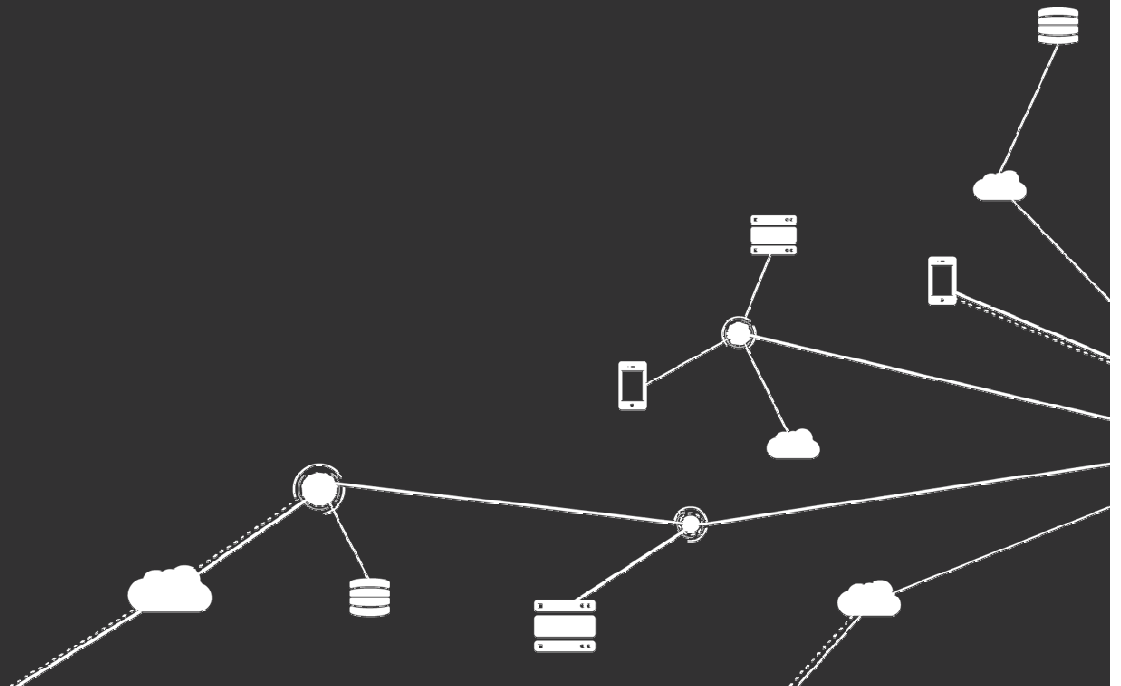




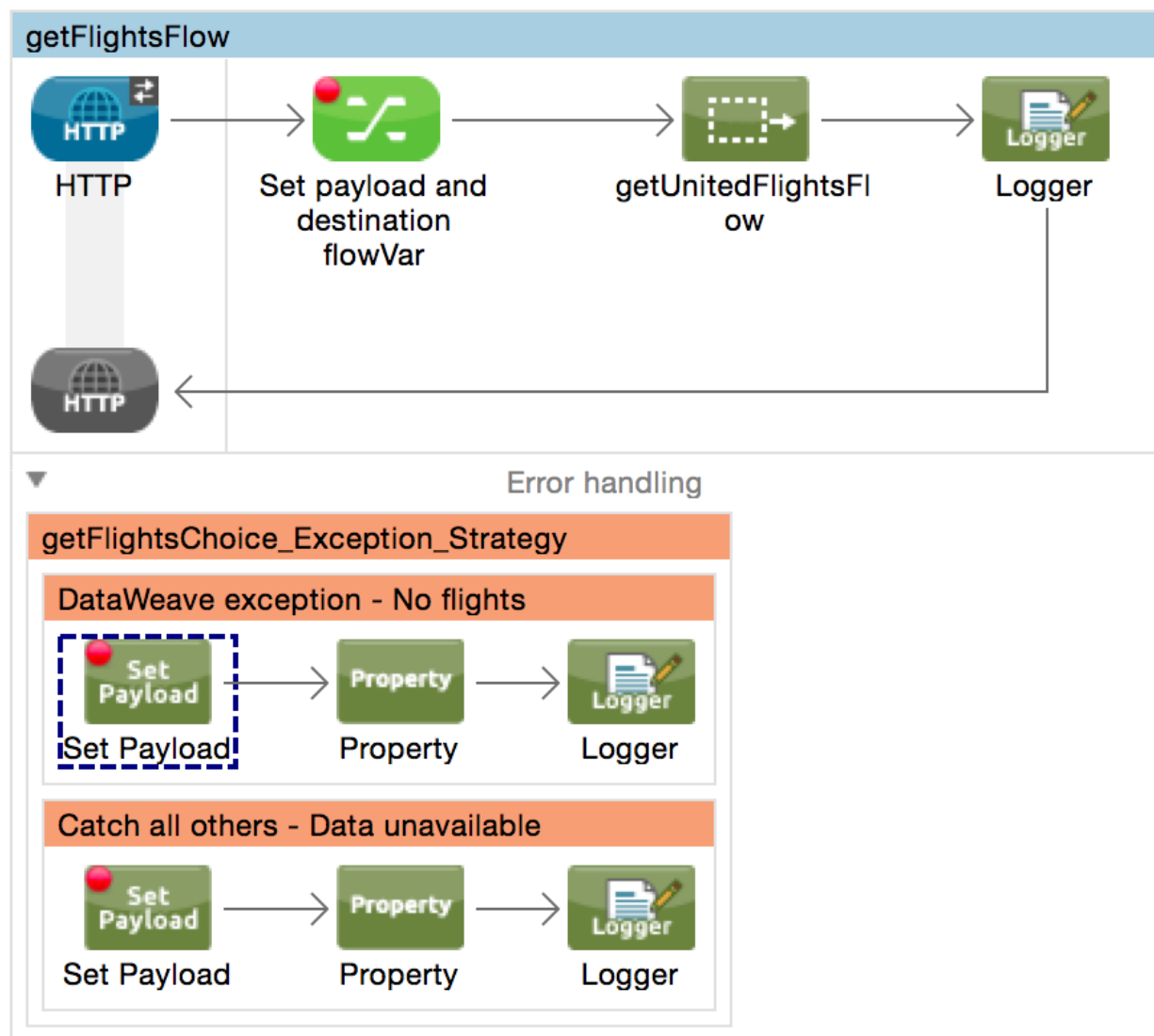
Module 7: Handling Errors



Objectives

- In this module, you will learn:
 - About the different types of exceptions and exception strategies
 - To handle messaging exceptions in flows
 - To create and use global exception handlers
 - To specify a global default exception strategy

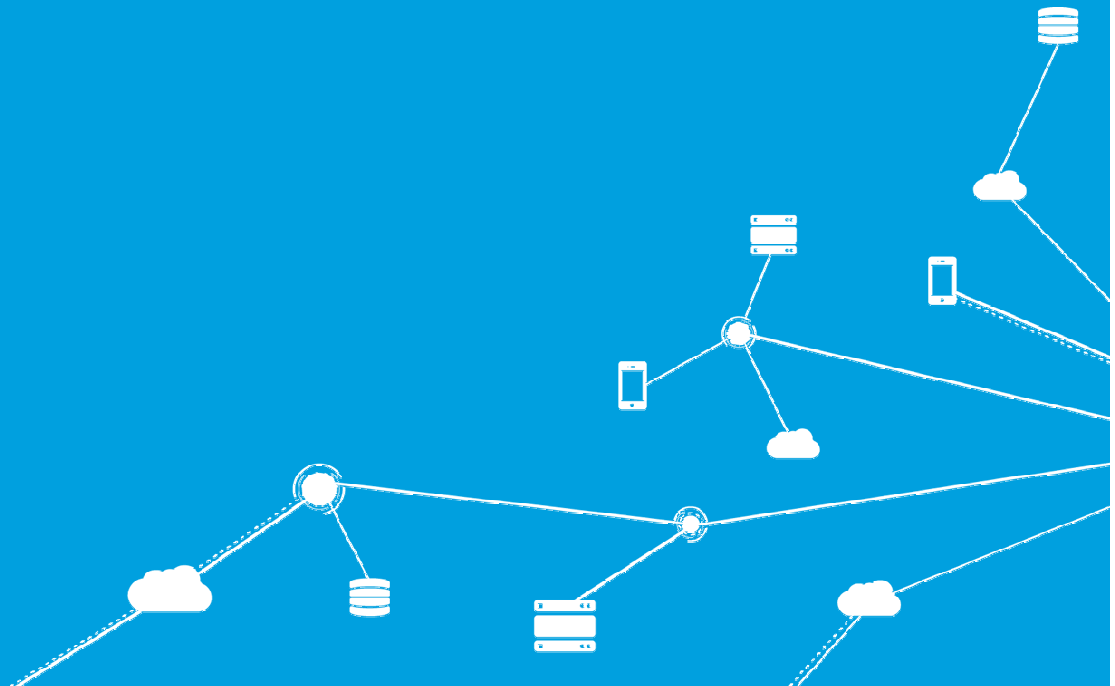
Goal



Types of exceptions

- System exceptions
 - Thrown at the system-level when *no* message is involved
 - Exceptions that occur
 - During application start-up
 - When a connection to an external system fails
- Message exceptions
 - Thrown within a flow whenever a message is involved

Handling system exceptions



Handling system exceptions

- When a system exception occurs, a system exception strategy is invoked
 - Non configurable
 - Logs the exception
 - If the exception was caused by a connection failure, executes the reconnection strategy

Reconnection strategies

- Set for each connector
- Some connectors have reconnection options in the Global Element properties GUI
- For most others, you set connector properties in XML
 - Set attempt count and frequency in ms
 - Set it to blocking or non-blocking
 - Notify registered listeners

```
<jms:activemq-connector name="AMQConnector">  
  <reconnect count="5" frequency="1000"/>  
</jms:activemq-connector>
```

Setting reconnection properties

The screenshot shows the 'Global Element Properties' dialog for a 'Salesforce' connector. The 'Reconnection' tab is selected, showing options to define how the mule should handle connection failures. The 'Standard Reconnection' strategy is chosen, with a frequency of 2000 ms and 2 reconnection attempts. The 'Custom Reconnection' strategy is also available, with a class field and a properties table. The 'Run the reconnection in a separated thread' checkbox is unchecked.

Global Element Properties

Salesforce
Global Salesforce configuration information.

General Pooling Profile **Reconnection** Notes

Strategies

Define how mule should attempt to handle a connection failure

☒ Do not use a Reconnection strategy

☐ Standard Reconnection

Frequency (ms): 2000

Reconnection Attempts: 2

☐ Reconnect Forever

☐ Custom Reconnection

Class:

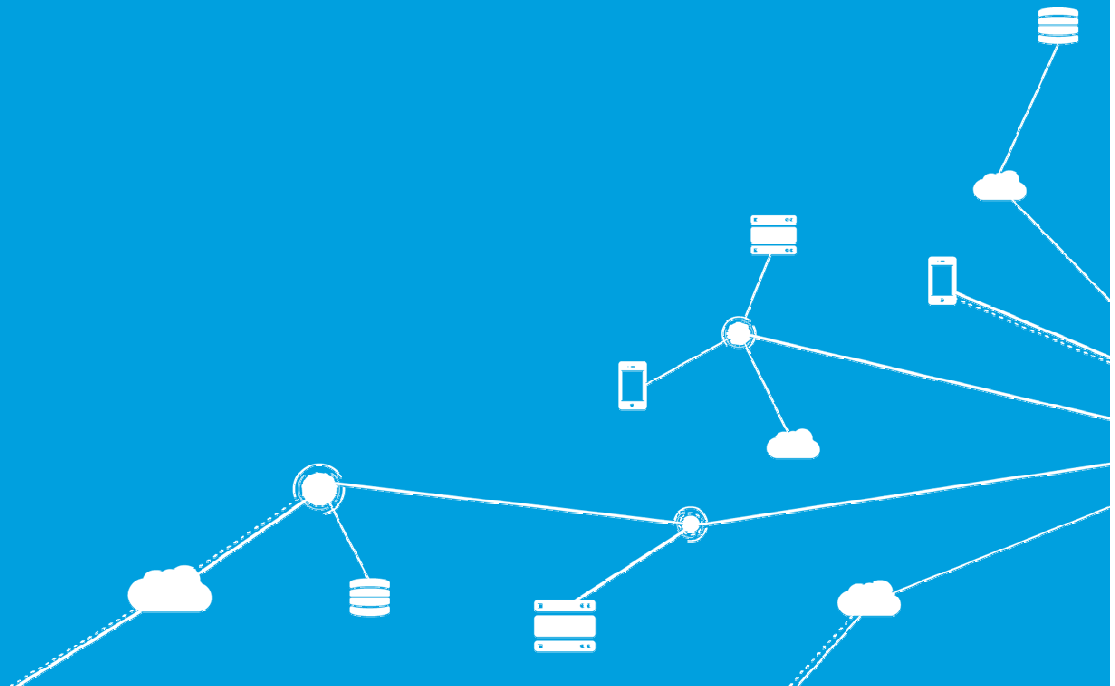
Properties

| Name | Value | Reference |
|------|-------|-----------|
|------|-------|-----------|

☐ Run the reconnection in a separated thread.

Test Connection... Cancel OK

Handling messaging exceptions

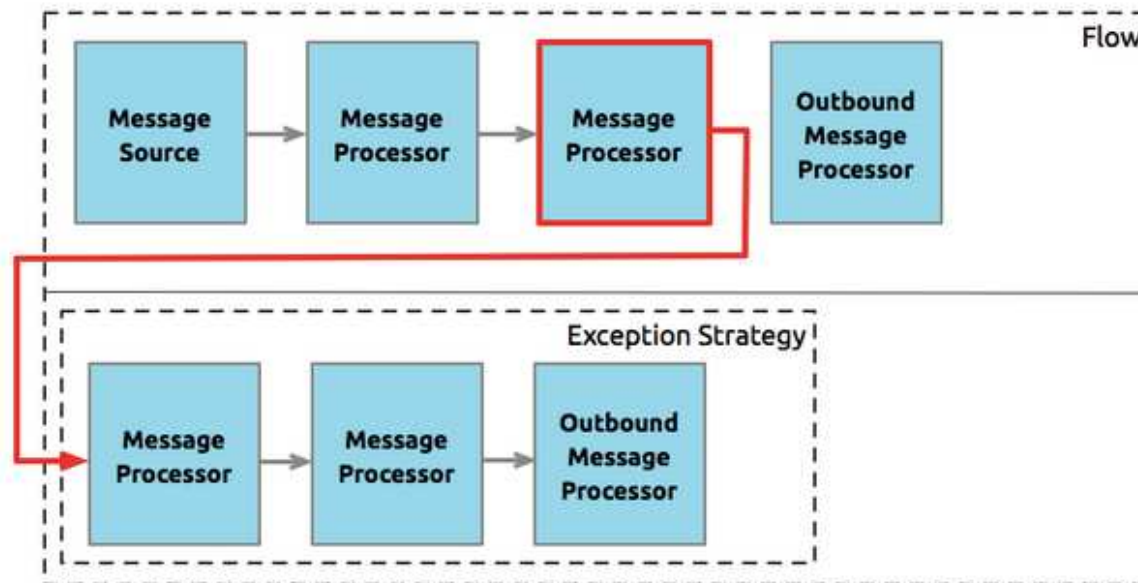


The default exception strategy

- If there is no exception strategy explicitly defined, Mule's default exception strategy is used
- The default exception strategy
 - Implicitly and globally handles all messaging exceptions thrown in Mule applications
 - Stops execution of the flow and logs the exception
 - Cannot be configured
 - Can be replaced with your own global default exception strategy
 - We will do this later this module

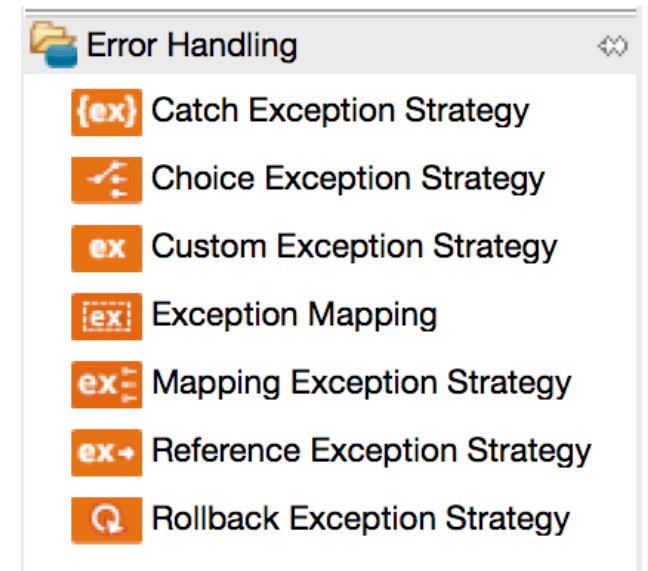
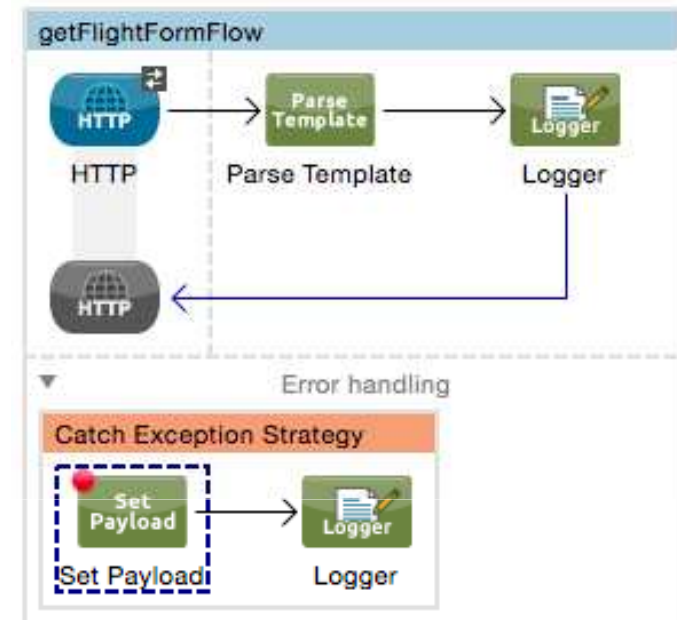
Handling messaging exceptions

- When a message being processed through a Mule flow throws an exception
 - Normal flow execution stops
 - The message is passed to the first processor in the exception strategy



Defining messaging exception strategies

- Exception strategies are added to the error handling section of a flow
- Each flow can contain only one exception strategy
 - Choice exception strategies can contain one or more catch and/or rollback exception strategies
- Each exception strategy can contain any number of message processors

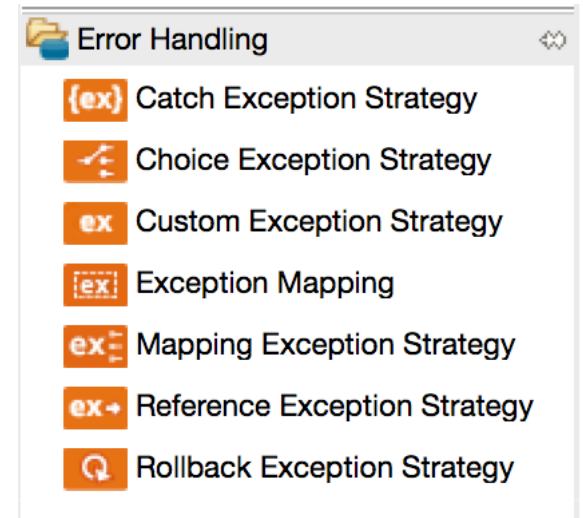


Referencing the exception inside the strategy

- Inside an exception strategy, you can reference the exception object
 - `<logger level="ERROR" message="#[exception]"/>`
- Use methods to get different amounts of detail about it
 - `exception.getSummaryMessage()`
 - `exception.getVerboseMessage()`
 - `exception.getMessageCode()`
 - `exception.getDetailedMessage()`

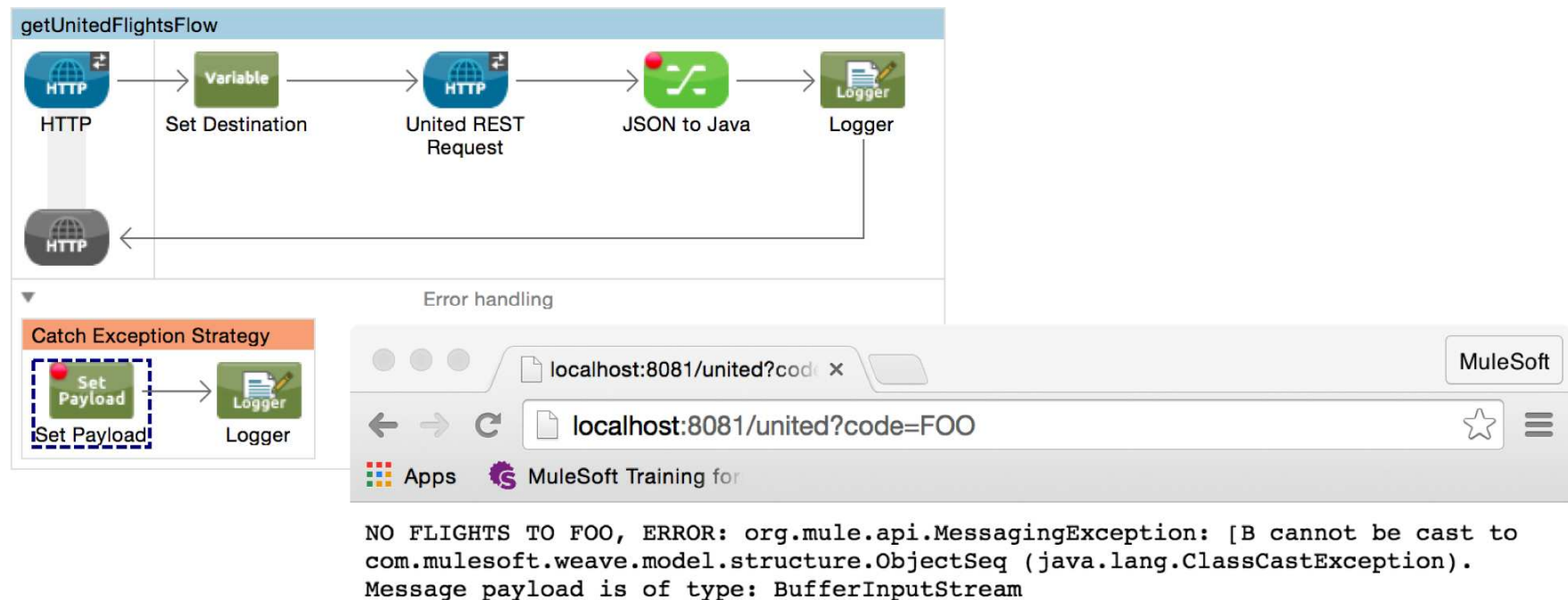
Exception strategies

- Catch
 - Catches exceptions based on conditions
- Rollback
 - Rolls back message for reprocessing
- Choice
 - Selects one of multiple catch and/or rollback strategies based on conditions
- Reference
 - Lets you reference globally defined strategies
- Mapping
 - Sets HTTP status codes based on exception type
- Custom
 - Lets you specify a custom class for handling the exception



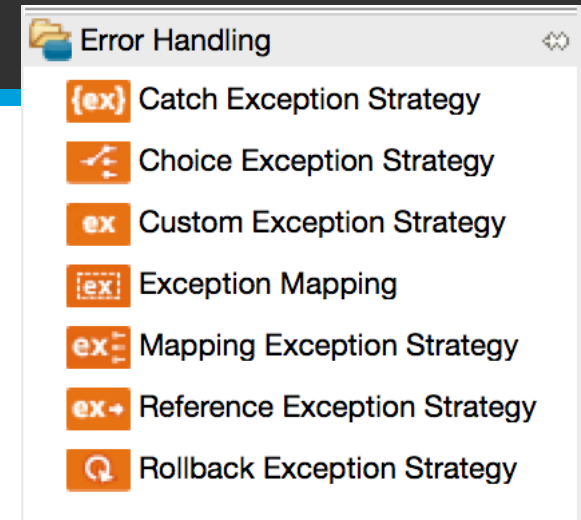
Walkthrough 7-1: Handle a messaging exception

- In this walkthrough, you will:
 - Add a Catch Exception Strategy to a flow
 - Catch the exception and send an error message back
 - Reference the exception object inside an exception handler
 - Create and catch a web service request error



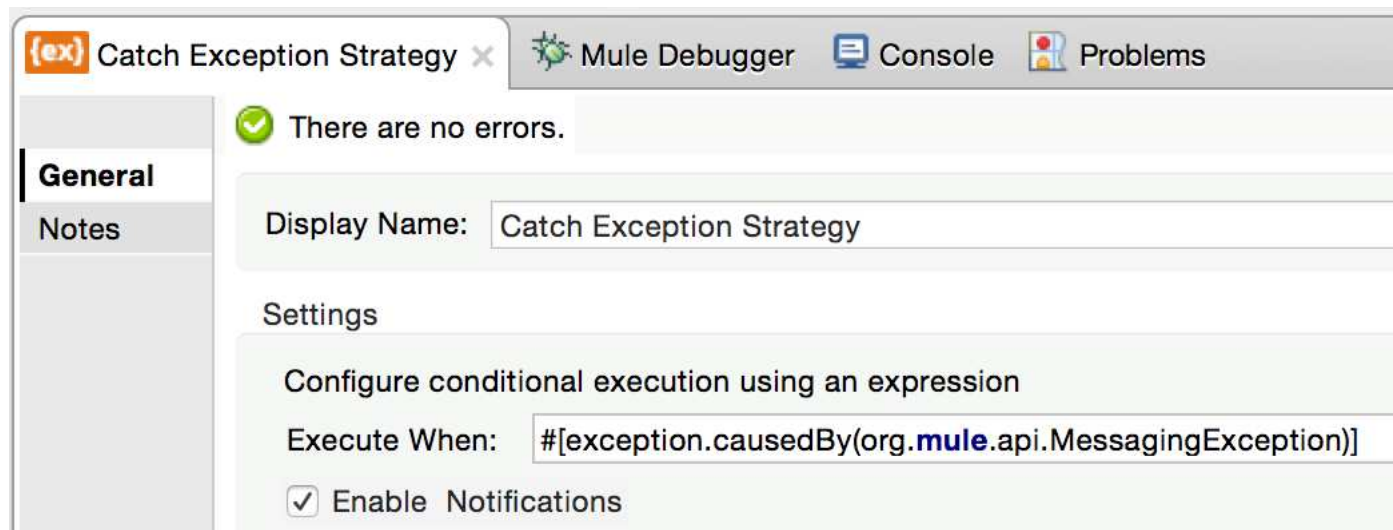
The Choice Exception Strategy

- The choice exception strategy must contain two or more catch and/or rollback strategies
- The individual catch and/or rollback strategies specify a condition for when they should be evaluated
- The choice strategy routes the message to the *first* exception strategy whose condition evaluates to true
- If none of its exception strategies can handle the error, the message is routed to Mule's default exception strategy



Setting exception strategy conditions

- Can reference the message or the exception
 - `exception.causedBy(org.mule.example.ExceptionType)`
 - `exception.causedExactlyBy(org.mule.example.ExceptionType)`
 - `exception.causeMatches('org.mule.example.*')`



Return status codes

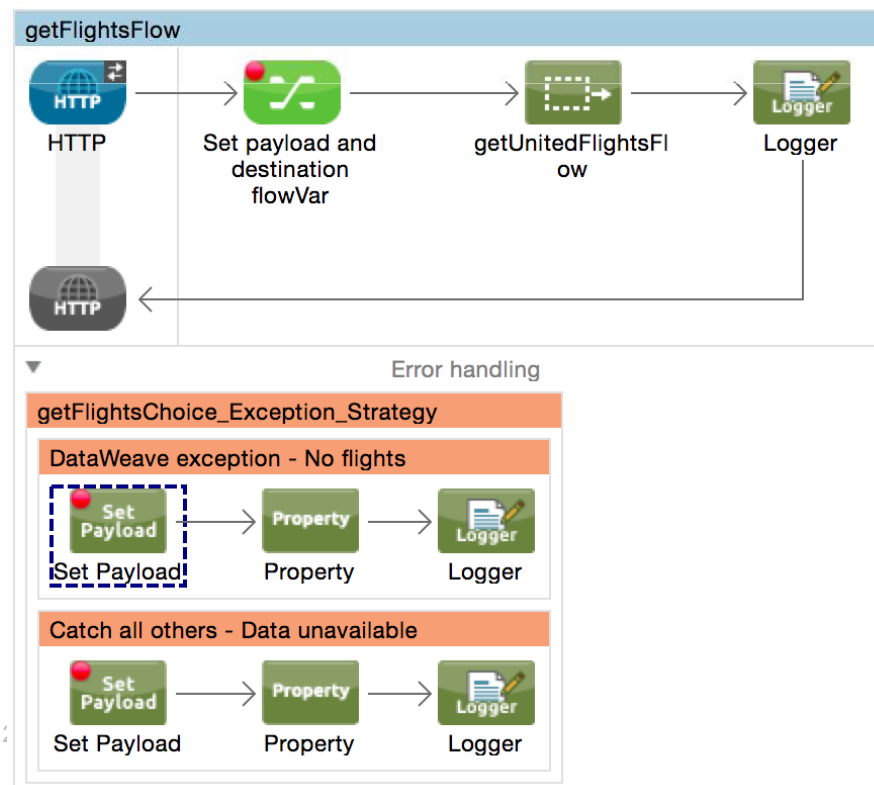
- By default, when a message is handled, an http status code of 200 is set and returned
- You can change this by setting outbound property
 - `message.outboundProperties. 'http.status'`
- You can also use the Mapping Exception Strategy

Bubbling exceptions

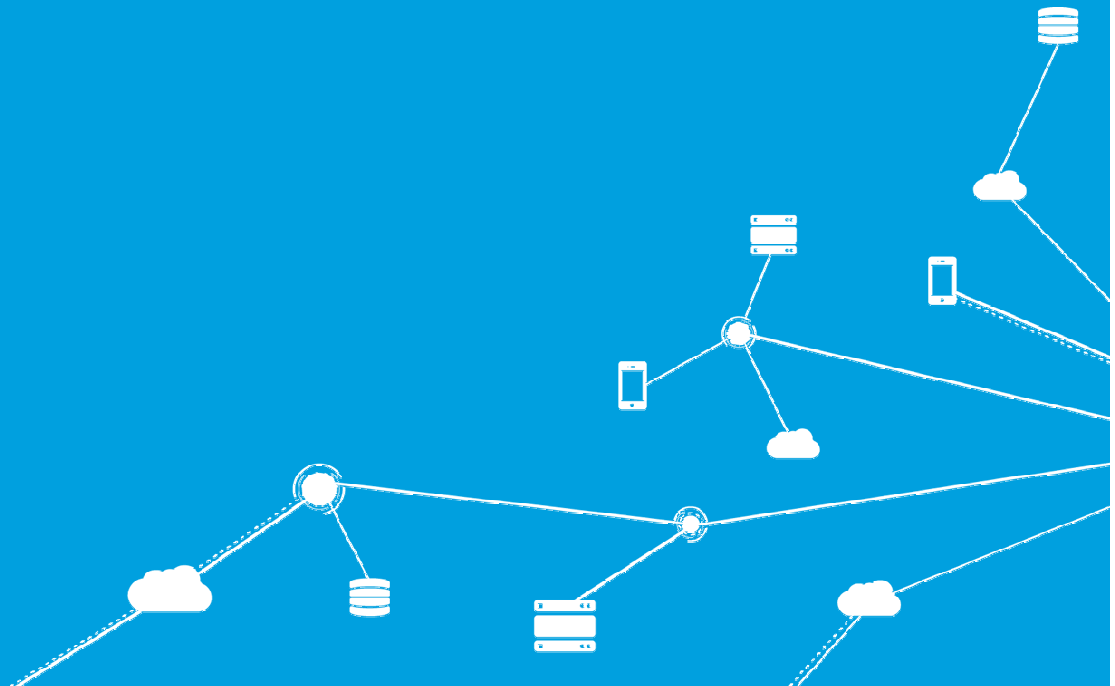
- All flows can have their own exception strategies
- If a flow does not have an exception strategy, the strategy of the calling flow is used

Walkthrough 7-2: Handle a messaging exception

- In this walkthrough, you will:
 - Add and configure a Choice Exception Strategy
 - Set HTTP status codes in the exception handler
 - Let an exception bubble up and be handled by the calling flow

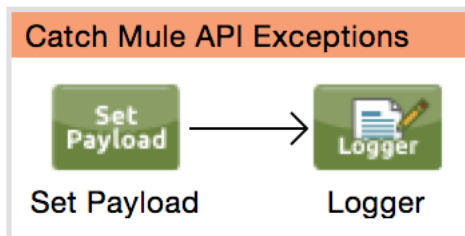


Defining global exception strategies



Defining global exception strategies

- You can reuse exception handling strategies by defining them outside a flow
 - You can drag them out and drop them outside any flow
 - Typically, put them in your global configuration file

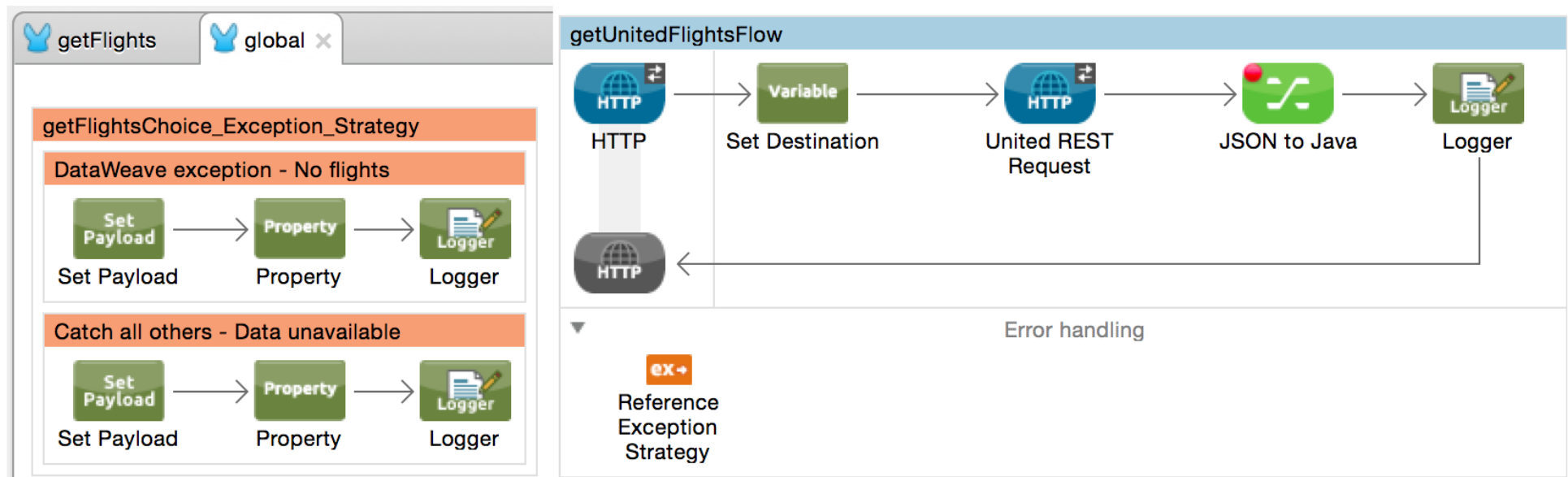


- Reference global exception handlers using the Reference Exception Strategy

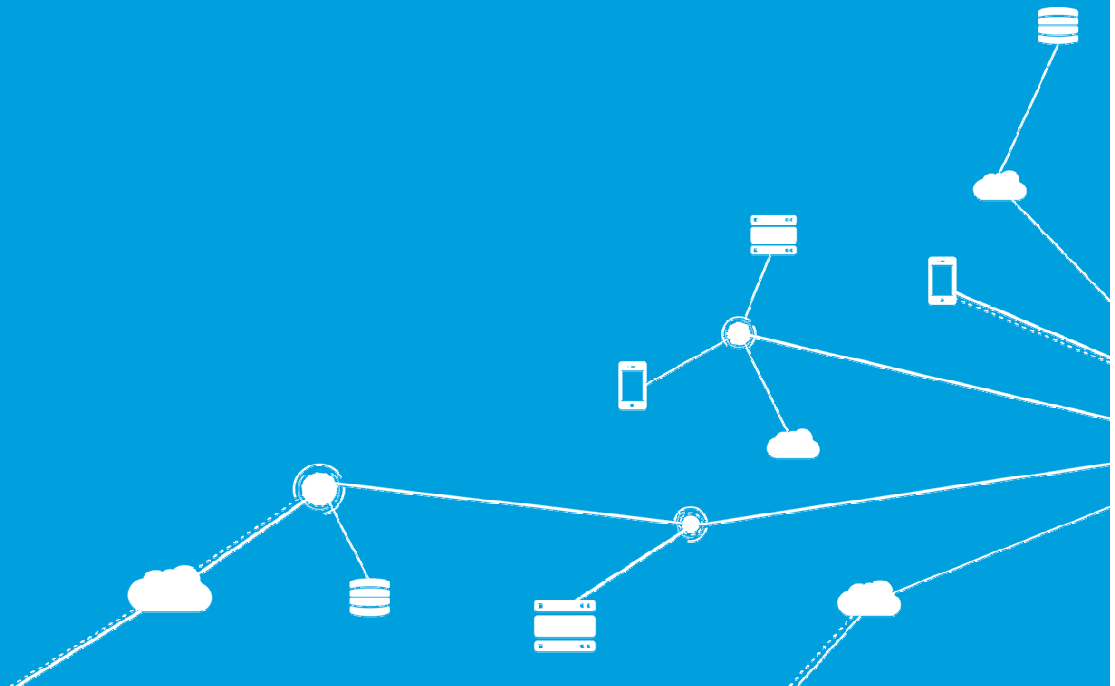


Walkthrough 7-3: Create and use global exception handlers

- In this walkthrough, you will:
 - Create a global exception handler
 - Reference and use the global exception handler in flows



Defining a default exception strategy



The default exception strategy

- Recall there is a default exception strategy
 - Implicitly handles all unhandled messaging exceptions
 - Simply logs the exception
 - Cannot be configured
- Can be replaced with your own global default exception strategy
 - Create a global configuration element
 - Specify a default exception strategy in the global configuration element



Walkthrough 7-4: Specify a global default exception strategy

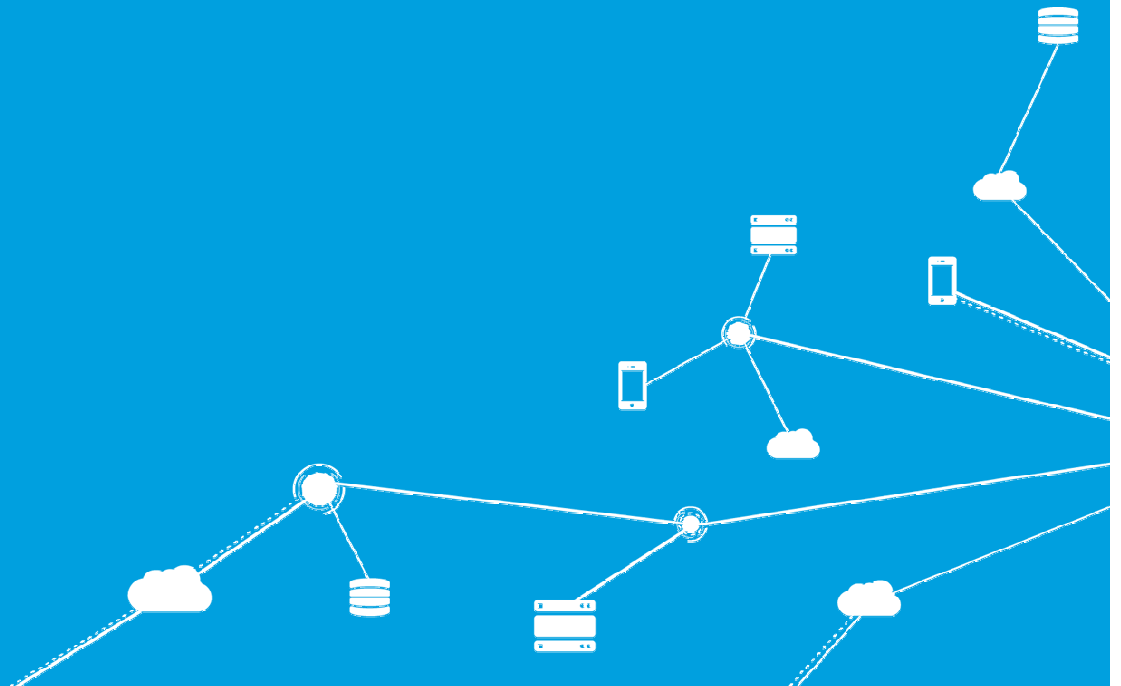
- In this walkthrough, you will:
 - Create a global configuration element in the global.xml file
 - Specify a default exception strategy in the global configuration element
 - Remove the existing exception handling strategies
 - Use the default exception handling strategy

The screenshot displays the Mule IDE interface. On the left, the 'Global Element Properties' dialog is open, showing the 'Configuration' tab. It includes a description: 'Use this element to specify defaults and general settings for the Mule instance.' Below this are two tabs: 'General' and 'Notes'. The 'General' tab contains settings for 'Settings' (including 'Use Transport For URIs', 'Default Exception Strategy' set to 'getFlightsChoice_Exception_Strategy', and 'HA Profile' set to '-- Empty --') and 'Default Processing Strategy' (including 'Default Processing Strategy' and 'Default Processing Strategy Ref', both set to '-- Empty --').

On the right, the 'Global Mule Configuration Elements' list is visible. It shows a table of configuration elements with their types and names.

| Type | Name |
|----------------------------------|-----------------------------------|
| HTTP Listener Configuration | HTTP_Listener_Configuration |
| HTTP Request Configuration | United_HTTP_Request_Configuration |
| HTTP Request Configuration | Bank_REST_Request_Configuration |
| Web Service Consumer | Delta_Web_Service_Consumer |
| MySQL Configuration | Training_MySQL_Configuration |
| Salesforce: Basic authentication | Salesforce |
| Configuration | Configuration |

Summary



Summary

- In this module, you learned to handle errors
- An application may have system or message exceptions
- System exceptions are thrown at the system level and involve no message
 - Occur during application start-up or when a connection to an external system fails
 - Non-configurable, but logs the exception and for connections, executes any connector reconnection strategy
- Message exceptions are thrown within a flow whenever a message is involved

Summary

- If there is no exception strategy defined, the default exception strategy is used
 - Stops execution of the flow and logs the exception
 - Cannot be configured but can be replaced with your own global default exception strategy
- If there is an exception strategy, normal flow execution stops and the message is passed to the exception strategy
 - Catch strategy catches exceptions based on conditions
 - Choice strategy selects one of multiple catch and/or rollback strategies based on conditions

Summary

- All flows can have their own exception strategies
 - If a flow does not have an exception strategy, the strategy of the calling flow is used
 - Subflows cannot have their own exception strategies
- Create global exception strategies by defining them outside a flow (typically in global.xml)
- Reference global exception handlers using the Reference Exception Strategy
- Set a default global exception strategy by creating a global configuration element and setting its default exception strategy to a global exception strategy