is a very lightweight data format, and the transition from String to JavaScript Object is all handled automatically, no serialization properties are needed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Batch By</td>
<td>JavaScript</td>
<td>Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>JavaScript</strong>: Use JavaScript to split messages. For additional information, see <a href="#">JavaScript Batch Script</a>.</td>
</tr>
<tr>
<td>JavaScript</td>
<td></td>
<td>Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see <a href="#">JavaScript Batch Script</a>.</td>
</tr>
</tbody>
</table>

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NCPDP Data Type

This data type handles the flat file format for National Council for Prescription Drug Programs (NCPDP) pharmacy data.

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Delimiter</td>
<td>0x1C</td>
<td>Characters that delimit the fields in the message.</td>
</tr>
<tr>
<td>Group Delimiter</td>
<td>0x1D</td>
<td>Characters that delimit the groups in the message.</td>
</tr>
<tr>
<td>Segment Delimiter</td>
<td>0x1E</td>
<td>Characters that delimit the segments in the message.</td>
</tr>
<tr>
<td>Use Strict Validation</td>
<td>Disabled</td>
<td>Validates the NCPDP message against the appropriate schema. Only applicable for the Deserialization properties.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| Split Batch By  | JavaScript    | Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:  
- **JavaScript**: Use JavaScript to split messages. For additional information, see JavaScript Batch Script. |
| JavaScript      |               | Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream.  
The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see JavaScript Batch Script. |
Raw Data Type

This data type allows a channel / connector to process any custom data not handled by any of the other data types. When using it, the msg / tmp variable accessible in the filter/transformer will be a String rather than an E4X XML object which some other data types use. This data type also has the special property that when used as the Response Inbound data type for a destination, the response transformer will always be executed, even if no actual response data was received. No serialization properties are needed since there is no conversion done.

<table>
<thead>
<tr>
<th>Batch Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>Split Batch By</td>
</tr>
<tr>
<td>JavaScript</td>
</tr>
<tr>
<td>JavaScript</td>
</tr>
</tbody>
</table>

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XML Data Type

This data type handles XML messages. No actual serialization or deserialization is needed because the data format is the same as the internal representation format (XML), but it still has options to strip namespaces if needed.

<table>
<thead>
<tr>
<th>Serialization / Template Serialization Properties</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Default Value</td>
<td>Description</td>
</tr>
<tr>
<td>Strip Namespaces</td>
<td>Enabled</td>
<td>Strips namespace definitions from the transformed XML message. Will not remove namespace prefixes. If you do not strip namespaces your default xml namespace will be set to the incoming data namespace. If your outbound template namespace is different, you will have to set &quot;default xml namespace = 'namespace';&quot; via JavaScript before template mappings.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Batch Properties</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Default Value</td>
<td>Description</td>
</tr>
<tr>
<td>Split Batch By</td>
<td>JavaScript</td>
<td>Select the method for splitting the batch message. This option has no effect unless Process Batch is enabled in the Source Settings. The following options are available:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• JavaScript: Use JavaScript to split messages. For additional information, see JavaScript Batch Script.</td>
</tr>
<tr>
<td>JavaScript</td>
<td></td>
<td>Enter JavaScript that splits the batch, and returns the next message. This script has access to 'reader', a Java BufferedReader, to read the incoming data stream. The script must return a string containing the next message, or a null/empty string to indicate end of input. For additional information, see JavaScript Batch Script.</td>
</tr>
</tbody>
</table>
Batch Processing

Batch Processing allows a channel to receive a single message, but split it into multiple messages that each get processed through the channel. When using this along with a source connector that supports streaming (File Reader, TCP Listener in MLLP mode), batch processing has the added benefit of not having to read the entire file into memory all at once, but instead only one message at a time. For example with the File Reader and batch processing you can read in files that are gigabytes in size, without causing any memory issues for your Mirth Connect server. Data types that support batch processing will have a Batch Properties section in the source inbound data type properties.

To enable batch processing, set Process Batch to Yes in the Source Settings. To change how an incoming message is split into multiple messages, look at the Batch Properties section of the source inbound data type you’re using. For example, the Delimited Text Data Type has options to split by record delimiter, a specific hard-coded delimiter, a grouping column, or a custom JavaScript script.

When batch messages are processing through a channel, some extra Source Map variables are available:

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>batchId</td>
<td>This is a unique ID that identifies the current overall batch file/message. It will be equal to the message ID of the first message that gets processed for the current batch. For example if you read in a single file and your batch processor splits it into 5 messages, all 5 of those messages will have the same batchId value in the source map.</td>
</tr>
<tr>
<td>batchSequenceId</td>
<td>This is an integer that starts at 1 and increments for each subsequent message in the batch.</td>
</tr>
<tr>
<td>batchComplete</td>
<td>This is a boolean value, equal to either true or false. It indicates whether the currently processing message is the last one in the current batch.</td>
</tr>
</tbody>
</table>

JavaScript Batch Script

The JavaScript batch adapter is an option common to almost all data types. When Process Batch is enabled on the Source Settings, you can set this script from the Set Data Types Dialog to programmatically decide how to split the incoming data into multiple messages.

Within the batch script you have access to a variable called "reader", which is a Java BufferedReader object. Use this variable to consume from the underlying character stream and return a String for each message you want to process through the channel. When you decide that no more messages should be processed, or you reach the end of the stream, return null or an empty string.

**Example 1**

This script will simply send a message for every line in the input.

```java
return reader.readLine();
```

**Example 2**

This script will simply send a message for every line in the input.
This script will split the input into multiple messages by assuming that each new message starts with a line break and the characters "MSH". Note that this is already a feature supported by the HL7 v2.x Data Type, but is shown here to illustrate how the batch script can be used.

```java
var message = new java.lang.StringBuilder();

var line;
while ((line = reader.readLine()) != null) {
    message.append(line).append('');

    // Mark the stream for 3 characters while we check for MSH
    reader.mark(3);
    // Check for the code points corresponding to MSH
    if (reader.read() == 77 && reader.read() == 83 && reader.read() == 72) {
        reader.reset();
        break;
    }
    reader.reset();
}

return message.toString();
```
Source Connectors

This section refers to the actual connector-specific settings for the source connector. The section is labeled according to the connector type, e.g. "HTTP Listener", "JavaScript Reader". For more information on connectors in general, go here: About Channels and Connectors

Here is a list of source connectors supported by Mirth Connect:

- Channel Reader
- DICOM Listener
- Database Reader
- File Reader
- HTTP Listener
- JMS Listener
- JavaScript Reader
- TCP Listener
- Web Service Listener

Additional source connectors are made available as commercial extensions:

- Email Reader
- Serial Connector

Channel Reader

The Channel Reader is a connector that does nothing but wait for other channels / processes to send it messages. This can be useful if you split your message workflow into multiple channels, where one sends to another. Note that you do not need to use a Channel Reader source for the channel to be able to receive messages from other internal channels / processes. Channels using other source connector types can still receive messages from a Channel Writer or from a "router.routeMessage" call.

Supported property groups:

- Source Settings

### Source Map Variables

If this connector receives a message from a Channel Writer, the following source map variables will be available:

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceChannelId</td>
<td>The unique ID of the channel that dispatched a message to the current channel.</td>
</tr>
<tr>
<td>sourceMessageId</td>
<td>The ID of the message from which the current message dispatch originated.</td>
</tr>
<tr>
<td>sourceChannelIds</td>
<td>If there are more than two Channel Writer -&gt; Reader chain, this will be a List containing</td>
</tr>
<tr>
<td>sourceMessageIds</td>
<td>If there are more than two channels in a Channel Writer -&gt; Reader chain, this will be a List containing the IDs of all messages in the chain.</td>
</tr>
</tbody>
</table>
DICOM Listener

This source connector works in conjunction with the DICOM Attachment Handler and the DICOM Data Type to allow Mirth Connect to receive and consume DICOM data. This connector supports the C-STORE operation as a Service Class Provider (SCP). Additional options are available with the SSL Manager extension.

Supported property groups:

- Listener Settings
- Source Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Application Entity</td>
<td></td>
<td>If specified, only requests with a matching Application Entity title will be accepted.</td>
</tr>
<tr>
<td>B</td>
<td>Max Async operations</td>
<td>0</td>
<td>Maximum number of outstanding operations performed asynchronously, unlimited by default.</td>
</tr>
<tr>
<td>C</td>
<td>Pack PDV</td>
<td>No</td>
<td>Send only one PDV in one P-Data-TF PDU, pack command and data PDF in one P-DATA-TF PDU by default.</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Value</td>
<td>Notes</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>D</td>
<td>DIMSE-RSP interval period (s)</td>
<td>10</td>
<td>Period to check for outstanding DIMSE-RSP, 10 seconds by default.</td>
</tr>
<tr>
<td>E</td>
<td>P-DATA-TF PDUs max length sent (KB)</td>
<td>16</td>
<td>Maximal length in KB of sent P-DATA-TF PDUs, 16 KB by default.</td>
</tr>
<tr>
<td>F</td>
<td>A-RELEASE-RP timeout (s)</td>
<td>5</td>
<td>Timeout for receiving A-RELEASE-RP, 5 seconds by default.</td>
</tr>
<tr>
<td>G</td>
<td>P-DATA-TF PDUs max length received (KB)</td>
<td>16</td>
<td>Maximal length in KB of received P-DATA-TF PDUs, 16 KB by default.</td>
</tr>
<tr>
<td>H</td>
<td>Socket Close Delay After A-ABORT (ms)</td>
<td>50</td>
<td>Delay in ms for Socket close after sending A-ABORT, 50 ms by default.</td>
</tr>
<tr>
<td>I</td>
<td>Send Socket Buffer Size (KB)</td>
<td>0</td>
<td>Send socket buffer size in KB</td>
</tr>
<tr>
<td>J</td>
<td>ASSOCIATE-RQ timeout (ms)</td>
<td>5</td>
<td>Timeout in ms for receiving ASSOCIATE-RQ, 5 seconds by default.</td>
</tr>
<tr>
<td>K</td>
<td>Receive Socket Buffer Size (KB)</td>
<td>0</td>
<td>Receive socket buffer size in KB</td>
</tr>
<tr>
<td>L</td>
<td>DIMSE-RQ timeout (ms)</td>
<td>60</td>
<td>Timeout in ms for receiving DIMSE-RQ, 60 ms by default.</td>
</tr>
<tr>
<td>M</td>
<td>Transcoder Buffer Size (KB)</td>
<td>1</td>
<td>Minimal buffer size to write received object to file, 1 KB by default.</td>
</tr>
<tr>
<td>N</td>
<td>DIMSE-RSP delay (ms)</td>
<td>0</td>
<td>Delay in ms for DIMSE-RSP; useful for testing asynchronous mode.</td>
</tr>
<tr>
<td>O</td>
<td>Accept Explicit VR Big Endian</td>
<td>No</td>
<td>Accept explicit value representation Big Endian transfer syntax.</td>
</tr>
<tr>
<td>P</td>
<td>Only Accept Default Transfer Syntax</td>
<td>No</td>
<td>Accept only the default transfer syntax.</td>
</tr>
<tr>
<td>Q</td>
<td>Only Uncompressed Pixel Data</td>
<td>No</td>
<td>Accept only transfer syntax with uncompressed pixel data.</td>
</tr>
<tr>
<td>R</td>
<td>TCP Delay</td>
<td>Yes</td>
<td>Set TCP_NODELAY socket option to false, true by default.</td>
</tr>
<tr>
<td>S</td>
<td>Store Received Objects in Directory</td>
<td>No TLS</td>
<td>Store received objects into files in specified directory.</td>
</tr>
<tr>
<td>T</td>
<td>TLS</td>
<td>No TLS</td>
<td>Do not receive data over an</td>
</tr>
</tbody>
</table>
The following options are available:

- **3DES**: TLS will be used, with the `SSL_RSA_WITH_3DES_EDE_CBC_SHA` cipher suite.
- **AES**: TLS will be used, with the following cipher suites:
  - `TLS_RSA_WITH_AES_128_CBC_SHA`
  - `SSL_RSA_WITH_3DES_EDE_CBC_SHA`
- **Without**: TLS will be used without symmetric encryption, with the cipher suite `SSL_RSA_WITH_NULL_SHA`. DICOM messages will be received unencrypted.
- **No TLS**: No TLS will be used. DICOM messages will be received over a regular unencrypted socket.

<table>
<thead>
<tr>
<th>Source Map Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>Description</td>
</tr>
<tr>
<td>U</td>
<td>Client Authentication TLS</td>
</tr>
<tr>
<td>V</td>
<td>Accept ssl v2 TLS handshake</td>
</tr>
<tr>
<td>W</td>
<td>Keystore</td>
</tr>
<tr>
<td>X</td>
<td>Keystore Password</td>
</tr>
<tr>
<td>Y</td>
<td>Trust Store</td>
</tr>
<tr>
<td>Z</td>
<td>Trust Store Password</td>
</tr>
<tr>
<td>AA</td>
<td>Key Password</td>
</tr>
<tr>
<td>localApplicationEntityTitle</td>
<td>The Application Entity Title of the local Service Class Provider (SCP).</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>remoteApplicationEntityTitle</td>
<td>The Application Entity Title of the remote Service Class User (SCU).</td>
</tr>
<tr>
<td>localAddress</td>
<td>The IP address that the TCP socket is locally bound to.</td>
</tr>
<tr>
<td>localPort</td>
<td>The port that TCP socket is locally bound to.</td>
</tr>
<tr>
<td>remoteAddress</td>
<td>The IP address of the remote connecting client.</td>
</tr>
<tr>
<td>remotePort</td>
<td>The TCP port of the remote connecting client.</td>
</tr>
<tr>
<td>associateACProtocolVersion</td>
<td>The associate protocol version of the local SCP.</td>
</tr>
<tr>
<td>associateACImplClassUID</td>
<td>The associate implementation class unique identifier of the local SCP.</td>
</tr>
<tr>
<td>associateACImplVersionName</td>
<td>The associate implementation version name of the local SCP.</td>
</tr>
<tr>
<td>associateACApplicationContext</td>
<td>The associate application context of the local SCP.</td>
</tr>
<tr>
<td>associateACPresentationContexts</td>
<td>A map containing all supported presentation contexts of the local SCP.</td>
</tr>
<tr>
<td>associateRQProtocolVersion</td>
<td>The associate protocol version of the remote SCU.</td>
</tr>
<tr>
<td>associateRQImplClassUID</td>
<td>The associate implementation class unique identifier of the remote SCU.</td>
</tr>
<tr>
<td>associateRQImplVersionName</td>
<td>The associate implementation version name of the remote SCU.</td>
</tr>
<tr>
<td>associateRQApplicationContext</td>
<td>The associate application context of the remote SCU.</td>
</tr>
<tr>
<td>associateRQPresentationContexts</td>
<td>A map containing all supported presentation contexts of the remote SCU.</td>
</tr>
<tr>
<td>username</td>
<td>The username presented by the remote SCU, if available.</td>
</tr>
<tr>
<td>passcode</td>
<td>The passcode presented by the remote SCU, if available.</td>
</tr>
<tr>
<td>userIdentityType</td>
<td>The type of user identity presented by the remote SCU, if available.</td>
</tr>
<tr>
<td></td>
<td>- USERNAME</td>
</tr>
<tr>
<td></td>
<td>- USERNAME_PASSCODE</td>
</tr>
<tr>
<td></td>
<td>- KERBEROS</td>
</tr>
<tr>
<td></td>
<td>- SAML</td>
</tr>
</tbody>
</table>
Database Reader

This source connector connects to an external database, performs a query, and reads selected rows into messages that get dispatched to the channel. This can be done using a SQL statement, or by using JavaScript mode to perform the query manually. The database connection will automatically be kept open across multiple polling windows, unless otherwise specified. This connector also supports a Post-Process section where an update statement can be performed after each row is read in, for example to set a processed flag in the source table. The values selected from the query will be automatically converted into an XML document where each column will be a separate node. That XML document is what actually gets dispatched to the channel as a message.

Supported property groups:

- Polling Settings
- Source Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Driver</td>
<td></td>
<td>Specifies the type of database driver to use to connect to the database. The following values are supported by default:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Sun JDBC-ODBC Bridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- MySQL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Oracle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- PostgreSQL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- SQL Server / Sybase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- SQLite</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>B</th>
<th>URL</th>
<th>The JDBC URL to connect to the database with. This is not used when <strong>Yes</strong> for <strong>Use JavaScript</strong> is checked. However, it is used when the <strong>Generate Connection / Select</strong> feature is used to generate code. Use the <strong>Insert URL Template</strong> button above to populate the URL field with a starting template.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Username</td>
<td>The username to connect to the database with. This is not used when <strong>Yes</strong> for <strong>Use JavaScript</strong> is checked. However, it is used when the <strong>Generate Connection / Select</strong> feature is used to generate code.</td>
</tr>
<tr>
<td>D</td>
<td>Password</td>
<td>The password to connect to the database with. This is not used when <strong>Yes</strong> for <strong>Use JavaScript</strong> is checked. However, it is used when the <strong>Generate Connection / Select</strong> feature is used to generate code.</td>
</tr>
<tr>
<td>E</td>
<td>Use JavaScript</td>
<td><strong>No</strong> If enabled, the below JavaScript scripts will be used to select messages and run a post-process update. If disabled, SQL code (either standard or database-specific) may be used, and the connection will be handled automatically.</td>
</tr>
<tr>
<td>F</td>
<td>Keep Connection Open</td>
<td><strong>Yes</strong> Re-use the same database connection each time the select query is executed. If disabled, the connection will be closed after all selected messages have finished processing.</td>
</tr>
<tr>
<td>G</td>
<td>Aggregate Results</td>
<td><strong>No</strong> If enabled, all rows returned in the query will...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>be aggregated into a single XML message. Note that all rows will be read into memory at once, so use this with caution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Cache Results</td>
<td>Yes</td>
</tr>
<tr>
<td>I</td>
<td>Fetch Size</td>
<td>1000</td>
</tr>
<tr>
<td>J</td>
<td># of Retries on Error</td>
<td>3</td>
</tr>
<tr>
<td>K</td>
<td>Retry Interval</td>
<td>10000</td>
</tr>
<tr>
<td>L</td>
<td>Encoding</td>
<td>Default</td>
</tr>
<tr>
<td>M</td>
<td>Generate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| N | SQL / JavaScript |   | The actual SQL or JavaScript code to execute for each polling window. When JavaScript mode is used, the return value of the script is expected to be a ResultSet or a
<table>
<thead>
<tr>
<th></th>
<th>Run Post-Process SQL / JavaScript</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Determines whether the post-process update script is active, and if so whether to execute it after each message or just once after all messages in the ResultSet have completed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>If Aggregate Results is disabled:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>Never</strong>: Do not run the post-process statement/script.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>After each message</strong>: Run the post-process statement/script after each message finishes processing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>Once after all messages</strong>: Run the post-process statement/script only after all messages have finished processing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>If Aggregate Results is enabled:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>Never</strong>: Do not run the post-process statement/script.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>For each row</strong>: Run the post-process statement/script for each row in the result set.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>Once for all rows</strong>: Run the post-process statement/script only once. If JavaScript mode is used, a List of Maps representing all rows in the result set will be available as the variable &quot;results&quot;.</td>
<td></td>
</tr>
</tbody>
</table>

| P | Generate (post-process) |
|   | **Connection**: This button is enabled when **Use JavaScript** is enabled and a post-process script is being run. |
used. When clicked, it inserts boilerplate Connection
construction code into the JavaScript pane at the current caret
position.

- **Update**: Opens a window to assist in building an update
statement to update records in the database specified in the URL
above. Only enabled if a post-process statement/script is
being used.

<table>
<thead>
<tr>
<th>Q</th>
<th>SQL / JavaScript (post-process)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The actual SQL or JavaScript code to execute after each row/message or after all rows/messages have completed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R</th>
<th>Result Map</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When using the <strong>After each message</strong> / <strong>For each row</strong> post-process option, values originally selected using the query above will be available in the SQL or JavaScript context. Drag the entries from this section into the post-process script to use them in your update statement. For example if you selected a unique ID column in your initial query, you may want to use that same value to update the table and set a processed flag.</td>
</tr>
</tbody>
</table>

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File Reader

This source connector reads files from a local or remote directory on a specified interval/time schedule. Several protocols are supported, including regular local file mode, FTP, SFTP, SMB, WebDAV, and Amazon S3. Files may be read in and converted to Base64, or converted to a message string using a specific character set encoding. After reading in files, the connector has options to either delete the original files, rename them, or move them to a separate directory. Additional options (like FTPS) are available with the SSL Manager extension.

Supported property groups:

- Polling Settings
- Source Settings
<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Method</td>
<td>file</td>
<td>The basic method used to access files to be read in. Options include File (local filesystem or NFS / mapped share), FTP, SFTP, SMB, WebDAV, or Amazon S3. Once all necessary connection/directory information has been filled in before, use the <strong>Test Read</strong> button to attempt to actually connect and test the ability to read from the directory.</td>
</tr>
<tr>
<td>B</td>
<td>Advanced Options</td>
<td></td>
<td>If the file method supports advanced options, this button will be enabled. Any advanced options set will be summarized in the Advanced Options label below this.</td>
</tr>
<tr>
<td>C</td>
<td>Directory</td>
<td></td>
<td>Only applicable to the File method. The directory (folder) in which the files to be read can be found.</td>
</tr>
<tr>
<td>D</td>
<td>URL</td>
<td></td>
<td>Applicable to all methods except File. The domain name or IP address of the host (computer) on which the files to be read can be found. If this setting is enabled, the second text field specifies the directory (folder) to read from. When using the Amazon S3 method, the first text field will be the bucket name, and the second text field can be used for a directory prefix.</td>
</tr>
<tr>
<td>E</td>
<td>Filename Filter Pattern</td>
<td>*</td>
<td>Files with names that do not match this pattern will be ignored. If <strong>Regular Expression</strong> is disabled, regular wildcard (*) matching is supported.</td>
</tr>
<tr>
<td>F</td>
<td>Include All Subdirectories</td>
<td>No</td>
<td>Select Yes to traverse directories recursively and search for files in each one.</td>
</tr>
<tr>
<td>G</td>
<td>Ignore . files</td>
<td>Yes</td>
<td>Select Yes to ignore all files starting with a period.</td>
</tr>
<tr>
<td>---</td>
<td>---------------</td>
<td>-----</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>H</td>
<td>Anonymous</td>
<td>Yes</td>
<td>Only applicable to the FTP / WebDAV / Amazon S3 methods. If enabled, connects to the remote server anonymously instead of using a username and password.</td>
</tr>
<tr>
<td>I</td>
<td>Username</td>
<td>anonymous</td>
<td>Applicable to all methods except File. The username used to connect to the remote server with. When using the Amazon S3 mode, this will be your AWS Access Key ID.</td>
</tr>
<tr>
<td>J</td>
<td>Password</td>
<td>Applicable to all methods except File. The password used to connect to the remote server with. When using the Amazon S3 mode, this will be your AWS Secret Access Key.</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Timeout (ms)</td>
<td>10000</td>
<td>Applicable to the FTP / SFTP / SMB / Amazon S3 methods. The socket timeout (in ms) to use when connecting to the remote server.</td>
</tr>
<tr>
<td>L</td>
<td>Secure Mode</td>
<td>Yes</td>
<td>Only applicable to the WebDAV method. If enabled, HTTPS will be used instead of HTTP.</td>
</tr>
<tr>
<td>M</td>
<td>Passive Mode</td>
<td>Yes</td>
<td>Only applicable to the FTP method. If enabled, the server decides what port the client should connect to for the data channel. Passive mode sometimes allows a connection through a firewall that normal mode does not, because the client is initiating the data connection rather than the server.</td>
</tr>
<tr>
<td>N</td>
<td>Validate Connection</td>
<td>Yes</td>
<td>Only applicable to the FTP method. If enabled, the connection is validated before it is used.</td>
</tr>
</tbody>
</table>

December 19, 2018
<table>
<thead>
<tr>
<th>Q</th>
<th>After Processing Action</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select <strong>Move</strong> to move and/or rename the file after successful processing. Select <strong>Delete</strong> to delete the file after successful processing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P</th>
<th>Move-to Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>If successfully processed files should be moved to a different directory (folder), enter that directory here. The directory name specified may include template substitutions from the list to the right. If this field is left empty, successfully processed files will not be moved to a different directory.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>Move-to File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>If successfully processed files should be renamed, enter the new name here. The filename specified may include template substitutions from the list to the right. If this field is left empty, successfully processed files will not be renamed.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R</th>
<th>Error Reading Action</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select <strong>Move</strong> to move and/or rename files that have failed to be read in (for example, if an out-of-memory error occurs, or the network connection drops). Select <strong>Delete</strong> to delete files that have failed to be read in.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S</th>
<th>Error in Response Action</th>
<th>After Processing Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select <strong>Move</strong> to move and/or rename the file if an ERROR response is returned. This action is triggered when the Response selected in the Source Settings has a status of ERROR. If After Processing Action is selected, the After Processing Action will apply. This action is only available if Process Batch is disabled in the Source Settings.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### T  Error Move-to Directory

If files which cause processing errors should be moved to a different directory (folder), enter that directory here. This action is triggered when the Response selected in the Source Settings has a status of `ERROR`. The directory name specified may include template substitutions from the list to the right. If this field is left empty, files which cause processing errors will not be moved to a different directory.

### U  Error Move-to File Name

If files which cause processing errors should be renamed, enter that directory here. This action is triggered when the Response selected in the Source Settings has a status of `ERROR`. The filename specified may include template substitutions from the list to the right. If this field is left empty, files which cause processing errors will not be renamed.

### V  Move-to Variables

The variables listed here can be dragged-and-dropped into the Move-to fields to the left.

- **channelName**: The name of the current channel.
- **channelId**: The unique ID of the current channel.
- **DATE**: The current date, formatted as a human-readable string.
- **COUNT**: A numeric count that increases for each file read in, from the point when the channel was last deployed.
- **UUID**: An auto-generated universally unique identifier.
- **SYSTIME**: The current epoch time in milliseconds.
- **originalFilename**: The name of the file that was read in. Use this to easily add on an extra file extension to the original name.

<table>
<thead>
<tr>
<th>W</th>
<th>Check File Age</th>
<th>Yes</th>
<th>Select <strong>Yes</strong> to skip files that are created within the specified age below.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>File Age (ms)</td>
<td>1000</td>
<td>If <strong>Check File Age</strong> is enabled, only the files with creation dates older than the specified value in milliseconds will be processed.</td>
</tr>
<tr>
<td>Y</td>
<td>File Size (bytes)</td>
<td>0, Ignore Maximum</td>
<td>The minimum and maximum size (in bytes) of files to be accepted. If <strong>Ignore Maximum</strong> is checked, the file size will only be bound by the minimum value.</td>
</tr>
<tr>
<td>Z</td>
<td>Sort Files By</td>
<td>Date</td>
<td>Selects the order in which files should be processed, if there are multiple files available. Files can be processed by <strong>Date</strong> (oldest last-modification date first), <strong>Size</strong> (smallest first), or <strong>Name</strong> (a before z, etc.).</td>
</tr>
<tr>
<td>AA</td>
<td>File Type</td>
<td>Text</td>
<td>Select <strong>Binary</strong> if files contain binary data; the contents will be Base64 encoded before processing. Select <strong>Text</strong> if files contain textual data; the contents will be encoded using the specified character set encoding.</td>
</tr>
<tr>
<td>BB</td>
<td>Encoding</td>
<td>Default</td>
<td>If <strong>Text</strong> is chosen for the <strong>File Type</strong>, select the character set encoding (<strong>ASCII</strong>, <strong>UTF-8</strong>, etc.) to be used in reading the contents of each file.</td>
</tr>
</tbody>
</table>

**Advanced SFTP Options**

When the SFTP file method is selected, these additional advanced options may be set:

---

*December 19, 2018*
### Item | Name | Default Value | Description
--- | --- | --- | ---
A | Authentication | Password | Determines how to authenticate to the SFTP server. Options include Password, Public Key, or Both.
B | Public/Private Key Files | | The absolute file path of the public/private keypair used to gain access to the remote server.
C | Passphrase | | The passphrase associated with the public/private keypair.
D | Host Key Checking | Ask | Select **Yes** to validate the server's host key within the provided Known Hosts file (or the system default). Otherwise the host key will always be automatically trusted.
E | Known Hosts File | | The path to the local Known Hosts file used to trust remote host keys.
F | Configuration Options | | Custom JSch configuration options used when connecting to the remote server. For example, these can be used to enabled Kerberos authentication.

**Advanced Amazon S3 Options**

When the Amazon S3 file method is selected, these additional advanced options may be set.
### Use Default Credential Provider Chain

**Item:** A  
**Name:** Use Default Credential Provider Chain  
**Default Value:** Yes  
**Description:** If enabled and no explicit credentials are provided, the default provider chain looks for credentials in this order:

- **Environment variables:** `AWS_ACCESS_KEY_ID` and `AWS_SECRET_ACCESS_KEY`
- **Java system properties:** `aws.accessKeyId` and `aws.secretKey`
- **Default credentials profile file:** Typically located at `~/.aws/credentials` (location can vary per platform)
- **ECS container credentials:** Loaded from an Amazon ECS environment variable.
- **Instance profile credentials:** Loaded from the EC2 metadata service.

Note that if your FileReader has Anonymous enabled, this option will not be enabled.

### Use Temporary Credentials

**Item:** B  
**Name:** Use Temporary Credentials  
**Default Value:** No  
**Description:** If enabled, the given credentials will be used to request a set of temporary credentials from the Amazon Security Token Service (STS). These temporary credentials will...
### NextGen Connect User Guide

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td><strong>Duration (seconds)</strong></td>
<td>7200</td>
</tr>
<tr>
<td></td>
<td>The duration that the temporary credentials are valid. Must be between 900 seconds (15 minutes) and 129,600 seconds (36 hours).</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td><strong>Region</strong></td>
<td>us-west-2</td>
</tr>
<tr>
<td></td>
<td>The AWS region that your S3 bucket is located in. Select a specific region from the drop-down menu, or enter one into the text field. You can also use Velocity Variable Replacement here.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td><strong>Custom HTTP Headers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>These headers will be used on any S3 PUT operation. They are not used for GET operations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To add user-defined metadata tags to the S3 object, include a custom header that starts with &quot;x-amz-meta-&quot;.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For more information, check out the official Amazon S3 documentation.</td>
<td></td>
</tr>
</tbody>
</table>

### Source Map Variables

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>originalFilename</td>
<td>The name of the file that was read in.</td>
</tr>
<tr>
<td>fileDirectory</td>
<td>The absolute path of the directory in which the file resides.</td>
</tr>
<tr>
<td>fileSize</td>
<td>The size of the file in bytes.</td>
</tr>
<tr>
<td>fileLastModified</td>
<td>The last modified date of the file, as an epoch time in milliseconds.</td>
</tr>
<tr>
<td>pollId</td>
<td>A unique nanosecond timestamp that uniquely identifies the current polling window. If your FileReader polls 5 files, the messages for each file will have the same pollId.</td>
</tr>
<tr>
<td>pollSequenceId</td>
<td>An integer that starts at 1 and increments for every subsequent file in the current polling window. If your FileReader polls 5 files, the message(s) for the first file will have a pollSequenceId of 1, the second file will have a pollSequenceId of 2, and so on.</td>
</tr>
</tbody>
</table>

**December 19, 2018**
file will have a pollSequenceId of 1, the message(s) for the second file will have a pollSequenceId of 2, and so on.

| pollComplete | This is **only** present for the last file in the current polling window. The value of this entry is always equal to true. Use this to determine programatically whether you are currently working with the *last* file in a poll.

Note that if you have Batch Processing enabled, you will want to look at both the pollComplete and batchComplete variables to determine whether the current message is truly the "last" one. If both are true, then you know that you're on the last file in the polling window, and also on the last message in that file.

| s3BucketName | The name of the S3 bucket that the file belongs to. |
| s3ETag | The hex encoded 128-bit MD5 hash of the file contents as computed by Amazon S3. |
| s3Key | The key under which the file is stored in S3. |
| s3Owner | The owner of the S3 object, if present. |
| s3StorageClass | The storage class used for this file in S3 (e.g. STANDARD, STANDARD_IA). |
| s3Metadata | A MessageHeaders object representing the map of metadata/headers for the S3 object. |
HTTP Listener

This source connector acts as an HTTP server, listening for requests from one or more remote clients. The messages sent to the channel can be just the raw payload, or an XML document allowing multipart payloads to be parsed in a consistent and easy-to-use way. The HTTP payload can be either Base64 encoded or converted using a charset, depending on the Content-Type. Responses that go back to each client can be fully configured, including custom response headers. Finally, static resources or directories can be automatically hosted, to allow the connector to act as a simple web server that serves specific content. Additional options are available with the SSL Manager extension.

Supported property groups:

- Listener Settings
- Source Settings
- HTTP Authentication Settings

**Item** | **Name** | **Default Value** | **Description**
--- | --- | --- | ---
A | Base Context Path | | The context path for the HTTP Listener URL. Note that if this is specified, any requests made at this base context path must have a trailing slash in the request URI.
B | Receive Timeout (ms) | 30000 | The maximum idle time in milliseconds for a connection.
C | Message Content | Plain Body | December 19, 2018
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parse Multipart</td>
<td>Yes</td>
<td>Select <strong>Yes</strong> to automatically parse multipart requests into separate XML nodes. Select <strong>No</strong> to always keep the request body as a single XML node.</td>
</tr>
<tr>
<td>D</td>
<td>Include Metadata</td>
<td>No</td>
<td>Select <strong>Yes</strong> to include request metadata (method, context path, headers, query parameters) in the XML content. Note that regardless of this setting, the same metadata is always available in the source map.</td>
</tr>
<tr>
<td>E</td>
<td>Binary MIME Types</td>
<td>application/.* (?&lt;!json</td>
<td>xml)</td>
</tr>
<tr>
<td>F</td>
<td>HTTP URL</td>
<td>&lt;auto-generated&gt;</td>
<td>Displays the generated HTTP URL for the HTTP Listener. This is not an actual configurable setting, but is instead displayed for copy/paste convenience. Note that the host in the URL will be the same as the host you used to connect to the Administrator. The actual host that connecting clients use may be different due to differing networking environments.</td>
</tr>
<tr>
<td>G</td>
<td>Response Content Type</td>
<td>text/plain</td>
<td>The MIME type to be used for the response.</td>
</tr>
<tr>
<td>I</td>
<td>Response Data Type</td>
<td>Text</td>
<td>If <strong>Binary</strong> is selected, responses will be decoded from Base64 into raw byte streams. If <strong>Text</strong> is selected, responses will be encoded with the specified character set encoding.</td>
</tr>
<tr>
<td>---</td>
<td>-------------------</td>
<td>------</td>
<td>---</td>
</tr>
<tr>
<td>J</td>
<td>Charset Encoding</td>
<td>UTF-8</td>
<td>Select the character set encoding to be used for the response to the sending system. Set to Default to assume the default character set encoding for the JVM Mirth Connect is running on.</td>
</tr>
<tr>
<td>K</td>
<td>Response Status Code</td>
<td></td>
<td>Enter the status code for the HTTP response. If this field is left blank, a default status code of 200 will be returned for a successful message, and 500 will be returned for an errored message. If a Response is chosen in the Source Settings, the status of that response will be used to determine a successful or errored response.</td>
</tr>
<tr>
<td>L</td>
<td>Response Headers</td>
<td></td>
<td>Enter custom headers to send back to the originating client.</td>
</tr>
<tr>
<td>M</td>
<td>Static Resources</td>
<td></td>
<td>Values in this table are automatically sent back to any request with the matching context path. There are three resource types:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <strong>File:</strong> The value field specifies the path of the file to return.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <strong>Directory:</strong> Any file within the directory given by the value field may be requested, but subdirectories are not included.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <strong>Custom:</strong> The value field itself is returned as the response.</td>
</tr>
</tbody>
</table>
**Source Map Variables**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>remoteAddress</td>
<td>The IP address of the remote connecting client.</td>
</tr>
<tr>
<td>remotePort</td>
<td>The TCP port of the remote connecting client.</td>
</tr>
<tr>
<td>localAddress</td>
<td>The IP address that the TCP socket is locally bound to.</td>
</tr>
<tr>
<td>localPort</td>
<td>The port that that TCP socket is locally bound to.</td>
</tr>
<tr>
<td>method</td>
<td>The HTTP method used for the incoming request.</td>
</tr>
<tr>
<td>url</td>
<td>The URL of the client request, excluding any query parameters.</td>
</tr>
<tr>
<td>uri</td>
<td>The HTTP URI requested, including the context path and all query parameters.</td>
</tr>
<tr>
<td>protocol</td>
<td>The HTTP protocol version used in the request.</td>
</tr>
<tr>
<td>query</td>
<td>The query parameter portion of the request URI.</td>
</tr>
<tr>
<td>contextPath</td>
<td>The context path requested, without any query parameters.</td>
</tr>
<tr>
<td>headers</td>
<td>A MessageHeaders object containing all headers sent in the incoming request.</td>
</tr>
<tr>
<td></td>
<td>Look in the User API for more information.</td>
</tr>
<tr>
<td>parameters</td>
<td>A MessageParameters object containing all headers sent in the incoming request. This will either be query parameters, or POST parameters if the application/x-www-form-urlencoded Content-Type is used.</td>
</tr>
</tbody>
</table>
**JMS Listener**

This source connector connects to an external JMS provider and reads messages from a queue or topic. It supports both JNDI and specifying a specific connection factory, as well as fine-tuned queries through a configurable selector. Once this connector is started, it will attempt to keep a persistent open connection to the JMS provider. If for any reason the connection is dropped, the connector will automatically reconnect without any intervention needed. The properties view also includes a mechanism to save configuration templates for common provider types, so that creating a new JMS Listener is as quick and easy as possible.

Supported property groups:

- **Source Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Use JNDI</td>
<td>No</td>
<td>Select <strong>Yes</strong> to use JNDI to look up a connection factory to connect to the queue or topic. Select <strong>No</strong> to specify a connection factory class without using JNDI.</td>
</tr>
<tr>
<td>B</td>
<td>Provider URL</td>
<td></td>
<td>If using JNDI, enter the URL of the JNDI provider here.</td>
</tr>
<tr>
<td>C</td>
<td>Initial Context Factory</td>
<td></td>
<td>If using JNDI, enter the fully-qualified Java class name of the JNDI Initial Context Factory class here.</td>
</tr>
<tr>
<td>D</td>
<td>Connection Factory Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Destination Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Destination Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Username</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Password</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Reconnect Interval (ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Selectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Client ID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Reconnect Interval (ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Connection Factory Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Connection Factory Name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Connection Factory Class

If using the generic JMS provider and not using JNDI, enter the fully-qualified Java class name of the JMS connection factory here.

### Connection Properties

This table allows you to enter custom connection factory settings. The **Property** column is the key, while the **Value** column is the actual value for the setting. The specific properties used here will vary depending on what connection factory class / provider you're using.

### Username

The username for accessing the queue or topic.

### Password

The password for accessing the queue or topic.

### Destination Type

Specify whether the destination is a queue or topic. When connecting to a topic, you can check the **Durable** checkbox so that all messages published to the topic will be read, regardless of whether or not a connection to the broker is active. If unchecked, only messages published while a connection is active will be read.

### Destination Name

The name of the queue or topic.

### Client ID

The JMS client ID to use when connecting to the JMS broker.

### Reconnect Interval (ms)

10000

The number of milliseconds between reconnect attempts in the case that a connection error occurs.

### Selector

Enter a selector expression to select specific messages from the queue/topic. Leave blank if not needed.
<table>
<thead>
<tr>
<th>N</th>
<th>Connection Templates</th>
</tr>
</thead>
</table>

This section allows you to save the current state of your JMS Listener properties into a **template**, which may then be restored later if you make changes, or may also be applied to other JMS Listener connectors. Custom templates can be updated and deleted.

### Loading Templates

Click a template in the Connection Templates list, then click the **Load** button. You will be prompted to overwrite your current JMS Listener settings:

![Confirm](image)

Are you sure you want to overwrite the current connection settings with the template: "ActiveMQ"?

- Yes
- No

### Creating New Templates

Configure your JMS Listener settings to the state you want to save, then click the **Save** button in the Connection Templates section. You will be prompted to give the template a name:

![Save](image)

Enter a name for the connection template:

- RabbitMQ

- OK
- Cancel

After clicking **OK**, the new template will appear in the Connection Templates list:
**Updating Templates**

To update a current template, follow the directions for creating a new template, then enter the same name as the template you wish to update. You will be prompted to overwrite:

![Confirm dialog]

Are you sure you want to overwrite the existing template named "RabbitMQ"?

[Yes] [No]

**Deleting Templates**

Just click a template in the Connection Templates list, then click the **Delete** button to delete a template. You will be prompted to confirm the action:

![Confirm dialog]

Are you sure you want to delete the template "RabbitMQ"?

[Yes] [No]

Updating / deleting an existing template **does not** affect any connectors currently using that template.

For convenience, the JMS Listener comes with two reserved templates, "ActiveMQ" and "JBoss Messaging / MQ". These cannot be updated or deleted, however you can load the template, update the configuration as needed, and then save it as a new template.

---

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JavaScript Reader

This source connector executes a custom user-defined JavaScript script on a specified schedule. This can be used in a wide variety of ways, such as calling out to external Java libraries or invoking a local OS shell script. You can return a message (or list of messages) to dispatch to the channel, or simply use the script as a scheduled job that doesn’t necessarily produce messages. For example, you can use tools like ChannelUtil to programmatically start /stop/deploy channels from within the script.

Supported property groups:

- Polling Settings
- Source Settings

JavaScript Reader Return Values

If you’re using the JavaScript Reader to produce messages for the channel, all you need to do is `return` those messages from the script. The following return values are accepted:

- **String**: Any non-empty string returned will be sent to the channel as a message.
- **RawMessage**: This is a special object that contains not only the string message data, but also information about which destinations to dispatch to, and any source map variables you wish to inject. For additional information, see The User API (Javadoc).
- **List**: If a Java List is returned, all values in the list will be sent to the channel as discrete messages. The list may contain a mix of Strings, RawMessage objects, or other objects.
- **Empty String / null / undefined**: Returning any of these (including just a "return;" statement or no return statement at all) will cause no messages to dispatch to the channel.
- **Any Object**: Any other object returned will be converted to a String via the `toString()` method, and that String representation will be sent to the channel as a message.
TCP Listener

This source connector listens for messages coming in over a TCP connection. It can either listen on a TCP interface /port and wait for clients to connect, or connect to an external server. There are options to decide when to keep connections open, and how many clients can connect at once. Configurable transmission modes allow you to decide how to receive inbound messages and send responses. When sending responses, you can choose to send the data back on the same connection, or on a new connection.

Supported property groups:

- Listener Settings
- Source Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Transmission Mode</td>
<td>MLLP</td>
<td>The transmission mode determines how to receive message data from the incoming byte stream, and how to send responses out. For additional information, see TCP Transmission Hooks.</td>
</tr>
<tr>
<td>C</td>
<td>MLLP Sample Frame</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Remote Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Remote Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Override Local Binding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Max Connections</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Reconnect Interval (ms)</td>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Receive Timeout (ms)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Buffer Size (bytes)</td>
<td>65536</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Keep Connection Open</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Data Type</td>
<td>Binary</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Encoding</td>
<td>Default</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Respond on New Connection</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Response Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>Response Port</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

December 19, 2018
<table>
<thead>
<tr>
<th></th>
<th>Sample Frame</th>
<th>&lt;VT&gt; &lt;Message Data&gt; &lt;FS&gt;&lt;CR&gt;</th>
<th>An example of a valid incoming message. This is dependent on the Transmission Mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Mode</td>
<td>Server</td>
<td>Select <strong>Server</strong> to listen for connections from clients, or <strong>Client</strong> to connect to a TCP Server. In Client mode, the <strong>Listener Settings</strong> will only be used if <strong>Override Local Binding</strong> is enabled.</td>
</tr>
<tr>
<td>D</td>
<td>Remote Address</td>
<td></td>
<td>The domain name or IP address on which to connect. Only applicable for Client mode.</td>
</tr>
<tr>
<td>E</td>
<td>Remote Port</td>
<td></td>
<td>The port on which to connect. Only applicable for Client mode.</td>
</tr>
<tr>
<td>F</td>
<td>Override Local Binding</td>
<td>No</td>
<td>Only applicable for Client mode. Select <strong>Yes</strong> to override the local address and port that the client socket will be bound to. Select <strong>No</strong> to use the default values of 0.0.0.0:0. A local port of zero (0) indicates that the OS should assign an ephemeral port automatically.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note that if a specific (non-zero) local port is chosen, after a socket is closed it is up to the underlying OS to release the port before the next socket creation, otherwise the bind attempt will fail.</td>
</tr>
<tr>
<td>G</td>
<td>Reconnect Interval (ms)</td>
<td>5000</td>
<td>Enter the time (in milliseconds) to wait between disconnecting from the TCP server and connecting to it again. Only applicable for Client mode.</td>
</tr>
<tr>
<td>H</td>
<td>Max Connections</td>
<td>10</td>
<td>The maximum number of client connections to accept. After this number has been reached, subsequent socket requests will be rejected. Only applicable for Server mode.</td>
</tr>
<tr>
<td></td>
<td>Receive Timeout (ms)</td>
<td>0</td>
<td>The amount of time, in milliseconds, to wait without receiving a message before closing a connection.</td>
</tr>
<tr>
<td>---</td>
<td>---------------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>J</td>
<td>Buffer Size (bytes)</td>
<td>65536</td>
<td>Useful when you expect to receive large messages. Generally, the default value is fine.</td>
</tr>
<tr>
<td>K</td>
<td>Keep Connection Open</td>
<td>Yes</td>
<td>Select No to close the socket after a received message has finished processing. Otherwise the socket will remain open until the sending system closes it. In that case, message will only be processed if data is received and either the receive timeout is reached, the remote system closes the socket, or an end-of-message byte sequence has been detected from the Transmission Mode.</td>
</tr>
<tr>
<td>L</td>
<td>Data Type</td>
<td>Text</td>
<td>Select Binary if the inbound messages are raw byte streams; the payload will be Base64 encoded. Select Text if the inbound messages are textual; the payload will be encoded with the specified character set encoding.</td>
</tr>
<tr>
<td>M</td>
<td>Encoding</td>
<td>Default</td>
<td>Select the character set encoding to use when decoding bytes from the TCP stream, or select Default to use the default character set encoding for the JVM Mirth Connect is running on.</td>
</tr>
</tbody>
</table>
| N | Respond on New Connection | No         | Select No to send responses only using the same connection the inbound message was received on. Select Yes to always send responses on a new connection (during normal processing as well as recovery). Select Message Recovery to only send responses on a
new connection during message recovery. Connections will be bound locally on the same interface chosen in the Listener Settings with an ephemeral port.

<table>
<thead>
<tr>
<th>O</th>
<th>Response Address</th>
<th>The domain name or IP address to send message responses to.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Response Port</td>
<td>The port to send message responses to.</td>
</tr>
</tbody>
</table>

**Source Map Variables**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>localAddress</td>
<td>The IP address that the TCP socket is locally bound to.</td>
</tr>
<tr>
<td>localPort</td>
<td>The port that that TCP socket is locally bound to.</td>
</tr>
<tr>
<td>remoteAddress</td>
<td>The IP address of the remote system.</td>
</tr>
<tr>
<td>remotePort</td>
<td>The TCP port of the remote system.</td>
</tr>
</tbody>
</table>

**TCP Transmission Modes**

The transmission mode determines how to receive message data from the incoming byte stream, and how to send responses out. The following transmission modes are supported on the TCP Listener / Sender (and Serial Listener / Sender commercial extension):

- Basic TCP Transmission Mode
- MLLP Transmission Mode

An additional transmission mode is made available via a commercial extension:

- ASTM E1381 Transmission Mode

**Basic TCP Transmission Mode**

This transmission mode allows you to specify basic TCP frame data (beginning and ending byte sequences). This allows the source connector to know when a message has been fully received. Destination connectors also use these sequences when sending data outbound.
### Byte Abbreviations

The Byte Abbreviations section to the right of the transmission mode dialog allows you to easily drag-and-drop bytes into the components to the left, without having to remember the actual hexadecimal values. These also show up as labels next to the byte fields:

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Start of Message Bytes</td>
<td>0x</td>
<td>The bytes before the beginning of the actual message. Only valid hexadecimal characters (0-9, A-F) are allowed.</td>
</tr>
<tr>
<td>B</td>
<td>End of Message Bytes</td>
<td>0x</td>
<td>The bytes after the end of the actual message. Only valid hexadecimal characters (0-9, A-F) are allowed. If this is not specified, the only way a connector knows whether a message has been received is if the socket timeout is reached or if the remote side closes the socket.</td>
</tr>
</tbody>
</table>

The bytes in the example are 0x05 and 0x04, which correspond to the byte abbreviations `<ENQ>` and `<EOT>` respectively.
MLLP Transmission Mode

This transmission mode implements the Minimal Lower Layer Protocol (MLLP) specified by HL7, and is often used when transmitting HL7 v2.x messages. There are two versions of MLLP, v1 and v2. The first version is similar to the Basic TCP Transmission Mode in that it only specifies sequences for the start/end message bytes.

**Minimal Lower Layer Protocol (MLLPv1)**

The second version builds on the first with "reliable delivery assurance", by having each system send a protocol-level ACK or NAK immediately after every received frame.

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By default only MLLPv1 is enabled, as it is the most common use-case.

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Start of Message Bytes</td>
<td>0x0B (&lt;VT&gt;)</td>
<td>The MLLP Start Block bytes before the beginning of the actual message. Only valid hexadecimal characters.</td>
</tr>
<tr>
<td>B</td>
<td>End of Message Bytes</td>
<td>0x1C0D (&lt;FS&gt;&lt;CR&gt;)</td>
<td>The MLLP End Data</td>
</tr>
</tbody>
</table>
/Block bytes after the end of the actual message. Only valid hexadecimal characters (0-9, A-F) are allowed.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Use MLLPv2</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Commit ACK Bytes</td>
<td>0x06 (&lt;ACK&gt;)</td>
</tr>
<tr>
<td>E</td>
<td>Commit NACK Bytes</td>
<td>0x15 (&lt;NAK&gt;)</td>
</tr>
<tr>
<td>F</td>
<td>Max Retry Count</td>
<td>2</td>
</tr>
</tbody>
</table>

**Byte Abbreviations**

This section is the same as in the Basic TCP Transmission Mode.
Web Service Listener

This source connector publishes a SOAP endpoint via JAX-WS. By default it uses a simple service with one operation that takes in a message string and sends back a response string. The SOAP XML envelope is automatically handled, so that the actual data the channel receives is the content within the operation argument node. You also have the option to provide your own custom service, with custom operations.

Supported property groups:

- Listener Settings
- Source Settings
- HTTP Authentication Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Web Service</td>
<td>Default service</td>
<td>If Custom is selected, provide the fully-qualified class name of the Endpoint service you wish to publish.</td>
</tr>
<tr>
<td>B</td>
<td>Service Class Name</td>
<td>com.mirth.connect.connectors.ws.DefaultAcceptMessage</td>
<td>The fully-qualified class name of the Endpoint service to publish.</td>
</tr>
<tr>
<td>C</td>
<td>Service Name</td>
<td>Mirth</td>
<td>The name of the service, used to populate the URL context path.</td>
</tr>
<tr>
<td>D</td>
<td>Binding</td>
<td>Default</td>
<td>The selected binding version defines the structure of the generated envelope. Selecting Default will publish this endpoint with the value from the annotation in the Web Service class. If no annotation is found, the SOAP 1.1 binding will be used.</td>
</tr>
</tbody>
</table>
| E    | WSDL URL              | <Auto-generated>               | The auto-generated WSDL URL for December 19, 2018
<table>
<thead>
<tr>
<th>F</th>
<th>Method</th>
<th>acceptMessage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>If the default service is used, this will show the method &quot;acceptMessage&quot;, which simply takes in a String and returns a String. For custom web services, this will display &quot;&lt;Custom Web Service Methods&gt;&quot;.</td>
</tr>
</tbody>
</table>
Destination Connectors

This section refers to the actual connector-specific settings for destinations. The section is labeled according to the connector type, e.g. "HTTP Sender", "JavaScript Writer". For additional information on connectors in general, see About Channels and Connectors.

Here is a list of destination connectors supported by Mirth Connect:

- Channel Writer
- DICOM Sender
- Database Writer
- Document Writer
- File Writer
- HTTP Sender
- JMS Sender
- JavaScript Writer
- SMTP Sender
- TCP Sender
- Web Service Sender

Additional destination connectors are made available as commercial extensions:

- Serial Connector
- Mirth Results Connector

Channel Writer

The Channel Writer is a connector that simply dispatches messages to other internal channels. This can be useful if you split your message workflow into multiple channels, where one sends to another. If no target channel is specified, the connector acts as a "sink" where no message dispatching is done. Note that a channel does not need to use a Channel Reader source for a Channel Writer to be able to send messages to it. The connector also has options to inject source map variables into the downstream message of the target channel.

Supported property groups:

- Destination Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Channel Id</td>
<td>&lt;None&gt;</td>
<td>The unique ID of the target channel to send messages to. This may be a hard-coded ID, or may be a Velocity Variable Replacement.</td>
</tr>
</tbody>
</table>
Use the drop-down menu to the right to quickly select a particular channel. If <code>None</code> is selected, the destination will act as a "sink" where messages are not dispatched anywhere.

### B Message Metadata

The map variables entered here will be included in the source map of the destination channel's message.

**B** Message Metadata

- **Key**
  - sourceChannelId
  - sourceMessageId
  - sourceChannelIds
  - sourceMessageIds

**Description**
- The unique ID of the channel that dispatched a message to the current channel.
- The ID of the message from which the current message dispatch originated.
- If there are more than two channels in a Channel Writer -> Reader chain, this will be a List containing the IDs of all channels in the chain.
- If there are more than two channels in a Channel

---

**Source Map Variables**

When this connector sends a message to another channel, the following source map variables will be available on the downstream message:

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceChannelId</td>
<td>The unique ID of the channel that dispatched a message to the current channel.</td>
</tr>
<tr>
<td>sourceMessageId</td>
<td>The ID of the message from which the current message dispatch originated.</td>
</tr>
<tr>
<td>sourceChannelIds</td>
<td>If there are more than two channels in a Channel Writer -&gt; Reader chain, this will be a List containing the IDs of all channels in the chain.</td>
</tr>
<tr>
<td>sourceMessageIds</td>
<td>If there are more than two channels in a Channel</td>
</tr>
</tbody>
</table>

This table expects only variable names, not Velocity replacement tokens. For example, do not use `${varName}`, instead just use varName. The value will be extracted from all available Variable Maps.
Writer -> Reader chain, this will be a List containing the IDs of all messages in the chain.
DICOM Sender

This destination connector works in conjunction with the DICOM Attachment Handler and the DICOM Data Type to allow Mirth Connect to send DICOM data. This connector supports the C-STORE operation as a Service Class User (SCU). Additional options are available with the SSL Manager extension.

Supported property groups:

- Destination Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Remote Host</td>
<td>127.0.0.1</td>
<td>The remote IP to send to.</td>
</tr>
<tr>
<td>B</td>
<td>Local Host</td>
<td></td>
<td>The local address that the client socket will be bound to.</td>
</tr>
<tr>
<td>C</td>
<td>Remote Port</td>
<td>104</td>
<td></td>
</tr>
</tbody>
</table>

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<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Local Port</td>
<td>The local port that the client socket will be bound to.</td>
</tr>
<tr>
<td>E</td>
<td>Remote Application Entity</td>
<td>The Application Entity title to sent to.</td>
</tr>
<tr>
<td>F</td>
<td>Local Application Entity</td>
<td>The Application Entity title to identify the local client with.</td>
</tr>
<tr>
<td>G</td>
<td>Max Async operations</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>Priority</td>
<td>Medium</td>
</tr>
<tr>
<td>I</td>
<td>Request Storage Commitment</td>
<td>No</td>
</tr>
<tr>
<td>J</td>
<td>User Name</td>
<td>Enable User Identity Negotiation with specified username and optional passcode.</td>
</tr>
<tr>
<td>K</td>
<td>Pass Code</td>
<td>Optional passcode for User Identity Negotiation, only effective when a username is set.</td>
</tr>
<tr>
<td>L</td>
<td>Request Positive User Identity Response</td>
<td>No</td>
</tr>
<tr>
<td>M</td>
<td>Pack PDV</td>
<td>No</td>
</tr>
<tr>
<td>N</td>
<td>DIMSE-RSP interval period (s)</td>
<td>10</td>
</tr>
<tr>
<td>O</td>
<td>P-DATA-TF PDUs max length sent (KB)</td>
<td>16</td>
</tr>
<tr>
<td>P</td>
<td>A-RELEASE-RP timeout (s)</td>
<td>5</td>
</tr>
<tr>
<td>Q</td>
<td>P-DATA-TF PDUs max length received (KB)</td>
<td>16</td>
</tr>
<tr>
<td>R</td>
<td>DIMSE-RSP timeout (s)</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Send Socket Buffer Size (KB)</td>
<td>0</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------</td>
<td>---</td>
</tr>
<tr>
<td>T</td>
<td>Shutdown delay (ms)</td>
<td>1000</td>
</tr>
<tr>
<td>U</td>
<td>Receive Socket Buffer Size (KB)</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>Socket Close Delay After A-ABORT (ms)</td>
<td>50</td>
</tr>
<tr>
<td>W</td>
<td>Transcoder Buffer Size (KB)</td>
<td>1</td>
</tr>
<tr>
<td>X</td>
<td>Timeout A-ASSOCIATE-AC (ms)</td>
<td>5000</td>
</tr>
<tr>
<td>Y</td>
<td>TCP Connection Timeout (ms)</td>
<td>0</td>
</tr>
<tr>
<td>Z</td>
<td>TCP Delay</td>
<td>Yes</td>
</tr>
<tr>
<td>AA</td>
<td>Default Presentation Syntax</td>
<td>No</td>
</tr>
<tr>
<td>BB</td>
<td>TLS</td>
<td>No TLS</td>
</tr>
</tbody>
</table>

- **3DES**: TLS will be used, with the `SSL_RSA_WITH_3DES_EDE_CBC_SHA` cipher suite.
- **AES**: TLS will be used, with the following cipher suites:
  - `TLS_RSA_WITH_AES_128_CBC_SHA`
  - `SSL_RSA_WITH_3DES_EDE_CBC_SHA`
- **Without**: TLS will be used without symmetric encryption, with the cipher suite `SSL_RSA_WITH_NULL_SHA`. DICOM messages will be received unencrypted.
- **No TLS**: No TLS will be used. DICOM messages will be received unencrypted. |
### NextGen Connect User Guide

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>Client Authentication TLS</td>
<td>Yes</td>
<td>Enable client authentication for TLS. Only applicable if the TLS option is not set to <strong>No TLS</strong>.</td>
</tr>
<tr>
<td>DD</td>
<td>Accept ssl v2 TLS handshake</td>
<td>Yes</td>
<td>Enable acceptance of the SSLv2Hello protocol in the TLS handshake.</td>
</tr>
<tr>
<td>EE</td>
<td>Keystore</td>
<td></td>
<td>File path or URL of P12 or JKS keystore to use for the local server certificate keypair.</td>
</tr>
<tr>
<td>FF</td>
<td>Keystore Password</td>
<td></td>
<td>Password for the configured Keystore.</td>
</tr>
<tr>
<td>GG</td>
<td>Trust Store</td>
<td></td>
<td>File path or URL of JKS truststore, used to trust remote client certificates.</td>
</tr>
<tr>
<td>HH</td>
<td>Trust Store Password</td>
<td></td>
<td>Password for the configured Truststore.</td>
</tr>
<tr>
<td>II</td>
<td>Key Password</td>
<td></td>
<td>Password for accessing the key in the Keystore.</td>
</tr>
<tr>
<td>JJ</td>
<td>Template</td>
<td><code>${DICOMMESSAGE}</code></td>
<td>The actual payload to send to the target channel. By default the encoded data of this destination (with all DICOM pixel data attachments reattached) will be used. <strong>Velocity Variable Replacement</strong> is supported here.</td>
</tr>
</tbody>
</table>

December 19, 2018
Database Writer

This destination connector connects to an external database and performs an INSERT/UPDATE statement (or any other statement, like calling a stored procedure). This can be done using a SQL statement, or by using JavaScript mode to execute the statement manually. The database connection will automatically be kept open across multiple dispatches.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| A    | Driver   |               | Specifies the type of database driver to use to connect to the database. The following values are supported by default:  
- Sun JDBC-ODBC Bridge  
- MySQL  
- Oracle  
- PostgreSQL  
- SQL Server / Sybase  
- SQLite  
Additional drivers can be added by editing The dbdrivers.xml File. |
<p>| B    | URL      |               | The JDBC URL to connect to the database with. This is not used when &quot;Use JavaScript&quot; is checked. However, it is used when the Generate Connection / Insert feature is used to generate code. Use the Insert URL Template button to populate the SQL with the correct template. |</p>
<table>
<thead>
<tr>
<th></th>
<th>Username</th>
<th>The username to connect to the database with. This is not used when &quot;Use JavaScript&quot; is checked. However, it is used when the Generate Connection / Insert feature is used to generate code.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Password</td>
<td>The password to connect to the database with. This is not used when &quot;Use JavaScript&quot; is checked. However, it is used when the Generate Connection / Insert feature is used to generate code.</td>
</tr>
<tr>
<td>E</td>
<td>Use JavaScript</td>
<td>No</td>
</tr>
</tbody>
</table>
| F | Generate | • **Connection**: This button is enabled when Use JavaScript is enabled. When clicked, it inserts boilerplate Connection construction code into the JavaScript pane at the current caret position.  
• **Insert**: Opens a window to assist in building an insert statement to insert records into the database specified in the URL above. |
| G | SQL / Template | The actual SQL or JavaScript code to execute. |
Document Writer

This destination connector takes an HTML template and converts it into either a PDF or RTF document. Custom embedded stylesheets are supported. That document can then be written out to a file and/or stored as a message attachment. The page size can be specified, and for PDFs you can also encrypt the document with a password.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Output</td>
<td>File</td>
<td>Choose how to output the document.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>File:</strong> Write the contents to a file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Attachment:</strong> Write the contents to an attachment. The destination's response message will contain the attachment Id and can be used in subsequent connectors to include the attachment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Both:</strong> Write the contents to both a file and an attachment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Directory</td>
<td>The directory (folder) where the generated file should be written. Use the <strong>Test Write</strong> button to confirm that files can be written to the folder.</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>File Name</td>
<td>The file name to give to the generated file.</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Document Type</td>
<td>PDF</td>
<td>The type of document to be created for each message.</td>
</tr>
<tr>
<td>E</td>
<td>Encrypted</td>
<td>No</td>
<td>If the document type is PDF, generated documents can optionally be encrypted.</td>
</tr>
<tr>
<td>F</td>
<td>Password</td>
<td>If encryption is enabled, enter the password that must be used to view the document after encryption.</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Page Size</td>
<td>8.5&quot; x 11&quot; (Letter)</td>
<td>The width and height of the document pages. The units for each are determined by the drop-down menu to the right. When rendering PDFs, a minimum of 26mm is enforced. Use the far-right drop-down menu to quickly select a page size among common US and UK formats.</td>
</tr>
<tr>
<td>H</td>
<td>HTML Template</td>
<td>This template is expected to be an HTML document, determining how to layout the PDF /RTF document. Custom embedded stylesheets are supported.</td>
<td></td>
</tr>
</tbody>
</table>

December 19, 2018
File Writer

This destination connector writes files out to the local filesystem, or to a remote directory. Several protocols are supported, including regular local file mode, FTP, SFTP, SMB, WebDAV, and Amazon S3. Files may be converted from Base64 and written out in raw binary format, or converted to bytes using a specific character set encoding. Additional options (like FTPS) are available with the SSL Manager extension.

Supported property groups:

- Destination Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Method</td>
<td>file</td>
<td>The basic method used to access the directory to write files to. Options include File (local filesystem or NFS / mapped share), FTP, SFTP, SMB, WebDAV, or Amazon S3. Once all necessary connection information has been filled in before, use</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Advanced Options</td>
<td>If the file method supports advanced options, this button will be enabled. Any advanced options set will be summarized in the Advanced Options label below this. For additional information, see <strong>File Reader</strong>.</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Directory</td>
<td>Only applicable to the File method. The directory (folder) to write the files to.</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>URL</td>
<td>Applicable to all methods except File. The domain name or IP address of the host (computer) to connect to. If this setting is enabled, the second text field specifies the directory (folder) to write to. When using the <strong>Amazon S3</strong> method, the first text field will be the bucket name, and the second text field can be used for a directory prefix.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>File Name</td>
<td>The name to write the file out as.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Anonymous</td>
<td>Yes</td>
<td>Only applicable to the <strong>FTP / WebDAV / Amazon S3</strong> methods. If enabled, connects to the remote server anonymously instead of using a username and password.</td>
</tr>
<tr>
<td>G</td>
<td>Username</td>
<td>anonymous</td>
<td>Applicable to all methods except File. The username used to connect to the remote server with. When using the <strong>Amazon S3</strong> mode, this will be your AWS Access Key ID.</td>
</tr>
<tr>
<td>H</td>
<td>Password</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>I</strong></td>
<td><strong>Timeout (ms)</strong></td>
<td><strong>10000</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applicable to the <strong>FTP / SFTP / SMB / Amazon S3</strong> methods. The socket timeout (in ms) to use when connecting to the remote server.</td>
<td></td>
</tr>
<tr>
<td><strong>J</strong></td>
<td><strong>Keep Connection Open</strong></td>
<td><strong>Yes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select Yes to keep the connection to the file system open after writing to it.</td>
<td></td>
</tr>
<tr>
<td><strong>K</strong></td>
<td><strong>Max Idle Time (ms)</strong></td>
<td><strong>0</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The maximum amount of time that a connection can be idle/unused before it gets closed. A timeout value of zero is interpreted as an infinite timeout, meaning that connections will only be closed when the connector is stopped.</td>
<td></td>
</tr>
<tr>
<td><strong>L</strong></td>
<td><strong>Secure Mode</strong></td>
<td><strong>Yes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only applicable to the <strong>WebDAV</strong> method. If enabled, HTTPS will be used instead of HTTP.</td>
<td></td>
</tr>
<tr>
<td><strong>M</strong></td>
<td><strong>Passive Mode</strong></td>
<td><strong>Yes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only applicable to the <strong>FTP</strong> method. If enabled, the server decides what port the client should connect to for the data channel. Passive mode sometimes allows a connection through a firewall that normal mode does not, because the client is initiating the data connection rather than the server.</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>Validate Connection</strong></td>
<td><strong>Yes</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only applicable to the <strong>FTP</strong> method. If enabled, the connection will be tested for validity before each operation.</td>
<td></td>
</tr>
<tr>
<td><strong>O</strong></td>
<td><strong>File Exists</strong></td>
<td><strong>Append</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Determines what to do when the file to be written already exists on the filesystem / remote server.</td>
<td></td>
</tr>
</tbody>
</table>
### Connector Map Variables

When the Amazon S3 mode is used, these variables will be available in the connector map.

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 19, 2018</td>
<td></td>
</tr>
</tbody>
</table>

- **P**: Create Temp File
  - **No**: If enabled, the file contents will first be written to a temp file and then renamed to the specified file name. If disabled, the file contents will be written directly to the destination file. This option is not available if the file is being appended to (option M).

- **Q**: File Type
  - **Text**: Select if the Template contains Base64 data; the contents will be decoded into raw bytes. Select **Binary** if the Template contains textual data; the contents will be decoded to bytes using the specified character set encoding.

- **R**: Encoding
  - **Default**: If **Text** is chosen for the File Type, select the character set encoding (ASCII, UTF-8, etc.) to be used in writing out the contents of each file.

- **S**: Template
  - **${message.encodedData}**: The actual payload to send to the target channel. By default the encoded data of this destination will be used. **Velocity Variable Replacement** is supported here.
<table>
<thead>
<tr>
<th>s3ETag</th>
<th>The hex encoded 128-bit MD5 hash of the file contents as computed by Amazon S3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>s3ExpirationTime</td>
<td>The expiration time for this object, only present if not null.</td>
</tr>
<tr>
<td>s3ExpirationTimeRuleId</td>
<td>The <code>BucketLifecycleConfiguration</code> rule ID for this object's expiration, only present if not null.</td>
</tr>
<tr>
<td>s3SSEAlgorithm</td>
<td>The server-side encryption algorithm, only present if the object is encrypted using AWS-managed keys.</td>
</tr>
<tr>
<td>s3SSECustomerAlgorithm</td>
<td>The server-side encryption algorithm, only present if the object is encrypted using customer-provided keys.</td>
</tr>
<tr>
<td>s3SSECustomerKeyMd5</td>
<td>The base64-encoded MD5 digest of the encryption key for server-side encryption, only present if the object is encrypted using customer-provided keys.</td>
</tr>
<tr>
<td>s3VersionId</td>
<td>The version ID of the newly uploaded object, only present if not null.</td>
</tr>
<tr>
<td>s3Metadata</td>
<td>A MessageHeaders object representing the map of metadata/headers for the S3 object.</td>
</tr>
</tbody>
</table>
HTTP Sender

This destination connector sends an HTTP request to an external web server. The method, parameters, and headers can all be fully customized. Both Basic and Digest authentication (preemptive or reactive) are supported. Sending requests through a proxy server is also supported, even when using HTTPS. The HTTP payload can be written out as raw bytes, or converted using a specified charset. Responses can be automatically converted to XML, allowing multipart payloads to be parsed in a consistent and easy-to-use way. Additional options are available with the SSL Manager extension.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>URL</td>
<td></td>
<td>The URL of the HTTP server to send each message to.</td>
</tr>
<tr>
<td>B</td>
<td>Use Proxy Server</td>
<td>No</td>
<td>If enabled, requests will be forwarded to the proxy server specified in the</td>
</tr>
<tr>
<td>Column</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Proxy Address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Proxy Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Multipart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Send Timeout (ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Response Content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Parse Multipart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Include Metadata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Binary MIME Types</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Proxy Address
The domain name or IP address of the proxy server to connect to.

D. Proxy Port
The port on which to connect to the proxy server.

E. Method
POST
The HTTP operation (POST / GET / PUT / DELETE / PATCH) to send for each message.

F. Multipart
No
If enabled, the content will first be written to a local temp file. Then the contents will be wrapped in a single file part inside a multipart/form-data payload.

G. Send Timeout (ms)
30000
Sets the socket timeout (SO_TIMEOUT) in milliseconds to be used executing the method. A timeout value of zero is interpreted as an infinite timeout.

H. Response Content
Plain Body
- **Plain Body**: The response body will be stored as a raw string.
- **XML Body**: The response body will be stored as serialized XML.

I. Parse Multipart
Yes
Select **Yes** to automatically parse multipart responses into separate XML nodes. Select **No** to always keep the response body as a single XML node.

J. Include Metadata
No
Select **Yes** to include response metadata (response code, headers) in the XML content. Note that regardless of this setting, the same metadata is always available in the connector map.

K. Binary MIME Types
application/.*
When a response comes in with a Content-Type header that matches one of these MIME types, it is interpreted as binary data and is directly written to the output.
| L | Authentication | No | If enabled, a Basic or Digest Authorization header will automatically be added to the request. |
| M | Authentication Type | Basic | Select between Basic or Digest auth. If the Preemptive option is checked, the Authorization header will be sent to the server with the initial request. Otherwise, the header will only be sent when the server requests it. When using Digest authentication, an Authorization header containing the realm/nonce/algorithim/qop values must be included in the Headers table. |
| N | Username | | The username to use to authenticate to the HTTP server. |
| O | Password | | The password to use to authenticate to the HTTP server. |
| P | Query Parameters | | Entries in this table will automatically be added to the request URI as query parameters. Multiple parameters with the same name are supported. |

If the "application/x-www-form-urlencoded" Content Type is used, this table will be used to populate the form data and will be sent in the entity payload rather...
### Connector Map Variables

After a request finishes, the connector map will automatically have the following entries available. These can be used from within the Response Transformer.

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>responseStatusLine</td>
<td>This is the full status line of the HTTP response, e.g. December 19, 2018</td>
</tr>
</tbody>
</table>
"HTTP/1.1 200 OK". It includes the HTTP version, the response code, and the response code reason.

| responseHeaders          | A MessageHeaders object containing all headers received in the response. Look in the User API for additional information. |
JMS Sender

This destination connector connects to an external JMS provider and writes messages to a queue or topic. It supports both JNDI and specifying a specific connection factory. Once this connector dispatches a message, the connection to the JMS provider will be kept open and cached until the connector is stopped or an error occurs. The properties view also includes a mechanism to save configuration templates for common provider types, so that creating a new JMS Sender is as quick and easy as possible.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Use JNDI</td>
<td>No</td>
<td>Select <strong>Yes</strong> to use JNDI to look up a connection factory to connect to the queue or topic. Select <strong>No</strong> to specify a connection factory class without using JNDI.</td>
</tr>
<tr>
<td>B</td>
<td>Provider URL</td>
<td></td>
<td>If using JNDI, enter the URL of the JNDI provider here.</td>
</tr>
<tr>
<td>C</td>
<td>Initial Context Factory</td>
<td></td>
<td>If using JNDI, enter the</td>
</tr>
</tbody>
</table>
### Fully-Qualified Java Class Name

**D**

- **Connection Factory Name**
  
  If using JNDI, enter the JNDI name of the connection factory here.

**E**

- **Connection Factory Class**
  
  If using the generic JMS provider and not using JNDI, enter the fully-qualified Java class name of the JMS connection factory here.

**F**

- **Connection Properties**
  
  This table allows you to enter custom connection factory settings. The property column is the key, while the value column is the actual value for the setting. The specific properties used here will vary depending on what connection factory class / provider you're using.

**G**

- **Username**
  
  The username for accessing the queue or topic.

**H**

- **Password**
  
  The password for accessing the queue or topic.

**I**

- **Destination Type**
  - **Queue**
    
    Specify whether the destination is a queue or topic.

**J**

- **Destination Name**
  
  The name of the queue or topic.

**K**

- **Client ID**
  
  The JMS client ID to use when connecting to the JMS broker.

**L**

- **Template**
  - `${message.encodedData}`
    
    The actual payload to send to the JMS broker. By default the encoded data of this destination will be used. **Velocity Variable Replacement** is supported here.

**M**

- **Connection Templates**
  
  This section allows you to save the current state of your JMS Sender properties into a template which can be restored later if you make changes.
changes, or may also be applied to other JMS Sender connectors. More information here: JMS Listener

December 19, 2018
JavaScript Writer

This destination connector executes a custom user-defined JavaScript script. This can be used in a wide variety of ways, such as calling out to external Java libraries or invoking a local OS shell script. You can return custom values that determine what response data to store, and what status to put the destination connector message into. Or simply use the script as a generic job that doesn't necessarily produce responses. For example, you can use tools like ChannelUtil to programmatically start/stop/deploy channels from within the script.

Supported property groups:

- **Destination Settings**

JavaScript Writer Return Values

When you return from your script, you can choose to set a custom Response that will be stored for the destination. The following return values are accepted:

- **String**: Any string returned will be stored as the Response content for the destination, with a status of `SENT`.
- **Status**: An instance of the Status enum (for additional information, see the User API Javadoc) will cause no response content to be stored, but the connector message status will be updated to `SENT`, `QUEUED`, or `ERROR` depending on the status returned. Note that the status can only be set to `ERROR` if queuing is enabled in the Destination Settings.
- **Response**: A Response object contains a status, status message, error message, and the actual response content. If this object is returned, all of these things will be stored in the Response content, and the connector message status will be updated accordingly. For additional information, see the User API Javadoc.

```javascript
try {
    var type = $('thisType').toLowerCase();
    var id = UUIDGenerator.getUUID();
    var versionId = 1;
    var data = AttachmentUtil.readAttachmentMessage(connectorMessage);
    var contentType = $('contentType');
    var isFormatXML = (FileUtil.isFileTypeJSON(contentType) || 'xml');
    var preferReturn = getPreferValue();

    if (type === 'binary') {
        var resource = isFormatXML ? FileUtil.fromString(data) : FileUtil.fromStringJSON(data);
        var resourceEle = resource.getElementById();

        if (resourceEle == null || resourceEle.getElementById('resourceType') == null) {
            return createOperationOutcome('error', 'invalid', errorDetails, 'Resource type not specified');
        } else if (resourceEle.getElementById('resourceType').toLowerCase() !== type) {
            return createOperationOutcome('error', 'invalid', errorDetails, 'Resource type ' + resource());
        }

        // Always convert back to XML, Binary resources will already be XML.
        contentType = FileUtil.getMimeTypeXML();
    }

    var params = [type, id, versionId, data, contentType, $('method'), $('url')];
    var result = executeUpdateAndGetGeneratedKeys('INSERT INTO resource (name, id, version, data, minify) result.next();
    var sequenceId = result.getInt(1);

    result = executeCachedQuery('SELECT last_modified FROM resource WHERE sequence_id = ?', [sequenceId])
    result.next();
    var lastModified = result.getDate('last_modified');

    var response;
    if (preferReturn === 'minimal' || (preferReturn && type === 'binary')) {
        // If the Prefer header is set to minimal they don't send back the created resource
    }
}
```
- **Empty String / null / undefined**: Returning any of these (including just a "return;" statement or no return statement at all) will cause *no* response data to be stored, and the message status will be updated to *SENT*.
- **Any Object**: Any other object returned will be converted to a String via the `toString()` method, and that String representation will be stored as the Response data. The message status will also be updated to *SENT*.

December 19, 2018
SMTP Sender

This destination connector sends an e-mail to a specified address (or list of addresses), through a given SMTP relay /host. Both implicit and explicit (STARTTLS) encryption modes are supported. The body can be either text or HTML. Custom headers and attachments can be added to the request as well.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SMTP Host</td>
<td></td>
<td>The domain name or IP address of the SMTP server to use to send the e-mail messages. Note that sending e-mail to an SMTP server that is not expecting it may result in the IP of the machine running Mirth Connect being added to the server's &quot;blacklist&quot;.</td>
</tr>
</tbody>
</table>
After filling out the necessary information below, use the **Send Test Email** button to send a sample e-mail to the To address, to verify that everything is working as intended.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B</strong></td>
<td>SMTP Port</td>
<td>25</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Override Local Binding</td>
<td>No</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Local Address</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Local Port</td>
<td>0</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Send Timeout (ms)</td>
<td>5000</td>
</tr>
</tbody>
</table>

The port number of the SMTP server to send the e-mail messages to. Generally, the default port of 25 is used.

Select **Yes** to override the local address and port that the client socket will be bound to. Select **No** to use the default values of 0.0.0.0:0. A local port of zero (0) indicates that the OS should assign an ephemeral port automatically.

Note that if a specific (non-zero) local port is chosen, then after a socket is closed it’s up to the underlying OS to release the port before the next socket creation, otherwise the bind attempt will fail.

The local address that the client socket will be bound to, if Override Local Binding is enabled.

The local port that the client socket will be bound to, if Override Local Binding is enabled.

The number of milliseconds for the SMTP socket connection timeout.
<table>
<thead>
<tr>
<th></th>
<th>Encryption</th>
<th>None</th>
<th>Determines what type of encryption to use for the connection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td></td>
<td></td>
<td>• <strong>None</strong>: No encryption will be used. Messages will be sent over the connection in plain text.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <strong>STARTTLS</strong>: The connection will begin as unencrypted, and then the SMTP client will manually upgrade the connection through a STARTTLS command.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• <strong>SSL</strong>: The connection will be encrypted from the very beginning. Use this when the server expects a TLS handshake after a client connects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Use Authentication</td>
<td>No</td>
<td>Determines whether to use authentication when connecting to the SMTP server.</td>
</tr>
<tr>
<td>I</td>
<td>Username</td>
<td></td>
<td>The username to authenticate with.</td>
</tr>
<tr>
<td>J</td>
<td>Password</td>
<td></td>
<td>The password to authenticate with.</td>
</tr>
<tr>
<td>K</td>
<td>To</td>
<td></td>
<td>The e-mail address to send to. Multiple addresses can be specified with commas.</td>
</tr>
<tr>
<td>L</td>
<td>From</td>
<td></td>
<td>The e-mail address to send the message from.</td>
</tr>
<tr>
<td>M</td>
<td>Subject</td>
<td></td>
<td>The subject line of the e-mail.</td>
</tr>
<tr>
<td>N</td>
<td>Charset Encoding</td>
<td>Default</td>
<td>The character set encoding to use when converting the body, or Default to use the default character set encoding of the JVM Mirth Connect is running on.</td>
</tr>
<tr>
<td>O</td>
<td>HTML Body</td>
<td>No</td>
<td>Determines the MIME type of the message, either text/plain or text/html. If HTML is used, richer message formatting may be used.</td>
</tr>
<tr>
<td>P</td>
<td>Template</td>
<td></td>
<td>The actual body of the e-mail.</td>
</tr>
</tbody>
</table>

Dec. 19, 2018
<table>
<thead>
<tr>
<th>Column</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>Headers</td>
<td>Entries in this table will be included as SMTP headers in the e-mail dispatch.</td>
</tr>
</tbody>
</table>
| R      | Attachments   | Entries in this table will be added as attachments with the e-mail. The following columns are configurable:  
  - **Name**: The name of the attachment.  
  - **Content**: The Base64-encoded content of the attachment. You can also use a message attachment replacement token here.  
  - **MIME Type**: The MIME type of the attachment (e.g. "image/png"). |
TCP Sender

This destination connector opens a new TCP client connection and sends messages over it. You can decide whether to keep a connection open, and if so for how long. Configurable transmission modes allow you to decide how to send outbound messages and receive responses.

Supported property groups:

- Destination Settings

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Transmission Mode</td>
<td>MLLP</td>
<td>The transmission mode determines how to send message data out on the socket byte stream, and how to receive responses. For additional information, see TCP Listener.</td>
</tr>
<tr>
<td>B</td>
<td>Sample Frame</td>
<td><code>&lt;VT&gt; &lt;Message Data&gt; &lt;FS&gt;&lt;CR&gt;</code></td>
<td>This is dependent on the Transmission Mode and displays an example of how an outgoing message frame is expected to look.</td>
</tr>
<tr>
<td>C</td>
<td>Remote Address</td>
<td>127.0.0.1</td>
<td>The domain name or IP address on which to connect. Press the <strong>Test Connection</strong> button to verify whether the server is able to open a TCP connection as the specified IP/port.</td>
</tr>
<tr>
<td>D</td>
<td>Remote Port</td>
<td>6660</td>
<td>The port on which to connect.</td>
</tr>
<tr>
<td>E</td>
<td>Override Local Binding</td>
<td>No</td>
<td>Select <strong>Yes</strong> to override the local address and port that the client socket will be bound to. Select <strong>No</strong> to use the default values of 0.0.0.0:0. A local port of zero (0) indicates that the OS should assign an ephemeral port automatically. Note that if a specific (non-zero) local port is chosen, then after a socket is closed it's up to the underlying OS to release the port before the next socket creation, otherwise the bind attempt will fail.</td>
</tr>
<tr>
<td>F</td>
<td>Local Address</td>
<td>0.0.0.0</td>
<td>The local address that the client socket will be bound to, if Override Local Binding is enabled.</td>
</tr>
<tr>
<td>G</td>
<td>Local Port</td>
<td>0</td>
<td>The local port that the client socket will be bound to, if Override Local Binding is enabled. Note that if a specific (non-zero) local port is chosen, then after a socket is closed it's up to the underlying OS to release the port before the next socket creation, otherwise the bind attempt will fail.</td>
</tr>
<tr>
<td>H</td>
<td>Keep Connection Open</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

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Select **Yes** to keep the connection to the host open across multiple messages. Select **No** to immediately close the connection to the host after sending each message.

When Keep Connection Open is enabled, the Send Timeout is used to determine how long to keep the connection open when there are no messages to send. By default the Send Timeout is set to 5 seconds, so even when Keep Connection Open is enabled, the connection may still be closed if there is a period of downtime where no messages are being dispatched.

<table>
<thead>
<tr>
<th></th>
<th>Check Remote Host</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select **Yes** to check if the remote host has closed the connection before each message. Select **No** to assume the remote host has not closed the connection. Checking the remote host will decrease throughput but will prevent the message from erroring if the remote side closed the connection and queuing is disabled.

<table>
<thead>
<tr>
<th></th>
<th>Send Timeout (ms)</th>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number of milliseconds to keep the connection to the host open, if Keep Connection Open is enabled. If zero, the connection will be kept open indefinitely.
<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
<th>Value</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Buffer Size (bytes)</td>
<td>65536</td>
<td>The size, in bytes, of the buffer to hold messages waiting to be sent. Generally, the default value is fine.</td>
</tr>
<tr>
<td>L</td>
<td>Response Timeout (ms)</td>
<td>5000</td>
<td>The number of milliseconds the connector should wait whenever attempting to create a new connection or attempting to read from the remote socket. If Ignore Response is checked, the connector will not wait for a response at all after sending a message.</td>
</tr>
<tr>
<td>M</td>
<td>Queue on Response Timeout</td>
<td>Yes</td>
<td>If enabled, the message is queued when a timeout occurs while waiting for a response. Otherwise, the message is set to ERROR when a timeout occurs. This setting has no effect unless queuing is enabled for the connector.</td>
</tr>
<tr>
<td>N</td>
<td>Data Type</td>
<td>Text</td>
<td>Select Binary if the outbound message is a Base64 string (will be decoded before it is sent out). Select Text if the outbound message is textual (will be encoded with the specified character set encoding).</td>
</tr>
<tr>
<td>O</td>
<td>Encoding</td>
<td>Default</td>
<td>Select the character set encoding used by the message sender, or select Default to use the default character set encoding for the JVM Mirth Connect is running on.</td>
</tr>
<tr>
<td>P</td>
<td>Template</td>
<td>${message.encodedData}</td>
<td>The actual payload to send to the remote server. By default the encoded data of this destination will be used. Velocity Variable Replacement is supported here.</td>
</tr>
</tbody>
</table>

December 19, 2018
Web Service Sender

This destination connector connects to a SOAP endpoint via JAX-WS and invokes a defined operation. When configuring this connector you can automatically fetch the WSDL from the remote server, and all the services / endpoints / operations will be filled out and modifiable from drop-down menus. Automatic generation of a sample SOAP envelope is supported too. Custom headers and MTOM attachments can be added to each request as well.

Supported property groups:

- **Destination Settings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>WSDL URL</td>
<td></td>
<td>The URL to the WSDL describing the web service and available operations. Click on Get Operations after entering the WSDL to automatically fill out the Service, Port, Location URI, and available Operations.</td>
</tr>
<tr>
<td>B</td>
<td>Service</td>
<td></td>
<td>The service name for the WSDL defined above.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Port / Endpoint</td>
<td>This field is filled in automatically when the <strong>Get Operations</strong> button is clicked and does not usually need to be changed, unless multiple services are defined in the WSDL.</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Location URI</td>
<td>The port / endpoint name for the service defined above. This field is filled in automatically when the Get Operations button is clicked and does not usually need to be changed, unless multiple endpoints are defined for the currently selected service in the WSDL.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Socket Timeout (ms)</td>
<td>30000 Sets the connection and socket timeout (SO_TIMEOUT) in milliseconds to be used when invoking the web service. A timeout value of zero is interpreted as an infinite timeout.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Authentication</td>
<td>No Turning on authentication uses a username and password to get the WSDL, if necessary, and uses the username and password binding provider properties when calling the web service.</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Username</td>
<td>The username used to get the WSDL and call the web service.</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Password</td>
<td>The password used to get the WSDL and call the web service.</td>
<td></td>
</tr>
</tbody>
</table>
| I | Invocation Type | Two-Way Determines how to invoke the operation.
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Operation</td>
<td>The web service operation to be called. This is used to generate the envelope along with the Generate Envelope button.</td>
</tr>
<tr>
<td>K</td>
<td>SOAP Action</td>
<td>The SOAPAction HTTP request header field can be used to indicate the intent of the SOAP HTTP request. This field is optional for most web services, and may be auto-populated when you select an operation.</td>
</tr>
<tr>
<td>L</td>
<td>SOAP Envelope</td>
<td>The actual SOAP envelope to send to the remote web service. Use the Generate Envelope button above to generate a sample skeleton XML document that you can then fill out using Velocity Variable Replacement.</td>
</tr>
</tbody>
</table>

- **Two-Way**: Invoke the operation using the standard two-way invocation function. This will wait for some response or acknowledgement to be returned.
- **One-Way**: Invoke the operation using the one-way invocation function. This will not wait for any response, and should only be used if the operation is defined as a one-way operation.

This is an XML SOAP document, so any variables used here may need to be properly entity-encoded. You can do this by dragging the XML Entity Encoder over from the Destination Mappings list first, and then
### Headers

Entries in this table will be added to the request as HTTP headers. Multiple headers with the same name are supported.

### Use MTOM

No

Enables **MTOM** on the SOAP Binding. If enabled, attachments can be added to the table below and referenced from within the envelope.

### Attachments

Entries in this table will be added as MTOM attachments along with the request. The following columns are configurable:

- **ID**: A unique ID for the attachment which can be referenced from within the SOAP envelope.
- **Content**: The Base64-encoded content of the attachment. You can also use a message attachment replacement token here.
- **MIME Type**: The MIME type of the attachment (e.g. "image/png").

---

*dragging the map variable inside the "XmlUtil.encode()" function call.*
Mirth Connect and JavaScript

JavaScript is a scripting language that can be used in a wide variety of places throughout Mirth Connect to perform advanced routing and transformation. This section is divided into the following topics:

- About JavaScript
- Using JavaScript in Mirth Connect
- Using the JavaScript Editor
- Variable Maps
- Attachment JavaScript Functions
- The User API (Javadoc)

About JavaScript

This section provides a basic explanation of how the language works:

- Variables
- Comments
- Arrays
- Operators
- Conditional Statements
- Functions
- Loops and Iterations
- Exception Handling

Variables

Unassigned variables have the value undefined by default; string literals can use single or double quotes; braces { } create a block of statements that can be used for loops, conditionals, and statements. These are some examples of variable declarations:

```
var x;
var y = r;
z = "abc"
```

Comments

You can start a single-line comment with two forward slashes, or a multi-line comment with forward slashes and asterisks:

```
// This is a single-line comment

/*
   This is a
*/
```
Arrays

Arrays are native objects indexed with bracket notation that can contain other objects, arrays, or primitive types. Arrays can be initialized using Java-like constructors or bracket notation and do not need to be sized upon construction:

```javascript
var myArray1 = new Array(10);
var myArray2 = new Array(5, "some string", new Array());
var myArray3 = [];
var myArray4 = [ "one", "two", "three" ];
```

Uninitialized elements in arrays are undefined, so use the length property (var size = myArray.length;) to get a size. Use the delete operator to remove the index value, which sets the element as undefined. There are several built-in methods for arrays: concat(), reverse(), replace(), sort(), indexOf(). Arrays in JavaScript are zero-based indexed, so use myArray[0] to access the first element. Other important native objects in JavaScript include:

- String
- Date
- Boolean
- RegExp (regular expressions)
- Math
- XML

Operators

The most common JavaScript operators can be put into the following categories:

- Arithmetic
- Assignment
- Comparison
- Logical

Arithmetic Operators

These operators are used to perform arithmetic between variables and/or values. In this table, the y-variable has a value of 5 to explain the JavaScript Arithmetic operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Example</th>
<th>Result of x</th>
<th>Result of y</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Addition</td>
<td>x=y+2 (5+2)</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>-</td>
<td>Subtraction</td>
<td>x=y-2 (5-2)</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>*</td>
<td>Multiplication</td>
<td>x=y<em>2 (5</em>2)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>/</td>
<td>Division</td>
<td>x=y/2 (5/2)</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td>%</td>
<td>Modulus (division remainder)</td>
<td>x=y%2 (remainder is 1 for the equation)</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
Assignment Operators

These operators are used to assign values to JavaScript variables. In this table, the `x`-variable has a value of 10, and the `y`-variable has a value of 5 to explain the JavaScript Assignment operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Example</th>
<th>Same As</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>=</code></td>
<td>assign</td>
<td><code>x=y</code></td>
<td><code>x=y (5)</code></td>
<td><code>x=5</code></td>
</tr>
<tr>
<td><code>+=</code></td>
<td>add and assign</td>
<td><code>x+=y</code></td>
<td><code>x=x+y (10+5)</code></td>
<td><code>x=15</code></td>
</tr>
<tr>
<td><code>-=</code></td>
<td>subtract and assign</td>
<td><code>x-=y</code></td>
<td><code>x=x-y (10-5)</code></td>
<td><code>x=5</code></td>
</tr>
<tr>
<td><code>*=</code></td>
<td>multiply and assign</td>
<td><code>x*=y</code></td>
<td><code>x=x*y (10*5)</code></td>
<td><code>x=50</code></td>
</tr>
<tr>
<td><code>/=</code></td>
<td>divide and assign</td>
<td><code>x/=y</code></td>
<td><code>x=x/y (10/5)</code></td>
<td><code>x=2</code></td>
</tr>
<tr>
<td><code>%=</code></td>
<td>modulus (division remainder) and assign</td>
<td><code>x%=y</code></td>
<td><code>x=x%y (remainder is 0 for the equation 10/2)</code></td>
<td><code>x=0</code></td>
</tr>
</tbody>
</table>

Comparison Operators

Comparison operators are used in logical statements to determine equality or difference between variables or values. In this table, the `x`-variable has a value of 5 to explain the JavaScript Comparison operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Comparing</th>
<th>Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>===</code></td>
<td>is equal to</td>
<td><code>x===y</code></td>
<td>false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>x===5</code></td>
<td>true</td>
</tr>
<tr>
<td><code>!==</code></td>
<td>is not equal to</td>
<td><code>x!==y</code></td>
<td>true</td>
</tr>
<tr>
<td><code>&gt;</code></td>
<td>is greater than</td>
<td><code>x&gt;y</code></td>
<td>false</td>
</tr>
<tr>
<td><code>&lt;</code></td>
<td>is less than</td>
<td><code>x&lt;y</code></td>
<td>true</td>
</tr>
<tr>
<td><code>&gt;=</code></td>
<td>is greater than or equal to</td>
<td><code>x&gt;=y</code></td>
<td>false</td>
</tr>
<tr>
<td><code>&lt;=</code></td>
<td>is less than or equal to</td>
<td><code>x&lt;=y</code></td>
<td>true</td>
</tr>
</tbody>
</table>
Logical Operators

Logical operators are used to determine the logic between variables or values. In this table, the $x$-variable has a value of 6, and the $y$-variable has a value of 3 to explain the JavaScript Logical operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp;&amp;</td>
<td>and</td>
<td>$(x &lt; 10 \text{ &amp;&amp; } y &gt; 1)$ is true</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>not</td>
<td>$(x==y)$ is true</td>
</tr>
</tbody>
</table>

Conditional Statements

This example shows the basic syntax structure for conditional statements in JavaScript:

```javascript
if (condition1) {
    // Code to execute
} else if (condition2) {
    // Code to execute
} else {
    // Code to execute
}
```

Functions

This example shows the basic syntax structure for the creation of functions in JavaScript:

```javascript
function functionName (p1, p2, ..., pN) {
    // Code to execute
    return someValue;
}
```

There are various ways to call a function [e.g., `var x = myFunction("ABC", 100, myVar);`]. Parameters are optional and unlimited. The return statement is also optional.

Loops and Iterations

A loop is a type of programming-language statement that lets code be executed repeatedly; that is, a loop is a series of iterations. In programming language, there are four types of loops:

- for
- for each...in
- while
- do...while.
An iteration is a single execution of the inner loop process. If you loop from 1 to 10, the code inside the loop will be executed for 10 iterations.

Loops can be unconditionally exited with a break statement: break; The continue statement: continue; unconditionally skips to the next iteration of the loop.

**for loops**

These loops are often distinguished by an explicit loop counter (variable), which lets the body of the for loop (the code that is being repeatedly executed) know about the sequencing of each iteration. for loops are typically used when the number of iterations is known before the loop is entered.

### Syntax (for loops)

```plaintext
for (index=startValue; endCondition; incIndex) {
  // Code to execute
}
```

### Example

```plaintext
for (var i=0; i<10; i++) {
  logger.info("i = "+i);
}
```

**for each...in loops**

These loops are part of the E4X standard. Unlike other for loop constructs, for each...in loops usually have no explicit counter; they essentially say "do this to everything in this set" rather than "do this X times." This avoids possible off-by-one errors and makes code easier to read. These loops are used to iterate through elements in an array (or collection) or in the property values of an object.

### Syntax (for each...in loops)

```plaintext
for each (var in object) {
  // Code to execute
}
```

### Example

```plaintext
var sources = new Array ();
sources [0] = "Customer 1";
sources [1] = "Customer 2";
sources [2] = "Customer 3";
for each (src in sources) {
  logger.info(src);
}
```

**while loops**

These loops are control-flow statements that let code execute repeatedly based on a given Boolean (true/false) condition. A while loop can be thought of as a repeating "if" statement and consists of a block of code and a condition. Upon evaluation, if the condition is true, the code in the block is executed, repeating until the condition becomes false. A while loop checks the condition before the block is executed, in contrast to a do...while loop, which tests the condition after the block is executed.

### Syntax (while loops)

```plaintext
while (condition) {
  // Code to execute
}
```

### Example

```plaintext
var index = 0;
var found = false;
while (!found) {
  if (myArray[index++] == "ABC") {
    found = true;
  }
}
```
**do...while loops**

These loops let code execute at least once based on a Boolean (true/false) condition. A **do...while** loop consists of a process symbol and a condition. The code in the block executes, and the condition is evaluated. If the condition is **true**, the code in the block is executed again, repeating until the condition becomes **false**. A **do...while** loop checks the condition after the block is executed, in contrast to the **while** loop, which tests the condition before the block is executed. It is possible—and sometimes desirable—for the condition to always evaluate as **true**, which creates an infinite loop. When such a loop is created purposely, there is usually another control structure, such as a **break** statement, that terminates the loop.

<table>
<thead>
<tr>
<th>Syntax (do...while loops)</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>do {</code></td>
<td>var index = -1;</td>
</tr>
<tr>
<td><code>   // Code to execute</code></td>
<td>do {</td>
</tr>
<tr>
<td><code>}</code> while (conditional);</td>
<td><code>   var val = getValue(++index);</code></td>
</tr>
<tr>
<td><code>}</code> while (val != &quot;ABC&quot;);</td>
<td><code>   </code> while (val != &quot;ABC&quot;);</td>
</tr>
</tbody>
</table>

**Exception Handling**

The variable in a **catch** statement is of the Error type or one of its subclasses. You can raise exceptions with a **throw** statement:

```
throw "This is my exception message!";
```

```
throw new RangeError("Var x is not between 1 and 100");
```

Uncaught exceptions inside a connector result in an error status for the processed message.

<table>
<thead>
<tr>
<th>Syntax (Exception Handling)</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>try {</code></td>
<td>try {</td>
</tr>
<tr>
<td><code>   // Code to execute</code></td>
<td><code>   var x = undefinedVarName;</code></td>
</tr>
<tr>
<td><code>} catch (exception) {</code></td>
<td><code>   } catch (e) {</code></td>
</tr>
<tr>
<td><code>   // Exception handling</code></td>
<td><code>   logger.error(&quot;Error: &quot;+e);</code></td>
</tr>
<tr>
<td><code>   // code to execute</code></td>
<td><code>   }</code></td>
</tr>
<tr>
<td><code>)</code></td>
<td><code>}</code></td>
</tr>
<tr>
<td><code>   // Code to always execute</code></td>
<td><code>   }</code></td>
</tr>
</tbody>
</table>
Using JavaScript in Mirth Connect

This section shows you how to use JavaScript to perform various messaging operations within Mirth Connect. Click a link to go to the operation:

- About E4X
- Accessing Message Data with E4X
- Adding Segments to a Message
- Deleting a Segment
- Iterating Over Message Segments
- Iterating Over Repeating Fields
- Adding a New Repeating Field
- Message Variables
- Built-In Code Templates
- Using Java Classes
- Regular Expressions
- Logging with JavaScript

About E4X

ECMAScript for XML (E4X), introduced in JavaScript 1.6, is a JavaScript extension that provides native XML support to ECMAScript:

```javascript
var person1 = new XML("<person></person>);
var person2 = <person></person>;
```

E4X supplies a simpler alternative to Document Object Model (DOM) interfaces for accessing XML documents. E4X also offers a new way to make XML visible. Prior to E4X, XML had to be accessed at an `object` level. E4X regards XML as `primitive` level, which suggests quicker access, improved support, and acknowledgment as a component (data structure) of a program. Provided below are several useful XML object methods:

- `appendChild()`—appends a child element
- `name()`—gets the name of an element
- `attribute()`—gets an attribute of an element
- `children()`—gets a list of all of an element's child elements
- `length()`—gets the count of an element's child elements.

Use DOM-like syntax to access XML elements and use `@` for element attributes:

```xml
<person>
  <name>
    <first/>
    <last/>
  </name>
  <address type="home"/>
</person>
```

```javascript
person.name.first = "Joe"
person["name"]["first"] = "Joe"
... 
person.address.@type = "work";
person["address"][@type] = "work";
```
Accessing Message Data with E4X

```xml
<?xml version="1.0" encoding="UTF-8"?>
<HL7Message>
  <MSH>
    <MSH.1>|</MSH.1>
    <MSH.2|^~&amp;></MSH.2>
    <MSH.3>
      <MSH.3.1>SENDAPP</MSH.3.1>
    </MSH.3>
    <MSH.4>
      <MSH.4.1>General Hospital</MSH.4.1>
    </MSH.4>
    <MSH.5>
      <MSH.5.1>RECAPP</MSH.5.1>
    </MSH.5>
    <MSH.6/>
    ...
  </MSH>
  ...
</HL7Message>
```

The XML variables `msg` and `tmp` represent root-level elements. Use JavaScript bracket notation for each element level in the document below the root (this works with any message data, not just HL7):

```javascript
var sendingFacility = msg['MSH']['MSH.4']['MSH.4.1'].toString();
```

Most values in an HL7 message go three levels deep. The first level is a `segment`; the second level is a `field` within the segment; the third level is a `component` within a segment field. If a field or component does not exist, it is created automatically. Examples for repeating segments and fields include using bracket notation to index:

```javascript
var obx = msg['OBX'];
var obx5 = obx['OBX.5'];
var obx5_1 = obx5['OBX.5.1'].toString();
```

All E4X methods available on the `msg` and `tmp` variables can be accessed through the auto-completion dialog in the JavaScript Editor.

**Adding Segments to a Message**

To add a segment to a message, create a new XML object with a segment code, then add it after the segment it should follow:

```javascript
var seg = new XML("<ZZZ><ZZZ.1><ZZZ.1.1>My Value</ZZZ.1.1></ZZZ.1></ZZZ>" );
msg['QRF'] += seg;
```

Insert the `+=` operator into a message after a particular segment or at the end of the message. Mirth Connect has four global functions by which you can create segments for messages:

<table>
<thead>
<tr>
<th>Function</th>
<th>Function Description</th>
<th>Example</th>
</tr>
</thead>
</table>
| Create Segment (individual) | Creates an XML object for the segment that has not been inserted into a message. | `var newSeg = createSegment ('ZYX');
newSeg ['ZYX']['ZYX.1']['ZYX.1.1'] = "My Value";
msg += newSeg;` |
| Create Segment          | Creates an XML object for the                                                        |                                                                        |
Create Segment (in message, index)

Creates an XML object for the segment in a specified message (msg or tmp) in a specified index and is issued for repeating segments; if a segment is already in the index, the new segment overwrites it.

createSegment ('OBX', msg, 4);
msg ['OBX'][4]['OBX.3']['OBX.3.2'] = "Glucose";

Create Segment After Segment

Creates an XML object for the segment and adds it after the target segment.

createSegmentAfter("ZZZ", msg ['QRF']);
msg ['ZZZ']['ZZZ.1']['ZZZ.1.1'] = "My Value";

which function call is equivalent to:
msg ['QRF'] += createSegment ("ZZZ");

Deleting a Segment

To delete a segment, use the JavaScript delete keyword: delete msg['ZZZ'];

In repeating segments, the above code deletes all instances of that segment. When you delete a segment, all subsequent segments move up.

Iterating Over Message Segments

To iterate over all segments, follow this example:

```javascript
for each (segment in msg.children()) {
    if (segment.name().toString() == "ORC") {
        // Do something…
    }
}
```

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To iterate through specifically named segments, use this formula:

```javascript
for each (segment in msg..OBX) {
    // Do something...
}
```

Note that although JavaScript can be used to iterate through message segments, you may find it easier to use the Iterator Rule / Step instead.

### Iterating Over Repeating Fields

To iterate over repeating fields, check the `Handle Repetitions` property. First, use the XML object's `length()` method to get the number of repetitions to iterate over:

```javascript
var reps = msg['PV1']['PV1.7'].length();
```

Then, use a `for each` loop to iterate over repetitions:

```javascript
for each (attendingDr in msg['PV1']['PV1.7']) {
    lastName = attendingDr['PV1.7.2'].toString();
}
```

Note that although JavaScript can be used to iterate through repeating fields, you may find it easier to use the Iterator Rule / Step instead.

### Adding a New Repeating Field

To add a new repeating field, you need to create an XML object at the segment's field level. Populate the fields, then link to the message at the repeating field level:

```javascript
var newDr = new XML (<PV1.7/>);
newDr ['PV1.7.1'] = "C3333";
newDr ['PV1.7.2'] = "Jones";
msg ['PV1']['PV1.7'] += newDr;
```

### Message Variables

There are a wide variety of different JavaScript contexts throughout Mirth Connect, and each have various variables automatically available from the local scope. Here are some common examples:

- **message**: A string that represents a raw inbound message in native format.
- **msg**: An XML object that represents a transformed version of the inbound message.
- **tmp**: An XML object that represents an outbound message template; available only if an outbound template is defined.
- **connectorMessage**: An instance of the ImmutableConnectorMessage Java class; an internal representation of the message and its attributes.

### Built-In Code Templates

These templates are used for function calls and code snippets for common JavaScript tasks. The templates are available in all JavaScript contexts on the Reference tab using the drag-and-drop function and can be extended with custom code templates. For additional information, see Reference List.

### Using Java Classes

You can access any Java class in any JavaScript context:

```javascript
var map = new Packages.java.util.LinkedHashMap();
```
The "Packages." at the beginning may be omitted for common top-level package domains, like "com", "net", "org", and "java". To avoid having to type out the fully-qualified class name every time, you can import the package:

```java
importPackage(org.apache.commons.io);
FileUtils.getUserDirectory();
```

For classes in custom or non-standard libraries, create a resource (see Resources Settings Tab) containing your .jar file. Then include it on the channel in the Library Resources dependencies tab.

**Regular Expressions**

These are used to search, match, or manipulate text strings based on patterns. In Mirth Connect, regular expressions may be used for:

- String replacement in the Mapper and Message Builder transformer steps
- File-reader filename filter patterns
- Error-condition matching in Alerts
- String methods in JavaScript contexts.

Regular expressions have their own set of rules.

<table>
<thead>
<tr>
<th>Character</th>
<th>Character Name</th>
<th>Usage</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vertical bar/pipe</td>
<td>Separates alternatives</td>
<td>this</td>
</tr>
<tr>
<td>()</td>
<td>Parentheses</td>
<td>Groups characters together</td>
<td>(A</td>
</tr>
<tr>
<td>^</td>
<td>Caret</td>
<td>Matches characters only at the start position</td>
<td>^ab – matches “abc” but not “lab”</td>
</tr>
<tr>
<td>$</td>
<td>Dollar sign</td>
<td>Matches characters only at the end position</td>
<td>Ab$ - matches “lab” but not “abc”</td>
</tr>
<tr>
<td>?</td>
<td>Question mark</td>
<td>Indicates 0 instances or 1 instance of the previous character</td>
<td>Ab?cd – matches “acd” or “abcd”</td>
</tr>
<tr>
<td>*</td>
<td>Asterisk/star</td>
<td>Indicates 0 instances or multiple instances of the previous character</td>
<td>ab*cd – matches “ac,” “abc,” “abbc,” “abbbbc,” etc.</td>
</tr>
<tr>
<td>+</td>
<td>Plus</td>
<td>Indicates 1 instance or multiple instances of the previous character</td>
<td>ab+c – matches “abc,” “abbc,” “abbbbc,” etc.</td>
</tr>
<tr>
<td>[]</td>
<td>Brackets</td>
<td>Denotes a set of characters that match</td>
<td>[abc] – matches “a,” “b,” or “c”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[^abc] – matches any characters except “a,” “b,” or “c”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[a-d] – matches “a,” “b,” “c,” or “d”</td>
</tr>
</tbody>
</table>

When you use regular expressions in JavaScript, define them with the regular expression object or with this syntax: `pattern/attributes`. Regular expression objects take two strings: `pattern` and `attributes`.

Attributes include "g" (global) and "i" (case insensitive): `var exp = new RegExp("abc", "gi")`
The `test()` method matches an expression to a given string: `found = exp.test("I know my abc's");`

JavaScript string object methods that use regular expressions include: `match()`, `replace()`, `search()`, `split()`

Example:

```javascript
var myString = "Line1
Line2
Line3
";
myString = myString.replace(/\n/g, "\r");
```

Logging with JavaScript

Use `logger.info()` and `logger.error()` to log information in JavaScript contexts: `logger.info("The value of x =" + x);`

You can view the output of this method in the Mirth Connect Dashboard's Server Log. The default logging level, `ERROR`, is the quickest, having the least amount of overhead. `INFO` and `DEBUG` levels give more details but have more overhead, so are somewhat slower. You can change the logging level via the Mirth Connect Server Manager for users who run the latest version of Mirth Connect on a Mac (`Applications > Mirth Connect > mcmanager`) or PC:

![Mirth Connect Server Manager](image)

Mirth Appliance users can change the logging level from the Mirth Connect Settings page via Applications > Mirth Connect > Manage from the Appliance UI.

December 19, 2018
Using the JavaScript Editor

Mirth Connect has a rich JavaScript editor that includes automatic code completion, code folding, multi-line tabs /comment toggles, auto-indentation, bracket matching, macros, and much more.

Using the Context Menu in the JavaScript Editor

The Context menu contains items that let you Undo/Redo actions; Select/Copy/Cut/Paste/Delete code; Find/Replace code; collapse/expand sections of code; and characterizes tabs/whitespace/line endings.

Finding/Replacing Code in the JavaScript Editor

You can use the Context menu to find code, to find and replace certain found code, or to find and replace all found code.

1. Navigate to the page that has the desired JavaScript Editor, and right-click/control-click in the Editor.

2. On the Context menu, select Find/Replace.

3. On the Find/Replace dialog > Find text field, enter the code string you want to replace (in this case, $co).

4. In the Replace with field, enter your replacement string (in this case, $c).

5. Configure other search filters as desired, and, depending on the situation, click the Replace button (to replace only the first incident of the string) or the Replace All button (to replace all incidents of the string).

Mirth Connect performs the selected action and highlights the strings in the Editor.
6. Click the Close button.

**Folding in the JavaScript Editor**

`Folding`, which refers to collapsing/expanding portions of code in the JavaScript Editor, can be accomplished manually by clicking the +/- icon in the left margin of the JS Editor or from the Editor’s Context menu (which offers more ways to collapse/expand folds faster than you can do manually). Use the following steps to collapse/expand a fold from the Context menu. (The procedures to perform the other folding actions are similar.)

1. Navigate to the page that has the desired JavaScript Editor, and click the first line of the desired fold.

   1) Select the first line of the fold

   ![Image of the fold selection process]

   2) Right-click/control+click in the Editor to reveal the Context Menu

   ![Image of the context menu]

   3) Move the pointer here, then select a sub-menu item

   ![Image of selecting a sub-menu item]

   You need to select the first line in the desired fold, which lines are distinguished by a +/- icon in the grey margin of the JS Editor (previous graphic). If you do not select one of these lines, the Editor does not collapse/expand the fold.

   You can see how many lines of code are in a fold by moving the pointer into the grey margin below a +/- icon, which action reveals a bracket that extends from the icon down to the last line of the fold.

   ![Image of the fold bracket]

2. **Right-click/control+click** in the Editor.
3. On the Context Menu, move the pointer over `Folding`, and select an option on the sub-menu (in this case, `Collapse Current Fold`).

   The **Collapse Current Fold** action is performed.

   ![Image of the collapsed fold]

**Using the Auto-Completion Popup in the JavaScript Editor**

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The Auto-Completion popup simplifies channel coding, eliminating the need to go back and forth between the JavaScript Editor and the User API or even the Message Template list on the same page as the Editor by putting all coding variables (e.g., code templates, classes, functions, variables) in one popup within the Editor itself. Accompanying the Auto-Completion popup is a descriptor window that displays, depending on the selected item, its name and various traits. To display the Auto-Completion popup, click on the beginning/end of a line in the JavaScript Editor, then hold down the `ctrl` button, and press the space bar. On the list, double-click the desired item to add it to the code in the Editor.

When adding classes in the JavaScript Editor, double-click the desired class on the Auto-Completion popup, and type a period after the class to reveal a list of its methods (that perform specific actions), then double-click the desired method to add it to the Editor.

**Remapping Editor Shortcut Keys**

All editor shortcut key mappings can be changed from the Administrator Settings Tab in the Settings View. You only have to do this once, even if you log into multiple, separate Mirth Connect instances.
Variable Maps

Throughout the Message Processing Lifecycle, your channels and messages have access to various maps. Depending on the scope, the map may only be available in the current channel/connector, or may be globally available across your entire system. These variable maps allow you to store a piece of information that can be used later (in a downstream channel, connector, or somewhere else). A common use for these variables is to provide easy drag-and-drop for connector properties. The Destination Mappings list will display all available connector/channel map variables for example. They are also used in other ways, such as populating Custom Metadata Columns.

The following variable maps exist throughout Mirth Connect:

<table>
<thead>
<tr>
<th>Name</th>
<th>JavaScript Variable</th>
<th>Get/Put Shortcut Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Map</td>
<td>responseMap</td>
<td>$r</td>
</tr>
<tr>
<td>Connector Map</td>
<td>connectorMap</td>
<td>$co</td>
</tr>
<tr>
<td>Channel Map</td>
<td>channelMap</td>
<td>$c</td>
</tr>
<tr>
<td>Source Map</td>
<td>sourceMap</td>
<td>$s</td>
</tr>
<tr>
<td>Global Channel Map</td>
<td>globalChannelMap</td>
<td>$gc</td>
</tr>
<tr>
<td>Global Map</td>
<td>globalMap</td>
<td>$g</td>
</tr>
<tr>
<td>Configuration Map</td>
<td>configurationMap</td>
<td>$cfg</td>
</tr>
</tbody>
</table>

The table above also shows the precedence of these maps when referencing them in Velocity or when using the generic lookup function. For additional information, see The Variable Map Lookup Sequence.

Connector Map

This map is isolated to the current message, and the current connector the message is processing through. For example, if you store a connector map variable in Destination 1, you will not be able to access that value in Destination 2. This is useful to avoid conflicts among common variable names, and to reduce message storage.

- Get connector map value:
  - `var value = connectorMap.get('key');`
  - `var value = $co('key');`
- Put connector map value:
  - `connectorMap.put('key', 'value');`
  - `$co('key', 'value');`

Channel Map

This map is isolated to the current message as it processes through a channel. If you store a connector map variable in the source connector, you will have access to that value in all subsequent destinations. However when the current message finishes and the next one begins, that next message will not have access to the value you stored for the previous message.

The channel map is useful for anything that needs to be shared among multiple destinations, or the source connector and all destinations. For example, you might have one HTTP Sender destination that makes a request to a remote service, and then in the Response Transformer you store a particular response HTTP header in the channel map. As long as the next destination connector is in the same chain, it will have access to that channel map variable, and can do something else with it, like include it on a subsequent HTTP request.
• Get channel map value:
  - var value = channelMap.get('key');
  - var value = $c('key');
• Put channel map value:
  - channelMap.put('key', 'value');
  - $c('key', 'value');

Source Map

This map is isolated to the current message as it processes through a channel. Unlike the channel map however, this one is read only. The Source Connector or an upstream process can inject source map variables. For example, the File Reader will automatically inject the "originalFilename" variable.

• Get source map value:
  - var value = sourceMap.get('key');
  - var value = $s('key');

Response Map

This map is isolated to the current message as it processes through a channel. Unlike the channel map, this one is specifically used for storing Response objects. When a destination finishes processing, its Response will automatically be stored in the response map. Subsequent destinations and the Postprocessor Script will have access to these values. The source connector can also use values stored in the response map to send responses back to the originating system (set in the Source Settings).

• Get response map value:
  - var value = responseMap.get('key');
  - var value = $r('key');
• Put response map value:
  - responseMap.put('key', 'value');
  - $r('key', 'value');

Global Channel Map

This map is isolated to a specific channel, but across multiple messages. That means you can store a value during a message processing lifecycle, and it will be available during the lifecycle of the next message. You can also store global channel map values in the channel scripts.

This map is useful for storing stateful, non-serializable objects like a database Connection. It is in-memory only, meaning that if Mirth Connect is restarted, the entries in this map are not preserved anywhere. It is also a concurrent map, which means that "null" values cannot be stored in it.

• Get global channel map value:
  - var value = globalChannelMap.get('key');
  - var value = $gc('key');
• Put global channel map value:
  - globalChannelMap.put('key', 'value');
  - $gc('key', 'value');

By default the "Clear global channel map on deploy" option is enabled on the Summary Tab. You may want to uncheck this if you want the global channel map to remain unchanged when you redeploy the channel.

Global Map

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This map is available across your entire server, across all channels and all messages. That means you can store a value during message processing in one channel, and use that value from a different channel, or somewhere else like an Alert. You can also store global map values in the global scripts.

Like the global channel map, this map is useful for storing stateful, non-serializable objects like a database Connection. It is in-memory only, meaning that if Mirth Connect is restarted, the entries in this map are not preserved anywhere. It is also a concurrent map, which means that "null" values cannot be stored in it.

- Get global map value:
  - var value = globalMap.get('key');
  - var value = $g('key');

- Put global map value:
  - globalMap.put('key', 'value');
  - $g('key', 'value');

By default the "Clear global map on redeploy" option is enabled on the Server Settings Tab. You may want to disable this if you want the global map to remain unchanged when you redeploy all channels.

Configuration Map

This map is also available across your entire server, across all channels and all messages. Like the global map, that means you can use the values from the configuration map in any channel, or somewhere else like an Alert. Unlike the global map however, this map is editable only from the Configuration Map Settings Tab, and is read-only from the perspective of channels / messages. The values are also String key/values only.

This map is useful for global, static settings you want to persist across restarts of Mirth Connect. For example, you could store a variable like "clientAdtPort" and then use Velocity to reference that variable ("${clientAdtPort}") in a TCP Listener. That way you can export the channel on one Mirth Connect installation, import it into a completely different installation, and then you would not have to edit anything in the channel settings as long as the configuration map is set on both instances.

- Get configuration map value:
  - var value = configurationMap.get('key');
  - var value = $cfg('key');

- Put configuration map value:
  - configurationMap.put('key', 'value');
  - $cfg('key', 'value');
The Variable Map Lookup Sequence

In many cases when referencing map variables in Mirth Connect, you don't call out to a specific map, but instead use the generic lookup function:

- `var value = $('variableName');`

Or, you might reference a variable using Velocity Variable Replacement:

- `${variableName}`

When you do this, Mirth Connect will automatically look that key up in all available maps. That may only be the configuration/global map (in the case of the global scripts), or it may be all maps (in the case of a filter / transformer script). This sequence is followed:

- Response Map
- Connector Map
- Channel Map
- Source Map
- Global Channel Map
- Global Map
- Configuration Map

For example, if you have stored a variable called "dataSource" in both the Connector Map and the Global Channel Map, the one from the Connector Map will be used. If you want the value specifically from the Global Channel Map instead, you can use the map-specific get function shown in the Variable Maps section:

- `var dataSource = globalChannelMap.get('dataSource');`

Attachment JavaScript Functions

Attachment Handlers are used to extract a portion of a message (or the entire message) and store it separately as an attachment. The portion of the message that was extracted is replaced with an attachment replacement token. When you use a destination connector to send a message downstream, Mirth Connect will automatically take the message and replace any attachment tokens with the actual attachment data (unless you have Reattach Attachments turned off in the Destination Settings).

Throughout the message lifecycle you can retrieve, modify, and add new attachments with built-in helper functions.

- Built-In Attachment Functions
- The AttachmentUtil Class
- The Attachment Object
- Examples

Built-In Attachment Functions

- `getAttachmentIds()`
  - Get a List containing the IDs of all Attachments associated with this message. Uses the current `connectorMessage` variable.
- `getAttachmentIds(channelId, messageId)`
  - Get a List containing the IDs of all Attachments associated with any channel / message.
- `channelId` | The ID of the channel associated with the attachments.
- `messageId` | The ID of the message associated with the attachments.

- **getAttachments(base64Decode)**
  - Get List of Attachments associated with this message. This will get all attachments that have been added in the source and destination(s).

  - base64Decode | If true, the content of each attachment will first be Base64 decoded for convenience.

- **getAttachment(attachmentId, base64Decode)**
  - Get a specific Attachment associated with this message. Uses the current `connectorMessage` variable.

  - attachmentId | The ID of the attachment to retrieve.
  - base64Decode | If true, the content of the attachment will first be Base64 decoded for convenience.

- **getAttachment(channelId, messageId, attachmentId, base64Decode)**
  - Get a specific Attachment associated with any channel / message. You can use this to retrieve an attachment from a completely different channel.

  - channelId | The ID of the channel to retrieve the attachment from.
  - messageId | The ID of the message to retrieve the attachment from.
  - attachmentId | The ID of the attachment to retrieve.
  - base64Decode | If true, the content of the attachment will first be Base64 decoded for convenience.

- **addAttachment(data, type, base64Encode)**
  - Add attachment (String or byte[]) to the current message.

  - data | The data to insert as an attachment. May be a string or byte array.
  - type | The MIME type of the attachment.
  - base64Encode | If true, the content will be Base64 encoded for convenience. If the content you're passing in is not already Base64 encoded, you should pass in true for this argument.

- **updateAttachment(attachment, base64Encode)**
- **updateAttachment(attachmentId, data, type, base64Encode)**
- **updateAttachment(channelId, messageId, attachment, base64Encode)**
- **updateAttachment(channelId, messageId, attachmentId, data, type, base64Encode)**
  - Updates an attachment associated with the current connector message, or with any message from any channel.

  - attachment | The Attachment object to update.
  - attachmentId | The unique ID of the attachment to update.
The AttachmentUtil Class

All of the built-in attachment functions are also available from the AttachmentUtil utility class available from the User API. In addition to this, AttachmentUtil has some extra methods available that you can use to re-attach attachment data into a message string.

For more information, check out the AttachmentUtil class in your locally hosted User API: The User API (Javadoc)

You can also view the documentation for this class here: http://javadocs.mirthcorp.com/connect/3.6.0/user-api/com/mirth/connect/server/userutil/AttachmentUtil.html

The Attachment Object

When using these methods, you will likely be working with a special class called Attachment. This class is documented in the User API. A few of the available methods are documented here:

Create a new Attachment

- new Attachment()
- new Attachment(id, content, type)
- new Attachment(id, content, charset, type)

<table>
<thead>
<tr>
<th>id</th>
<th>The unique ID of the attachment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>content</td>
<td>The content (String or byte array) to store for the attachment.</td>
</tr>
<tr>
<td>charset</td>
<td>If the content passed in is a string, this is the charset encoding to convert the string to bytes with. If the content is a String and a charset is not used, UTF-8 will be used as the charset.</td>
</tr>
<tr>
<td>type</td>
<td>The MIME type of the attachment.</td>
</tr>
</tbody>
</table>

Retrieve Attachment Content

When you retrieve an attachment using the built-in attachment functions or AttachmentUtil, you may want to pass in true for the base64Decode argument so that the attachment content is already decoded.
• **getContent()**  
  - Retrieves the raw byte array content of the attachment. Note that this may be the actual raw bytes of the attachment, or it may be the Base64 byte array representation. See the note above.

• **getContentString()**  
  - **getContentString(charset)**  
  - Returns the content of the attachment as a string, using the specified charset encoding. If not specified, UTF-8 will be used. Note that this may be the raw string value of the attachment, or it may be the Base64 string value. See the note above.

**Examples**

Modify a previously attached CCD attachment:

```javascript
var ccd = new XML(getAttachment(attachmentId, true).getContentString());
ccd.id.@root = 'testing';
updateAttachment(attachmentId, ccd.toString(), 'text/xml', true);
```

Read in a PDF from the filesystem and add it as an attachment:

```javascript
var fileBytes = FileUtil.readBytes('/path/to/file.pdf');
// Pass in true for Base64Encode, since the content isn't already Base64 encoded
addAttachment(fileBytes, 'application/pdf', true);
```
The User API (Javadoc)

The User API is a collection of classes and methods that help you interact with channels / messages, and also provides helper methods for common tasks such as date formatting. Wherever you are editing JavaScript code in Mirth Connect, you can view the API by clicking the View User API function in the Other panel, which is available on all Mirth Connect Administrator views.

You can also right-click/command+click in the text area of any JavaScript Editor, and on the drop-down menu, select View User API.

The Javadoc appears in your default web browser, in which you can select classes to view their method signatures and descriptions.
You can also view the API via this link: http://javadocs.mirthcorp.com/connect/3.6.0/user-api/
Velocity Variable Replacement

The Apache Velocity template engine is used throughout Mirth Connect to allow dynamic variables to be injected into property fields. For example, you can use a transformer to programmatically select a TCP address/port to send to and store those values in the channel map, and then use a Velocity template to inject those variables into the TCP Sender settings.

Basic Syntax

Basic syntax for a Velocity reference is as follows:

```text
${variableName}
```

The brackets may be omitted if the identifier starts with a letter and contains only letters, numbers, hyphens, or underscores:

```text
$variableName
```

The variable will be looked up in all available maps, according to The Variable Map Lookup Sequence. The string representation of the value will then replace the Velocity reference. You can also access properties and methods from context variables:

```text
${myArray.length}
${myList.size()}
${myObject.customMethod('param')}
```

If a property has a corresponding getter method (like getValue()), the engine will automatically find that method when you attempt to access the property. Therefore these may be equivalent:

```text
${myObject.value}
${myObject.getValue()}
```

If the context variable doesn't exist, or if the value returned by the reference evaluation is null, no replacement will be done, so the final template will still have your "${varName}" string within. In these cases you can put an exclamation mark after the dollar sign to tell the engine to replace null values with an empty string instead:

```text
${!thisValueIsNull}
```
Conditional Statements

Velocity supports if..else statements, with the #if / #elseif / #else directives:

```velocity
There #if($list.size()==1)is#{else}are#end ${list.size()} total value#if($list.size()!=1)s#end
```

The curly brackets ("{}") are only needed if the if/else/end might be confused with template data immediately before or after.

For Loops

Velocity supports iterating through Lists / Collections / Arrays with the #foreach directive:

```velocity
<table>
  #foreach ($item in $list)
    <tr>
      <td>${item.name}</td>
    </tr>
  #end
</table>
```
Mirth Connect Command Line Interface

The Command Line Interface is an alternate, lightweight way to interact with your Mirth Connect server. Not everything you can do through the Administrator is available in the CLI (like editing channels), but common monitoring and management operations are supported:

- List deployed status / statistics of all channels
- Deploy/undeploy/start/stop/halt/pause/resume channels
- Enable/disable/remove channels
- Import/export channels, alerts, code templates, libraries, or the entire server configuration
- And more...

The CLI comes packaged with the standard Mirth Connect distribution. It is also available as a standalone client from the Downloads page. If using the standalone client, simply extract the archive in a location of your choice.

Running the Command Line Interface

The CLI has both interactive and non-interactive modes. With the interactive mode, you can choose to store your username/password in a file, or enter your username/password every time you launch the CLI.

From a terminal / shell:

- In a terminal / shell, run the mccommand executable script, with the following options:
  - mccommand -a https://localhost:8443 -u user -p pass
  - Change the address, username, and password as necessary

You can also set the address / username / password in the "conf/mirth-cli-config.properties" file, so that you don't need to enter it every time.

Once connected, you'll see a welcome prompt:

```
Connected to Mirth Connect server @ https://127.0.0.1:8443
(3.5.0.8232)
$
```

From here, you can type help to view all available commands.

Using Non-interactive Scripting

The CLI supports a -s option where you can pass in a script file containing multiple commands. This can be used to programmatically call the CLI from a scheduled job or anywhere else.

From a terminal / shell:

- In a terminal / shell, run the mccommand executable script, with the following options:
  - mccommand -a https://localhost:8443 -u user -p pass -s script.txt
  - Change the address, username, and password as necessary

You can also add script=script.txt to the "conf/mirth-cli-config.properties" file, so that it will automatically be used any time the CLI is executed.
Mirth Connect REST API

The Administrator and Command Line Interface both use a well-defined API to communicate with the Mirth Connect server. You can also use the same API to create custom integrations of your own. The API is documented at https://localhost:8443/api (change the IP / port as needed), or you can click on View Client API in Administrator via Other Tasks:

- Click the View Client API action to open the API documentation in your default browser:

- Click an endpoint's List Operations action to view its operations. This list shows the operation's HTTP method type, name, and description of function.

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Click an endpoint’s **Expand Operations** action to view the details of all its operations. If desired, you can click a specific operation to view only that op’s details. Each operation’s details include response class, model and model schema, response content type, parameters fields (channelId, channelName, body), and Try it out! button so you can try the op in your own instance.

**Authentication**

Mirth Connect supports both session-based cookie authentication and **Basic Authentication**.

**Basic Authentication:**

- Simply include an Authorization header on all API requests, with basic credentials. Example (for admin/admin):
  - Authorization: Basic YWRtaW46YWRtaW4=
Session-Based Authentication:

- First, invoke the POST /users/_login endpoint, passing in your login credentials. If successful, the server will respond with a cookie (Set-Cookie header) like the following:
  - Set-Cookie: JSESSIONID=uysqrtx91le36ernbizstps;Path=/api;Secure

- Invoke the actual API endpoints of your choice, passing in the same cookie as a header:
  - Cookie: JSESSIONID=uysqrtx91le36ernbizstps;Path=/api;Secure

- Once you’re done, make sure to call the POST /users/_logout endpoint, making sure to pass in the same cookie.

Session-based Authentication is preferred since you only need to transmit your login credentials once.

Note that the API documentation page invokes the same endpoint automatically when you login at the top:
Installation Directory

This is the location you installed or extracted Mirth Connect into. Typically only administrators need to have access to this, and even then usually only once when first setting up. For example this where you can edit initial configuration to change the database Mirth Connect points to. This section is separated into the following topics:

- Application Data Directory
- Configuration Directory
- Other Files and Folders

Application Data Directory

This directory stores configuration files and temporary data created by Mirth Connect after starting up. Usually the name of this directory is "appdata" and it resides directly inside your installation directory. However the name and location of this directory can be modified from mirth.properties. The main files/folders of note here are as follows:

- configuration.properties
- extension.properties
- keystore.jks
- server.id
- temp

configuration.properties

This stores the current state of the Configuration Map. The file is formatted as a standard properties file:

```key = value

# This is a comment for key "clientAddress"
clientAddress = 10.0.1.123```

The configuration map is edited from the Configuration Map Settings Tab. If you instead edit the properties file manually, Mirth Connect will not pick up those changes until you restart the server.

extension.properties

This stores the current enabled/disabled state of all installed extensions. Typically you do not need to edit this file, as enabling / disabling can be done through the Extensions View.

keystore.jks

This is a critical file that stores your server's local certificate keypair (for the web server and API), and also the secret key used for encrypting message data, exports, and anything else. Note that usually the name of this file is "keystore.jks" and it resides inside of appdata, but the keystore name and location can be modified from mirth.properties.

If you plan on making any changes to this file, **BACK IT UP** first! If you lose this file, any data (messages, exports, etc.) encrypted with it will be lost forever!
Changing The Server Certificate

When Mirth Connect starts up for the first time, it will automatically create a new self-signed certificate, which it will use for web server and secure API access. After installing Mirth Connect, you should replace this with an appropriate company certificate signed by a Certificate Authority (CA). Use the following steps to install a new certificate:

- **BACK UP** your current keystore.jks file just in case.
- Have your new keypair ready to import in a PKCS #12 format. Example: myservercert.p12
- In a terminal / shell, navigate to the location of your keystore.jks file.
- Use this command:

```bash
keytool -importkeystore -srckeystore myservercert.p12 -srcstoretype PKCS12 -srcstorepass mystorepass -srckeypass mykeypass -srcalias myalias -destkeystore keystore.jks -deststoretype JCEKS -deststorepass 81uWxplDtB -destkeypass 81uWxplDtB -destalias mirthconnect
```

Make sure to change the file names, passwords, and local alias as necessary. The **-destalias** option must be "mirthconnect" though in order to overwrite the current certificate.

- Restart the Mirth Connect server.

**server.id**

This is the unique ID for your server instance. It is auto-generated when Mirth Connect starts up for the first time.

**temp**

This stores all temporary files created by the Mirth Connect server. Note that usually the name of this file is "temp" and it resides inside of appdata, but the name and location can be modified from `mirth.properties`.

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Configuration Directory

This directory contains the main configuration files Mirth Connect needs in order to start up correctly. Modifying the configuration requires a restart of Mirth Connect. The following files are found here:

- The dbdrivers.xml File
- The log4j.properties File
- The log4j-cli.properties File
- The mirth.properties File
- The mirth-cli-config.properties File

The dbdrivers.xml File

This file is used by the Database Reader and Database Writer connectors to populate the Driver drop-down menu. The default values are as shown:

```xml
<!--
    Database driver information
    class = the driver class name, cannot be empty
    name = database driver name to be displayed as, cannot be empty
    template = the template for creating the database connection, cannot be empty
    selectLimit = defines the select statement used for retrieving column information, empty means use the generic query (which could be slow)
    -->
    <drivers>
        <driver class="sun.jdbc.odbc.JdbcOdbcDriver" name="Sun JDBC-ODBC Bridge" template="jdbc:odbc:DSN" selectLimit="" />
        <driver class="com.mysql.jdbc.Driver" name="MySQL" template="jdbc:mysql://host:port/dbname" selectLimit="SELECT * FROM ? LIMIT 1" />
        <driver class="oracle.jdbc.driver.OracleDriver" name="Oracle" template="jdbc:oracle:thin:@host:port:dbname" selectLimit="SELECT * FROM ? WHERE ROWNUM &lt; 2" />
        <driver class="org.postgresql.Driver" name="PostgreSQL" template="jdbc:postgresql://host:port/dbname" selectLimit="SELECT * FROM ? LIMIT 1" />
        <driver class="net.sourceforge.jtds.jdbc.Driver" name="SQL Server/Sybase" template="jdbc:jtds:sqlserver://host:port/dbname" selectLimit="SELECT TOP 1 * FROM ?" />
        <driver class="org.sqlite.JDBC" name="SQLite" template="jdbc:sqlite:dbfile.db" selectLimit="SELECT * FROM ? LIMIT 1" />
    </drivers>
```

Adding a new entry to dbdrivers.xml

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Simply add a new <driver> node to the list. The following attributes must be specified:

- **class**: The fully-qualified class name of the JDBC Driver implementation.
- **name**: The name you want to appear in the Driver drop-down menu.
- **template**: The JDBC URL template you want to have populated when you click on the Insert URL Template button in a Database connector.
- **selectLimit**: An optional query that selects one row from a given table. If specified, this will be used when attempting to retrieve database metadata.

### The log4j.properties File

This file is used to tell Mirth Connect where to write log files out to, and how verbose the logs should be. It's split up into the following sections:

```properties
log4j.rootLogger = ERROR,stdout,fout
```

This is the "root" logger property, used to denote the appenders to include, and the root level. The following levels can be set, in order from least to most logging:

- OFF
- FATAL
- ERROR
- WARN
- INFO
- DEBUG
- TRACE
- ALL

```properties
# stdout appender
log4j.appender.stdout = org.apache.log4j.ConsoleAppender
log4j.appender.stdout.layout = org.apache.log4j.PatternLayout
log4j.appender.stdout.layout.ConversionPattern = %-5p %d [%t] %c: %m%n
```

This appender ensures that all logging can redirect to STDOUT, if you're running Mirth Connect from an attached shell.

```properties
# file appender
dir.logs = logs
log4j.appender.fout = org.apache.log4j.RollingFileAppender
log4j.appender.fout.File = ${dir.logs}/mirth.log
log4j.appender.fout.MaxFileSize = 500KB
log4j.appender.fout.MaxBackupIndex = 20
log4j.appender.fout.layout = org.apache.log4j.PatternLayout
log4j.appender.fout.layout.ConversionPattern = %-5p %d [%t] %c: %m%n
```

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This appender writes logs out to files in the "logs" directory. The directory and file names can be modified here. You can also modify the maximum file size and maximum file count to limit how much log data to retain. Finally, the pattern can be modified to change how the log entries will be formatted.

```
# splash screen
log4j.logger.com.mirth.connect.server.Mirth = INFO

# Mirth Connect server logging
log4j.logger.com.mirth.connect.donkey.server.channel.RecoveryTask = INFO
```

These entries help display certain helpful information when logging in, and when messages get recovered.

```
# Mirth Connect channel logging
log4j.logger.transformer = DEBUG
log4j.logger.preprocessor = DEBUG
log4j.logger.postprocessor = DEBUG
log4j.logger.deploy = DEBUG
log4j.logger.undeploy = DEBUG
log4j.logger.filter = DEBUG
log4j.logger.db-connector = DEBUG
log4j.logger.js-connector = DEBUG
log4j.logger.attachment = DEBUG
log4j.logger.batch = DEBUG
log4j.logger.response = DEBUG
```

These determine what level verbosity to use when logging from within various JavaScript contexts. Note that these can also be set from the Server Manager.

```
# SQL Logging
log4j.logger.java.sql = ERROR
```

Turn the verbosity up here to see more information about which database statements are being executed across the server.

**The log4j-cli.properties File**

This is the same as the log4j.properties file, except that it's specific to the Command Line Interface. You can edit the root logger level, and the STDOUT appender settings:

```
log4j.rootCategory=ERROR, stdout
log4j.appender.stdout=org.apache.log4j.ConsoleAppender
```
log4j.appender.stdout.layout=org.apache.log4j.PatternLayout
log4j.appender.stdout.layout.ConversionPattern=%-5p %d [%t] %c: %m%n
## The mirth.properties File

This is the main configuration file that tells Mirth Connect where to store application data, what web server ports to listen on, and which database to connect to. There are also other security and encryption options that may be set. The following properties are supported:

<table>
<thead>
<tr>
<th>Property</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directories</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dir.appdata</td>
<td>appdata</td>
<td>The location of the Application Data Directory.</td>
</tr>
<tr>
<td>dir.tempdata</td>
<td><code>${dir.appdata}/temp</code></td>
<td>The location of the temporary files directory, by default set inside of the Application Data Directory.</td>
</tr>
<tr>
<td><strong>Ports</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>http.port</td>
<td>8080</td>
<td>The HTTP port to make the web server available from. This is used to access the launch page and download signed client resources from. If this property is omitted or commented out, the web server will only start up on the HTTPS port.</td>
</tr>
<tr>
<td>https.port</td>
<td>8443</td>
<td>The HTTPS port to make the web server available from. This is used to access the secure launch page, web dashboard, and all REST API traffic (which includes the Administrator and CLI).</td>
</tr>
<tr>
<td><strong>Password Requirements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>password.minlength</td>
<td>0</td>
<td>Minimum password length, 0 for no minimum.</td>
</tr>
<tr>
<td>password.minupper</td>
<td>0</td>
<td>Minimum uppercase characters, 0 for no minimum.</td>
</tr>
<tr>
<td>password.minlower</td>
<td>0</td>
<td>Minimum lowercase characters, 0 for no minimum.</td>
</tr>
<tr>
<td>password.minnumeric</td>
<td>0</td>
<td>Minimum numeric characters, 0 for no minimum.</td>
</tr>
<tr>
<td>password.minspecial</td>
<td>0</td>
<td>Minimum special characters, 0 for no minimum.</td>
</tr>
<tr>
<td>password.retrylimit</td>
<td>0</td>
<td>Maximum number of times a user may retry a failed login, 0 for no maximum. If specified, the lockout period must be specified as well.</td>
</tr>
<tr>
<td>password.lockoutperiod</td>
<td>0</td>
<td>Amount of time (in hours) to</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>lockout user when the retry limit has been exceeded, 0 for no lockout.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>password.expiration</td>
<td>After this amount of time (in days), passwords will expire.</td>
<td></td>
</tr>
<tr>
<td>password.graceperiod</td>
<td>If user's password is expired, the amount of time (in days) to give the user to change password after the next login.</td>
<td></td>
</tr>
<tr>
<td>password.reuseperiod</td>
<td>The amount of time (in days) to wait before users can change passwords to one that was used in the past. Set to 0 to always allow reuse, and to -1 to never allow users to reuse the same password.</td>
<td></td>
</tr>
<tr>
<td>password.reuselimit</td>
<td>The amount of times to allow users to reuse the same password. Set to 0 for no limit, and to -1 to never allow users to reuse the same password.</td>
<td></td>
</tr>
</tbody>
</table>

### Keystore

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>keystore.path</td>
<td>The location of the keystore file, which houses the server certificate and the secret encryption key. This is usually located in the Application Data Directory.</td>
</tr>
<tr>
<td>keystore.storepass</td>
<td>81uWxpIDtB The password for the keystore file itself. It's a good idea to change this from the default value. On first startup when the keystore is created, if this value equals the default it will be replaced with a randomly generated password.</td>
</tr>
<tr>
<td>keystore.keypass</td>
<td>81uWxpIDtB The password for the keys within the keystore, including the server certificate and the secret encryption key. It's a good idea to change this from the default value. On first startup when the keystore is created, if this value equals the default it will be replaced with a randomly generated password.</td>
</tr>
<tr>
<td>keystore.type</td>
<td>JCEKS The type of keystore. Usually this should not be changed.</td>
</tr>
</tbody>
</table>

### Server

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>http.contextpath</td>
<td>/ The base context path of the web server.</td>
</tr>
<tr>
<td>server.url</td>
<td>If set, this value will be set in the webstart JNLP file, so that when...</td>
</tr>
<tr>
<td>Property</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>http.host</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>https.host</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>server.id.ephemeral</td>
<td>false</td>
</tr>
<tr>
<td>server.startupdeploy</td>
<td>true</td>
</tr>
<tr>
<td>server.includecustomlib</td>
<td>false</td>
</tr>
<tr>
<td>administrator.maxheapsize</td>
<td>512m</td>
</tr>
<tr>
<td>administrator.maxheapsizeoptions</td>
<td>256m,512m,1g,2g</td>
</tr>
<tr>
<td>configurationmap.location</td>
<td>file</td>
</tr>
<tr>
<td>configurationmap.path</td>
<td>${dir.appdata}/configuration.properties</td>
</tr>
<tr>
<td>extension.properties.provider</td>
<td></td>
</tr>
</tbody>
</table>
| donkey.statsupdateinterval     | 1000    | The interval on which to update channel statistics across all
<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>license.key</td>
<td>If you have any commercial extensions installed, enter your license key here. Contact the help desk through our Success Community to get a license key.</td>
</tr>
<tr>
<td>rhino.optimizationlevel</td>
<td>Sets the optimization level for Rhino (the JavaScript engine). 1 indicates that the engine should run in interpretive mode, which is less efficient but allows very large /complex scripts to compile. Set it to 0 or 1-9 to increase optimization, which may increase performance at the cost of limited script complexity.</td>
</tr>
<tr>
<td>rhino.languageversion</td>
<td>ES6</td>
</tr>
<tr>
<td>server.api.sessionstore</td>
<td>false</td>
</tr>
<tr>
<td>server.api.sessionstoretable</td>
<td>sessiondata</td>
</tr>
<tr>
<td>server.api.sessioncache</td>
<td>default</td>
</tr>
<tr>
<td>server.api.sessionmaxinactiveinterval</td>
<td>259200 (72 hours)</td>
</tr>
</tbody>
</table>

**Security**

<table>
<thead>
<tr>
<th>Environment Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>https.client.protocols</td>
<td>The protocols to support by default for all TLS/SSL/HTTPS client traffic. Changing this property could leave your server vulnerable to certain SSL-based attacks. Note that the SSL Manager allows you to tweak protocol settings on a per-connector basis, rather than having to change the value for the entire server.</td>
</tr>
<tr>
<td>https.server.protocols</td>
<td>The protocols to support by default for all TLS/SSL/HTTPS server traffic. Changing this property could leave your server vulnerable to certain SSL-based attacks. Note that the SSL Manager allows you to tweak protocol settings on a per-connector basis, rather than having to change the value for the entire server.</td>
</tr>
</tbody>
</table>
vulnerable to certain SSL-based attacks. Note that the SSL Manager allows you to tweak protocol settings on a per-connector basis, rather than having to change the value for the entire server.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>https.ciphersuites</td>
<td>See Below</td>
<td>The cipher suites to support by default for all TLS/SSL/HTTPS server traffic. Changing this property could leave your server vulnerable to certain SSL-based attacks.</td>
</tr>
<tr>
<td>https.ephemeraldhkeysiz</td>
<td>2048</td>
<td>The key size to use for all generated Diffie-Hellman parameters. Changing this property could leave your server vulnerable to certain SSL-based attacks.</td>
</tr>
<tr>
<td>server.api.allowhttp</td>
<td>false</td>
<td>If enabled, API access will be allowed through the regular HTTP port. Generally you should not enable this except for testing / development purposes.</td>
</tr>
<tr>
<td>server.api.accesscontrol</td>
<td></td>
<td>This value will be set on the specified headers.</td>
</tr>
<tr>
<td>alloworigin</td>
<td>*</td>
<td>This value will be set on the Access-Control-Allow-Origin HTTP header on all API responses.</td>
</tr>
<tr>
<td>allowcredentials</td>
<td>false</td>
<td>This value will be set on the Access-Control-Allow-Credentials HTTP header on all API responses.</td>
</tr>
<tr>
<td>allowmethods</td>
<td>GET, POST, DELETE, PUT</td>
<td>This value will be set on the Access-Control-Allow-Methods HTTP header on all API responses.</td>
</tr>
<tr>
<td>allowheaders</td>
<td>Content-Type</td>
<td>This value will be set on the Access-Control-Allow-Headers HTTP header on all API responses.</td>
</tr>
<tr>
<td>exposeheaders</td>
<td></td>
<td>This value will be set on the Access-Control-Expose-Headers HTTP header on all API responses.</td>
</tr>
<tr>
<td>maxage</td>
<td></td>
<td>This value will be set on the Access-Control-Max-Age HTTP header on all API responses.</td>
</tr>
<tr>
<td>contentsecurity policy</td>
<td>frame-ancestors 'none'</td>
<td>This value will be set on the Content-Security-Policy HTTP header on all API responses.</td>
</tr>
</tbody>
</table>
### Server Properties

- **server.api.xframeoptions**: DENY

  This value will be set on the X-Frame-Options HTTP header on all API responses. Changing this property could leave your server vulnerable to clickjacking attacks if you're embedding API access in a webpage.

### Database

- **database**: derby

  The database type to use for the Mirth Connect backend database. Options:
  - derby
  - mysql
  - postgres
  - oracle
  - sqlserver

  By default Mirth Connect ships with an embedded Apache Derby database for quick testing / development purposes. For production instances, you should change the database type to one of the other supported options.

- **database.url**: `jdbc:derby:${dir.appdata}/mirthdb;create=true`

  The JDBC URL to use when connecting to the database.

- **database.driver**: The fully-qualified JDBC Driver class to use when connecting to the database.

- **database.max-connections**: 20

  The maximum number of connections to use for the internal messaging engine connection pool.

- **database.username**: The username to use when connecting to the database.

- **database.password**: The password to use when connecting to the database.

- **database.pool**: HikariCP

  The connection pool type to use for the internal messaging engine. By default HikariCP is used, but "DBCP" is supported as well.

- **database.jdbc4**: true

  Indicates whether the database driver supports JDBC 4 operations.

- **database.test-query**: SELECT 1

  A small test query (e.g. "SELECT 1") that the connection pool can
<table>
<thead>
<tr>
<th>Configuration Key</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>database.enable-read-write-split</td>
<td>true</td>
<td>If enabled, the database connection pool will be split into read-only and read/write pools. More information <a href="#">here</a>.</td>
</tr>
<tr>
<td>database.write-pool-cache</td>
<td>false</td>
<td>If enabled, the channel / channel group / code template / library internal cache queries will use the read/write connection pool instead of the read-only pool. If your read-only pool is pointing to a read replica and there is significant replica lag, you may want to consider enabling this. Only applicable when &quot;database.enable-read-write-split&quot; is enabled.</td>
</tr>
<tr>
<td>database-readonly</td>
<td></td>
<td>The database type to use for the read-only pool, if enabled. If not specified, defaults to the &quot;database&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.url</td>
<td></td>
<td>The JDBC URL to use when connecting to the database for the read-only pool, if enabled. If not specified, defaults to the &quot;database.url&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.driver</td>
<td></td>
<td>The fully-qualified JDBC Driver class to use when connecting to the database for the read-only pool, if enabled. If not specified, defaults to the &quot;database.driver&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.username</td>
<td></td>
<td>The username to use when connecting to the database for the read-only pool, if enabled. If not specified, defaults to the &quot;database.username&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.password</td>
<td></td>
<td>The password to use when connecting to the database for the read-only pool, if enabled. If not specified, defaults to the &quot;database.password&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.max-connections</td>
<td></td>
<td>The maximum number of connections to use for the read-only pool, if enabled. If not specified, defaults to the &quot;database.max-connections&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.pool</td>
<td></td>
<td>The connection pool type to use for the read-only pool, if enabled. If not specified, defaults to the &quot;database.pool&quot; setting.</td>
</tr>
<tr>
<td>database-readonly.jdbc4</td>
<td></td>
<td>Indicates whether the database driver supports JDBC 4 operations</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>database-readonly.test-query</td>
<td>A small test query (e.g. &quot;SELECT 1&quot;) used for validity checking for the read-only pool, if enabled. If not specified, defaults to the &quot;database.test-query&quot; setting.</td>
<td></td>
</tr>
<tr>
<td>encryption.export</td>
<td>If enabled, exported channels and other files from the Administrator will be encrypted.</td>
<td></td>
</tr>
<tr>
<td>encryption.properties</td>
<td>If enabled, the &quot;database.password&quot; property in this file will automatically encrypted and re-saved when the Mirth Connect server is next started. To update the password, simply overwrite database.password and on next server startup it will be automatically encrypted and updated again.</td>
<td></td>
</tr>
<tr>
<td>encryption.algorithm</td>
<td>The algorithm to use for symmetric encryption. This applies to messages, exports, and anything that is used along with the keystore to encrypt / decrypt.</td>
<td></td>
</tr>
<tr>
<td>encryption.keylength</td>
<td>The key length to use for symmetric encryption.</td>
<td></td>
</tr>
<tr>
<td>digest.algorithm</td>
<td>The algorithm to use for generating cryptographically secure hashes / digests. This is used for creating salted hash values for user passwords. If you change this, all current passwords will no longer be valid, and will have to be reset by an administrator.</td>
<td></td>
</tr>
<tr>
<td>security.provider</td>
<td>The fully-qualified JCE/JCA provider class name to use. This provider is used for both symmetric encryption and password hashing.</td>
<td></td>
</tr>
</tbody>
</table>
Split Database Connection Pools

When the "database.enable-read-write-split" setting is enabled, the database connection pool is split into two: A read-only pool, and a read/write pool. The read-only pool is used for many of the Administrator API calls that only fetch data. The read/write pool is used for all backend message processing, as well as any operation that creates/modifies/deletes data.

When the connection pools are split, you can separately configure settings for the read-only pool, with the "database-readonly" options. By default none of the "database-readonly" options are set, meaning that the read-only pool will default to the same configuration as the main read/write pool.

For example, if "database-readonly.max-connections" is not set, it defaults to the "database.max-connections" setting. So if you have your max connections set to 20 for the read/write pool, the read-only pool will also have up to 20 connections, meaning the total number database connections will be at most 40.

These settings also allow you to point the read-only connection pool to a completely different database instance. You may want to do this if you have a master DB and a horizontally scaling cluster of read-replica DBs. You can point the main read/write pool to the master DB, and point the read-only pool to the read-replica cluster instead. By doing this you can potentially reduce the traffic and strain on your master database.

When using read replicas however, the concept of "replica lag" should be taken into account. That refers to the amount of time a read replica DB is behind the master DB. If your replica lag is sufficiently large, all the selects done by the read-only pool may return out-of-date information, which can lead to unintended results in the Administrator.

The server keeps internal caches for channels, channel groups, code templates, and code template libraries. By default these caches use the read-only pool. But if replica lag is a concern, a separate option, "database.write-pool-cache", allows you to switch the caches over to using the read/write pool instead.

Default Supported Cipher Suites

The following cipher suites are supported by default for the overall server when using TLS / SSL / HTTPS:

- TLS_CHACHA20_POLY1305_SHA256
- TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_DHE_RSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_AES_256_GCM_SHA384
- TLS_AES_128_GCM_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_RSA_WITH_AES_256_GCM_SHA384
- TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384
- TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_DHE_DSS_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA384
- TLS_ECDH_RSA_WITH_AES_128_GCM_SHA384
- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_DHE_DSS_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- TLS_RSA_WITH_AES_256_CBC_SHA256
- TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384
- TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384
- TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
- TLS_DHE_DSS_WITH_AES_256_CBC_SHA256
The mirth-cli-config.properties File

This properties file allows you to launch the Mirth Connect Command Line Interface without having to include any command line arguments like the username / password. The following properties are supported:

- **address**: The HTTPS address of the Mirth Connect server to connect to.
- **user**: The username to connect with.
- **password**: The password to connect with.
- **version**: The version to enforce, to ensure that you don't incorrectly connect to an unexpected server version. Use "0.0.0" to allow all.
- **script**: The file to use for non-interactive script mode.

Other Files and Folders

Other files and folders present in the Installation Directory include the following:

- **cli-lib**: Libraries used by the Command Line Interface. These should not be changed.
- **client-lib**: Libraries used by the Mirth Connect Administrator. These should not be changed.
- **custom-lib**: Custom libraries can be dropped in this folder, to be used by the default library resource.
- **docs**: Contains license information for Mirth Connect and all third-party libraries. Also contains the Javadoc documentation used by User API.
- **extensions**: Extension libraries used by the Server, Administrator, and CLI. These should not be changed.
- **logs**: This is the default location that server logs will be written into. This can be changed from the log4j.properties file.
- **manager-lib**: Libraries used by the Server Manager. These should not be changed.
- **mccommand(.exe)**: The entrypoint script for launching the Command Line Interface.
- **mcmanager(.exe)**: The entrypoint script for launching the Server Manager.
- **mcserver(.exe)**: The entrypoint script for launching the Mirth Connect server in a shell or other custom job.

Depending on your Java installation and other factors (like having the JCE Unlimited Strength policy files installed), not all the cipher suites listed above may be available.
• **mcserver.vmoptions**: Entries set here will be added as command-line parameters to the Java process when running mcserver.
• **mcservice(.exe)**: The entrypoint script for launching the Mirth Connect server as a service / daemon.
• **mcservice.vmoptions**: Entries set here will be added as command-line parameters to the Java process when running mcservice.
• ***-launcher.jar**: These libraries are used by the entrypoint scripts to launch their respective applications.
• **public_api_html**: Contains the files used to serve up the REST API documentation.
• **public_html**: Contains the files used to serve up the launch page, if the Web Dashboard WAR fails to load.
• **server-lib**: Libraries used by the Mirth Connect server. These should not be changed.
• **server-launcher-lib**: JARs in this directory will be loaded into the main server thread context classloader upon startup. This is required if you are using any custom log4j appender libraries.
• **webapps**: All WAR files in this directory will automatically be published by the Mirth Connect web server upon startup.
FAQ

- What is Mirth Connect?
- Is Mirth Connect the same as “Mirth?”
- Who develops Mirth Connect?
- What is the Mirth Connect license, and how much does it cost?
- How can Mirth Connect be free and open source?
- Is there a difference between the free, open-source Mirth Connect download and the supported version of Mirth Connect?
- How does Mirth Connect compare to commercial integration engines?
- How many production installations of Mirth Connect exist?
- What can I expect next from Mirth Connect?
- Is there data that shows how fast Mirth Connect operates?
- Is Mirth Connect hard to install and configure?
- Do I need Mirth Appliance to run Mirth Connect?
- As a member of the Mirth community, how can I get more help?
- How do I become a Mirth Connect expert?
- What are the system requirements for Mirth Connect?
- Which databases does Mirth Connect support for its data store?
- Does Mirth Connect use the Mule ESB?
- Do I need an application server to run Mirth Connect?
- Can Mirth Connect send data to ______ or transform data from ______ to ______?
- What message standards does Mirth Connect support?
- What transfer protocols does Mirth Connect support?
- How do I transform a data segment?

What is Mirth Connect?

Mirth Connect is an open-source, standards-based healthcare integration engine that speeds message routing, filtering, and transformation between health-info systems over various messaging protocols (e.g., HL7, X12, EDI, DICOM, XML).

Is Mirth Connect the same as “Mirth?”

Yes. Mirth 1.0 was released in 2006 by WebReach, Inc. Based on the success of the Mirth application, WebReach, Inc. was renamed “Mirth Corporation” in 2009. To avoid confusion between the new company name and its products, the Mirth application was renamed Mirth Connect.

As of early 2016, Mirth Corporation, as a business entity, no longer exists, having been absorbed into the Quality Systems, Inc. family of products in Sept. 2013. QSI has since become NextGen Healthcare, and Mirth Connect lives on with other former Mirth Corporation products as part of the “Mirth Solutions” suite.
Who develops Mirth Connect?

NextGen Healthcare develops and fully sponsors Mirth Connect with the unofficial assistance of its users, who report bugs and contribute source-code patches, feature requests, and online support.

What is the Mirth Connect license, and how much does it cost?

Mirth Connect is released under the Open Source Initiative (OSI) approved MPL 1.1 (see Mozilla Public License 1.1.), and it costs you absolutely nothing! You can download Mirth Connect free via the Mirth download page.

How can Mirth Connect be free and open-source?

NextGen Healthcare, the primary developer of Mirth Connect, backs it with commercial support, services, training, and appliances. Also, the contributions of thousands of users help keep Mirth Connect a leading HIT (health-information technology) integration engine.

Is there a difference between the free, open-source Mirth Connect download and the supported version of Mirth Connect?

No; however, support subscriptions make available to you various commercial plug-ins and connectors as well as day-to-day improvements that are unavailable to non-support users until the next software release.

How does Mirth Connect compare to commercial integration engines?

Based on user feedback, Mirth Connect's features compare favorably to commercial integration engines and are usually superior in head-to-head comparisons. Despite being free and open-source, Mirth Connect has NextGen Healthcare's full backing with support, training, and consulting services similar to those of commercially vended software. We are proud of our agile development process and frequent release cycle, which are possible because Mirth Connect is open-source and community-driven.
**How many production installations of Mirth Connect are there?**

NextGen Healthcare formally supports hundreds of specific production installations of Mirth Connect, but because it is free and open-source, the overall number of production installations is unknown. We do know, however, that Mirth Connect has been downloaded over 500,000 times, and the active online Mirth Connect community has over 40,000 members, so Mirth Connect installations in production worldwide are undoubtedly in the thousands.

**What can I expect next from Mirth Connect?**

Mirth Connect is continually evolving, and each new version includes various enhancements and new features. To see what’s new in any given version, check out the release notes on our public wiki: Mirth Connect 3.5.0 - What’s New

**How fast does Mirth Connect operate?**

Performance varies widely depending on your hardware setup and channel configuration. If there is a performance bottleneck, it is almost always not because of Mirth Connect, but rather because of the underlying database Mirth Connect is using, or the storage solution. For large-scale instances we recommend deploying Mirth Connect with a horizontally-scalable database solution, backed by SSDs. Benchmarks are available for the hardware appliances that Mirth Corporation offers.

**Is Mirth Connect hard to install and configure?**

No. In fact, we’ve heard from users that they installed Mirth Connect and minutes later were processing messages. There are several installation methods, but the easiest is the cross-platform GUI (graphical user interface) installer that guides you through the process. If you prefer a more hands-on method, however, we offer a **zip/tar.gz** distribution.

**Do I need Mirth Appliance to run Mirth Connect?**

No, but running Mirth Connect on the Appliance platform provides such advantages as easy updates, added security and reliability through clustering, and a platform that can host the entire Mirth Solutions suite. To view an extensive list of features, see our data sheet on Appliance solutions.
As a member of the Mirth Solutions community, how can I get more help?

NextGen Healthcare provides numerous commercial support options if you have a specific problem or would like support for running Mirth Connect for production. Sign up for support to access online training videos and monthly Q&As with Mirth Connect developers.

How do I become a Mirth Connect expert?

NextGen Healthcare provides extensive Mirth Connect training and a certification program. More information here: Training

What are the system requirements for Mirth Connect?

You can run Mirth Connect on any system that supports Java and requires the Sun/Oracle JRE (Java Runtime Environment) 8 or newer.

The Mirth Connect Server requires a database for its configuration and message store. For quick deployment, development, and testing, Mirth Connect already includes an embedded database (Apache Derby). For production use, the latest version of Mirth Connect supports the following databases:

- PostgreSQL 8.3+
- MySQL 5.0+
- Oracle 10gR2+
- SQL Server 2005+

Note that the above database requirements only apply to what is used for the configuration and message store of the Mirth Connect Server, and have no impact on which databases Mirth Connect can interface with.

Which databases does Mirth Connect support for its data store?

Apache Derby (default), PostgreSQL, MySQL, Oracle, and Microsoft SQL Server, but the Database Reader/Writer connectors can support any type of database if you add the right client libraries to the custom folder in the Mirth Connect installation directory.
Does Mirth Connect use the Mule ESB?

Not anymore. Prior to the release of Mirth Connect 3.0, Mule was eliminated from the application.

Do I need an application server to run Mirth Connect?

No. Mirth Connect runs as a stand-alone executable or service in its own JVM (Java virtual machine).

Can Mirth Connect send data to _____ or transform data from _____ to _____?

Whichever variables fill these blanks, the answer is generally a resounding Yes! Even if a message standard (protocol) is foreign to Mirth Connect, advanced Java and JavaScript capabilities are so flexible that almost any data type can be transformed and transferred.

What message standards does Mirth Connect support?

- HL7 v2.x
- HL7 v3.x
- Delimited Text (CSV, tab-delimited, fixed-width, etc.)
- DICOM
- EDI / X12
- XML
- JSON
- NCPDP
- Raw (supports any data format!)
- ASTM E1394 (Commercial extension)
What transfer protocols does Mirth Connect support?

- MLLP (v1 and v2)
- TCP/IP
- HTTP
- Flat Files
- Databases
- SFTP
- FTP
- SMB
- WebDAV
- IMAP / POP3 (Email)
- SMTP (Email)
- DICOM
- JMS
- SOAP Web Services
- PDF/RTF Documents
- Custom Java and JavaScript
- ASTM E1381
- Serial / RS-232

How do I transform a data segment?

Example: You have the data segment 20080624175854-0700, and you want to eliminate the hyphen and the four digits after it. The easiest way to do this is to create a new STEP in the transformer with some JavaScript such as:

```javascript
var originalValue = msg['PID']['PID.18']['PID.18.1'].toString(); //, which represents: 20080624175854-0700

var splittedValueArray = originalValue.split("-");
msg['PID']['PID.18']['PID.18.1'] = splittedValueArray[0]; // splittedValueArray[0], which represents: 20080624175854

// splittedValueArray[1], which represents: 0700
```

Use of the split function returns an array of the values split by the delimiter.
Channel Development Best Practices and Tips

Channel Performance

Adjust the Message Storage slider so that the channel only retains the message data that you will actually need.

One limitation on message throughput is the amount of disk writes that Mirth Connect's database must perform while processing each message. Reducing the amount of message data retained can increase throughput and decreases memory usage as well as disk usage. Production level guarantees that if an unexpected server failure occurs, any incomplete (received, but not yet fully processed) messages will be automatically recovered and processed on restart. If increased performance is needed, you can reduce this to the Raw level, which only retains the original raw message prior to being processed by any transformer steps. Incomplete messages can still be recovered on failure, but must be done so by manually reprocessing them. Keep in mind that using destination queues requires at least Production level.

<table>
<thead>
<tr>
<th>Message Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw</td>
</tr>
<tr>
<td>Content: Raw</td>
</tr>
<tr>
<td>Metadata: All</td>
</tr>
<tr>
<td>Durable Message Delivery: Reprocess only</td>
</tr>
<tr>
<td>Performance:</td>
</tr>
<tr>
<td>Encrypt message content</td>
</tr>
<tr>
<td>Remove content on completion Filtered only</td>
</tr>
<tr>
<td>Remove attachments on completion</td>
</tr>
</tbody>
</table>

If large messages are expected, use an Attachment Handler to improve throughput and reduce memory and disk usage.

When a channel processes a message, copies of the message content are made in memory at various steps in which the message is transformed. Depending on the message storage mode, multiple copies of the transformed content are also written to the disk/database. Due to this, large messages can quickly consume memory and can cause out-of-memory errors if one is not careful. An attachment handler can mitigate these problems by extracting the bulk of the message content that does not need to undergo transformation while passing through the channel.

For more information about attachment handlers, please see the official User Guide.

Enable source queuing if an auto-generated acknowledgement is sufficient for the upstream system.

If you do not need to send back a response to the originating system, or the response does not need to come from one of your destinations, consider turning the "Source Queue" ON in your source connector. This lets the channel respond to the originating system immediately on message receipt, rather than waiting for the message to finish processing. This can increase your channel's overall throughput.

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Enable destination queuing if you don’t need to respond to the originating system from your destination.

All destination connectors support queuing. Queuing is important for re-attempting to send messages if they do not succeed at first, but can also improve channel performance. Without queuing, the message send attempt will occur on the main message processing thread for the channel, which will block any new messages from being processed (unless the Max Processing Threads is increased, see below). This can significantly improve channel performance if the system you are sending to is slow to respond.

Increase the Max Processing Threads value if message order is not important and you may receive a large number of messages in a short time.

This setting controls how many messages the channel can process simultaneously (on separate CPU threads). The default value is 1, which means that only one message can be processed by the channel at a time and also guarantees that messages are sent out from the channel in the order that they are received. Increasing this value eliminates the order guarantee, but can greatly increase throughput when a large number of messages is received in a short amount of time. Setting this value too high however, can harm throughput. Keep in mind that this setting controls how many CPU threads are used by the channel. So, it is important to consider how many threads the CPU can execute concurrently as well as how much of the CPU’s resources are needed by other channels/processes.

Increase the Queue Threads value if the downstream system can accept multiple concurrent connections.

This setting controls how many messages can be simultaneously retrieved from the outbound queue to attempt to send and is similar to the Max Processing Threads setting described above. As with the Max Processing Threads setting, the default value is 1, and increasing the value will no longer guarantee the order in which queued messages are processed. However, the "Thread Assignment Variable" setting can be used to assign messages to a particular queue thread, thus guaranteeing the send order of all messages assigned to a particular thread (unless "Rotate Queue" is set to "Yes"). Users wanting to increase outbound threads can start with 2-10 and increase or decrease from there until reaching maximum throughput.
Uncheck the "Wait for previous destination" checkbox, unless you need destinations to process messages one after another.

Unchecking this box will allow adjacent destinations to execute in parallel, potentially improving performance. When using several destinations, you can configure some to execute in order and others to execute in parallel.

Use the "Destination Set Filter" feature in your source transformer when you need to route messages to just one (or a subset) of destinations in your channel.

This feature has been available in the JavaScript user API since version 3.1.0:

```javascript
if (sourceMap.get("contextPath") == "/path1") {
    destinationSet.removeAllExcept([1]);
}
```

A less efficient pattern used prior to version 3.1.0 was to filter the message on all destinations except the desired destination. This approach consumes more disk space as the message is copied to each destination before the filtering takes place. The Destination Set Filter will ensure that the message is only processed and stored by the desired destination.

Since version 3.5.0, it can also be leveraged without writing any code.
Channel Configuration

Use tags to categorize your channels.

If you have a large number of channels to manage, tags can help you keep them organized. See the official User Guide at mirth.com or the Mirth Connect 3.5.0 What’s New page for more information.

Place any reusable JavaScript code into Code Template functions and organize them into Code Template Libraries.

This prevents code duplication and keeps your JavaScript code from being scattered across your channels. Put reusable code into Code Templates and keep only channel-specific code in your channels. Code template libraries can also be enabled for only specific channels, to prevent namespace clashes and other confusion.

Read more about Code Templates in the official User Guide.

Use Custom Meta Data Columns to increase the performance of searching the message history on a particular message field.

If there is a particular element of data from your messages that you may need to search by later, configure the channel to map the data into a custom meta data field. Mirth Connect will then index this data to improve search performance when searching for particular values. To do this, first create a mapper transformer step that maps the value into a Channel Map variable (“myField” for example). Then in the “Custom Metadata” section of the channel summary screen, add a new column and assign it to the variable mapping that you defined in your transformer step.
To search for messages based on values in your custom meta data column, click "Advanced..." to open the Advanced Search Filter. Then add search criteria for the custom field in the table.

Use Deploy/Start Dependencies if one channel depends on another to operate correctly.

This can be configured in the Channel Summary view > Set Dependencies > Deploy/Start Dependencies.

By defining channel dependencies, you can protect yourself against deploying a channel without deploying another channel that it depends on to operate correctly. Mirth Connect will alert you when you attempt to deploy a channel that depends on another:

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Use multiple resource folders for your Java libraries if you need to limit library usage to specific channels or if you have many Java libraries.

(Settings > Resources) Avoid putting all of your custom Java libraries in the Default Resource folder ("custom-lib"). You may have added a particular Java library to be used by a single channel. If so, place that library into a separate resource and enable that resource for that one channel under the "Dependencies" section of the Channel Properties. A danger of having too many libraries in the default resource is that unexpected runtime conflicts could occur between different libraries.

Other Tips

Don’t reference Mirth Connect’s internal Java classes in your JavaScript code.

These classes are not intended to be used directly by your channels and could result in unexpected behavior. They are also subject to change, so upgrading to a new version of Mirth Connect could immediately break your channels.

Instead, make use of the user API. There is a link to browse the user API documentation in the left-hand navigation menu:

Any methods/functions in the user API are intended to be used by channels and are guaranteed to be supported and available when you upgrade Mirth Connect. Future versions of Mirth Connect may deprecate certain functions, in which case a warning message will appear in your server log.
Troubleshooting

This page is meant to capture some of the most common errors that may occur when using Mirth Connect. It is by no means an exhaustive list. For additional help, you may be interested in our Commercial Support / Extensions or Training offerings.

- Logs
- Configuration
- Mirth Connect fails to start up
- Unable to launch Mirth Connect Administrator
- Clearing your Java Cache
- Opening the Java Client Console
- Out of Memory Errors

Logs

Whenever an issue occurs, it may be helpful to look at the server logs. These are stored in the "logs" folder inside your Installation Directory. The "mirth.log" file will be the most recent log.

Configuration

Often times issues occur because of mistakes in initial configuration. The main configuration for Mirth Connect is done in the mirth.properties file in the "conf" folder inside your Installation Directory.

Mirth Connect fails to start up

- A common cause of this is port conflicts. Check the logs, you may see something like this:

```
```

- Change the "http.port" and "https.port" in your configuration to ones that aren't already used.

- Another common cause is database connectivity / problems. If you see this:

```
```

It probably means you have an error in your database configuration settings, or the machine running Mirth Connect does not have connectivity to the correct IP.

- If you see an error like this:

```
com.mirth.connect.model.util.MigrationException: Failed to execute script:
```

If may mean that you've changed the "database.url" setting correctly, but forgot to also change the "database" setting. For example if you're switching from Derby to PostgreSQL, you need to change the "database" setting to "postgres".
• Another possibility is that you have all the database settings correct, but the schema you're trying to connect to doesn't yet exist:

```
```

• In your database management tool / command line, make sure to create the schema ("mirthdb" by default). Then Mirth Connect will automatically create all the necessary tables once it starts up.

Unable to launch Mirth Connect Administrator

The login dialog will generally tell you if there is any issue:

![Login Dialog](image)

• If you don't have connectivity from your local machine to the Mirth Connect server over the HTTPS port (default 8443), you'll see this:

```
There was an error connecting to the server at specified address. Please verify that the server is up and running.
```

Make sure the URL you're using is correct, and verify whether you have network connectivity to the server.

• Also verify that the Mirth Connect server is actually running. If you installed as a service, you can view the current status from the Server Manager.

Clearing your Java Cache

If you've recently upgraded Mirth Connect or installed a new extension, you may find that your current Administrator shortcut no longer works:
This can be resolved by clearing your Java cache. You can do that directly from the command line, or by using the Java Control Panel.

**Using the Java Control Panel**

- In your System Preferences (on OSX) or the Control Panel (on Windows), open the Java section. A new dialog will appear:
• Under **Temporary Internet Files**, click on **Settings**...

![Temporary Files Settings](image)

- **Location**: Select the location where temporary files are kept:
- **Disk Space**: Select the compression level for JAR files, set the amount of disk space for storing temporary files.

  - Delete Files...
  - Restore Defaults

![Delete Files](image)

• Click on **Delete Files**...

- Check all three boxes and then click OK.

**Using the Command Line**

• Open up a terminal / command prompt, and type this:

  - `javaws -uninstall`

• Wait for the operation to finish. Note that if you have multiple versions of Java installed on your machine, you may have to use the `javaws` executable specific to the version you launch the Mirth Connect Administrator with.

**Opening the Java Client Console**

If an error occurs on the Mirth Connect server, you will typically see one or more entries appear in the logs. If an error occurs in the Mirth Connect Administrator, it's possible that it's isolated to the client-side only, and so nothing will appear in the server-side logs. In cases like this, it's useful to enable the **Java Client Console** to see any exceptions that occur on your client-side Java virtual machine (JVM).

To enable the console, first open the Java Control Panel:
In your System Preferences (on OSX) or the Control Panel (on Windows), open the Java section. A new dialog will appear:

- Click on the Advanced tab.
- Select Show console.
- Click Apply, then click OK.

Now when you launch the Administrator, you'll see a second window also pop-up:

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Any exceptions that are logged to stdout / stderr on the client side will appear in that console.

**Out of Memory Errors**

By default, the max Java heap size for the Mirth Connect server is set to 256 MB. For large production instances you will typically want to increase this value. You can do this from the **Server Manager**:

Or, you can edit the appropriate `.vmoptions` file in your **Installation Directory**.

> When changing the max Java heap size, you must restart your Mirth Connect server / service for it to take effect.

Out of memory errors can also happen on the client-side, usually when attempting to view very large messages through the message browser:

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If this is the case, first you may want to consider using Attachment Handlers on your channel. To change the max heap size for the client-side Administrator, open the 8080 launch page in a browser:

Click on the cog icon next to the Launch button, and change the max heap size. Then click the launch button. The JNLP file you download will have the “max-heap-size” attribute set to the value you chose.

The default value for the client-side max heap size is 512 MB. To change this default, edit the administrator.

maxheapsize setting in the mirth.properties file. To change the options that show up in the drop-down on the 8080 launch page, change the administrator.maxheapsizeoptions setting.
Commercial Support / Extensions

A Mirth Connect commercial license includes:

- **Enterprise-class Support**: Most importantly, you'll be safely under our support umbrella. You can contact us directly if for any reason you run into a production incident.

- **Advanced Commercial Extensions**: Our commercial extensions are built specifically for large healthcare organizations that require secure and scalable solutions. Streamline SSL certificate management, add role-based user restrictions, define metric-based advanced alerts, and much more! Look below for a full list.

- **Option For Professional Services**: We have a professional services team that can build interfaces from scratch to your (or your vendor's) specifications! We offer this option (as a separate engagement) to commercial support customers in case your organization doesn't have the necessary developer resources.

Don't hesitate to Contact Us if you have any questions about commercial support, training, or any of the extensions!

The following extensions are available as part of commercial licenses:

- Advanced Alerting
- Advanced Clustering
- ASTM E1381 Transmission Mode
- ASTM E1394 Data Type
- Channel History
- Email Reader
- FHIR Connector
- Interoperability Connector Suite
- LDAP Authorization
- Message Generator
- Multi-Factor Authentication
- Serial Connector
- SSL Manager
- User Authorization
- Mirth Results Connector

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Advanced Alerting

Advanced Alerting provides metric, exception, and state-based monitoring of channels and connectors. Additional features include automatic escalation and de-escalation, scheduling, and notification throttling. Using advanced alerts, dynamically send different alert messages to different user groups based on the current escalation level, time, and day. The new alert dashboard provides a view of all alert statistics and logs. Feel free to Contact Us if you have any questions.
Advanced Clustering

The Advanced Clustering plug-in improves the availability of your Mirth Connect cluster with automatic message takeover. If one server in the cluster fails, another server will automatically resume processing of any queued or unfinished messages from the failed server. Managing your cluster becomes easier as you can monitor the status of each server, deploy/start/stop/pause channels across all servers, and view message statistics for the whole cluster or a particular server from the Mirth Connect dashboard. This plug-in can be used with standalone Mirth Connect instances using your own load-balancing solution, but also seamlessly integrates with the load-balancing and failover services provided on Mirth Appliances. Feel free to Contact Us if you have any questions.
ASTM E1381 Transmission Mode

The ASTM E1381 transmission mode for Mirth Connect allows you to send and receive data using the ASTM E1381 lower-layer protocol standard. It can be used in conjunction with the TCP Listener / TCP Sender or the Serial Connector. By default the official ASTM E1381 standard is strictly followed, but there are several settings available to support variations from the standard. The extension supports specifying the bytes used for frame delimiters, the checksum algorithm used, various timeouts, and much more. Feel free to Contact Us if you have any questions.
ASTM E1394 Data Type

The ASTM E1394 data type for Mirth Connect allows you to easily accept, parse, and transform messages following the ASTM E1394 data standard. As with other data types, an incoming message will be serialized into a simple XML format, and all the usual transformer steps may then be used to transform the message, or to convert it to or from a different data type. Several data type properties are also provided for specifying how messages should be converted to and from XML. A standard vocabulary for the ASTM E1394 data type is also included to help identify fields in the message template trees of a transformer. Feel free to Contact Us if you have any questions.
**Channel History**

Get configuration management for all of your critical channels using the Channel History plug-in. You can view and compare past revisions of channel configurations—and identify the user making changes. Plus, revert to a past revision from the embedded viewer. Feel free to Contact Us if you have any questions.
Email Reader

Securely connect to a POP3 or IMAP email server and download email messages for processing in a channel using the Email Reader. With the Message Content parameter, you can specify if an individual email message should be read as XML, including the metadata and the body, as just the body, or as a set of attachments. Access numerous options for specifying behavior once a message is read. Feel free to Contact Us if you have any questions.
FHIR Connector

FHIR (Fast Healthcare Interoperability Resources) is a new set of HL7 healthcare standards. Its main focus is on the ease of implementation, based on RESTful HTTP using XML or JSON. Components called "Resources" are used to store and exchange data between systems. The resources are just XML or JSON documents following a standard definition, and include the actual resource data (like patient demographics), metadata, tags, and a human-readable description. However, they are also fully extensible, meaning that additional implementation-specific data elements can be added if needed.

This extension provides FHIR Listener and FHIR Sender connectors, a new FHIR data type, a FHIR Resource Builder available as both a transformer step and code template type, and some helper/utility classes for working with responses. For more information, check out the user guide on the public wiki: https://www.mirthcorp.com/community/wiki/display/mirth/FHIR+Connector+Extension+(3.6)
Interoperability Connector Suite

This extension provides Listener and Sender connectors that can help kickstart your eHealth Exchange onboarding and integration. The following protocols and operations are supported:

- **PIX (v2 and v3)**
  - PRPA_IN201301UV02
  - PRPA_IN201302UV02
  - PRPA_IN201304UV02
  - PRPA_IN201309UV02
- **PDQ (v2 and v3)**
  - PRPA_IN201305UV02
  - QUQI_IN000003UV01_Cancel
  - QUQI_IN000003UV01_Continue
- **XDS.b**
  - RegistryStoredQuery
  - RegisterDocumentSet-b
  - RetrieveDocumentSet
  - ProvideAndRegisterDocumentSet-b
- **XCA**
  - CrossGatewayQuery
  - CrossGatewayRetrieve
- **XCPD**
  - PRPA_IN201305UV02

The connectors accept SOAP XML from external systems, and convert it to JSON for transforming within a channel. They also support automatic generation and validation of NHIN (eHealth Exchange) compliant WS-Security/SAML. In addition, this extension includes a new UDDI Provider resource which automatically downloads and syncs business endpoint information from a remote UDDI provider.
### Edit Channel - XCPD and XCA Sender

<table>
<thead>
<tr>
<th>Status</th>
<th>Destination</th>
<th>Connector Type</th>
<th>Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>Patient Discovery</td>
<td>XCPD Sender (SSL Configured)</td>
<td>1</td>
</tr>
<tr>
<td>Disabled</td>
<td>Cross Gateway Query</td>
<td>XCA Sender (SSL Configured)</td>
<td>3</td>
</tr>
<tr>
<td>Enabled</td>
<td>Cross Gateway Gateway</td>
<td>XCA Sender (SSL Configured)</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Connector Type: XCPD Sender

**Destination Settings**
- Queue Messages: Never, On Failure, Always
- Advanced Queue Settings: D Retry
- Validate Responses: Yes, No
- Retriable Attachments: Yes, No

**SSL Settings**
- Use SSL: Yes, No
- Current Security: Trusted Java Installations: Client cert, mepg2transport, 2 enabled protocols, 12 enabled cipher suites

**XCPD Sender Settings**
- WSDL URL: [WSDL URL for PatientDiscovery](https://www.appipi.com:443/patientdiscovery)
- Use UDID: Yes, No
- Location URL: [Location URL for PatientDiscovery](https://www.appipi.com:443/patientdiscovery)
- Socket Timeout (ms): 30000
- Validate IS-Security: Yes, No
- Generate IS-Security: Yes, No
- Operations: [MappingExample_MPA_IN203386WILL.xml](https://www.appipi.com:443/patientdiscovery)
- Use SOAP Template: Yes, No
- SOAP Envelope: [SOAP Envelope Example](https://www.appipi.com:443/patientdiscovery)

**Use FTP:** Yes, No

### Note
- Destination Mappings:
  - Channel ID
  - Channel Name
  - Message ID
  - S柔 Data
  - Transformed Data
  - Shaded Data
  - Message Source
  - Message Version
  - Message Data
  - Formatted Date
  - Timezone
  - Unique ID
  - Original File Name
  - Course
  - EMPI Entity Identifier
  - EMPI Entity Shortener
  - Escape XSD Schema
  - ISDN Prefix
  - CAIPA Tag
  - DICOM Message Raw Data
  - InputStream
  - ID

---

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LDAP Authorization

The LDAP Authorization replaces the existing authentication mechanism and instead authenticates against an LDAP server so you can manage user accounts on a centralized LDAP server. Any user contained within the specified User Base DN on the LDAP server can log in to Mirth Connect. When a user logs in, Mirth Connect copies the user’s attributes from the LDAP server. The connection to the LDAP server can optionally use SSL or STARTTLS encryption. Feel free to Contact Us if you have any questions.
Message Generator

With the Message Generator, quickly and easily generate HL7 v2.x messages for use as a transformer’s inbound or outbound template, for sending to a channel, or for testing. Create messages of any type/trigger and any version (HL7 2.1 through 2.6), with specific options for which segments, fields, and components to include. Where applicable, pseudo data is generated (dates, names, free text, and even random values from the HL7 specification tables), though there are also several options to override parts of the message with your own data. Feel free to Contact Us if you have any questions.
Multi-Factor Authentication

This extension provides an extra layer of security for all user accounts. A secondary device such as a phone, tablet, or landline is used to ensure that no one but the actual user can login, even if they know the correct username and password. Both Duo and generic apps such as Google Authenticator / Authy are supported. When using Duo, advanced options such as lockout protection, automatic enrollment, and policy management are available in the Duo administrator dashboard. Feel free to Contact Us if you have any questions.
Serial Connector

The Serial Connector allows Mirth Connect to send and receive data over serial communication ports, such as those compliant with the RS-232 standards. Any installed transmission mode may be used in conjunction with the connectors, including a raw serial mode, MLLP, or the ASTM E1381 transmission mode. Options are available to select the port to connect to, the baud rate, the parity, and much more, allowing for fully customizable communication. This extension comes with both a Serial Listener source connector and a Serial Sender destination connector. Feel free to Contact Us if you have any questions.
SSL Manager

Use the SSL Manager to quickly enable and configure certificate-based SSL connectivity for socket-based connectors such as the HTTP Listener / Sender, Web Service Listener / Sender, and FTP Reader / Writer. The central settings view allows you to manage and store your certificates in one location. Trusted certificates and advanced SSL settings such as client (two-way) authentication and hostname verification can be applied on a per-connector basis. Feel free to Contact Us if you have any questions.
User Authorization

User Authorization provides role-based access control to all aspects of the Mirth Connect Administrator. Create new roles with specific permissions to areas such as channel management or message browsing. Assign any number of roles to users. Use this to manage access to sensitive channel and messaging data across your enterprise. Feel free to Contact Us if you have any questions.
Mirth Results Connector

The Mirth Results Connector provides a scalable and streamlined path to getting data into Mirth Results. Create a resource once, and then select that resource on any Mirth Results Sender destination connector. Supports posting data in a variety of formats, and comes with a built-in connection pool for persistent and highly available processing. Feel free to Contact Us if you have any questions.

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Training

We offer two levels of Mirth Connect Certification Training:

In Mirth Connect Fundamentals Certification Training, we’ll cover everything from basic installation to Mirth Connectors. You’ll leave with a solid grasp on Mirth Connect. It’s designed to be your first Mirth Connect class and certification.

During Mirth Connect Advanced Certification Training, for users who have completed the Mirth Fundamentals class, you’ll take an even deeper dive into building your own channels and applications with Mirth solutions. This class will dig into topics such as customizing interfaces using Java and JavaScript, in-depth HL7 processing, working with databases, and using HTTP, web services, and JSON. Already certified on Mirth Connect? Take your skills to the next level!

We offer public classes in Costa Mesa, Atlanta, and London. We also offer private classes where we’ll come to your location. For more information, go here: https://www.nextgen.com/Interoperability/Mirth-Solutions/Training

Don’t hesitate to Contact Us if you have any questions about commercial support, training, or any of the extensions!