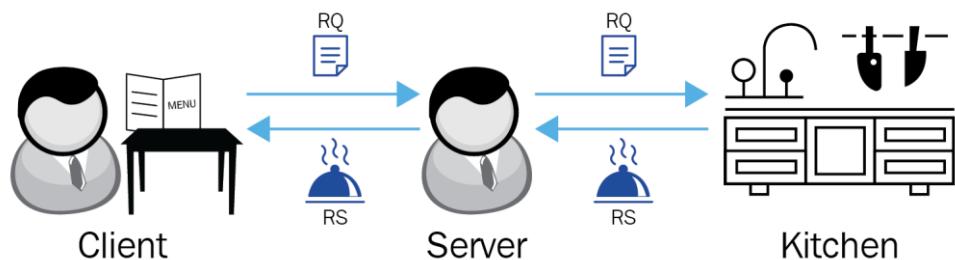
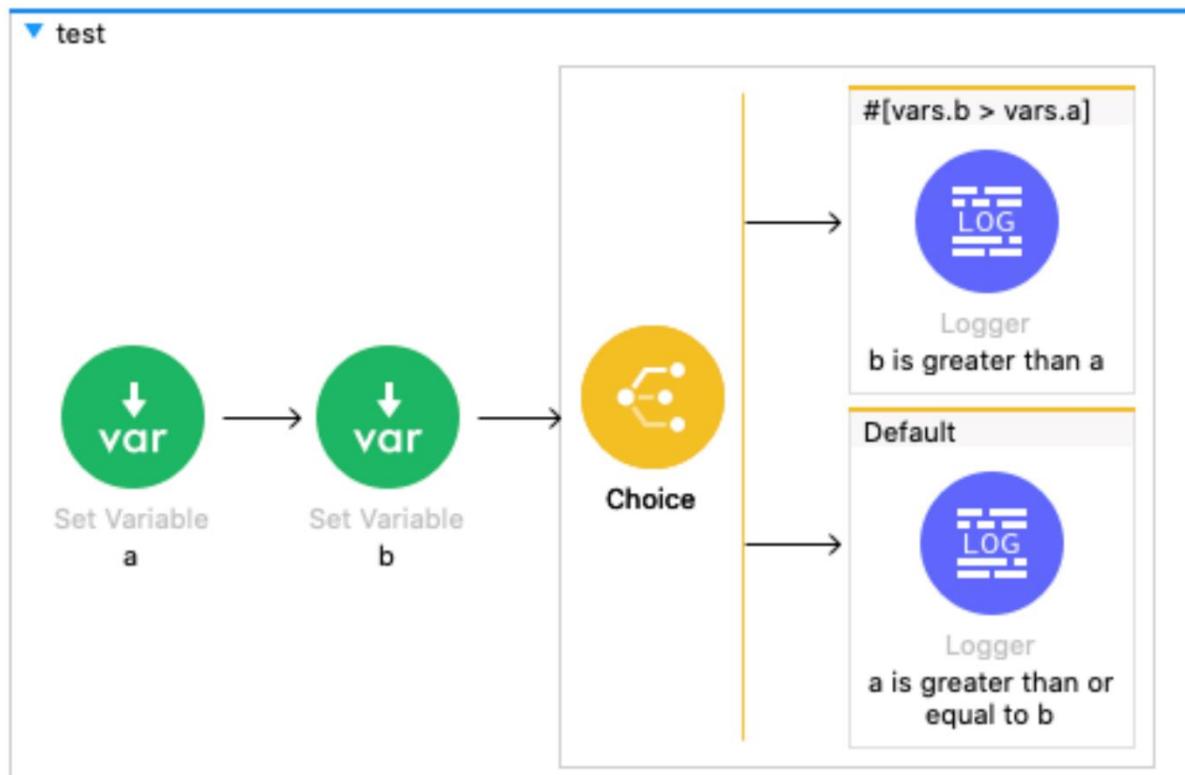
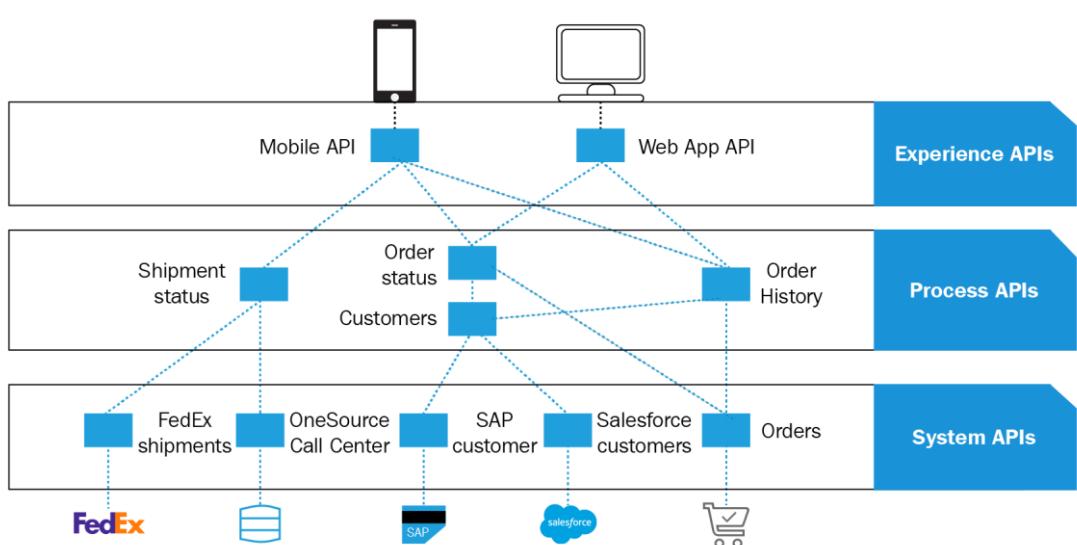
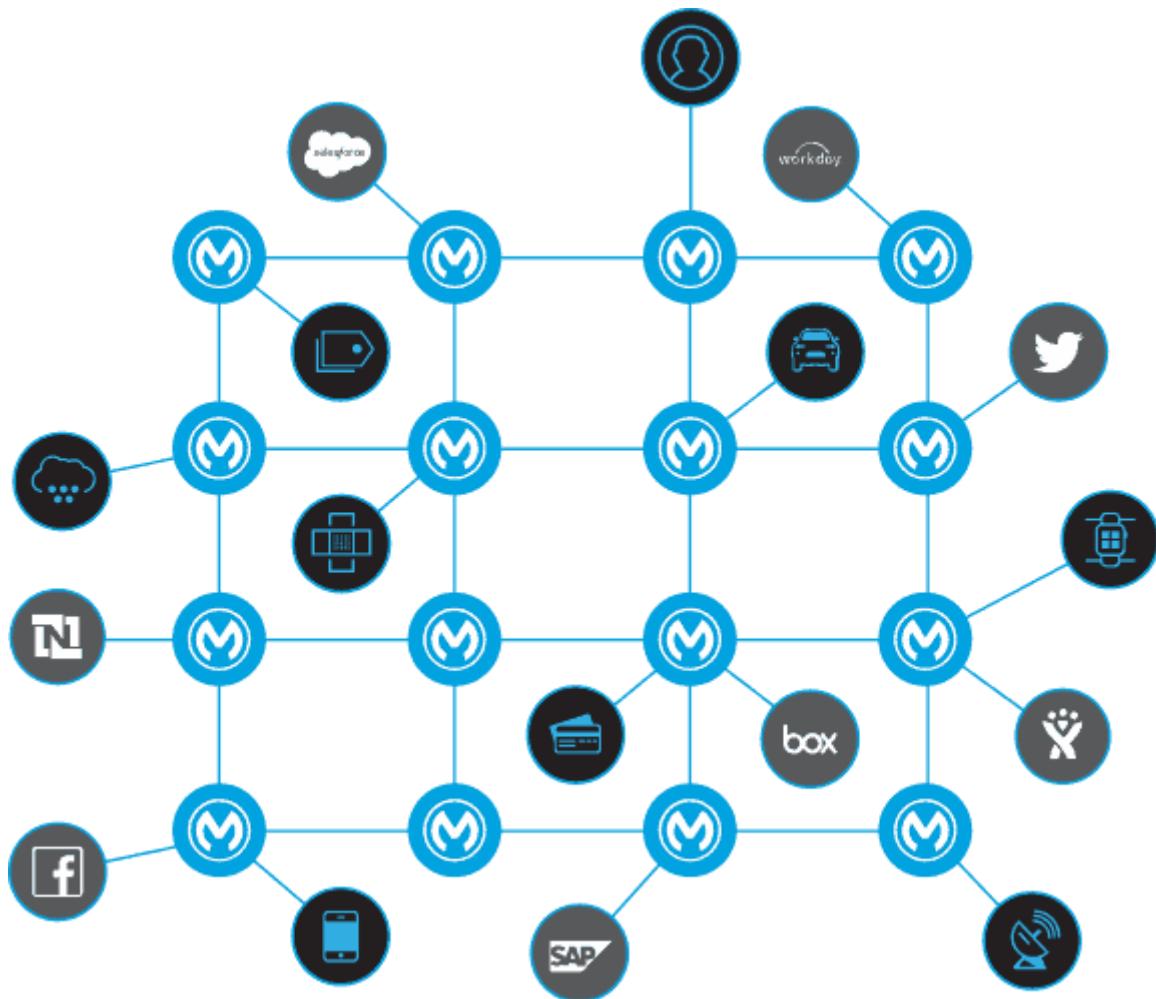


# Chapter 1: Introduction to MuleSoft

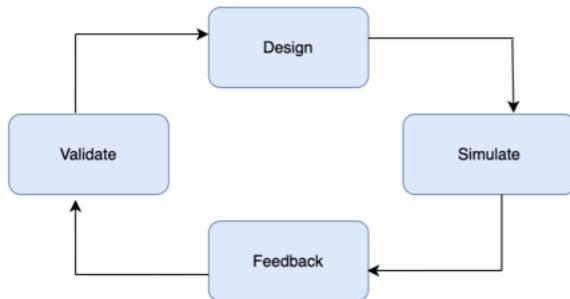


The screenshot shows the Twitter API Getting Started page. The left sidebar is dark-themed and includes sections for Fundamentals, Tools and libraries, Tutorials, API reference index, Twitter API (with sub-sections like Getting started, About the Twitter API, Getting access, Make your first request, Important resources, Tools and libraries, What to build, Migrate, Twitter API v2, Enterprise - Gnip 2.0, Premium v1.1, Standard v1.1), Twitter Ads API, and Twitter for Websites. The main content area has a light background. It features a large heading "Getting started" and a sub-section "About the Twitter API". Below this are several paragraphs of text explaining the API's purpose and history, along with links for "Access levels and versions", "What's new with v2", and "Twitter API resources".

This screenshot is identical to the one above, except the sidebar is light-colored instead of dark. The layout and content, including the "Getting started" section and the "About the Twitter API" sub-section, remain the same.



## Chapter 2: Design your API



The screenshot shows the Postman interface with the following highlighted elements:

- Method:** GET (1)
- URL:** http://mulesoft-demo123.us-e2.cloudhub.io/api/displaySongs (1)
- Send button:** Send (2)
- Headers tab:** Headers (6) (3)
- Body tab:** Body (4)
- Body content:** A JSON response containing song titles (5):

```
1: "Hey Brother. Avicii",
2: "See You Again (feat. Charlie Puth) Wiz Khalifa",
3: "Wake Me Up. Avicii",
4: "Shivers. Ed Sheeran."
```
- Status bar:** Status: 200 OK Time: 3.14 s Size: 312 B (6)

anypoint.mulesoft.com

Anypoint Platform

 MuleSoft

Sign up for Anypoint Platform

Full name

Email

Phone number

Company

Username

Password

I'm not a robot   
reCAPTCHA  
Privacy - Terms

I agree to MuleSoft's [terms of service](#) and [privacy policy](#).

Accept and create account

Already have an account? [Sign in](#)

Thousands of enterprises use Anypoint Platform to connect their apps, data, and devices

The screenshot shows the Anypoint Platform interface with the following sections:

- Design Center**: The active section, indicated by a red box around its icon in the sidebar.
- DataGraph**
- Management Center**
- Access Management**
- API Manager**
- Runtime Manager**
- Visualizer**
- Monitoring**
- Secrets Manager**

**Design Center** details:

- Get started creating Mule applications and APIs.
- Create visual flows, and build, test, and reuse API specifications and fragments.
- [Start designing](#)

**DataGraph** details:

- Unify many APIs into a single graph of data, and consume exactly the data you need in a single request.
- [Unify & consume](#)

**Management Center** details:

- Access Management**: Manage users, business groups, and audit logs.
- API Manager**: Manage clients, policies, SLAs, traffic, and alerts.
- Runtime Manager**: Deploy, manage & monitor deployed applications.
- Visualizer**: Visualize your Application Network.
- Monitoring**: Monitor, search, alert & troubleshoot.

**Exchange** details:

- Discover and share reusable APIs, connectors, and templates.
- [Discover & share](#)

The screenshot shows the Design Center interface with the following elements:

## Design Center

### Projects

Name	Project Type	Last Update	Created
------	--------------	-------------	---------

A modal window titled "New Project from scratch" is open, listing project creation options:

- New API Spec** (highlighted with a red box):  
Define how the API will behave and how it communicates with other systems & APIs
- New Fragment**: Compose snippets that can easily be reused across multiple APIs
- New Mule App**: Design a Mule integration flow
- New AsyncAPI**: Design an AsyncAPI
- New Project from existing source**
- Import from File**: Create an API spec, fragment, or Mule app from a file on your computer

## New API Spec

API Title

musicbox-sys-api

How do you want to draft the API Spec?

I'm comfortable designing it on my own

A complete code editing experience with interactive documentation

Specification Language

RAML 1.0

Guide me through it

Use a visual interface scaffolding the API Specification (can generate both RAML & OAS)

Cancel

Create API Spec

The screenshot shows the 'Design Center' interface. On the left, there's a 'Files' panel (5) with a '+' button (7) for creating new files. A file named 'exchange.json' is listed. In the center, a code editor shows the beginning of a RAML 1.0 specification (1):

```
1 #%RAML 1.0
2 title: musicbox-sys-api
```

On the right, a 'Documentation' tab (4) is selected, showing the API title 'musicbox-sys-api' (8). Below the tabs, a toolbar includes 'Publish' (MD icon) (9), 'Project Errors' (3), and a 'RAML API specification' link.

The screenshot shows the 'Documentation' tab (4) selected in the 'Design Center'. The API title 'musicbox-sys-api' (8) is displayed. A context menu (9) is open over the project settings icon, listing options: Project settings, Import, Import from Exchange, Download Project, Rename, Duplicate..., and Delete... The 'Project settings' option is highlighted.

Saved a few seconds ago

musicbox-sys-api/master

Files

exchange.json

\* musicbox-sys-api.raml Root file

```

1 #!/RAML 1.0
2 title: musicbox-sys-api
3 description: Musicbox aims to provide high quality music streaming service. All the endpoints connecting backend services are present in this system API.
4
5
6 /songs:
7
8
9

```

Methods	Docs	Types and Traits	Security	Parameters
delete	description	is	securedBy	
get	displayName	type		
head				
options				
patch				
post				
put				

Documentation

API title: musicbox-sys-api

Musicbox aims to provide high quality music streaming service. All the endpoint connecting backend services are present in this system API.

API endpoints

/songs

Design Center

Saved a few seconds ago

musicbox-sys-api/master

Files

exchange.json

\* musicbox-sys-api.raml Root file

```

1 #!/RAML 1.0
2 title: musicbox-sys-api
3 description: Musicbox aims to provide high quality music streaming service. All the endpoints connecting backend services are present in this system API.
4
5
6 /songs:
7   get:
8     description: To get all the songs based in the music-box
9     displayName: Get all songs
10    responses:
11      200:
12        body:
13          application/json:
14            example:
15              [
16                {
17                  "1": "Hey Brother. Avicii",
18                  "2": "See You Again (feat. Charlie Puth) Wiz Khalifa",
19                  "3": "Wake Me Up. Avicii",
20                  "4": "Shivers. Ed Sheeran."
21              }
22

```

Documentation

Get All Songs

Try It

GET https://anypoint.mulesoft.com/mockin/g/api/v1/sources/vcs/projects/09e7c0e3-f585-42e4-9e4c-49853f7f270d/maste/r/m/songs

To get all the songs based in the music-box

Code examples

Show ▾

Responses

200

Body

Hide ▾

Media type: application/json

Any instance of data is allowed.

The API file specifies body for this request but it does not specify the data model.

Example

Project Errors

The screenshot shows the Design Center interface with the following components:

- Header:** "Design Center" with a "Logout" button.
- Left Sidebar:** "Files" section containing "exchange.json" and "musicbox-sys-api.raml".
- Middle Content:** A code editor displaying the "musicbox-sys-api.raml" file. The file defines two endpoints:
  - /songs:** An "get" endpoint with a response example showing four song titles: "Hey Brother. Avicii", "See You Again (feat. Charlie Puth) Wiz Khalifa", "Wake Me Up. Avicii", and "Shivers. Ed Sheeran."
  - /({artistName}:** A "post" endpoint with a response example showing a song entry: "songName": "Shivers", "releasedate": "10-09-2021", "albumName": "", and "genre": "Dance-pop".
- Right Sidebar:** "Documentation" panel with sections like "Summary", "Endpoints", and "Overview". The "Endpoints" section lists "/songs" and "/{artistName}" with their descriptions. The "/{artistName}" entry has a "POST" button highlighted with a red box, labeled "Post a new song".

Saved a few seconds ago

musicbox-sys-api/master

The screenshot shows a code editor interface with a sidebar containing icons for files, new file, new folder, and exchange.json. The main area displays a RAML 1.0 file named musicbox-sys-api.raml. The file content describes a service named 'musicbox-sys-api' with a brief description: 'Musicbox aims to provide high quality music streaming service. All the endpoints connecting services are present in this system API.' It defines a '/songs' resource with a 'get' method. The 'get' method has a description: 'To get all the songs based in the music-box', a display name: 'Get all songs', and a response object for status code 200, which includes an application/json example.

```
1  #%RAML 1.0
2  title: musicbox-sys-api
   description: Musicbox aims to provide high quality music streaming service. All the endpoints connecting services are present in this system API.
3
4  /songs:
5    get:
6      description: To get all the songs based in the music-box
7      displayName: Get all songs
8      responses:
9        200:
10          body:
11            application/json:
12              example:
13
14
15
16
17
18
```

The screenshot shows the Raml Studio interface with the 'Files' tab selected. A context menu is open over the 'examples' folder in the 'musicboxAssets' directory. The menu items are 'New file' (highlighted with a red box) and 'New folder'. Other visible items in the menu include '+', '...', and 'Empty'. The main pane displays files like 'exchange.json' and 'musicbox-sys-api.raml'.

## Add new file

RAML 1.0

Example

get-songs-example.raml

Cancel Create

Design Center

Saved a few seconds ago

# musicbox-sys-api/master

Files +

Filter

musicboxAssets

examples

get-songs-example.raml

exchange.json

musicbox-sys-api.raml Root file

```
1 #%RAML 1.0 NamedExample
2 get-songs-example:
3
```

Design Center

Saved a few seconds ago

# musicbox-sys-api/master

Files +

Filter

musicboxAssets

examples

get-songs-example.raml

exchange.json

musicbox-sys-api.raml Root file

```
1 #%RAML 1.0 NamedExample
2
3
4 {
5   "1": "Hey Brother. Avicii",
6   "2": "See You Again (feat. Charlie Puth) Wiz Khalifa",
7   "3": "Wake Me Up. Avicii",
8   "4": "Shivers. Ed Sheeran."
9 }
```

≡ Design Center

Saved 2 minutes ago

musicbox-\*

The screenshot shows the Design Center interface with a file tree on the left and a code editor on the right. A context menu is open over the line 'getSongsExample : !include' in the code editor. The menu items are: Open in new editor tab (⌘ + Click), Rename, Copy name, **Copy path** (highlighted with a red box), Duplicate, Download, and Delete... . To the right of the menu, there is a tooltip for 'Copy path' with the text: 'To get all the songs based in the music-box' and 'Get all songs'. Below the menu, there are two additional lines of code: '/songs:' and 'get:'.

```
1 #%RAML 1.0
2 title: musicbox-sys-api
3 description: Musicbox aims to provide high quality music stream
4
5 types:
6   getSongsExample : !include
7
8 /songs:
9
10 get:
```

≡ Design Center

Saved a few seconds ago

musicbox-sys-api/master

The screenshot shows the Design Center interface with a file tree on the left and a code editor on the right. A context menu is open over the line 'example: !include' in the code editor. The menu items are: Open in new editor tab (⌘ + Click), Rename, Copy name, Copy path, Duplicate, Download, and Delete... . To the right of the menu, there is a tooltip for 'Copy path' with the text: 'To get all the songs based in the music-box' and 'Get all songs'. Below the menu, there are two additional lines of code: 'body:' and 'application/json:'.

```
1 #%RAML 1.0
2 title: musicbox-sys-api
3 description: Musicbox aims to provide high quality music streaming service. All the endpoints connecting
4
5
6 uses:
7   getSongsExample : !include /musicboxAssets/examples/get-songs-example.raml
8
9 /songs:
10 get:
11   description: To get all the songs based in the music-box
12   displayName: Get all songs getSongsExample
13   responses:
14     200:
15       body:
16         application/json:
17           example: !include /musicboxAssets/examples/get-songs-example.raml
18
19
```

The screenshot shows the Design Center interface with the following details:

- File Structure:** On the left, there's a tree view of files under "musicboxAssets". The "requestExamples" and "responseExamples" nodes are expanded, showing their respective sub-files: "get-songs-example.raml" and "post-songs-example.raml".
- RAML File Content:** The main editor area displays the "get-songs-example.raml" file. It includes a header with "version: 1.0", "title: musicbox-sys-api", and a description stating "Musicbox aims to provide high quality music streaming service. All the endpoints connecting backend services are present in this system API." Below this, it defines a "uses" section for "getSongsExample" and provides examples for "GET /songs" and "POST /songs/{artistCode}".
- Documentation View:** On the right, the "Documentation" tab is active. It shows the "API title: musicbox-sys-api" and its description. It also lists the "API endpoints" with their methods: "/songs" (GET) and "/songs/{artistCode}" (POST).

The screenshot shows the generated API documentation page with the following content:

## Documentation

**API title: musicbox-sys-api**

**Version: v1**

Musicbox aims to provide high quality music streaming service. All the endpoints connecting backend services are present in this system API.

---

### API endpoints

/songs  
GET

/songs/{artistCode}  
POST



## Post A New Song

[Try it](#)

**POST** <https://anypoint.mulesoft.com/mocki ng/api/v1/sources/vcs/projects/09e7c0e3-f585-42e4-9e4c-49853f7f270d/master/m/songs/{artistCode}>

Post a new song based on particular playlist based on the artists' name

## Code examples

[Show ▾](#)

## URI parameters

[Hide ^](#)

## artistCode

String Required

## Body

[Hide ^](#)

Media type: application/json

Any instance of data is allowed.

The API file specifies body for this request but it does not specify the data model.



## Post A New Song

[Back to docs](#)

Request URL

`https://anypoint.mulesoft.com/mockng/api/v1/sources/vc:`

URI parameters

artistCode\*



123

Query parameters



Show optional parameters

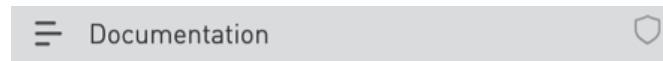
[+ Add](#)

Headers

COPY

Text editor

Add a header to the HTTP request.



## Query parameters

Show optional parameters

[⊕ Add](#)

## Headers

[COPY](#)  [Text editor](#)

Add a header to the HTTP request.

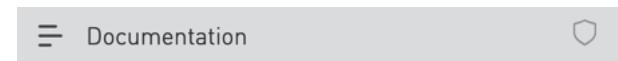
[⊕ Add](#)

## Body

[Format JSON](#) [Minify JSON](#) [Copy](#)

```
1 {  
2   "songName": "Shivers",  
3   "releaseDate": "10-09-2021",  
4   "albumName": "=",  
5   "genre": "Dance-pop"  
6 }
```

[Send](#)



Add a header to the HTTP request.

[⊕ Add](#)

## Body

[Format JSON](#) [Minify JSON](#) [Copy](#)

```
1 {  
2   "songName": "Shivers",  
3   "releaseDate": "10-09-2021",  
4   "albumName": "=",  
5   "genre": "Dance-pop"  
6 }
```

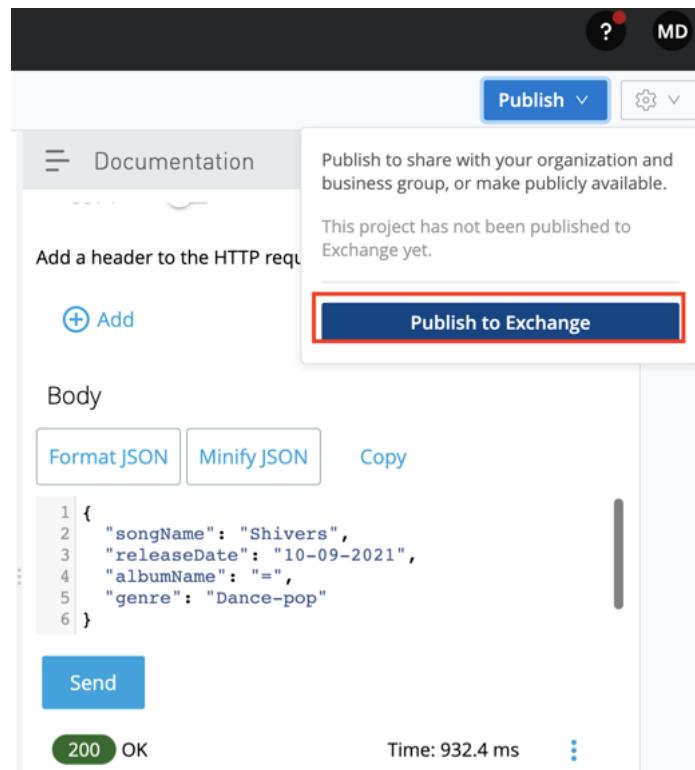
[Send](#)

200 OK

Time: 932.4 ms



```
1 [-]  
2   "Message": "Song added successfully"  
3 }
```



## musicbox-sys-api

Asset version (required)

1.0.0

Asset versioning

To publish to Exchange, you must version assets using [SemVer](#). Examples of good versions are 1.0.0 or 4.3.1.

API version (required)

v1

Specified in [root file](#)

Additional help

- [Changing a project's main/root file](#)
- [What is an API version?](#)

LifeCycle State [\(i\)](#)

Stable

Stable

State of release, ready to consume

Development

Development

In Process of Design and Development

> More options

Cancel

Publish to Exchange

## musicbox-sys-api

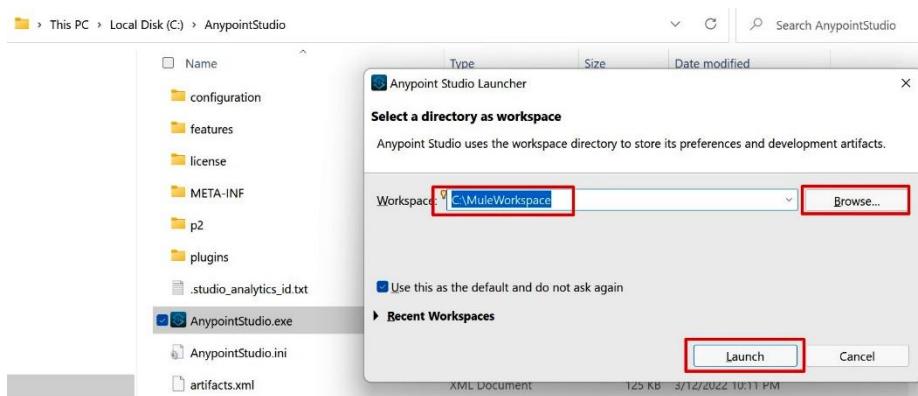
Successfully published to [Exchange](#)

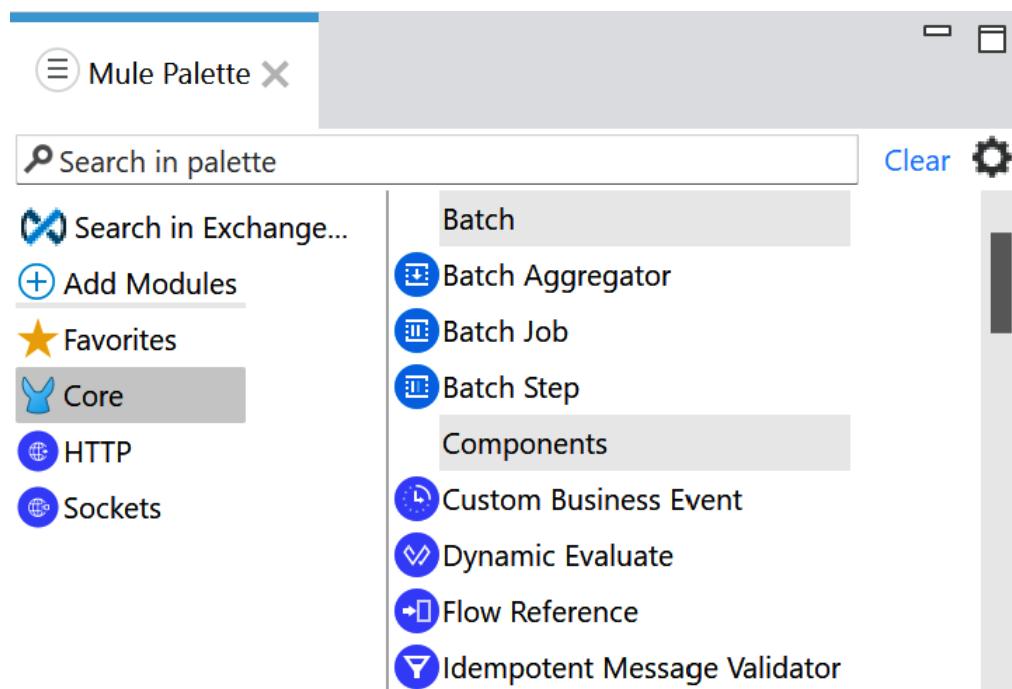
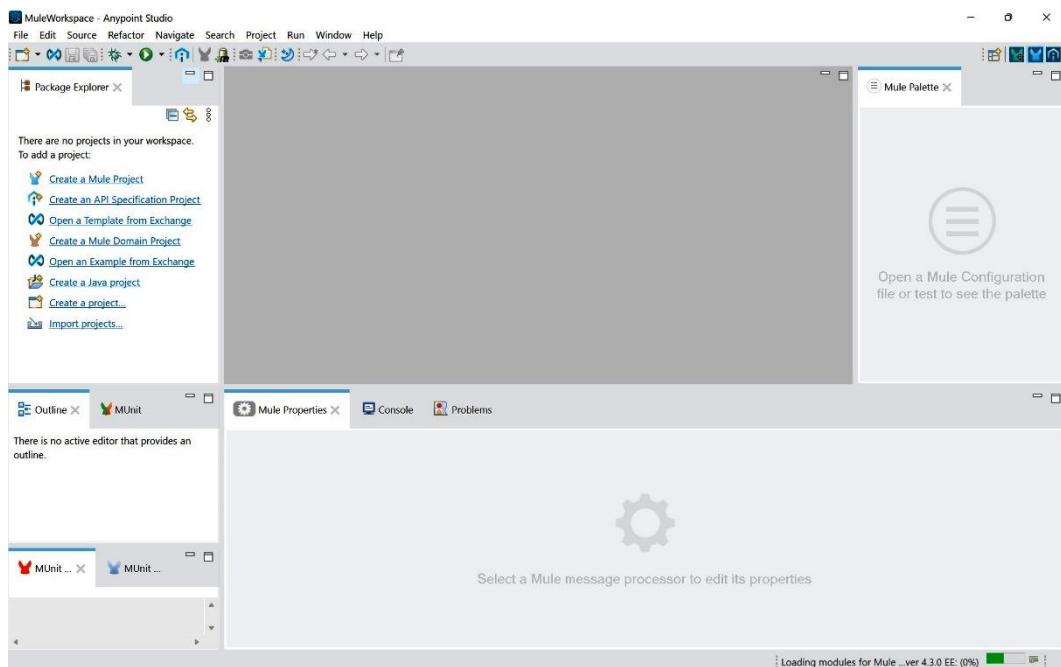
[View in Exchange](#)

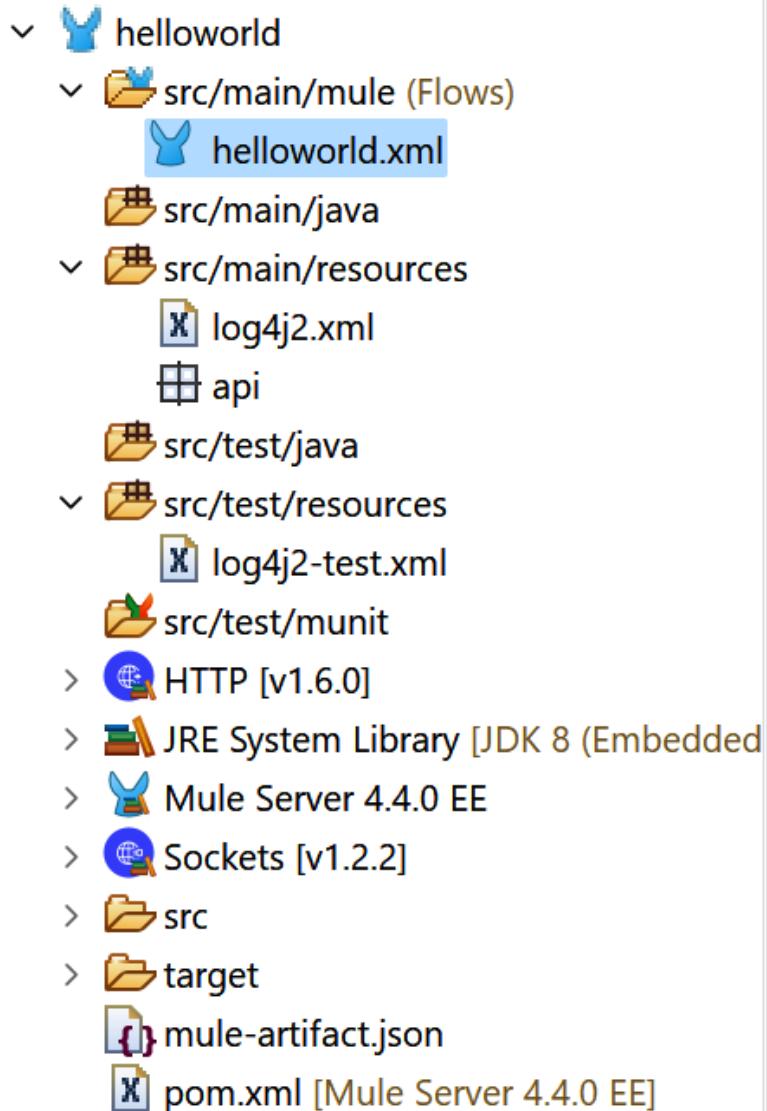
[Done](#)

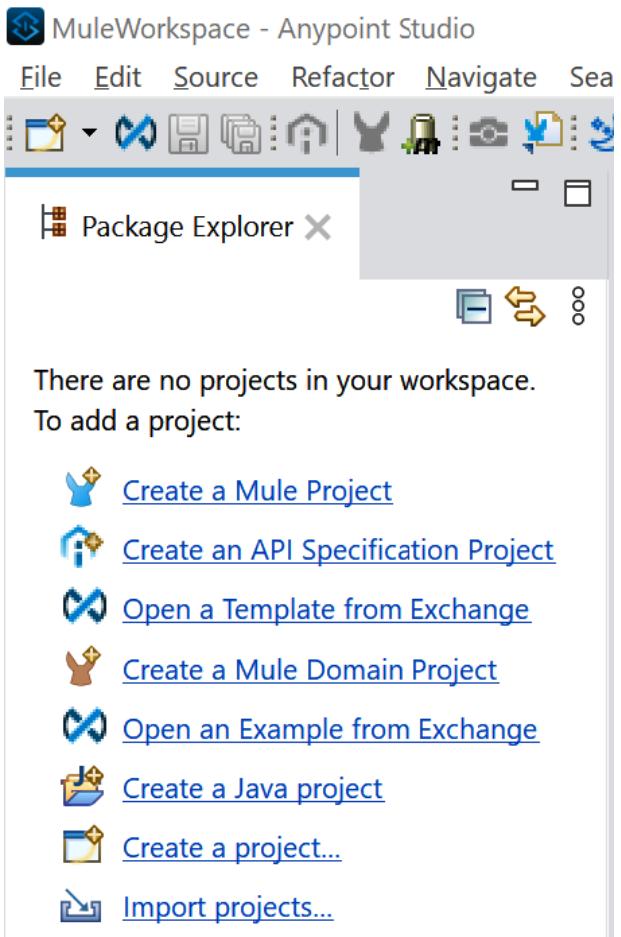
# Chapter 3: Exploring Anypoint Studio

File Explorer View of AnypointStudio Directory			
Name	Type	Size	Actions
configuration	File folder		...
features	File folder		...
license	File folder		...
META-INF	File folder		...
p2	File folder		...
plugins	File folder		...
.studio_analytics_id.txt	Text Document	1 KB	...
AnypointStudio.exe	Application	417 KB	...
AnypointStudio.ini	Configuration settings	2 KB	...
artifacts.xml	XML Document	125 KB	...









There are no projects in your workspace.

To add a project:

- [Create a Mule Project](#)
- [Create an API Specification Project](#)
- [Open a Template from Exchange](#)
- [Create a Mule Domain Project](#)
- [Open an Example from Exchange](#)
- [Create a Java project](#)
- [Create a project...](#)
- [Import projects...](#)

\*helloworld

Process

Listener

Message Flow Global Elements Configuration XML

Listener

Console Problems

General

MIME Type Redelivery Responses Advanced Metadata

2 issues found ...

Display Name: Listener

Basic Settings

Connector configuration:  Add

General

Path:

Input type filt

Mule Payload Attribu

Variables

## HTTP Listener config

Configuration element for a HttpListener.

General Notes Help

Name: **HTTP\_Listener\_config**

Connection

General TLS Advanced

Connection

Protocol: **HTTP (Default)**

Host: **All Interfaces [0.0.0.0] (default)**

Port: **8081**

Read timeout:

General

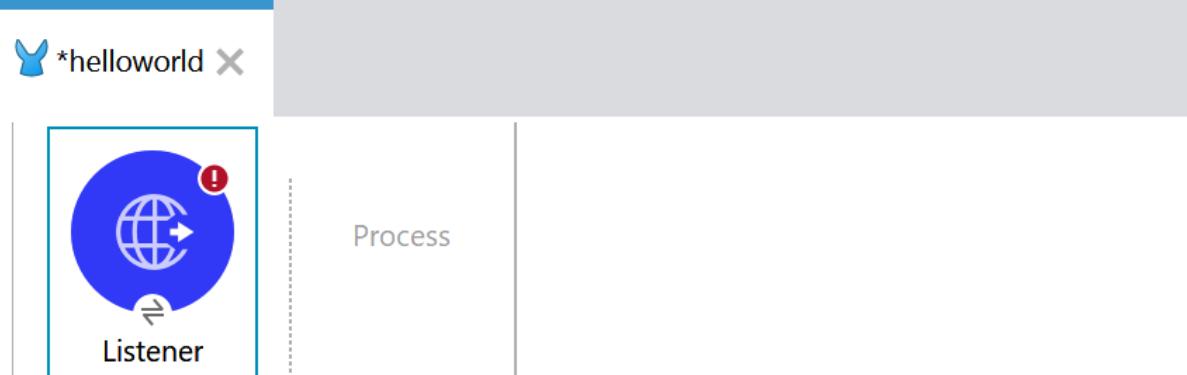
Base path:

Listener interceptors **None**

Reject invalid transfer encoding

?

Test Connection... OK



Message Flow Global Elements Configuration XML

Listener

Console Problems

General

MIME Type

Redelivery

Responses

Advanced

Metadata

There are no errors.

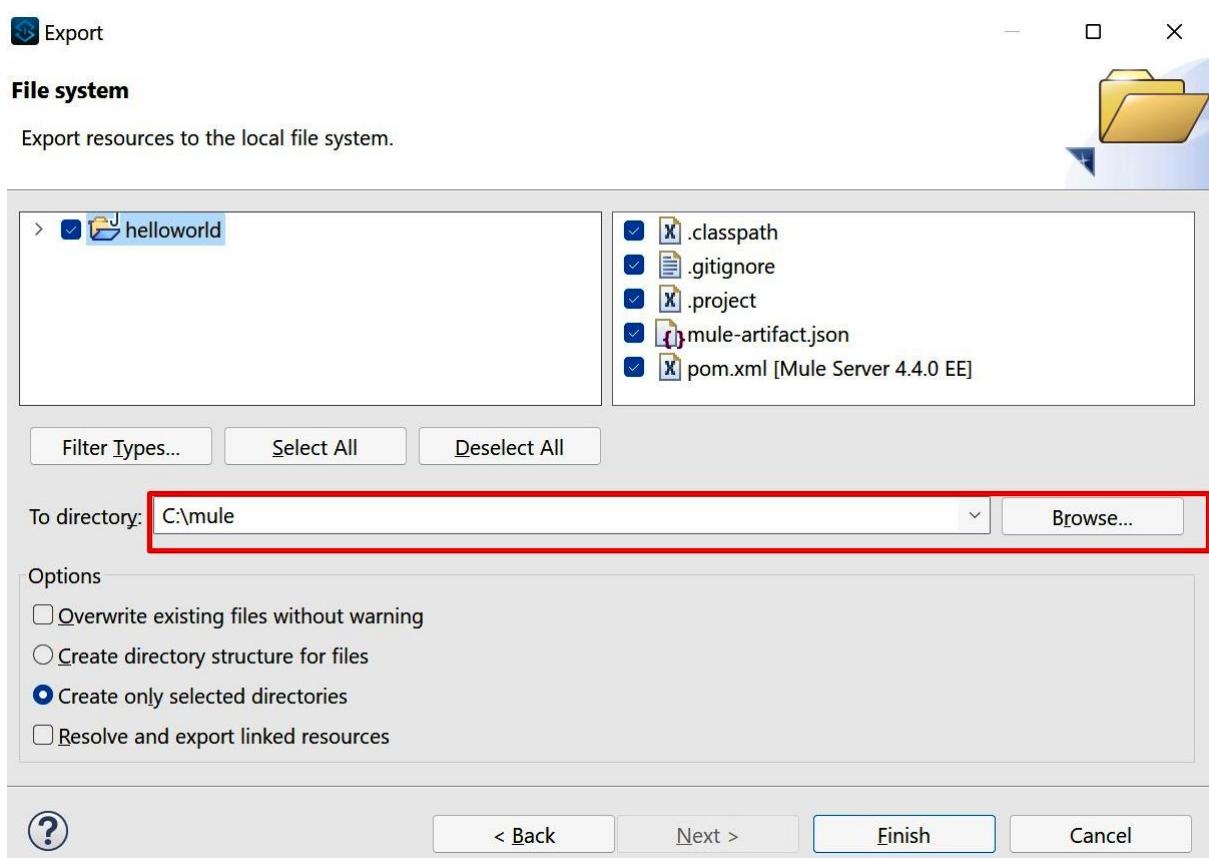
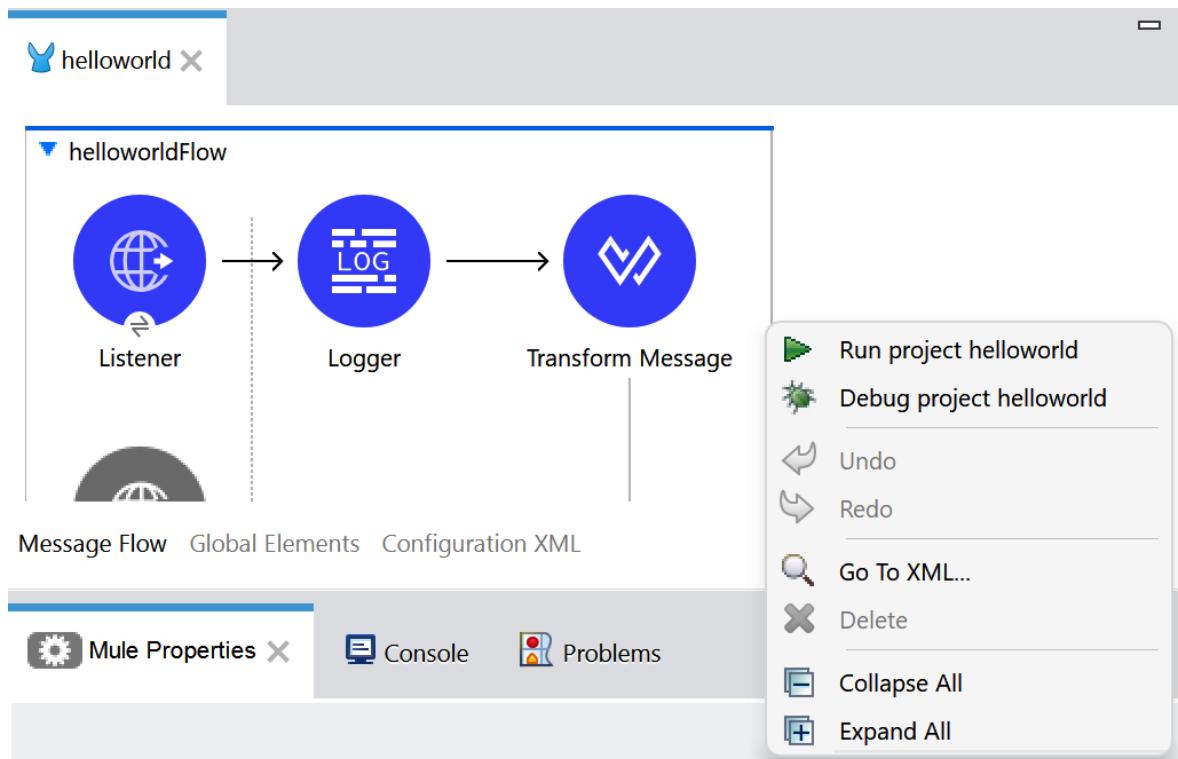
Display Name: Listener

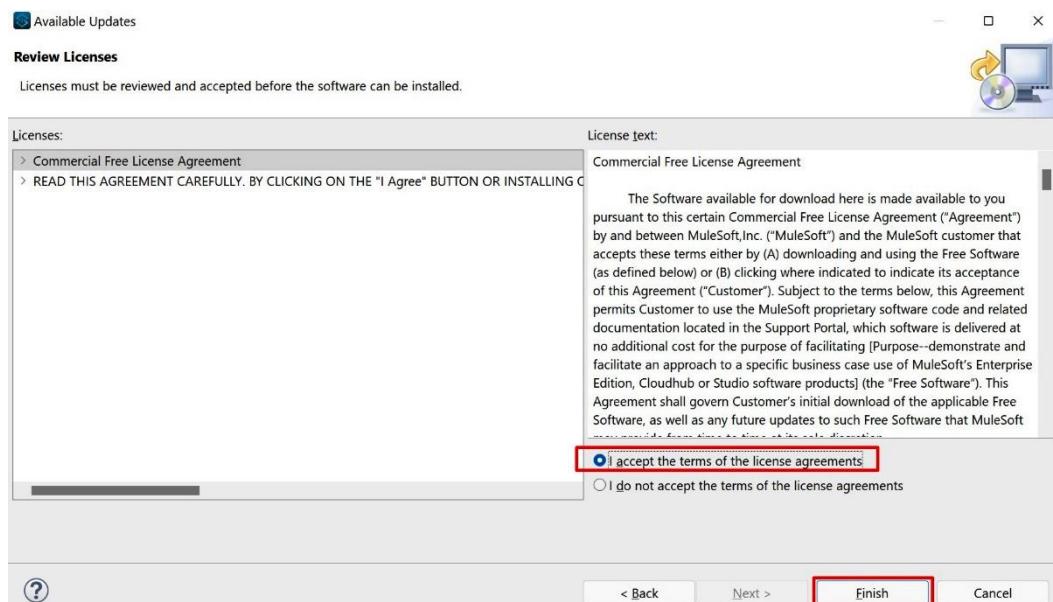
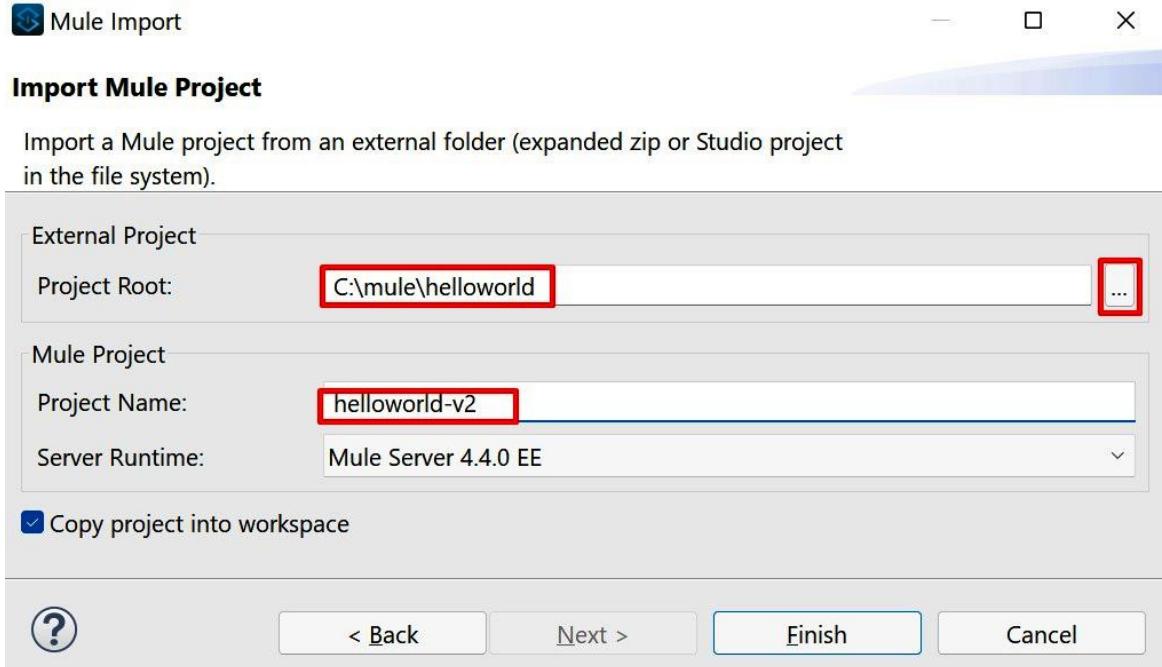
Basic Settings

Connector configuration: HTTP\_Listener\_config

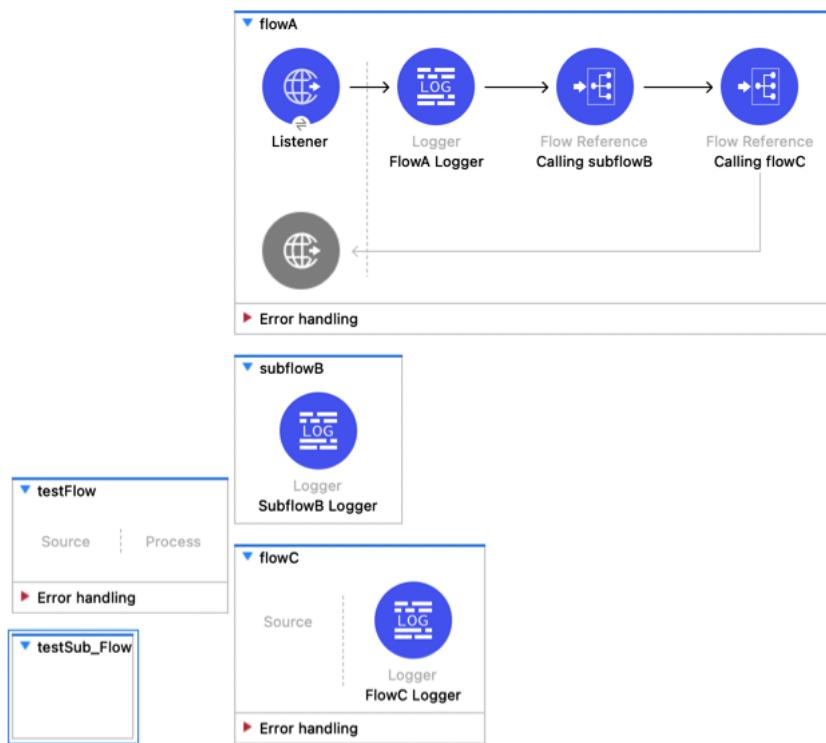
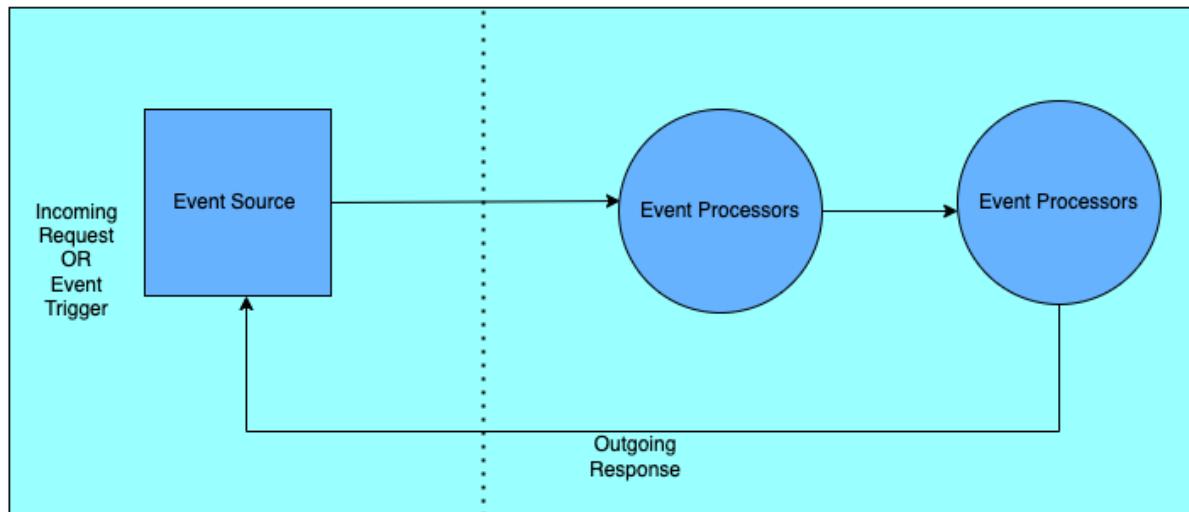
General

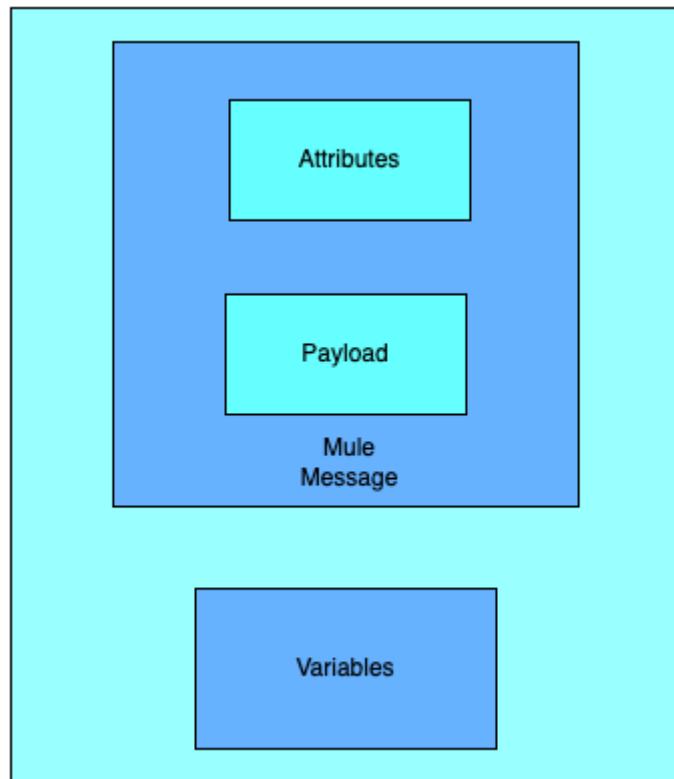
Path: /hello





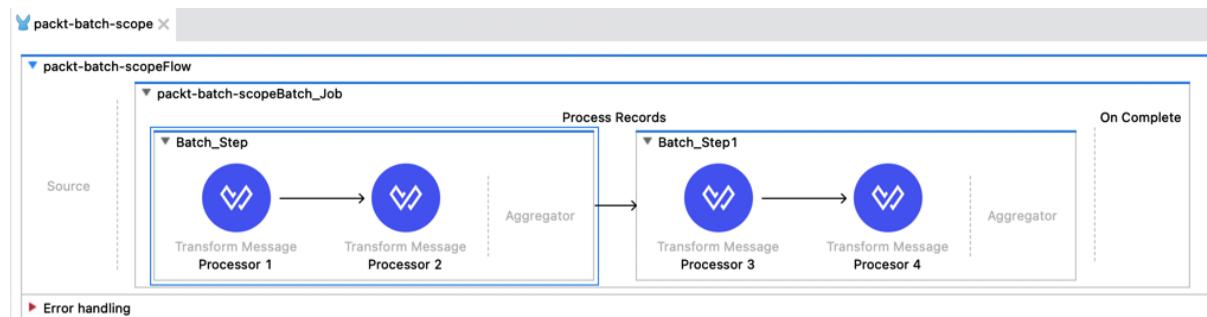
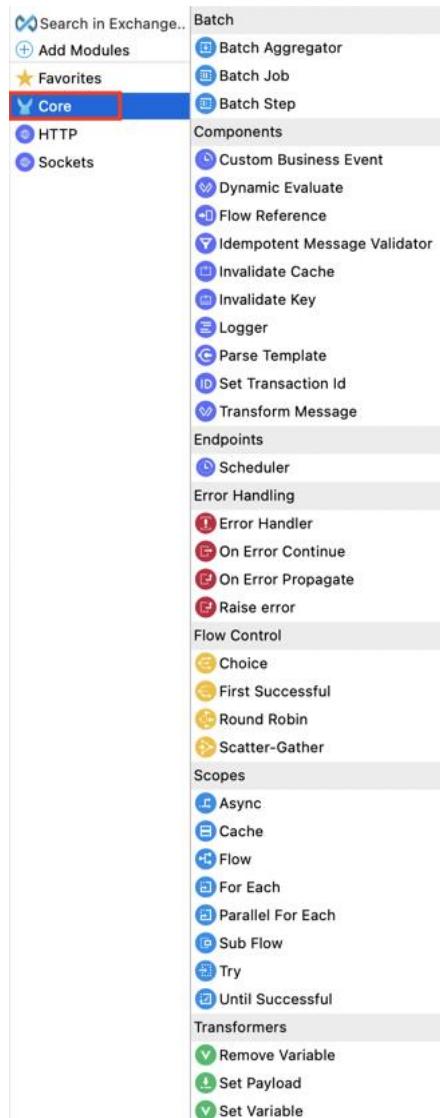
## Chapter 4: Core Components





```

✓  Logger = FlowA Logger
    @ level = "INFO"
    @ message = "Hello World"
✓  attributes = {HttpRequestAttributes} org.mule.extension.http.api.HttpRequestAttributes
    Request path=/test
    Raw request path=/test
    Method=GET
    @ DOUBLE_TAB =
    @ TAB =
    @ ^mediaType =
    @ clientCertificate = {Certificate} null
    > headers = {ImmutableCaseInsensitiveMultiMap} size = 6
    > lazyClientCertificateProvider = {DefaultCertificateProvider} org.mule.extension.http.internal.certificate.DefaultCertificateProvider@5ba06375
    @ listenerPath = "/test"
    @ localAddress = "127.0.0.1:8081"
    @ maskedRequestPath = "null"
    @ method = "GET"
    @ queryParams = {ImmutableMultiMap} size = 0
    @ queryString =
    @ rawRequestPath = "/test"
    @
    @ relativePath = "/test"
    @ remoteAddress = "127.0.0.1:64733"
    @ requestPath = "/test"
    @ requestUri = "/test"
    @ scheme = "http"
    @ serialVersionUID = 7227330842640270811
    @ serialVersionUID = -3580630130730447236
    @ serialVersionUID = -5172640902396741873
    @ uriParams = {EmptyMap} size = 0
    @ version = "HTTP/1.1"
    @ correlationId = "40288060-afaa-11ec-803e-88665a3c4d2d"
✓  payload =
    @ ^mediaType = */*; charset=UTF-8
    @ vars = {Map} size = 0
  
```



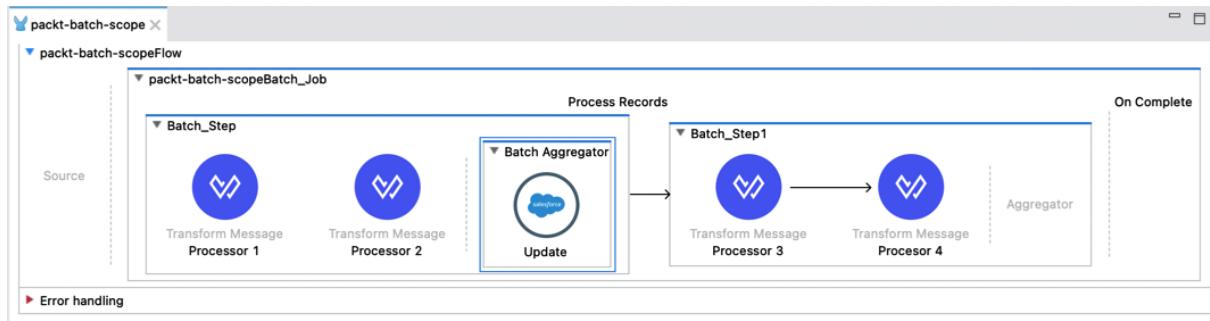
Message Flow Global Elements Configuration XML

Batch\_Step X Console Problems

General

There are no errors.

Name:	Batch_Step
Accept Expression:	
Accept Policy:	NO_FAILURES (Default)



Message Flow Global Elements Configuration XML

**Batch Aggregator**

There are no errors.

Display Name: Batch Aggregator

Aggregator Size: 20

Streaming

Preserve Mime Types

General

Metadata

Notes

Help

**packt-batch-scope**

**packt-batch-scopeFlow**

**packt-batch-scopeBatch\_Job**

```

graph LR
    subgraph Source [Source]
        direction LR
        S1[Transform Message Processor 1] --> S2[Transform Message Processor 2]
    end
    subgraph Process_Records [Process Records]
        direction LR
        S1 --> SA[Batch Aggregator  
Transform Message Processor 3]
    end
    subgraph On_Complete [On Complete]
        direction LR
        SA --> S2
    end

```

**Error handling**

Message Flow Global Elements Configuration XML

**packt-batch-scopeBatch\_Job**

There are no errors.

General

History

Metadata

Notes

Help

Name: packt-batch-scopeBatch\_Job

Max Failed Records: 0

Scheduling Strategy: ORDERED\_SEQUENTIAL (Default)

Job Instance ID:

Batch Block Size: 100

Max concurrency:

Target:

The screenshot shows two windows from Anypoint Studio.

The top window is titled "packt-custom-business-event". It displays a "Message Flow" with a single node labeled "Custom Business Event". Below the message flow, there are tabs for "Error handling", "Message Flow", "Global Elements", and "Configuration XML".

The bottom window is titled "Custom Business Event". It shows the "General" tab selected. The "Display Name" is set to "Custom Business Event". Under "Settings", the "Event Name" is set to "AccountID". In the "Key Performance Indicators" section, there is a table:

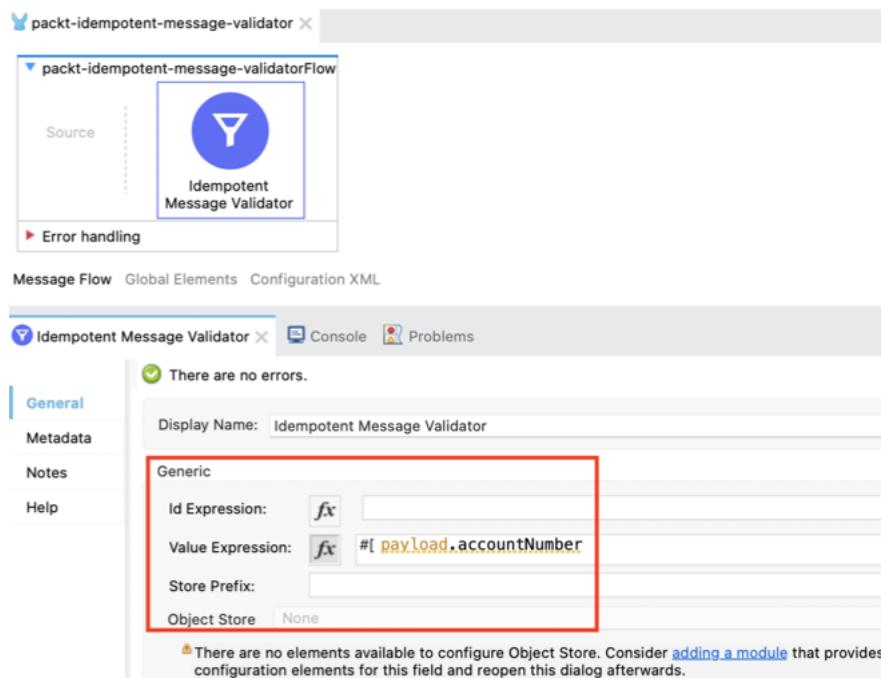
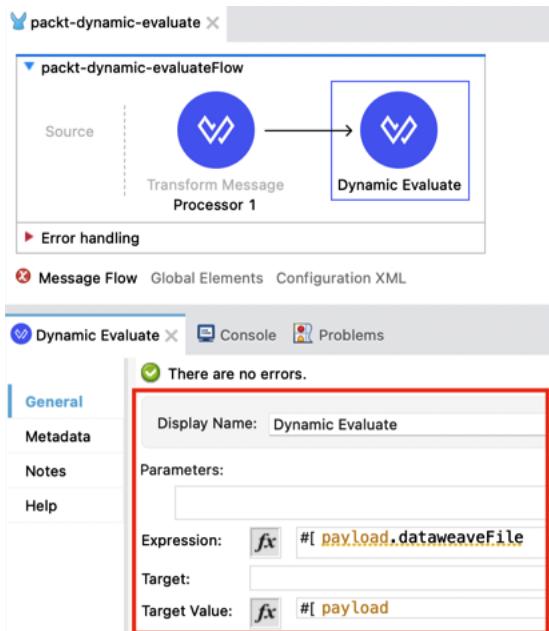
Name	Expression / Value
accountID	##[payload.account_id]

The screenshot shows the "Runtime Manager" interface.

The left sidebar has a "Sandbox" button and links for "Applications", "Dashboard", "Insight" (which is selected), "Logs", "Object Store", "Queues", "Schedules", and "Settings" (which is also selected).

The main area shows an application named "demo-helloworldapplication". It includes fields for "Application File" (set to "helloworld.jar"), "Last Updated" (2022-04-13 12:26:51AM), and "App url" ([demo-helloworldapplication.us-e2.cloudhub.io](https://demo-helloworldapplication.us-e2.cloudhub.io)).

Below these are tabs for "Runtime" (disabled), "Properties", and "Insight" (selected). The "Runtime" tab has a note: "Do not store any metadata." The "Properties" tab is empty. The "Insight" tab has a section for "Metadata" (selected) with the note: "Store message metadata of every Mule transaction." Another section for "Metadata and Replay" is also present.



packt-invalidate-cache

packt-invalidate-cacheFlow

Source      Invalidate Cache

Error handling

Message Flow Global Elements Configuration XML

Invalidate Cache Console Problems

General      There are no errors.

Metadata      Display Name: Invalidate Cache

Notes      Cache settings

Help      Caching strategy: Caching\_Strategy

The screenshot shows a message flow named 'packt-invalidate-cache' containing a single step named 'Invalidate Cache'. The 'Caching strategy' field is highlighted with a red box and contains the value 'Caching\_Strategy'.

packt-invalidate-key

packt-invalidate-keyFlow

Source      Invalidate Key

Error handling

Message Flow Global Elements Configuration XML

Invalidate Key Console Problems

General      There are no errors.

Metadata      Display Name: Invalidate Key

Notes      Cache settings

Help      Caching strategy: Caching\_Strategy  
Select a method for generating object keys when storing data in the cache  
 Default  
 Key Expression      fx #[ payload.accountId ]  
 Key Generator

The screenshot shows a message flow named 'packt-invalidate-key' containing a single step named 'Invalidate Key'. The 'Key Expression' field is highlighted with a red box and contains the value '#[ payload.accountId ]'.

The screenshot shows the Mule Studio interface with the 'Logger' component selected. The top left window displays the 'LoggerFlow' configuration, which includes a 'Source' node and a 'Logger' node. The top right window is the 'Mule Palette' with the 'Logger (Core)' component highlighted in the 'Favorites' section. Below these are the 'Message Flow', 'Global Elements', and 'Configuration XML' tabs. The main workspace shows the 'Logger' component configuration details:

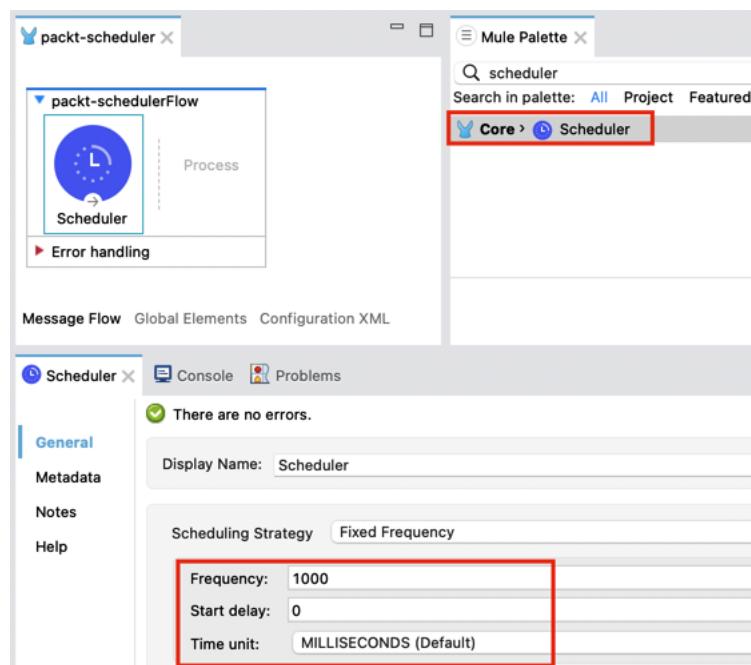
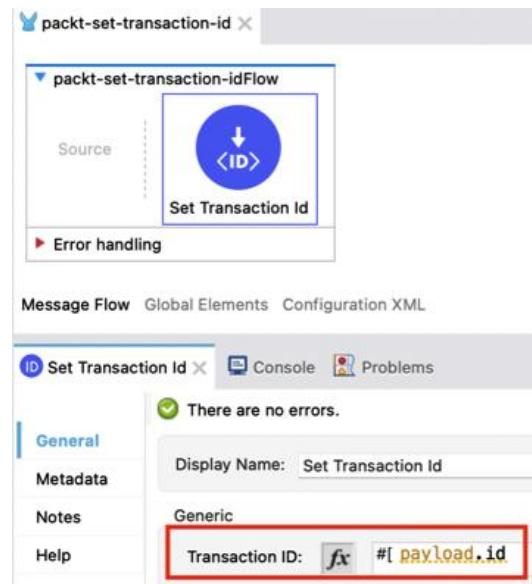
- General**:
  - Display Name:
  - Message:  (fx icon)
  - Level:
  - Category:
- Mule Message**:
  - Payload**: Undefined : Unknown
  - Attributes**: Undefined : Unknown
  - Variables

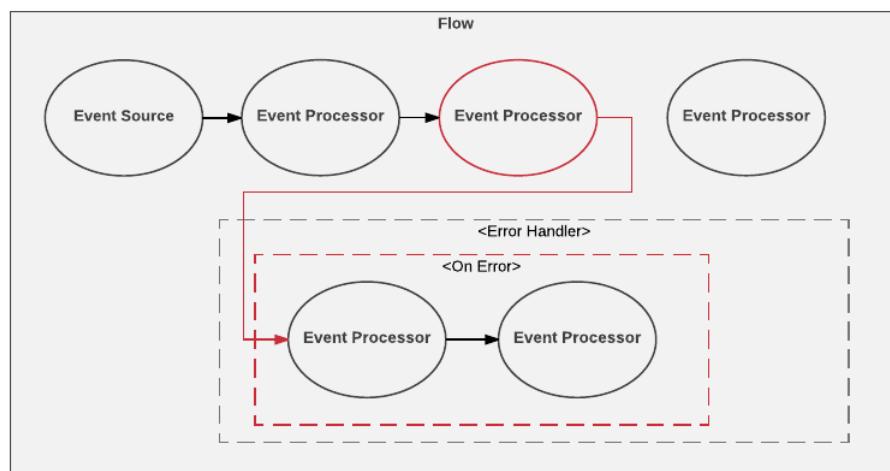
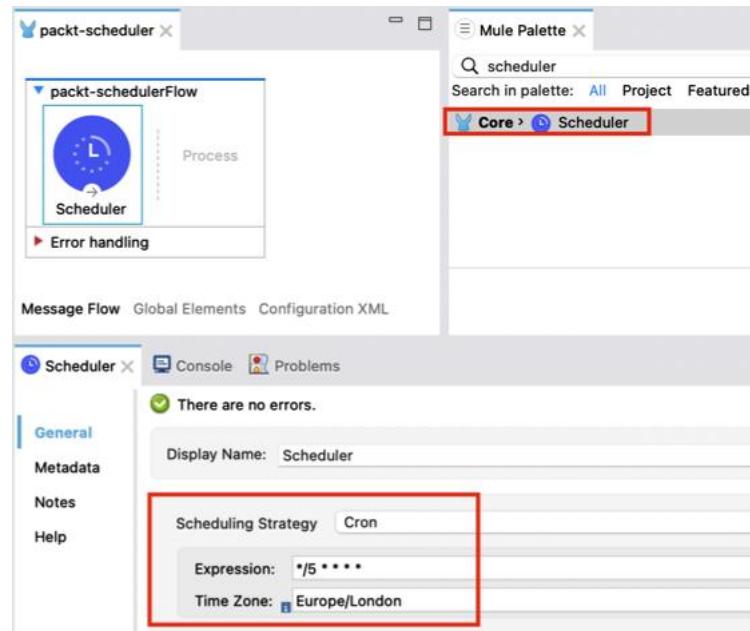
The 'Input' and 'Output' tabs are also visible at the bottom.

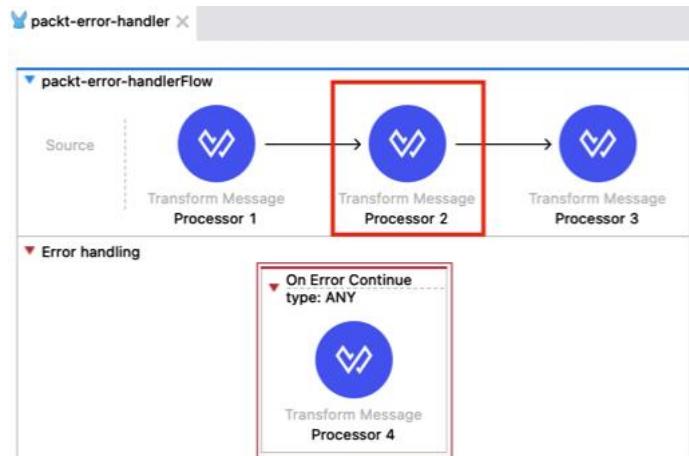
The screenshot shows the Mule Studio interface with the 'Parse Template' component selected. The top left window displays the 'packt-parse-templateFlow' configuration, which includes a 'Source' node and a 'Parse Template' node. The top right window is the 'Parse Template' component configuration details. The 'General' tab is selected, and the 'Content' field is highlighted with a red border. Other fields include:

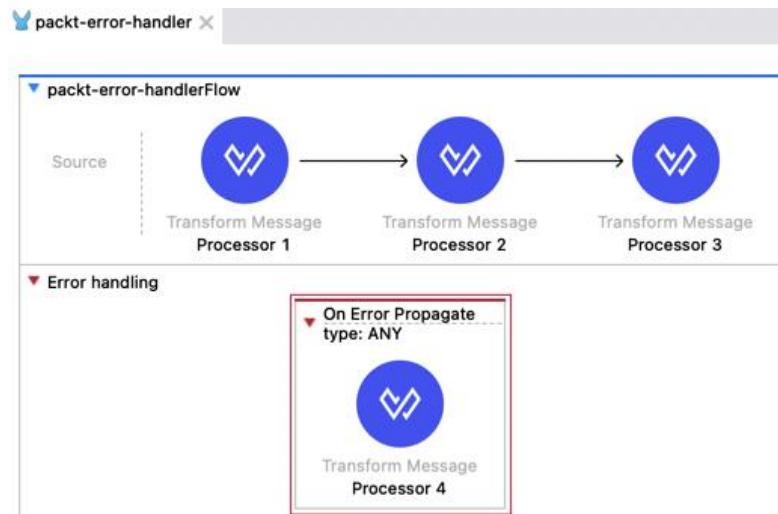
- Display Name:
- Settings
- Content:  
[Empty text area]
- Location:
- Output
- Target Variable:
- Target Value:  (fx icon)

The 'Message Flow', 'Global Elements', and 'Configuration XML' tabs are visible below the workspace.









[Message Flow](#) [Global Elements](#) [Configuration XML](#)

On Error Propagate X Console Problems

General

Display Name: On Error Propagate

Metadata

Notes

Help

There are no errors.

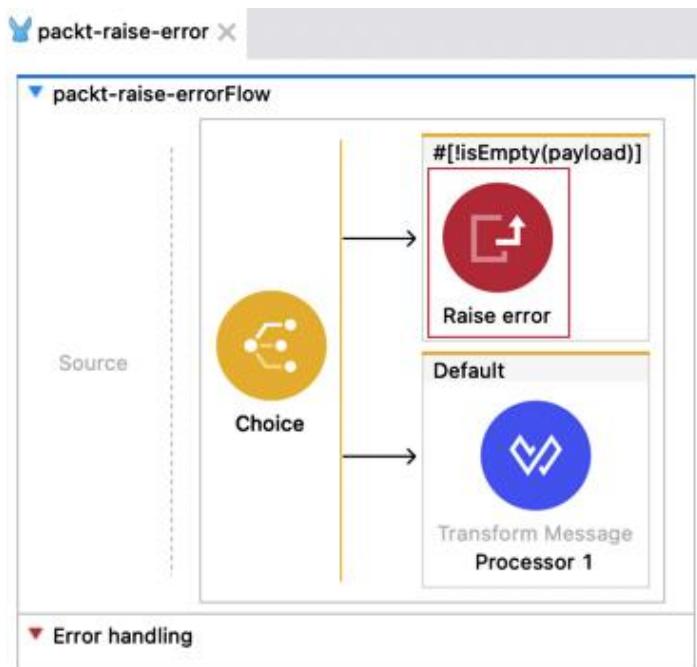
Settings

Type:  
ANY

When:

Enable Notifications

Log Exception



Message Flow Global Elements Configuration XML

Raise error X

Console Problems

General

Metadata

Notes

Help

Display Name: Raise error

Settings

Type: ANY

Description:

There are no errors.

packt-error-handler X

packt-error-handlerError\_Handler

On Error Continue type: ANY

Transform Message

On Error Propagate type: STREAM\_MAXIMUM\_SIZE\_EXCEEDED

Transform Message

Message Flow Global Elements Configuration XML

packt-error-handlerError\_Handler X

Console Problems

General

Metadata

Notes

Help

Name: packt-error-handlerError\_Handler

There are no errors.

packt-error-handler X

Global Configuration Element

Global Element Properties

Configuration

Use this element to specify defaults and general settings for the Mule instance.

General Notes Help

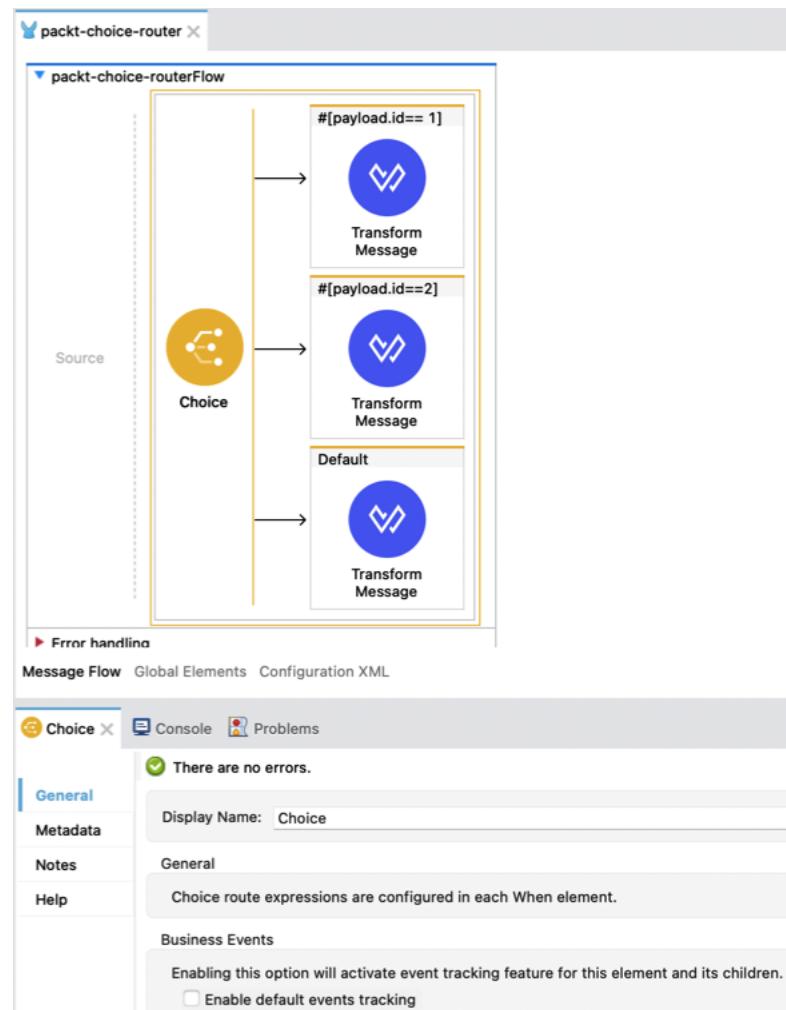
Settings

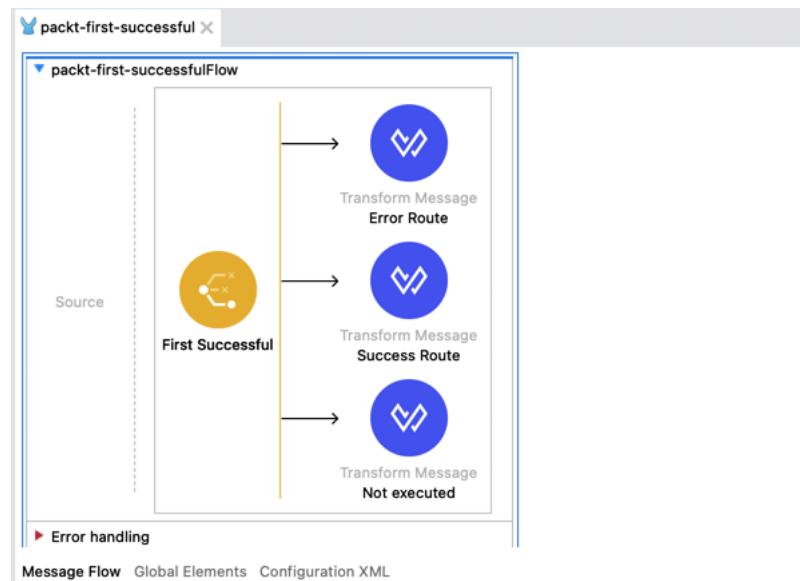
Default Error Handler: packt-error-handlerError\_Handler

HA Profile: -- Empty --

Create Edit Delete

OK Cancel ?





**packt-first-successfulFlow**

Console Problems

- General
- Metadata
- Notes
- Help

There are no errors.

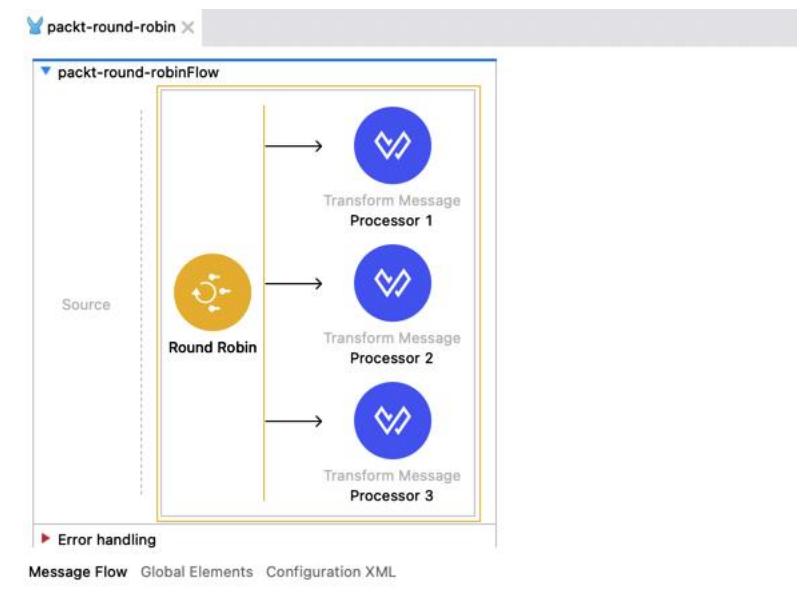
Flow Configuration

Name:  Initial State:  Max Concurrency:

Business Events

Enabling this option will activate event tracking feature for all the elements within the flow.

Enable default events tracking



Round Robin

Console Problems

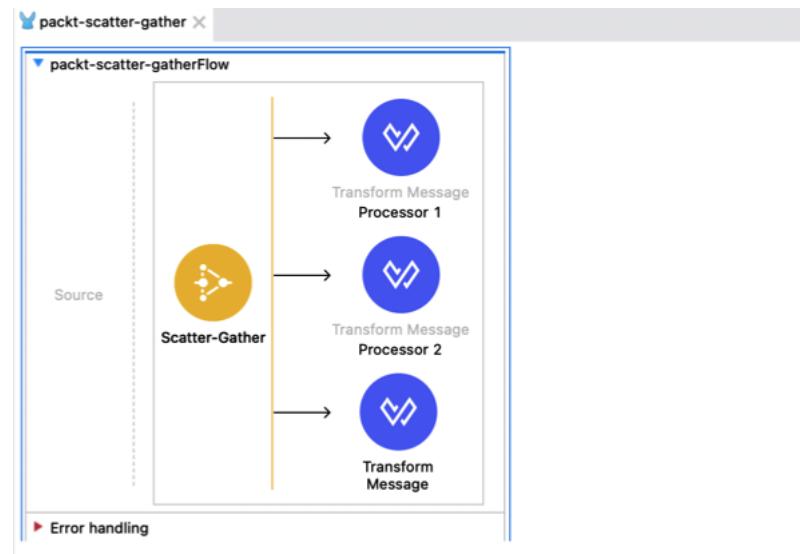
- Advanced
- Metadata
- Notes
- Help

There are no errors.

Business Events

Enabling this option will activate event tracking feature for this element and its children.

Enable default events tracking



Message Flow Global Elements Configuration XML

**packt-scatter-gatherFlow** Console Problems

General There are no errors.

#### Flow Configuration

Name: packt-scatter-gatherFlow

Initial State:

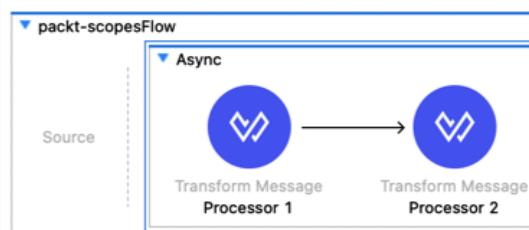
Max Concurrency:

#### Business Events

Enabling this option will activate event tracking feature for all the elements within the flow.

Enable default events tracking

**packt-async-scope**



Message Flow Global Elements Configuration XML

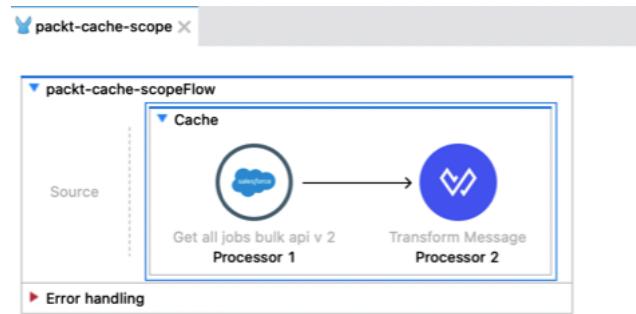
**Async** Console Problems

General There are no errors.

Display Name: Async

Generic

Max concurrency: 2



Message Flow Global Elements Configuration XML

**Cache**

General

Display Name: Cache

Caching strategy reference

Use Default caching strategy

Reference to a strategy:

Filter

Use the filter to exclude specific messages from cache scope flow.

fx  #[payload]



Message Flow Global Elements Configuration XML

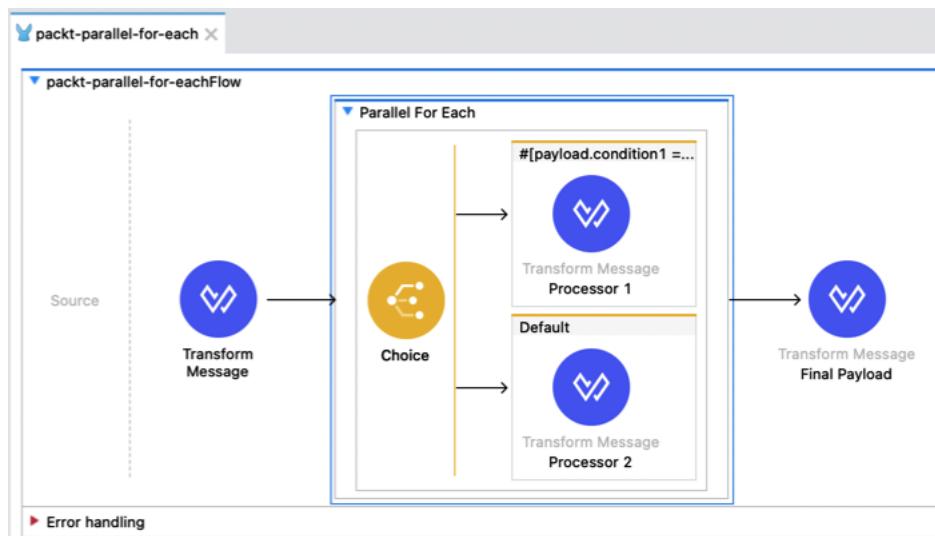
**For Each**

General

Display Name: For Each

Settings

Collection:	<input type="text"/> fx <code>#{payload.id}</code>
Counter Variable Name:	<input type="text"/> counter
Batch Size:	<input type="text"/> 1
Root Message Variable Name:	<input type="text"/> rootMessage



Message Flow Global Elements Configuration XML

Parallel For Each X Console Problems

General There are no errors.

Metadata

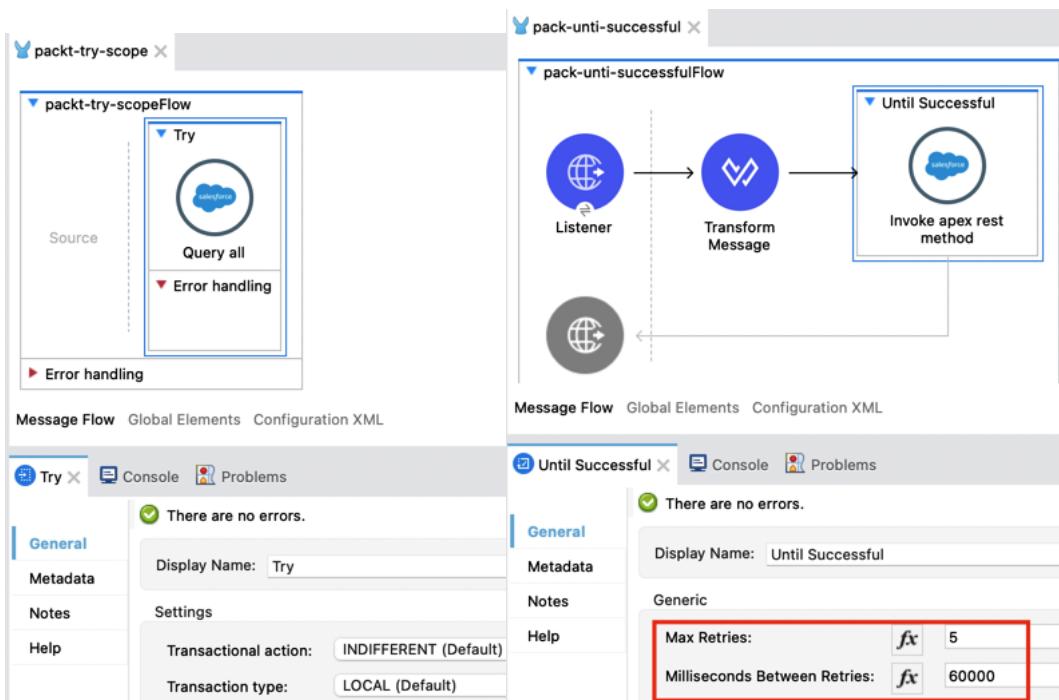
Notes

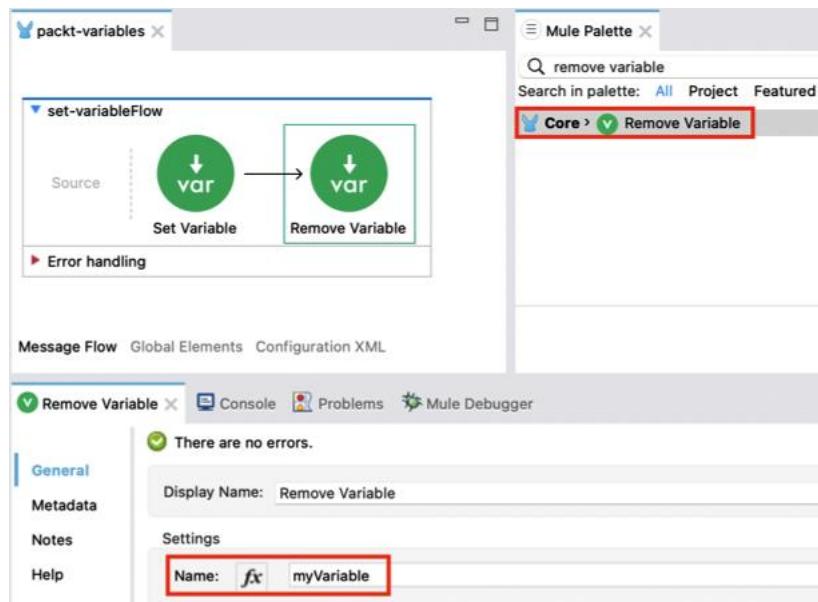
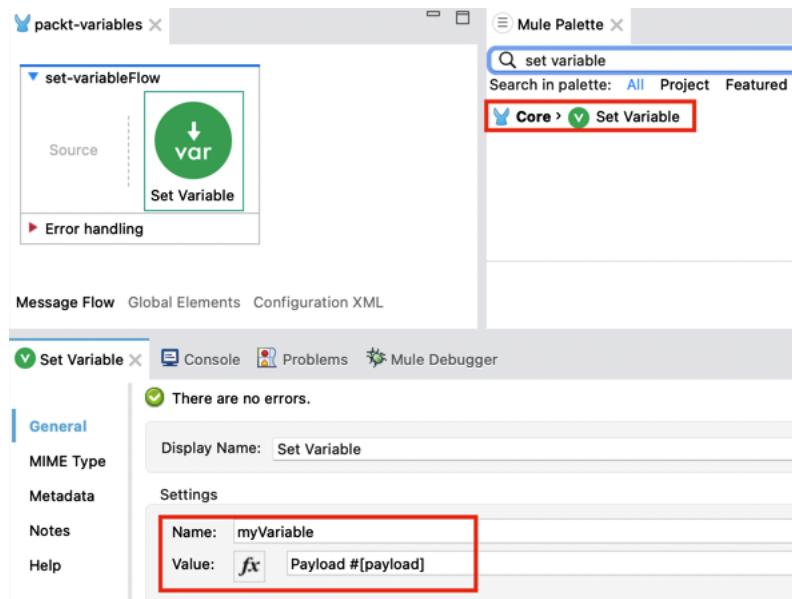
Help

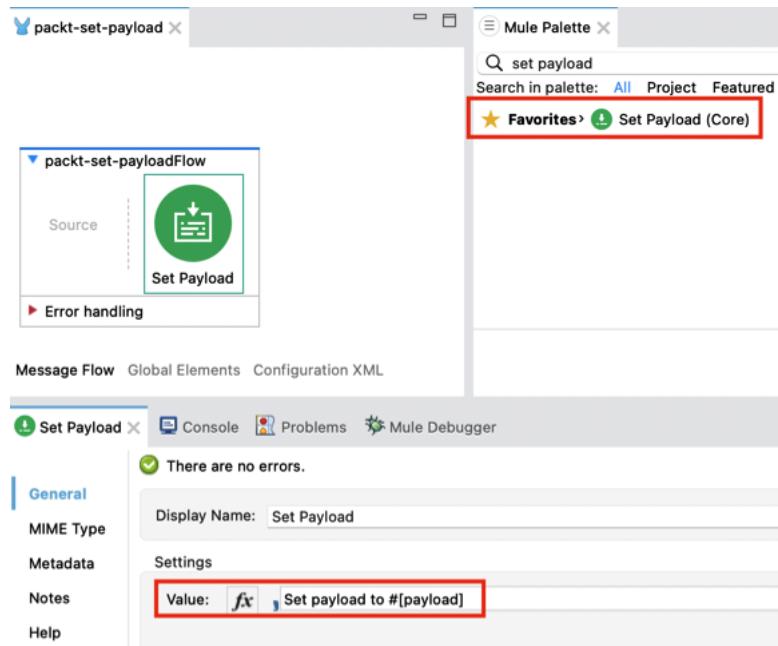
Display Name: Parallel For Each

Settings

Collection:	<code>fx #[ payload ]</code>
Timeout:	
Max concurrency:	5
Target:	finalPayload
Target Value:	<code>fx #[ payload ]</code>







# Chapter 5: All About Anypoint Platform

### New AsyncAPI

Project Name

 MusicAsyncAPI

Project Language

 ▼

Cancel Create AsyncAPI

MusicAsyncAPI/master ▾

1 `asyncapi: '2.0.0'`  
2 `info:`  
3 `title: MusicAsyncAPI`  
4 `version: '1.0.0'`  
5 `contact:`  
6 `name: Pact Publication`  
7 `email: mule.book@gmail.com`  
8 `servers:`  
9 `Production:`  
10 `protocol: amqp`  
11 `url: broker.mule.com`  
12 `description: production environment`  
13 `UAT:`  
14 `protocol: amqp`  
15 `url: broker.nonprodmule.com`  
16 `description: non prouduction enviornment. mainly used for UAT purpose`  
17 `channels:`  
18 `songs-request:`  
19 `publish:`  
20 `message:`  
21 `payload:`  
22 `type: object`  
23 `properties:`  
24 `song_name:`  
25 `type: string`  
26 `example: "Hey Brother. Avicii"`  
27 `minlength: 1`  
28 `maxlength: 100`  
29 `songs-response:`  
30 `subscribe:`  
31 `message:`  
32 `payload:`  
33 `type: object`  
34 `properties:`  
35 `song_id:`  
36 `type: string`  
37 `example: "S1001"`

Documentation

API title: MusicAsyncAPI  
Version: 1.0.0

API servers

- amqp://broker.mule.com production environment
- amqp://broker.nonprodmule.com non prouduction enviornment. mainly used for UAT purpose

Publish View in Exchange Publish to Exchange

Contact information  
Pact Publication [mule.book@gmail.com](mailto:mule.book@gmail.com)

API channels

songs-request PUBLISH

songs-response SUBSCRIBE

### MusicAsyncAPI

Asset version (required)

API version (required)

Specified in `rootfile`

Additional help

- Changing a project's main/root file
- What is an API version?

LifeCycle State (1)

Stable

Development

In Process of Design and Development

> More options

Cancel Publish to Exchange

## New Mule App

Name

SongsMuleApp

Cancel

Create App



Transform DataWeave

Configuration Input Output Notes

Create an output payload to see suggestions for mappings.

**Input**

Search payload Any

attributes HttpRequestAttributes

- listenerPath String
- rawRequestPath String
- relativePath String
- maskedRequestPath String
- version String
- scheme String
- method String
- requestUri String
- rawRequestUri String
- queryString String
- localAddress String
- remoteAddress String

> clientCertificate Certificate?

**Transformation script**

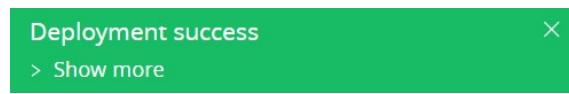
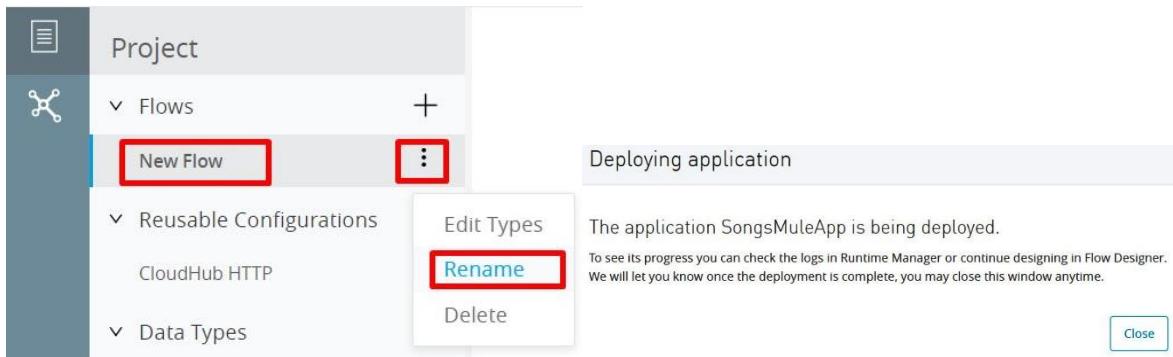
```
%dw 2.0
output application/json
---
{
    "1": "Hey Brother. Avicii",
    "2": "See You Again (feat. Charlie Puth) Wiz Khalifa",
    "3": "Wake Me Up. Avicii",
    "4": "Shivers. Ed Sheeran."
}
```

**Preview**

```
{
    "1": "Hey Brother. Avicii",
    "2": "See You Again (feat. Charlie Puth) Wiz Khalifa",
    "3": "Wake Me Up. Avicii",
    "4": "Shivers. Ed Sheeran."
}
```

Sample data Script Mappings

A screenshot of the DataWeave transformation editor. It shows the 'Configuration' tab selected. The 'Input' section lists various attributes. The 'Transformation script' section contains a DataWeave script that outputs a JSON object with four entries. The 'Preview' section shows the resulting JSON output. A red box highlights the transformation script area. At the bottom, tabs for 'Sample data', 'Script' (which is selected), and 'Mappings' are visible.



### Runtime Manager

SANDBOX

Applications

Dashboard

Insight

songsmuleapp-wtjz

Domain: [songsmuleapp-wtjz.us-e2.cloudhub.io](http://songsmuleapp-wtjz.us-e2.cloudhub.io) · Last Updated 2022-04-02 12:56:04AM · 1 micro worker, using 4.3.0

Mule messages

GET http://songsmuleapp-wtjz.us-e2.cloudhub.io/songs Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

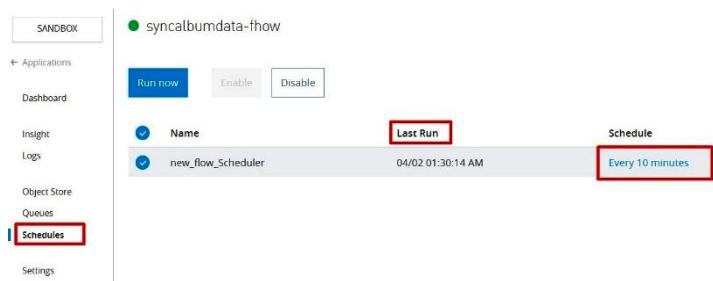
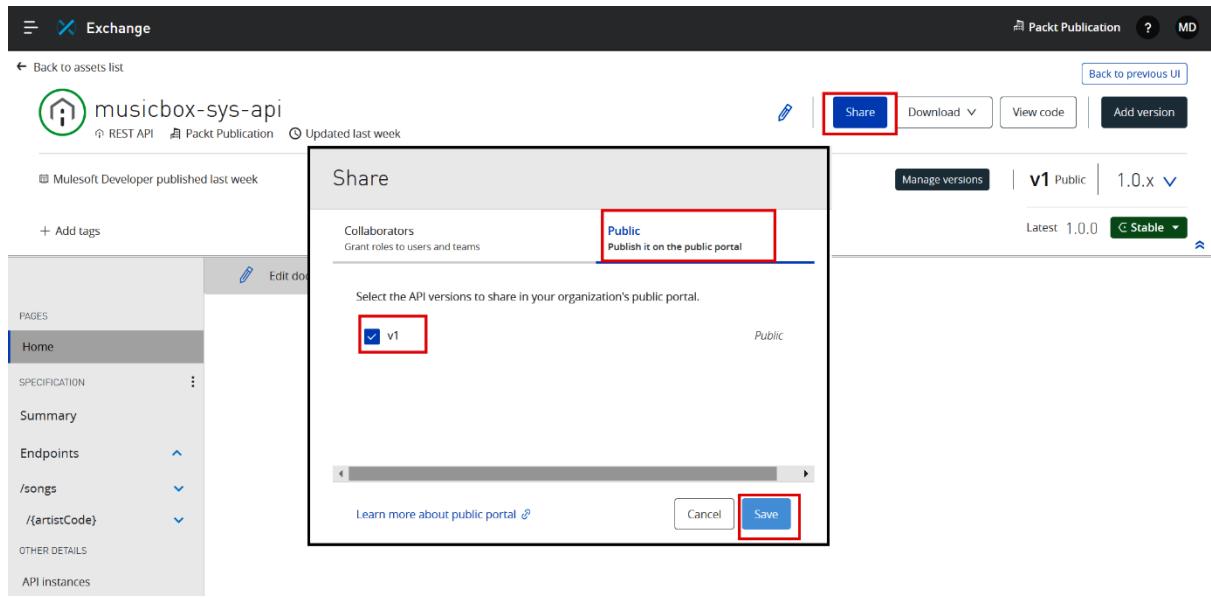
Query Params

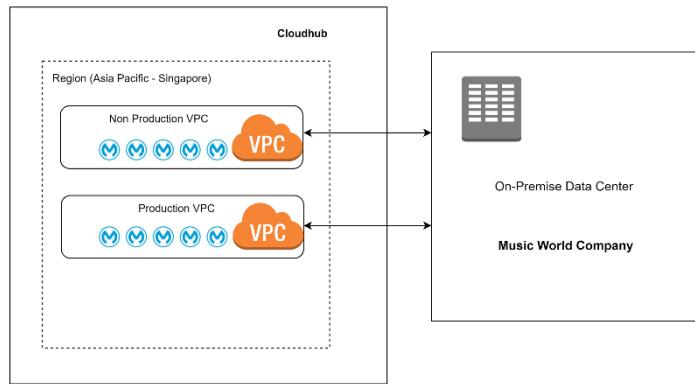
KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

Status: 200 OK Time: 964 ms Size: 312 B Save Response

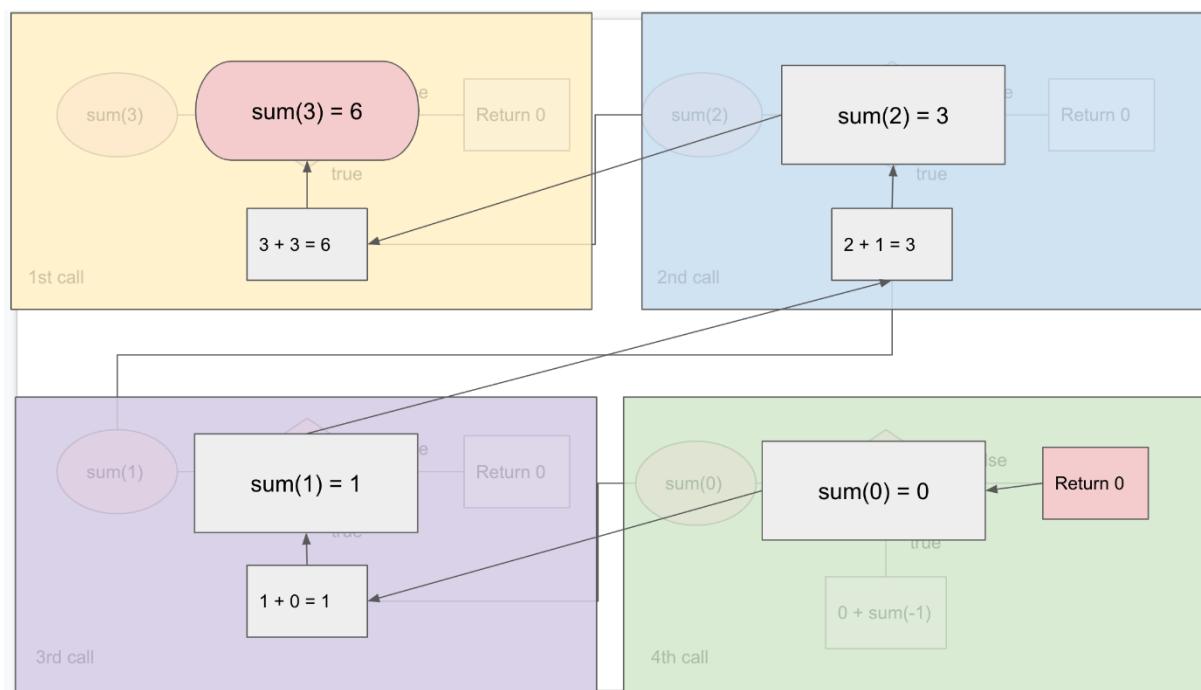
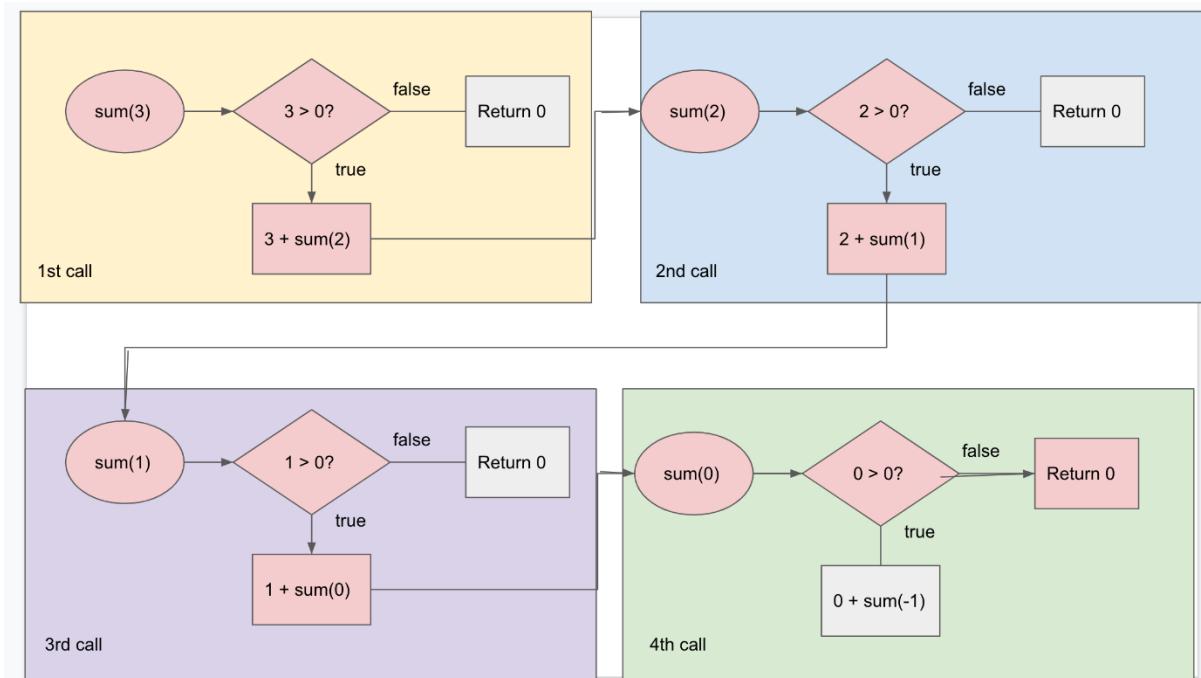
Pretty Raw Preview Visualize JSON

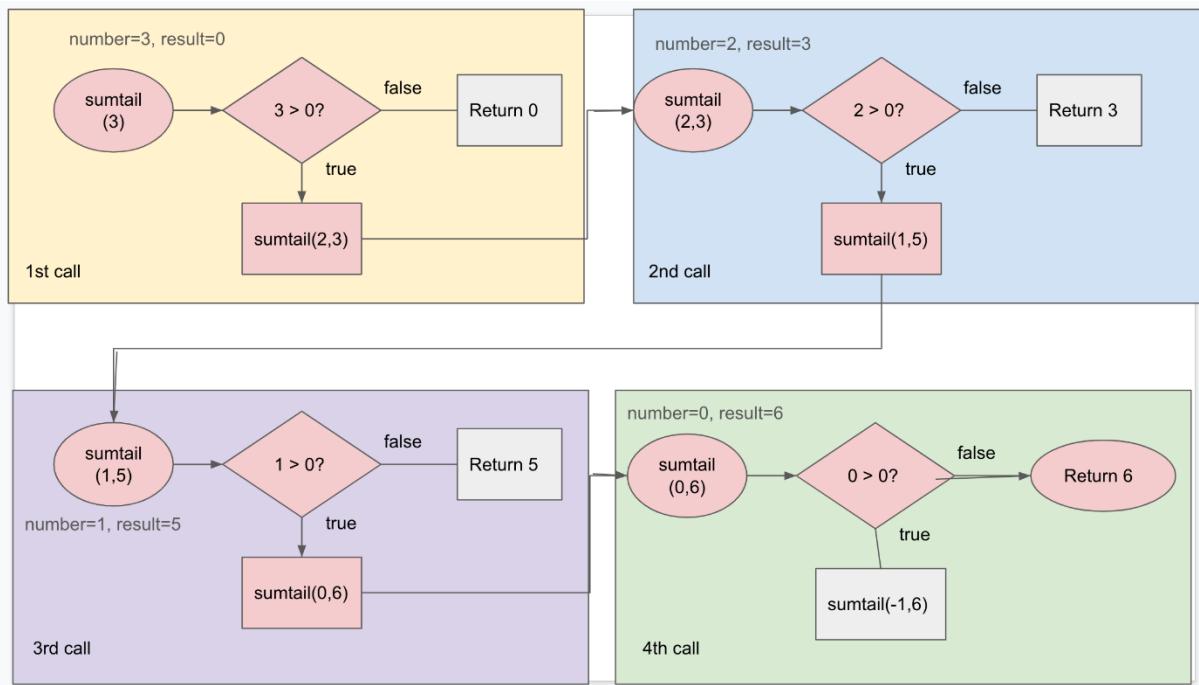
```
1 [ { "1": "Hey Brother. Avicii", "2": "See You Again (feat. Charlie Puth) Wiz Khalifa", "3": "Wake Me Up. Avicii", "4": "Shivers. Ed Sheeran." } ]
```





## Chapter 6: Learning Transform with Dataweave





# Chapter 7: Transform with DataWeave

 DataWeave Playground

Tutorial Playground

INPUT EXPLORER	SCRIPT	OUTPUT JSON
JSON payload	<pre>1 %dw 2.0 2 output application/json 3 --- 4 [1, 2, 3] map log(\$) 5 </pre>	<pre>1 [ 2   1, 3   2, 4   3 5 ]</pre>
<a href="#">LOG VIEWER</a>	<a href="#">API REFERENCE</a>	©2021 MuleSoft LLC, a Salesforce company
<input type="text" value="Filter"/>		
1		2022-06-16T15:48:35.540192
2		2022-06-16T15:48:35.540210
3		2022-06-16T15:48:35.540222

**testFlow**

- Source
- Transform Message
- Error handling

Search in Exchange..

- Add Modules
- Favorites
- Core
- HTTP
- Sockets

Components

- Custom Business Event
- Dynamic Evaluate
- Flow Reference
- Idempotent Message Validator
- Invalidate Cache
- Invalidate Key
- Logger
- Parse Template
- Set Transaction Id
- Transform Message

Message Flow Global Elements Configuration XML

**Transform Message**

Source → Transform Message → Error handling

Output Payload:

```

1@%dw 2.0
2  output application/java
3  ---
4{
5 }

```

Output Payload:

```

1@%dw 2.0
2  output application/java
3  ---
4{
5 }

```

Input:

- Payload: Array<Object>
  - id: Number = 1
  - firstName: String = "Akshata"
  - lastName: String = "Sawant"
- Variables
- Attributes: Unknown Define metadata

Output:

```

1@%dw 2.0
2  output application/json
3  ---
4{
5   Authors: payload.firstName
6 }

```

Input:

- Payload: Array<Object>
  - id: Number = 1
  - firstName: String = "Akshata"
  - lastName: String = "Sawant"
- Variables
- Attributes: Unknown Define metadata

Output:

```

1@%dw 2.0
2  output application/json
3  ---
4{
5   Authors: payload.firstName
6 }

```

Preview:

```
{
  "Authors": [
    "Akshata",
    "Arul",
    "Alex"
  ]
}
```

Transform Message X Console Problems

Input

Payload : Array<Object>

- id : Number = 1
- firstName : String = "Akshata"
- lastName : String = "Sawant"

Variables

Attributes : Unknown Define metadata

Output

Object

- Book : String
- Publisher : String
- Authors : Array<String> = ["Akshata"]

Output Payload ▾

```
1@ %dw 2.0
2  output application/json
3  ---
4@ [
5   Authors: payload.firstName
6 ]
```

{ "Authors": [ "Akshata", "Arul", "Alex" ] }

Tree Text

Transform Message X Console Problems

Input

Payload : Array<Object>

- id : Number = 1
- firstName : String = "Akshata"
- lastName : String = "Sawant"

Variables

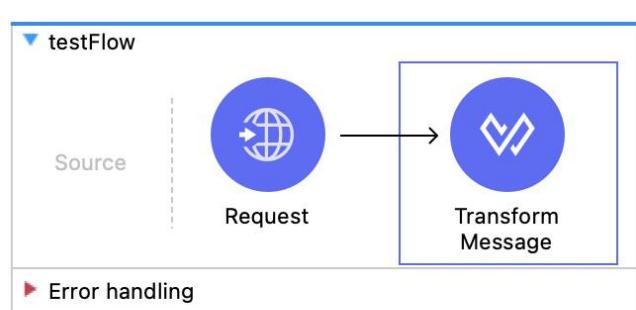
Attributes : Unknown Define metadata

Output Payload ▾

```
1@ %dw 2.0
2  output application/json
3  ---
4@ [
5   Authors: payload.firstName
6 ]
```

{ "Authors": [ "Akshata", "Arul", "Alex" ] }

Tree Text



Message Flow Global Elements Configuration XML

**Transform Message** X Console Problems

Input

Payload : Any [Define metadata](#)

Variables

Attributes : Object

- statusCode : Number
- reasonPhrase : String
- headers : Object

Output Payload ▾ [Edit](#) [Delete](#)

```

1@ %dw 2.0
2 output application/java
3 ---
4{
5 }
  
```

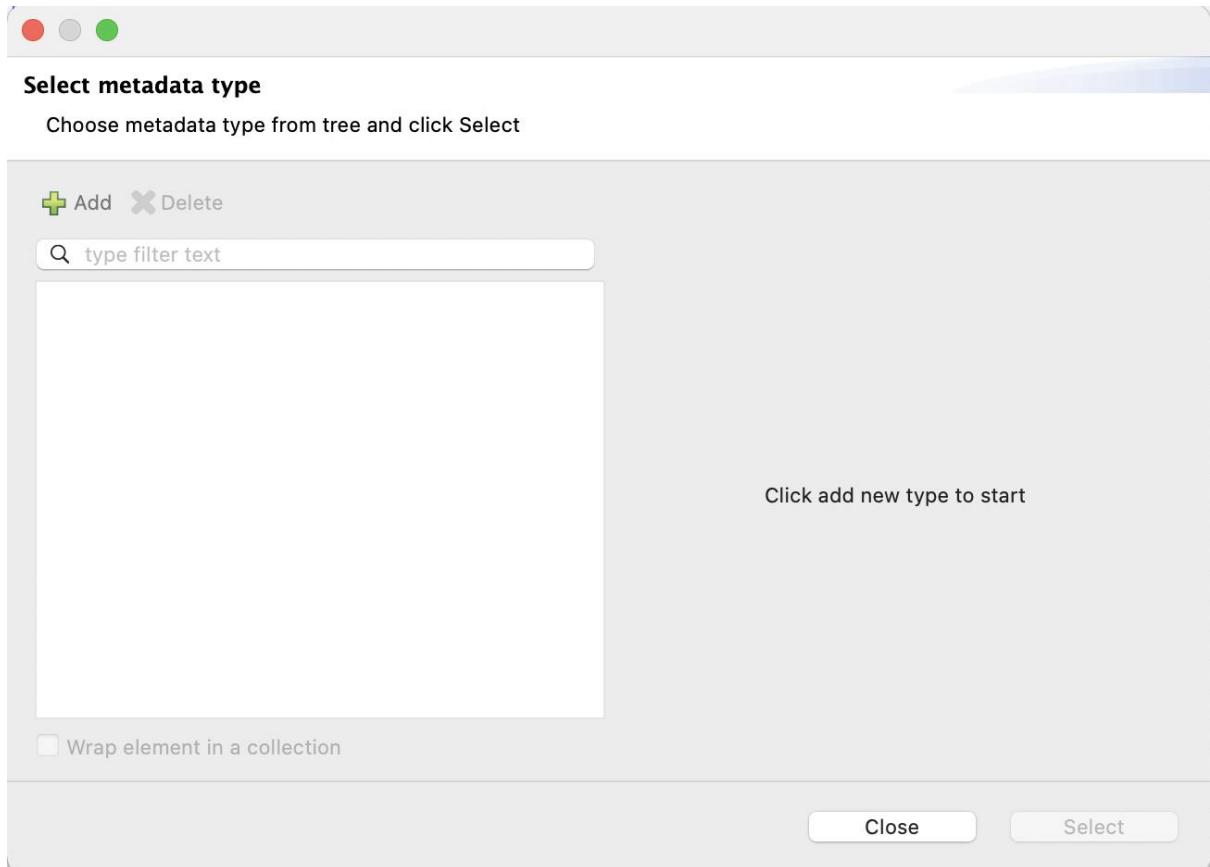
**Transform Message** X Console Problems

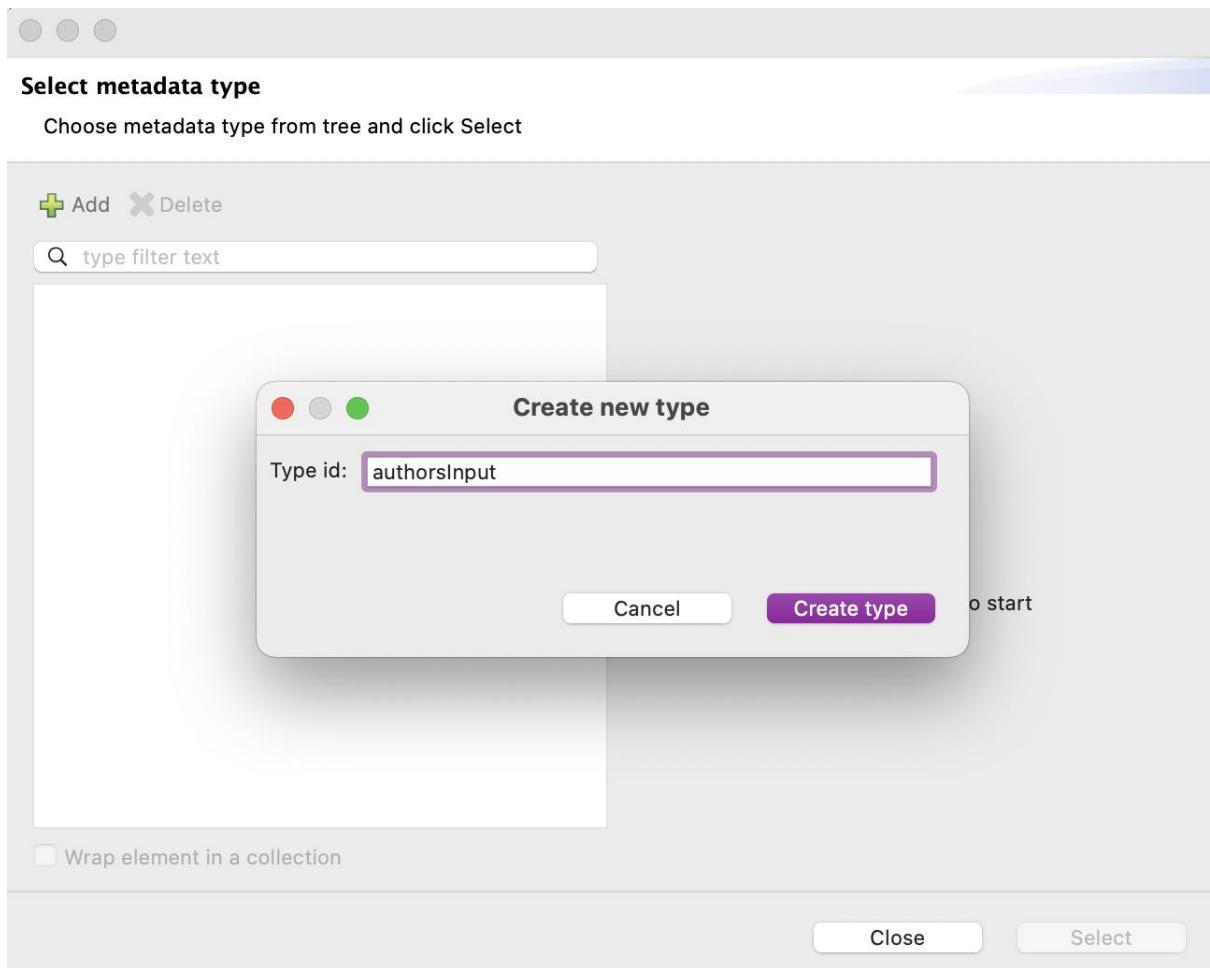
Input

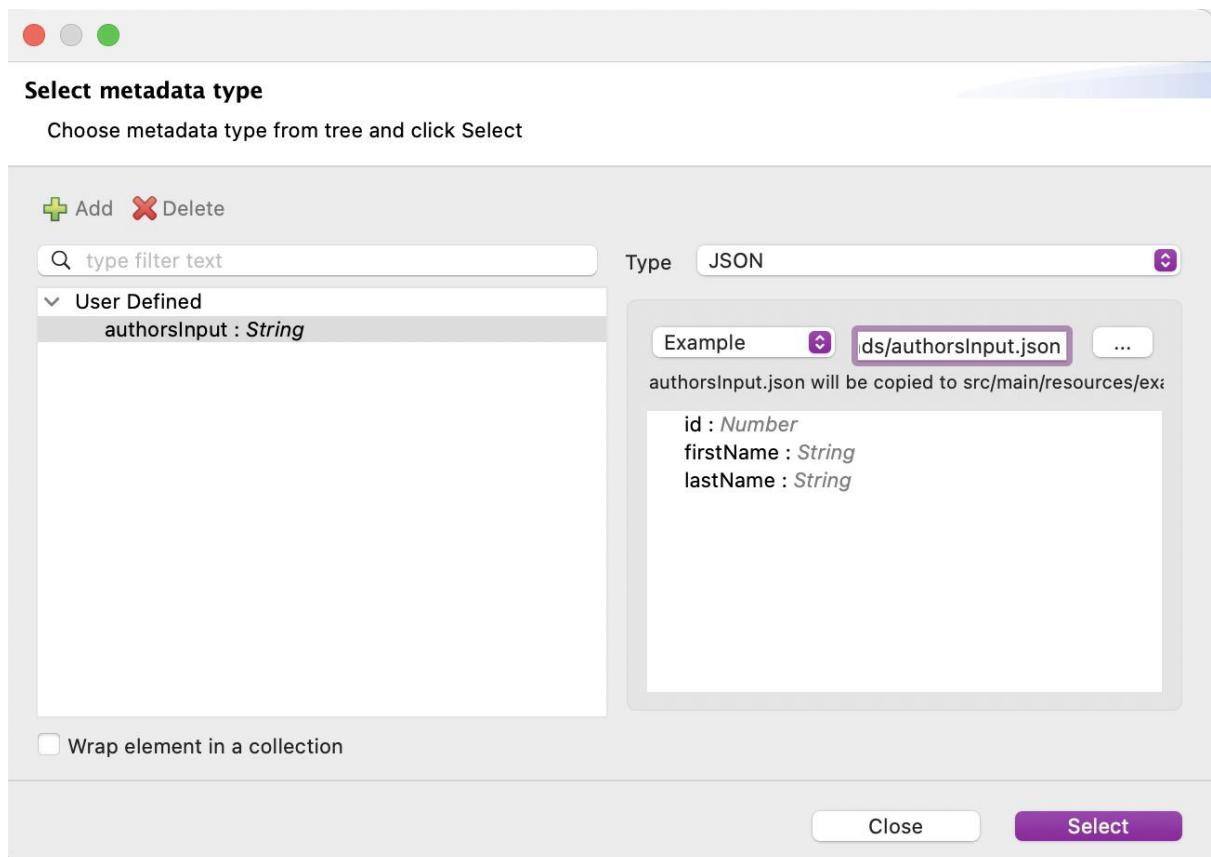
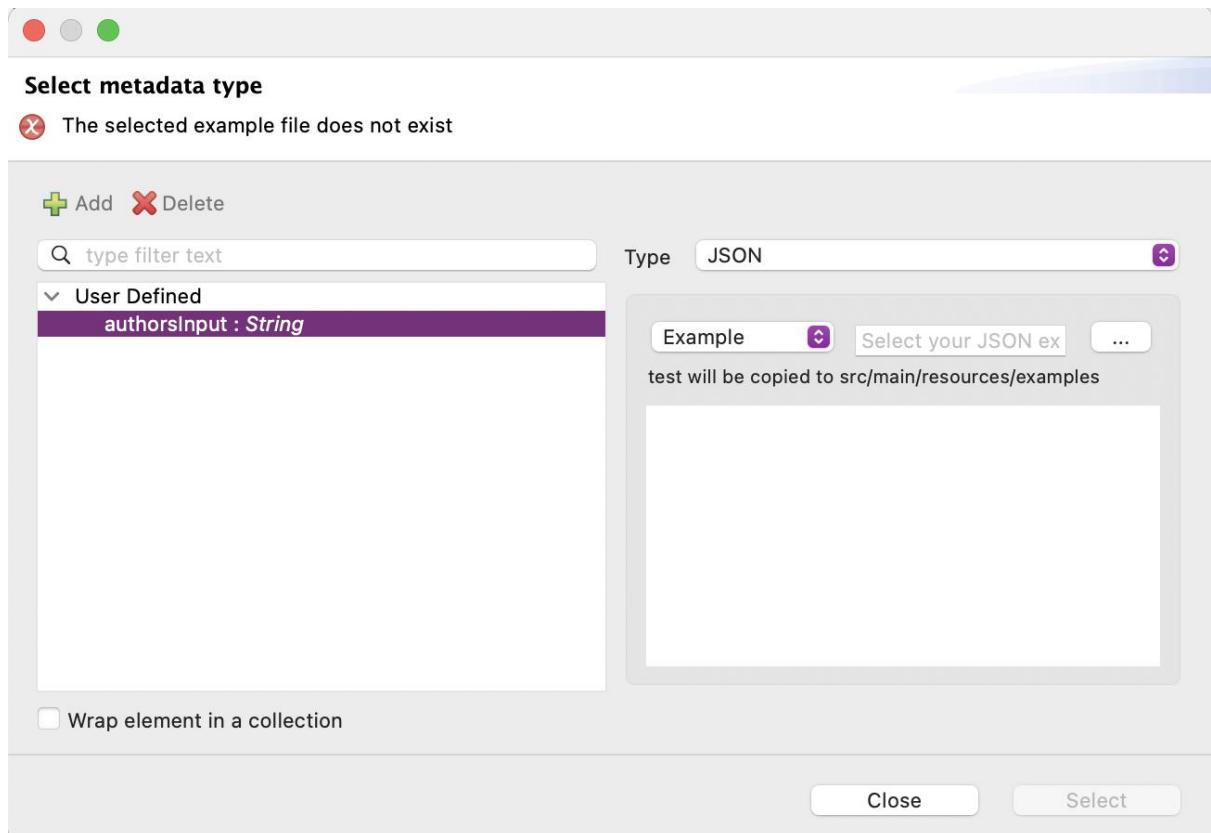
Payload : Unknown [Define metadata](#)

Variables

Attributes : Unknown [Define metadata](#)







Transform Message X Console Problems

Input

Payload : Array<Object>

- id : Number
- firstName : String
- lastName : String

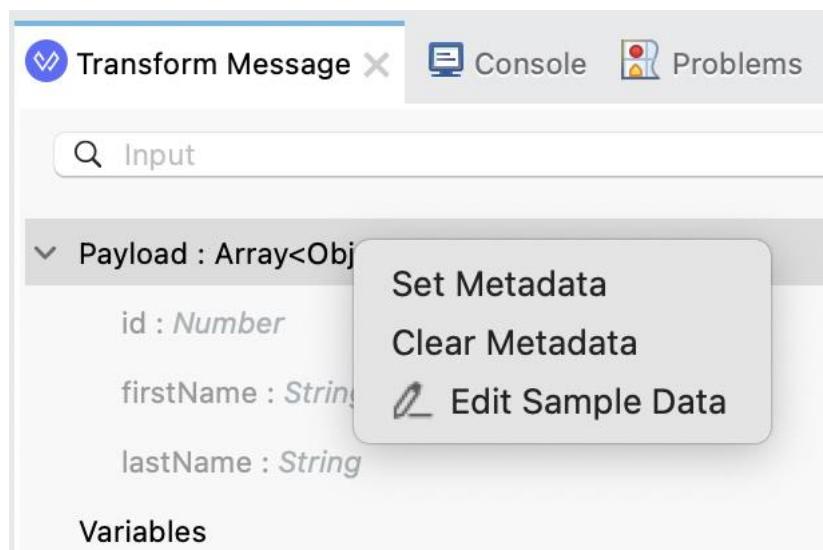
Variables

Attributes : Unknown [Define metadata](#)

Output Payload [+](#) [-](#) [Edit](#) [Preview](#)

```
1@ %dw 2.0
2 output application/json
3 ---
4 payload
```

```
[ {
  "id": 1,
  "firstName": "Akshata",
  "lastName": "Sawant"
},
{
  "id": 2,
  "firstName": "Arul",
  "lastName": "Alphonse"
},
{
  "id": 3,
  "firstName": "Alex",
  "lastName": "Martinez"
}]
```

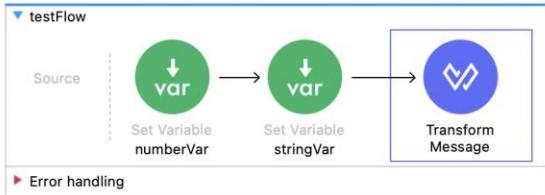


Transform Message X Console Problems

list\_json.json

```
[  
  {  
    "id": 1,  
    "firstName": "Akshata",  
    "lastName": "Sawant"  
  },  
  {  
    "id": 2,  
    "firstName": "Arul",  
    "lastName": "Alphonse"  
  },  
  {  
    "id": 3,  
    "firstName": "Alex",  
    "lastName": "Martinez"  
  }]
```

Context payload X



Message Flow Global Elements Configuration XML

**Transform Message**

**Input**

```

Payload : Array<Object>
  id : Number = 1
  firstName : String = "Akshata"
  lastName : String = "Sawant"

```

**Variables**

```

  stringVar : String
  numberVar : Number

```

Attributes : Unknown [Define metadata](#)

**Output**

**Payload**

```

1%dw 2.0
2 output application/json
3 ---
4[
5  firstVariable: vars.numberVar,
6  secondVariable: vars.stringVar
7 ]

```

```

{
  "firstVariable": 1,
  "secondVariable": "abc"
}

```

**Payload : Array<Object>**

```

id : Number = 1
firstName : String = "Akshata"
lastName : String = "Sawant"

```

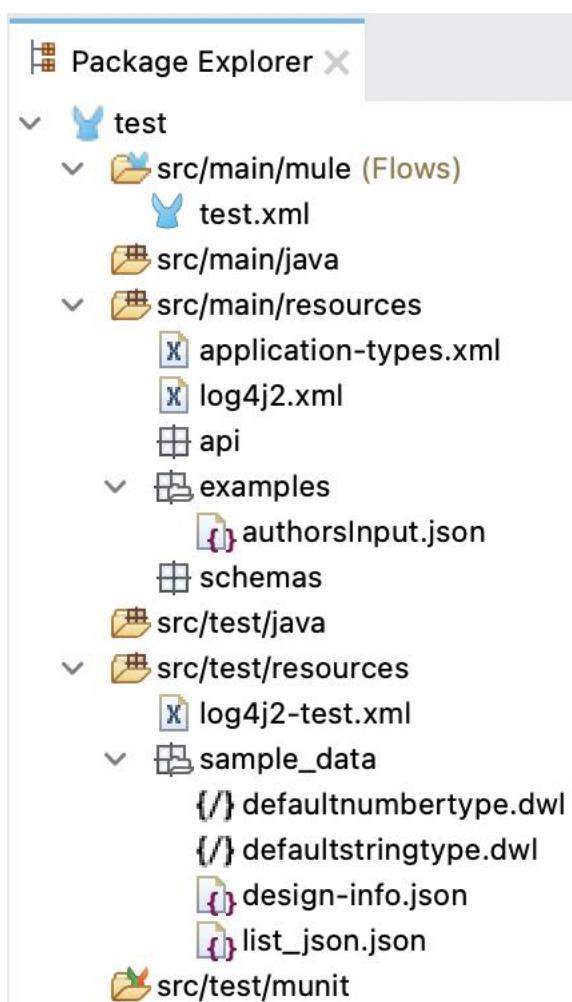
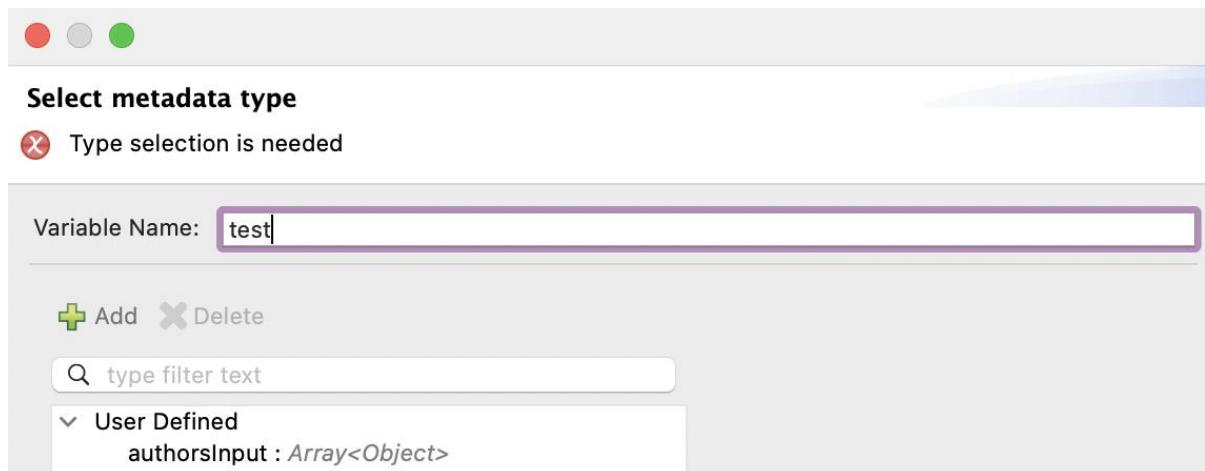
**Variables**

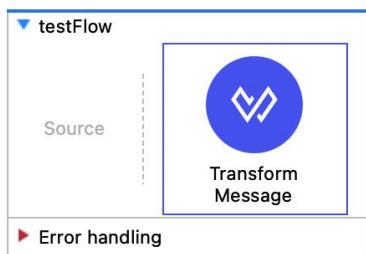
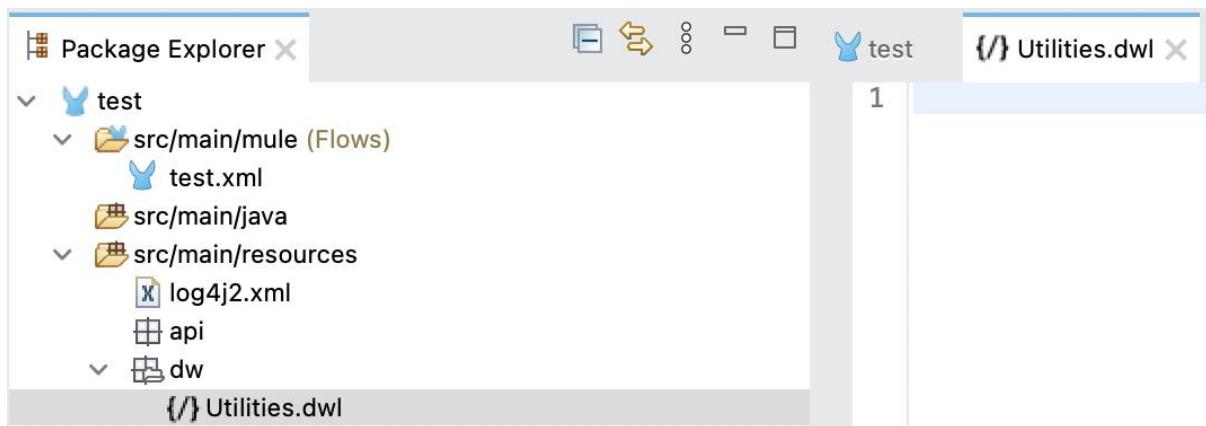
**New Variable**

stringVar : String

numberVar : Number

Attributes : Unknown [Define metadata](#)





Message Flow Global Elements Configuration XML

The screenshot shows the 'Transform Message' configuration dialog with the following details:

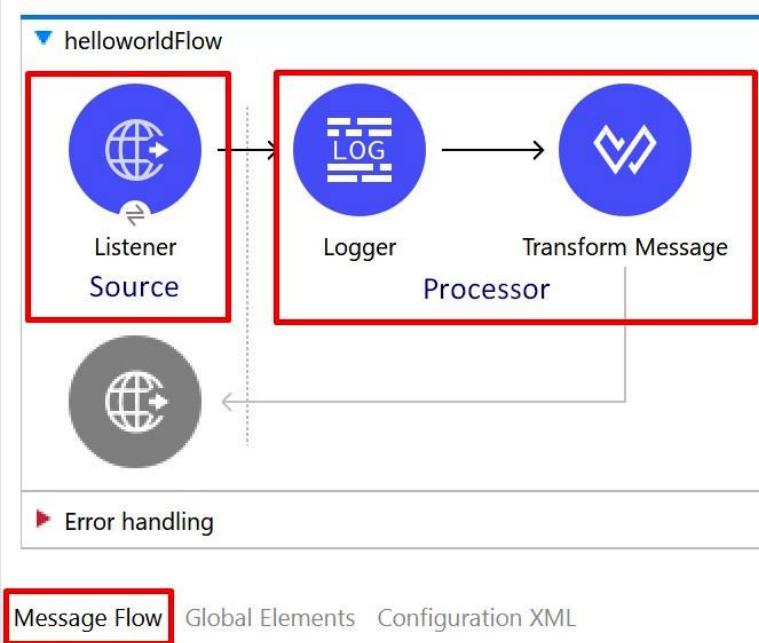
- Input: Payload : Array<Object>
- Output: Payload
- Script:

```
1 %dw 2.0
2 output application/json
3 import getAuthorsNames from dw::Utilities
4 ---
5 getAuthorsNames(payload)
```

The output payload is displayed as:

```
[ "Akshata Sawant", "Arul Alphonse", "Alex Martinez" ]
```

## Chapter 8: Build your Mule Application



The screenshot shows the 'Global Configuration Elements' screen. It displays a table with one row:

Type	Name	Description
HTTP Listener config (Configurable)	HTTP_Listener_config	

On the right side of the table are three buttons: 'Create' (blue), 'Edit' (grey), and 'Delete' (grey). Below the table, there are tabs: 'Message Flow', 'Global Elements' (highlighted with a red box), and 'Configuration XML'.

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <mule xmlns:ee="http://www.mulesoft.org/schema/mule/ee/core" xmlns:http="http://www.mulesoft.org/schema/mule/http"
3   xmlns="http://www.mulesoft.org/schema/mule/core"
4   xmlns:doc="http://www.mulesoft.org/schema/mule/documentation" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
5 http://www.mulesoft.org/schema/mule/http http://www.mulesoft.org/schema/mule/http/current/mule-http.xsd
6 http://www.mulesoft.org/schema/mule/ee/core http://www.mulesoft.org/schema/mule/ee/core/current/mule-ee.x
7 <http:listener-config name="HTTP_Listener_config" doc:name="HTTP Listener config" doc:id="8a596ccb-ca
8   <http:listener-connection host="0.0.0.0" port="8081" />
9 </http:listener-config>
10 <flow name="helloworldFlow" doc:id="a7eb1467-be29-44c0-8a35-3e9f65a05310" >
11   <http:listener doc:name="Listener" doc:id="6746ea9a-fd5a-4d24-b194-adb416ae6d64" config-ref="HTTP_
12   <logger level="INFO" doc:name="Logger" doc:id="71e8ecfb-482c-4662-ad15-409c1ad02804" message="Wel
13   <ee:transform doc:name="Transform Message" doc:id="af26834a-6066-4b75-a4a5-31ab25a2a6c1" >
14     <ee:message >
15       <ee:set-payload ><![CDATA[%dw 2.0
16 output application/json| --->
17 {
18   "message" : "Hello World"
19 }]]></ee:set-payload>
20       </ee:message>
21     </ee:transform>
22   </flow>
23 </mule>

```

Message Flow Global Elements Configuration XML

**Mule Palette**

- Search in Exchange...
- Add Modules
- Favorites
- Core** (selected)
- HTTP
- Sockets

**Scheduler**

- Endpoints
- Error Handling
- Error Handler
- On Error Continue
- On Error Propagate
- Raise error

**Flow Control**

**Message Flow** Global Elements Configuration XML

**Scheduler** (selected)

Console Problems

General Metadata Notes Help

There are no errors.

Display Name: Scheduler

Scheduling Strategy: **Fixed Frequency**

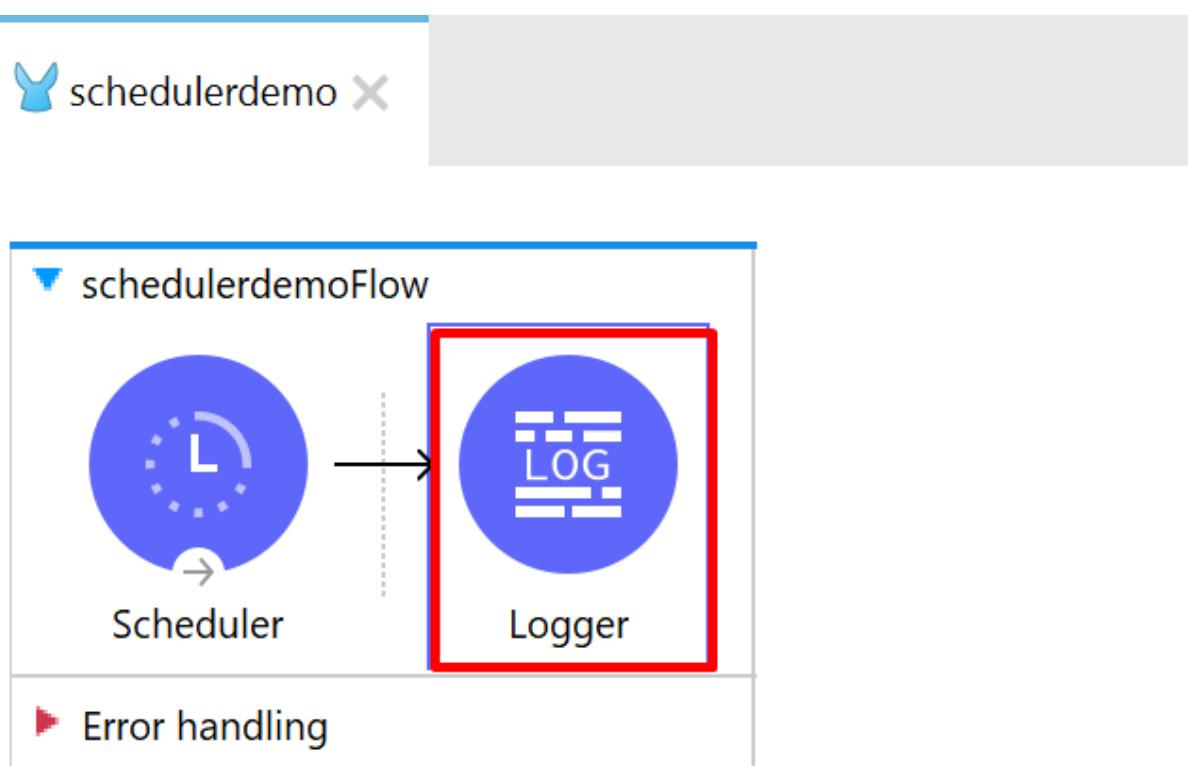
Frequency: **2**

Start delay: **0**

Time unit: **MINUTES**

Days Hours Milliseconds (Default) Minutes Seconds

Mule Mess Payload Attribut Variables



Message Flow Global Elements Configuration XML

Logger X

Console Problems

General

Metadata Notes Help

Display Name:

Generic

Message:  Scheduler invoked

Level:

Category:

This screenshot shows the configuration details for the 'Logger' element. On the left, there's a sidebar with tabs for 'General', 'Metadata', 'Notes', and 'Help'. The 'General' tab is selected. In the main area, under 'Generic', there are fields for 'Message' and 'Level'. The 'Message' field contains the value 'Scheduler invoked', which is highlighted with a red border. The 'Level' field is set to 'INFO (Default)'. There's also a note indicating 'There are no errors' with a green checkmark icon.

```

Logger Console Problems
schedulerdemo [Mule Applications]
INFO 2022-04-24 13:51:43,900 [[MuleRuntime].uber.07: [schedulerdemo].uber@org.mule.runtime.core.internal.source.scheduler.DefaultSchedulerMessageSource.create
INFO 2022-04-24 13:51:43,932 [WrapperListener_start_runner] org.eclipse.jetty.server.AbstractConnector: Started ServerConnector@67026b98{HTTP/1.1, (http/1.1)}
INFO 2022-04-24 13:51:43,932 [WrapperListener_start_runner] org.mule.runtime.core.internal.logging.LogUtil:
*****
* - - + DOMAIN + - - * - - + STATUS + - - *
***** * default * DEPLOYED * *
*****
***** - - + APPLICATION + - - * - - + DOMAIN + - - * - - + STATUS + - - *
***** * schedulerdemo * default * DEPLOYED * *
*****
INFO 2022-04-24 13:51:43,932 [[MuleRuntime].uber.08: [schedulerdemo].schedulerdemoFlow.CPU_LITE @343f7808] [processor::LoggerMessageProcessor: Scheduler invoked
INFO 2022-04-24 13:53:43,890 [[MuleRuntime].uber.07: [schedulerdemo].schedulerdemoFlow.CPU_LITE @343f7808] [processor::LoggerMessageProcessor: Scheduler invoked
INFO 2022-04-24 13:55:43,891 [[MuleRuntime].uber.08: [schedulerdemo].schedulerdemoFlow.CPU_LITE @343f7808] [processor::LoggerMessageProcessor: Scheduler invoked
INFO 2022-04-24 13:57:43,897 [[MuleRuntime].uber.07: [schedulerdemo].schedulerdemoFlow.CPU_LITE @343f7808] [processor::LoggerMessageProcessor: Scheduler invoked
INFO 2022-04-24 13:59:43,894 [[MuleRuntime].uber.08: [schedulerdemo].schedulerdemoFlow.CPU_LITE @343f7808] [processor::LoggerMessageProcessor: Scheduler invoked

```

New Mule Project

EN English (United States)

### Project Settings

Create a Mule project in the workspace or in an external location.

**Runtime**

Mule Server 4.4.0 EE

[Install Runtimes](#)

**API Implementation**

Add an API implementation to your project to automatically set up an APIkit router and create placeholder flows for each resource method

Import a published API   Import RAML from local file   Download RAML from Design Center

Location:

C:\Chapter2\musicbox-sys-api-1.0.0-raml\musicbox-sys-api.raml

✓ You are importing the following API: musicbox-sys-api Vv1

Scaffold flows from these API specifications

**Project location**

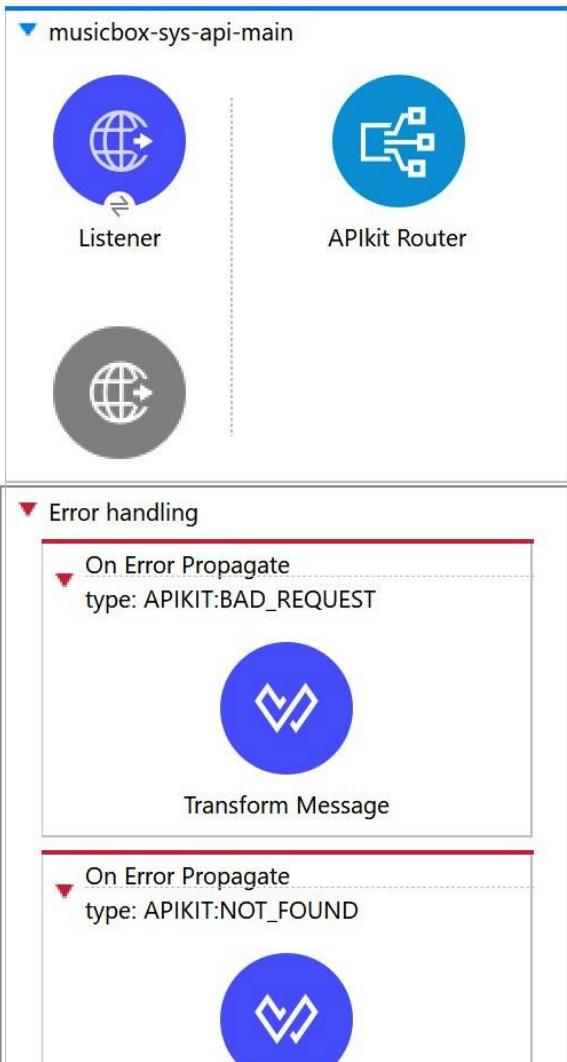
Use default location

Location: C:\MuleWorkspace\APIkitRouterDemo   [Browse...](#)

?

Finish

Cancel



### ▼ musicbox-sys-api-console



Listener



APIkit Console



### ▼ Error handling

#### ▼ On Error Propagate

type: APIKIT:NOT\_FOUND



Transform Message

localhost:8081/console/

## API console

### musicbox-sys-api

**Summary** API title: musicbox-sys-api  
Version: v1

**Endpoints**

- /songs
  - /songs/{artistCode}

Musicbox aims to provide high quality music streaming service. All the endpoints connecting backend services are present in this system API.

http://localhost:8081/api

---

**API endpoints**

/songs  
GET

/songs/{artistCode}  
POST

musicbox-sys-api

get:\songs

Source Transform Message

Error handling

post:\songs\{artistCode}:application\json:musicbox-sys-api-config

Message Flow Global Elements Configuration XML

Transform Message

Console Problems

Output Payload

```

1 %dw 2.0
2   output application/json
3   ---
4   {
5     a: "Hey Brother. Avicii",
6     b: "See You Again (feat. Charlie Puth) Wiz Khalifa",
7     c: "Wake Me Up. Avicii",
8     d: "Shivers. Ed Sheeran."
9   }

```

GET localhost:8081/api/songs Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

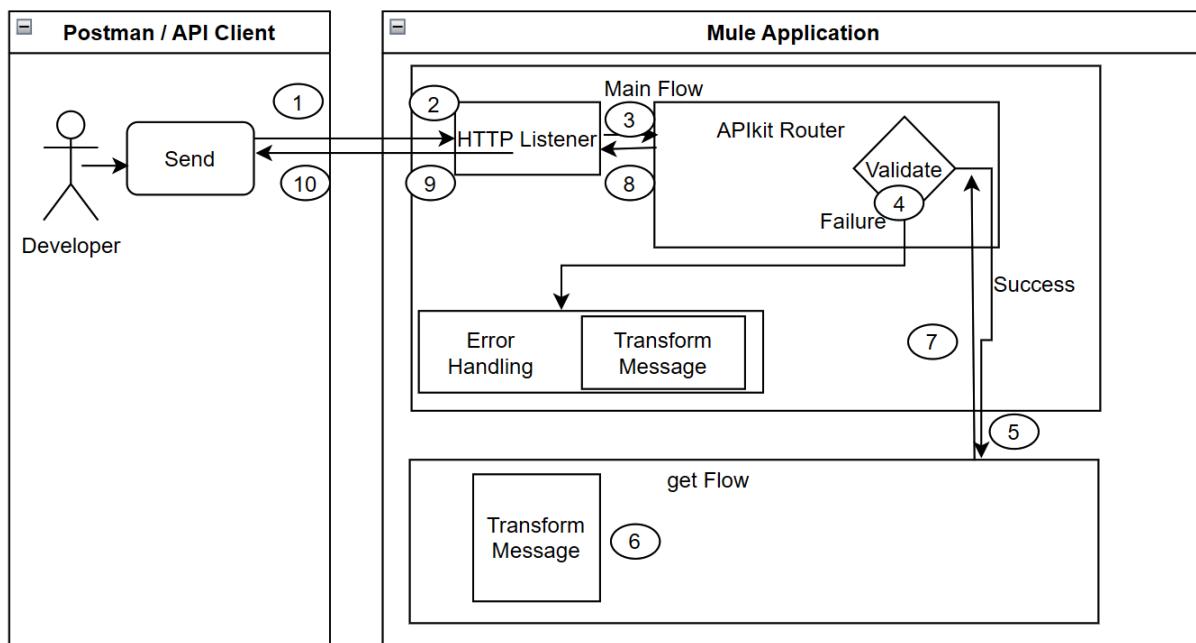
Body Cookies Headers (3) Test Results 200 OK 199 ms 273 B Save Response

Pretty Raw Preview Visualize JSON {

```

1 [
2   "a": "Hey Brother. Avicii",
3   "b": "See You Again (feat. Charlie Puth) Wiz Khalifa",
4   "c": "Wake Me Up. Avicii",
5   "d": "Shivers. Ed Sheeran."
6 ]

```



POST  Send

Params Authorization Headers (8) **Body** Pre-request Script Tests Settings Cookie

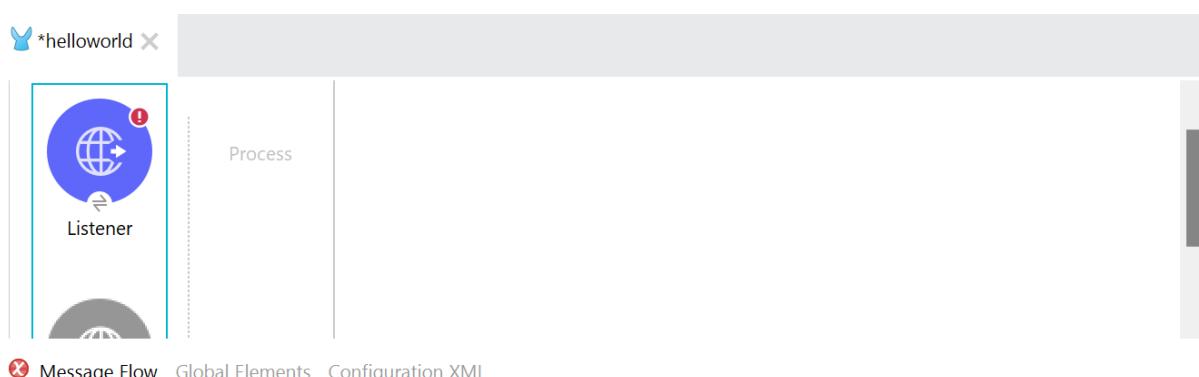
none form-data x-www-form-urlencoded **raw** binary GraphQL **JSON** **Beautify**

```
1 {
2     "a": "Hey Brother..Avicii",
3     "b": "See You Again (feat. Charlie Puth)-Wiz Khalifa",
4     "c": "Wake Me Up..Avicii",
5     "d": "Shivers..Ed Sheeran."
6 }
```

Body Cookies Headers (3) Test Results 200 OK 368 ms 165 B Save Response

Pretty Raw Preview Visualize JSON Copy Search

```
1 {
2     "Message": "Song added successfully"
3 }
```



Listener X Console Problems

General

MIME Type  
Redelivery  
Responses  
Advanced  
Metadata

Display Name: Listener

Basic Settings

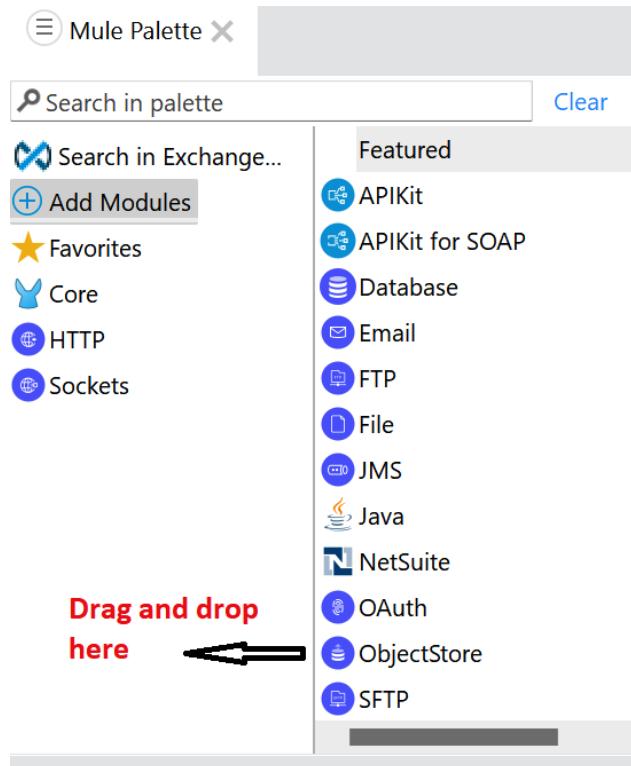
Connector configuration:

General

Path:

Input

Mule Mess  
Payload  
Attribut  
Variables



objectstoredemo

▼ StoreFlow

```
graph LR; Listener((Listener)) --> Store((Store)); Store --> Listener
```

Message Flow Global Elements Configuration XML

Store

Console Problems

General

Display Name: Store

General

Key:  lastProcessedSongID

Value:  1 5

Fail if present: False (Default)

Fail on null value: True (Default)

Object store: SongsObjectStore + Edit

objectstoredemo

RetrieveFlow

```
graph LR; Listener((Listener)) --> Retrieve[Retrieve]; Retrieve --> Transform[Transform Message]; Transform --> Listener
```

Error handling

Message Flow Global Elements Configuration XML

Retrieve

Console Problems

General Advanced Error Mapping Notes Help

There are no errors.

Display Name: Retrieve

General

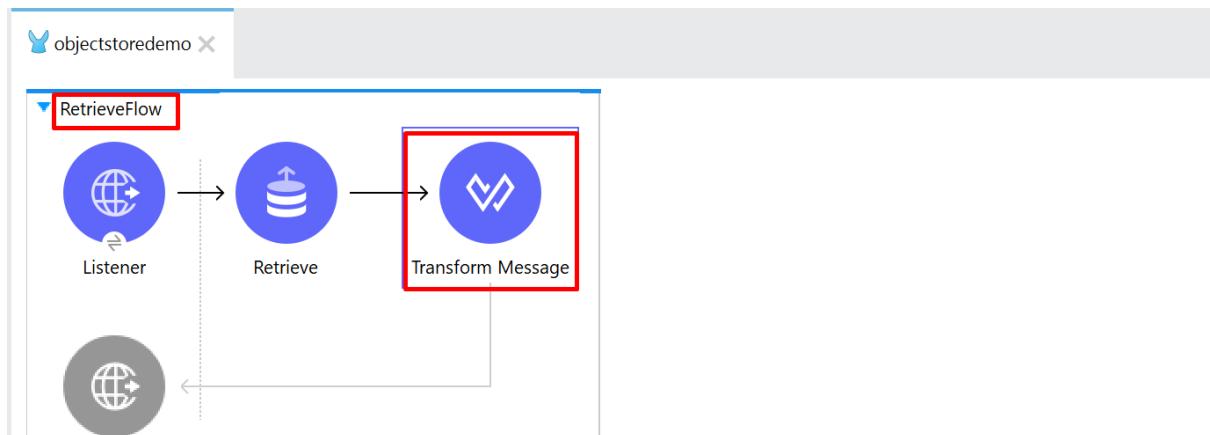
Key:  lastProcessedSongID

Default value:

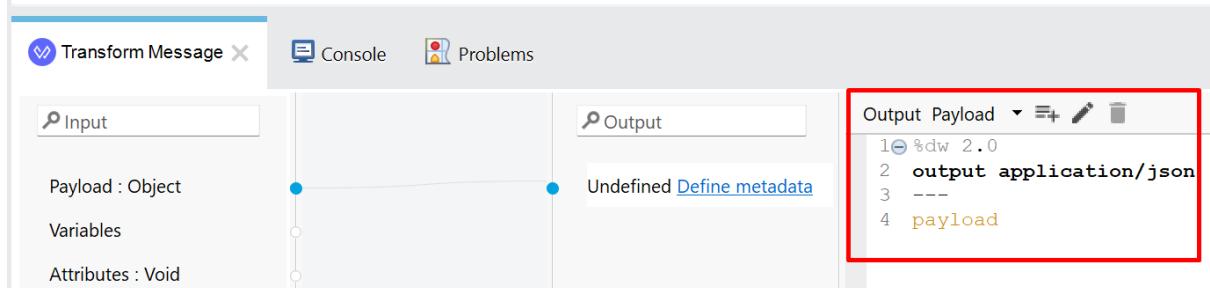
Object store: SongsObjectStore

The screenshot shows the Mule Studio interface with the following details:

- Message Flow:** A flow named "RetrieveFlow" is displayed. It starts with a "Listener" icon, followed by a "Retrieve" component (highlighted with a red box), then a "Transform Message" component, and finally a second "Listener" icon at the end of the flow.
- Component Configuration:** The "Retrieve" component is selected and its configuration is shown in the right-hand panel.
  - General Tab:** The "Display Name" is set to "Retrieve".
    - Key:** The value "lastProcessedSongID" is entered into the "Key" field, which is also highlighted with a red box.
    - Default value:** This field is empty.
  - Object store:** The value "SongsObjectStore" is entered into the "Object store" field, which is also highlighted with a red box.
- Toolbars and Status:** The top toolbar includes "Message Flow", "Global Elements", and "Configuration XML". The bottom toolbar includes "Console" and "Problems".



Message Flow Global Elements Configuration XML



KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

Body Cookies Headers (2) Test Results

200 OK 307 ms 75 B Save Response

Pretty Raw Preview Visualize Text

1

GET  Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

	KEY	VALUE	DESCRIPTION	...	Bulk Edit
	Key	Value	Description		

Body Cookies Headers (3) Test Results 200 OK 205 ms 123 B Save Response

Pretty Raw Preview Visualize JSON

1

# Chapter 9: Deploy your application

The screenshot shows the 'Access Management' interface with the 'Organization' tab selected. On the left, a sidebar lists various management categories like 'Users', 'Roles', 'Environments', etc. The main area displays a table of organizations. One organization, 'Packt Publication', is highlighted with a red box. The table columns include 'Name', 'Owner', and a small blue '+' icon for adding new entries. Below the table, a section titled 'Business Groups' provides information on their purpose and how to add them.

### Organization info

Organization name \*

Organization domain \*

Owner \*

Organization Id

Client Id

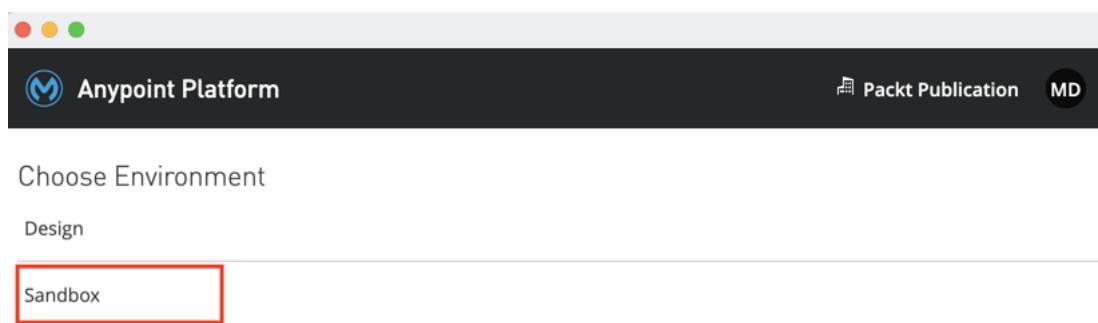
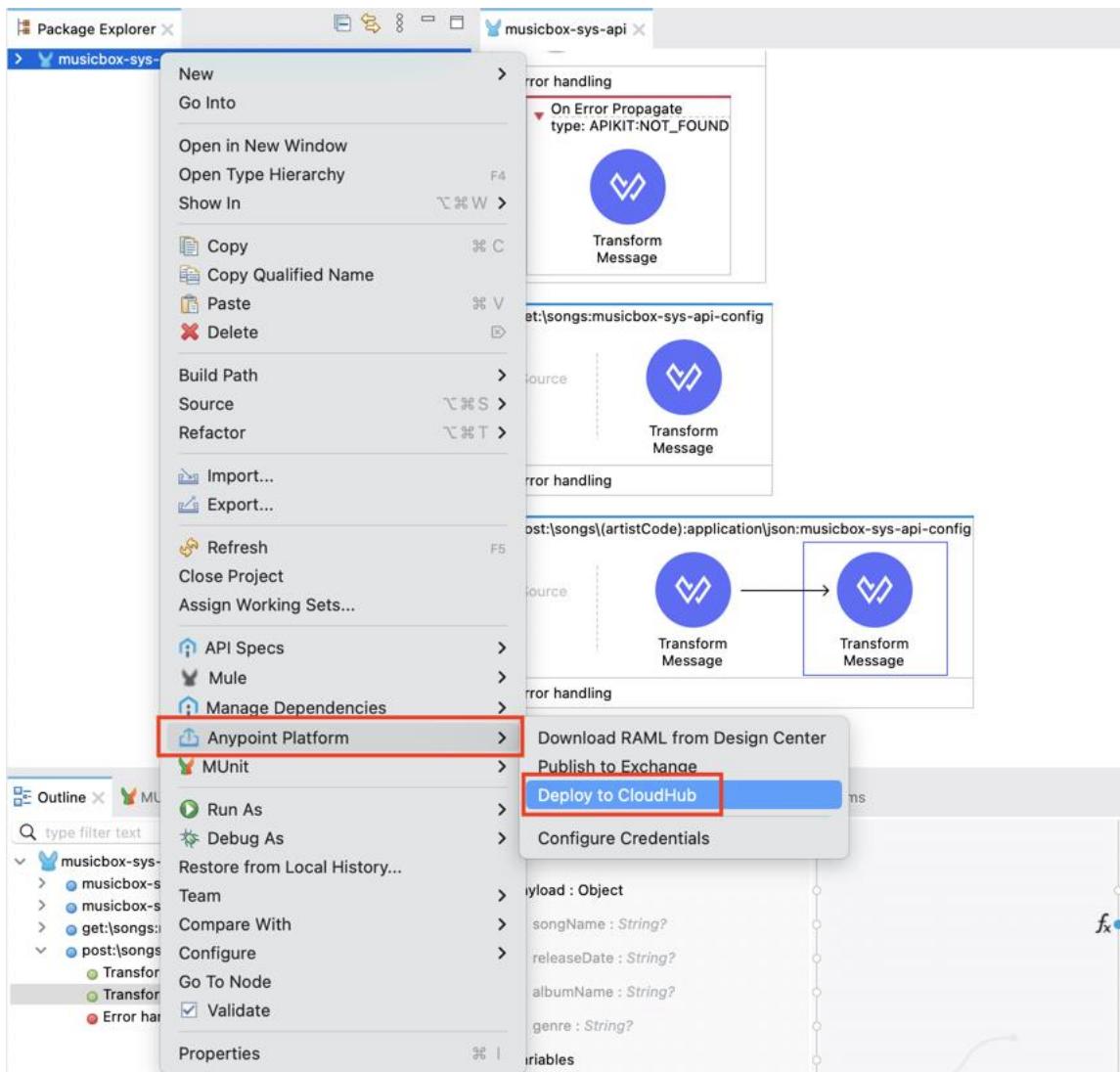
Client Secret

 [Show](#)

Default session timeout \*

 minutes

[Cancel](#) [Save changes](#)



**Anypoint Platform**

SANDBOX

### Deploying Application

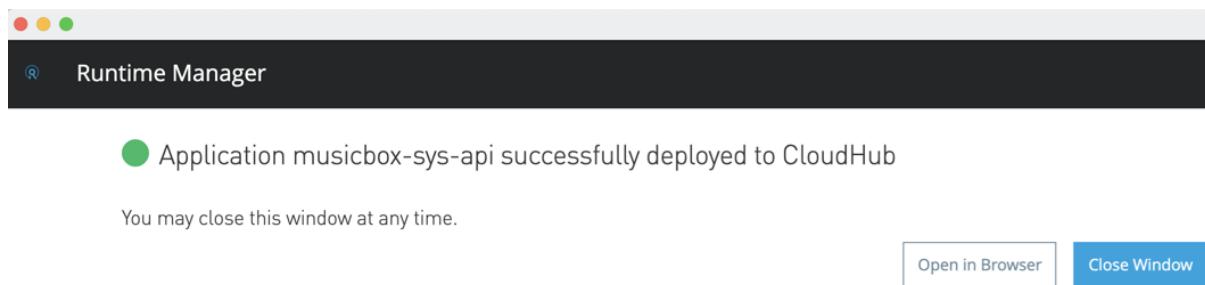
musicbox-sys-api

Deployment Target

CloudHub

Application File

Runtime	Properties	Insight	Logging	Static IPs
Runtime version 4.4.0	Worker size 0.1 vCores	Workers 1	⚠️ Your current subscription allows only one worker per application	
<input checked="" type="checkbox"/> Automatically restart application when not responding <input type="checkbox"/> Persistent queues   <input type="checkbox"/> Encrypt persistent queues <input checked="" type="checkbox"/> Use Object Store v2		<input type="button" value="Cancel"/> <input style="border: 2px solid red;" type="button" value="Deploy Application"/>		



**Runtime Manager**

SANDBOX

musicbox-sys-api

Stop

Applications

Dashboard

Insight

Logs

Object Store

Queues

Schedules

Settings

Application File

musicbox-sys-api-1.0.0-SNAPSHOT-mule-application.jar

Choose file  Get from sandbox

Last Updated 2022-05-23 10:19:57PM  
App url: [musicbox-sys-api.us-e2.cloudhub.io](http://musicbox-sys-api.us-e2.cloudhub.io)

Runtime	Properties	Insight	Logging	Static IPs
Runtime version 4.4.0	Worker size 0.1 vCores	Workers 1	⚠️ Your current subscription allows only one worker per application	
<input checked="" type="checkbox"/> Automatically restart application when not responding <input type="checkbox"/> Persistent queues   <input type="checkbox"/> Encrypt persistent queues <input checked="" type="checkbox"/> Use Object Store v2				

SANDBOX

Runtime Manager

Packt Publication ? MD

musicbox-sys-api

Stop ▾ 🔔

Applications

Dashboard

Insight Logs

Object Store

Queues

Schedules

Settings

musicbox-sys-api-1.0.0-SNAPSHOT-mule-application.jar

Last Updated 2022-05-23 11:04:44PM

App url: [musicbox-sys-api.us-e2.cloudhub.io](https://musicbox-sys-api.us-e2.cloudhub.io)

Runtime Properties Insight Logging Static IPs

Table view Text view

anypoint.platform.analytics_base_uri	https://analytics-ingest.anypoint.mulesoft.com/	X
anypoint.platform.client_id	77e78aed4cb94b13bdc8fc619cb45e8e	X
anypoint.platform.client_secret	D2eB35D580C74fB993F4a52d3a063795	X
anypoint.platform.base_uri	https://anypoint.mulesoft.com/	X
key	value	

## Download 30 day free trial

Existing customers can download Anypoint Studio and Mule from the [Support Portal](#).

First Name
Last Name 
Email
Company
Job Title
Industry
Phone
Country/Region
<input checked="" type="checkbox"/> I agree to Salesforce's <a href="#">License Agreement</a> and <a href="#">Privacy Policy</a> .
<b>Download</b>

JDK is required. [Download OpenJDK 8](#).

File Explorer showing the contents of the 'mule-enterprise-standalone-4.4.0' directory:

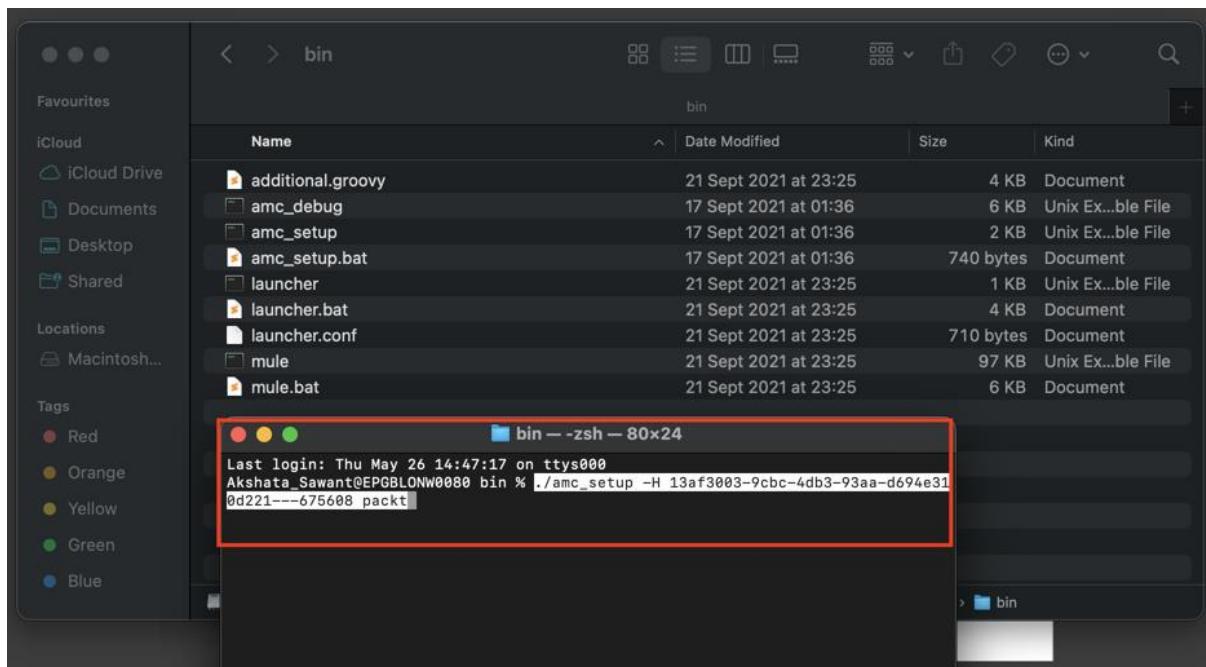
Name	Date Modified	Size	Kind
> apps	22 Sept 2021 at 00:17	--	Folder
> bin	Today at 11:26	--	Folder
> conf	Today at 11:26	--	Folder
> domains	22 Sept 2021 at 00:17	--	Folder
> lib	Today at 11:26	--	Folder
LICENSE.txt	21 Sept 2021 at 23:25	519 bytes	Plain Text
> logs	Today at 11:26	--	Folder
MIGRATION.txt	21 Sept 2021 at 23:25	3 KB	Plain Text
> policies	22 Sept 2021 at 00:17	--	Folder
README.txt	21 Sept 2021 at 22:50	4 KB	Plain Text
> server-plugins	22 Sept 2021 at 00:17	--	Folder
> services	22 Sept 2021 at 00:17	--	Folder
> tools	Today at 11:26	--	Folder

Runtime Manager interface showing the 'Servers' tab selected. A red box highlights the 'Add Server' button.

Name	Status	Type
packt	Up	Java

The 'Add Server' dialog is open, containing the following fields:

- Name:** packt (highlighted with a red box)
- Command:** ./amc\_setup -H 13af3003-9cbc-4db3-93aa-d694e310d221--675608 packt
- Copy command:** A blue button with a red box around it.



```
len -1 added 09/17/21
    Creating: com/mulesoft/agent/configuration/guice/HierarchyModule.class
len -1 added 09/17/21
    Creating: com/mulesoft/agent/AgentServiceLifecycleManager$LifecycleStage
.class len -1 added 09/17/21
    Creating: com/mulesoft/agent/AgentPlugin.class len -1 added 09/17/21

-> Mule Agent Unpacked

INFO: Fips enabled: false

Communication between Anypoint Management Center and the Mule Agent is authorized by using two way SSL verification. In the following step we are going to create a keystore and request Anypoint Management Center to sign it. Your private key will never leave your machine.

Sending Sign request to Anypoint Management Center
Mule Agent configured successfully
```

The screenshot shows the Anypoint Runtime Manager interface. The left sidebar has navigation links: SANDBOX, Applications, Servers (which is selected and highlighted with a red box), Flex Gateways, Alerts, VPCs, and Load Balancers. The main content area has buttons for Add Server, Create Group, Create Cluster, and a search bar for 'Search servers'. Below these are tables for 'Name', 'Status', 'Type', and 'Version'. One row is highlighted with a red box, showing a server named 'packt' with a status of 'Created', type 'Mule', and version '4.4.0'.

```

Akshata_Sawant - mule - java - mule - 80x24
* Started domain 'default' *
+-----+
+ Mule is up and kicking (every 5000ms) +
+-----+
* - + DOMAIN + - - * - + STATUS + - - *
* default * DEPLOYED *
*-----*
WARN 2022-05-26 15:28:07,842 [WebSocketInboundExecutor] [processor: ; event: ] com.mulesoft.agent.external.handlers.administration.ComponentRequestHandler: Ignored reference in configuration: '' does not exist in component 'mule.agent.tracking.handler.analytics'
WARN 2022-05-26 15:28:07,843 [WebSocketInboundExecutor] [processor: ; event: ] com.mulesoft.agent.external.handlers.administration.ComponentRequestHandler: Ignored reference in configuration: 'enabled' does not allow dynamic configuration for component 'mule.agent.tracking.handler.analytics'
INFO 2022-05-26 15:28:07,850 [WebSocketInboundExecutor] [processor: ; event: ] com.mulesoft.agent.configuration.postconfigure.DefaultPostConfigureRunner: Skip

```

## Runtime Manager

SANDBOX Add Server Create Group Create Cluster Search servers

Name	Status	Type	Version
packt	Running	Gateway	4.4.0

- Applications
- Servers**
- Flex Gateways
- Alerts
- VPCs
- Load Balancers

## Runtime Manager

Packt Publication ? MD

SANDBOX Deploy Application Application Name musicbox-sys-on-premise

Deployment Target packt

Application File musicbox-sys-api-1.0.0-SNAPSHOT-mule-application.jar

Choose file ▾ Get from sandbox

Deployment Target Insight Properties Logging

Target name packt  
 Target type GATEWAY  
 Target status Running  
 Gateway version 4.4.0  
 Agent version 2.4.22

Deploy Application

SANDBOX

musicbox-sys-on-premise

Stop ▾ 

← Applications

Dashboard

Flows

Insight

Schedulers

Settings

Status 

Last Updated 2022-05-26 4:24:59PM

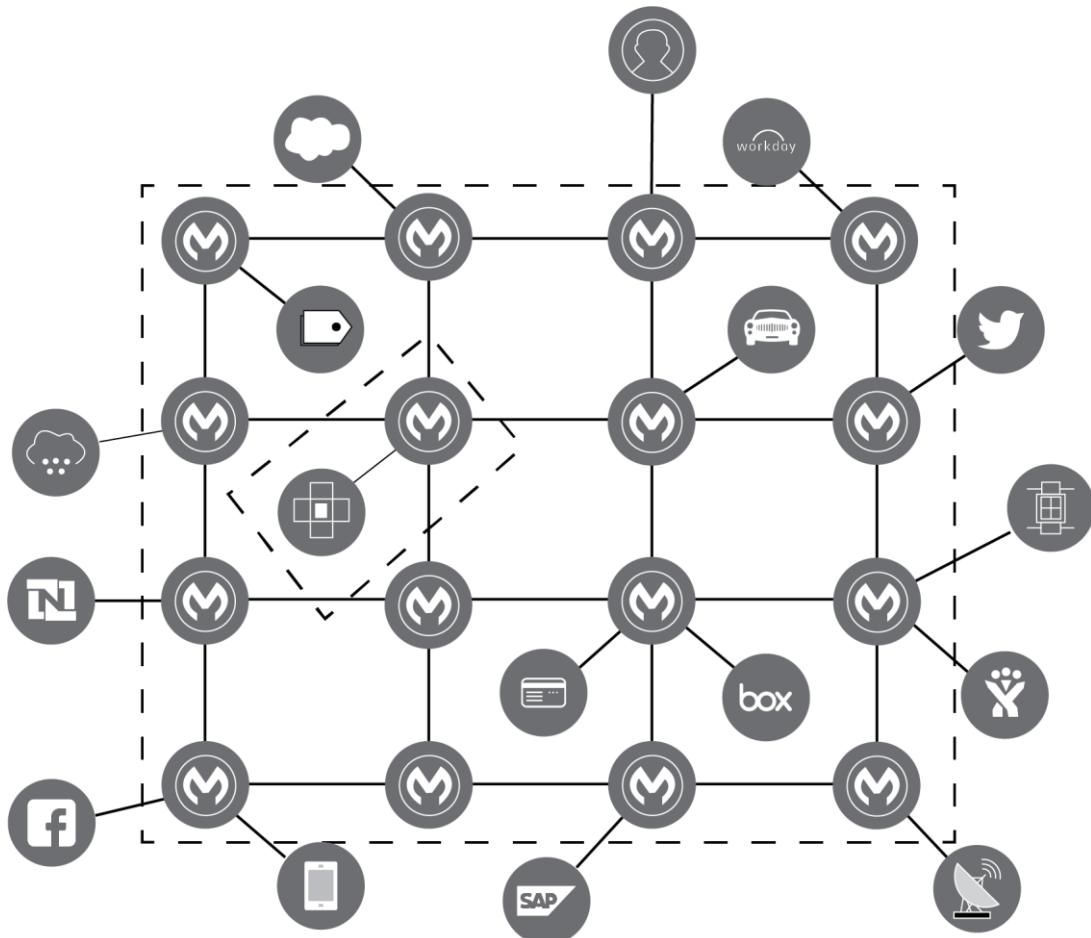
SHA-1 2a87edb76d8dbe1665940489f2b1e3eefa3d02e4

Uptime 2 minutes 50 seconds

Deployment Target     

Target name	packt
Target type	 GATEWAY
Target status	 Running
Gateway version	4.4.0
Agent version	2.4.22

# Chapter 10: Secure your API



≡  API Manager

Packt Publication ? MD

API Administration (Sandbox)

SANDBOX Add API ▾ Filter by ▾ Search by API name, version or label 0 to 0 of 0 ▾ K < > X

API Administration

API Groups

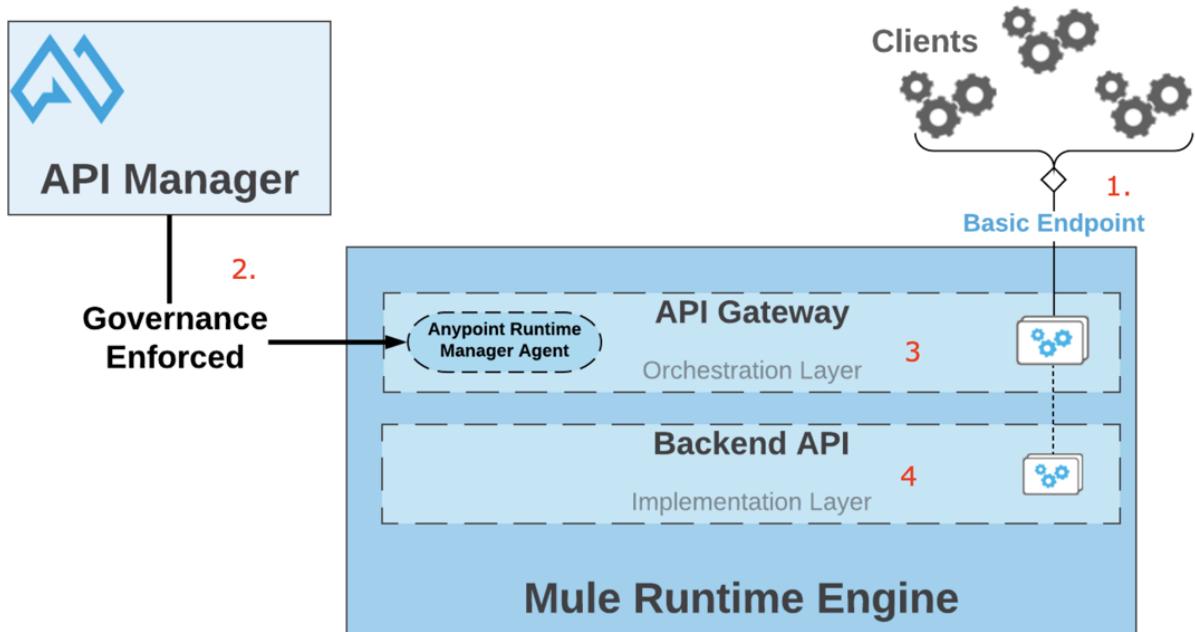
Automated Policies

Client Applications

Custom Policies

Analytics

No APIs found in this environment



Screenshot of the API Manager UI, specifically the API Administration (Sandbox) section:

- The sidebar includes links for **SANDBOX**, **API Administration** (which is selected and highlighted in red), **API Groups**, **Automated Policies**, **Client Applications**, **Custom Policies**, and **Analytics**.
- The main content area has a header with **Add API** and a filter button labeled **Filter by**.
- The main content area contains two options:
  - Add new API**: A box with a red border containing the text "Start a new API configuration from scratch through a guided experience".
  - Import API from zip file**: A box containing the text "Add an API by importing an API configuration zip file that was exported from another API".

## APIs / Add API

Runtime

API

Endpoint

Review

### API

Select the API you want to manage.

Select API from Exchange       Create new API

#### Select API

Search APIs

**musicbox-sys-api**  
Published to Exchange: March 20, 2022

[View in Exchange](#)

SANDBOX

API Administration

API Groups

Automated Policies

Client Applications

Custom Policies

Analytics

**musicbox-sys-api**  
Published to Exchange: March 20, 2022

[View in Exchange](#)

**Selected API**

Asset type: RAML/OAS

API version: v1 (Latest)

Asset version: 1.0.0 (Latest)

[Cancel](#)      [Previous](#)      [Next](#)

SANDBOX

## APIs / Add API

- Runtime
- API
- Endpoint
- Review

### Endpoint

Configure the endpoint and other settings.

Selected API **musicbox-sys-api** [View in Exchange](#)

API instance label (Optional)

Implementation URI (Optional)

Consumer endpoint (Optional)

Client provider

[Cancel](#) [Previous](#) [Next](#)

SANDBOX

## APIs / Add API

- Runtime
- API
- Endpoint
- Review

### Review

Review your selections before saving and deploying your API instance. You can also save the configuration and deploy it later.

<b>Runtime</b> <hr/> Runtime type <b>Mule Gateway</b> <a href="#">Edit</a> Proxy type <b>Basic Endpoint</b> <a href="#">Edit</a>	<b>API</b> <hr/> API name <b>musicbox-sys-api</b> API version <b>v1</b> Asset version <b>1.0.0</b>
<b>Endpoint</b> <hr/> Scheme <b>HTTP</b> <a href="#">Edit</a>	

[Cancel](#) [Previous](#) [Save](#)

**API Manager**

API Administration (Sandbox) musicbox-sys-api (v1) - Settings

SANDBOX

musicbox-sys-api v1

API Status: Unregistered Asset Version: 1.0.0 Latest Type: RAML/OAS

API Instance ID: 17815497 Autodiscovery API ID: 17815497

Labels: Add a label

Tags: ADD A TAG

To complete the registration process, you need to connect this API to your Mule application using Autodiscovery. [Learn more](#)

Key Metrics ^

Requests Top Apps Latency

Include Policy Violations 1h 3h 1d 7d 1m 3m 1y

No data available

To complete the registration process, you need to connect this API to your Mule application using Autodiscovery. [Learn more](#)

global

Global Configuration Element

Type: HTTP Listener config (Configuration)

API Autodiscovery

Service auto-discovery configuration information.

Auto-discovery configuration Notes Help

Auto-discovery settings

API Id: 17815497

Flow Name: musicbox-sys-api-main

Ignore base path on resource level policies

Create Edit Delete

Message Flow Global Elements Conf

Mule Properties Console

```
<terminated> api-autodiscovery-demo
* Application "api-autodiscovery"
* 14/05/2022 14:49
* Up for: 0 days, 0 hours, 2
*****
WARN 2022-05-14 14:49:53,956
```

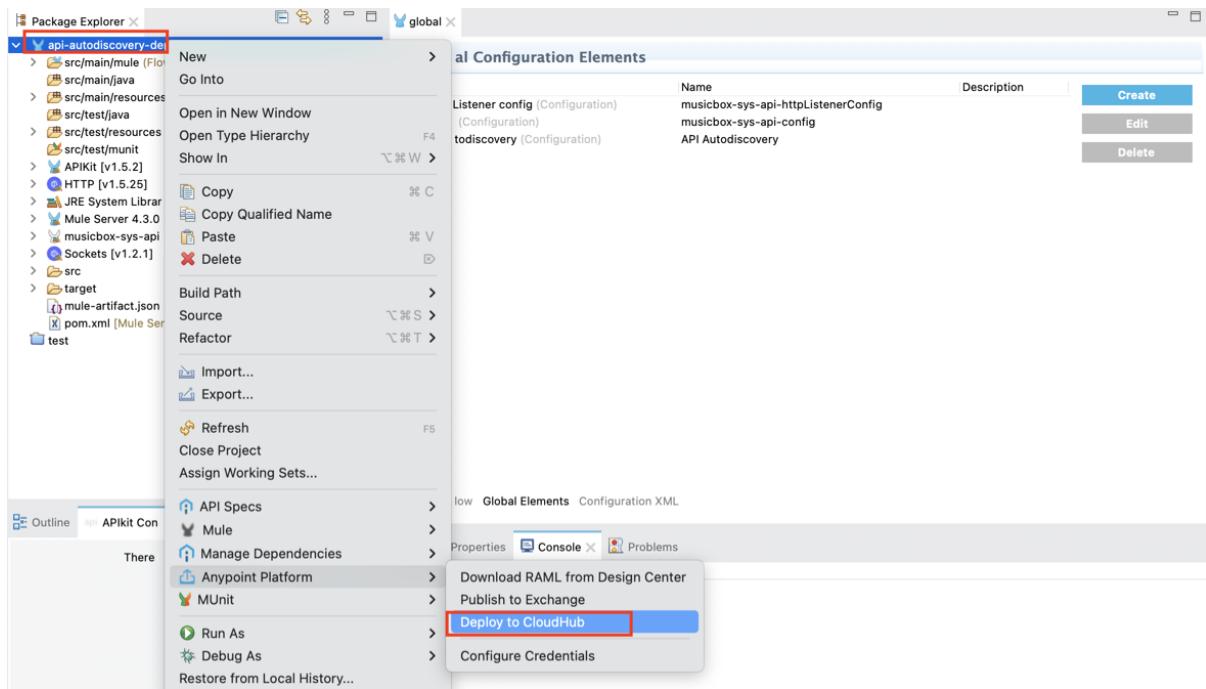
Cancel OK

API Id: 17815497

Flow Name: musicbox-sys-api-main

Ignore base path on resource level policies

OK



The screenshot shows the MuleSoft API Administration interface. The top navigation bar indicates 'API Administration (Sandbox)' and 'musicbox-sys-api (v1) - Policies'. The left sidebar includes links for 'Sandbox', 'API Administration', 'Alerts', 'Contracts', 'Policies' (which is currently selected and highlighted in blue), 'SLA Tiers', and 'Settings'. The main content area displays 'APIs / musicbox-sys-api / Policies' with the sub-section 'Automated policies'. It shows a message: 'No automated policies applied'. Below this, under 'API-level policies', there is a blue button labeled '+ Add policy' (which is highlighted with a red box). The message 'No policies applied' is displayed below the button. The overall interface has a clean, modern design with a light gray background and blue highlights for active sections.

≡ API Manager

API Administration (Sandbox) musicbox-sys-api (v1) - Policies

SANDBOX

- Policies

APIs / musicbox-sys-api / Policies / Configure Basic authentication - Simple policy

User Name

MuleSoft

User Password

..... Show

Advanced options >  
Configure policy version, methods and resources

Previous Apply

APIs / musicbox-sys-api / Policies / Configure Basic authentication - Simple policy

User Name

MuleSoft

User Password

..... Show

Advanced options ▾  
Configure policy version, methods and resources

Policy version

1.3.0 (latest) ▾

Method & resource conditions

Apply configuration to all API method & resources       Apply configuration to specific API method & resources

Previous Apply

**API Manager**

API Administration (Sandbox) musicbox-sys-api (v1) - Policies

SANDBOX

← API Administration

Alerts

Contracts

Policies

SLA Tiers

Settings

APIs / musicbox-sys-api / Policies

The policy was created successfully

Automated policies ⓘ

No automated policies applied

API-level policies ⓘ

+ Add policy

Basic authentication - Simple SECURITY

Methods: All API methods Resource: All API resources

```
11:27:59.259 05/15/2022 Worker-0 agw-policy-set-deployment.01 INFO
```

```
*****
* Policy: *
* http-basic-authentication-mule-2819519-musicbox-sys-api-main *
* OS encoding: UTF-8, Mule encoding: UTF-8 *
* *
*****
```

```
11:27:59.261 05/15/2022 Worker-0 agw-policy-set-deployment.01 INFO
```

```
Applied policy http-basic-authentication-mule-2819519 version 1.3.0 to API musicbox-sys-api-v1-v1:17815497 (17815497) in application api-autodiscovery-demo
```

api-autodiscovery-demo.us-e2.cloudhub.io/api/songs

Save | ⌂ | ⌓ | ⌚

GET ↴ api-autodiscovery-demo.us-e2.cloudhub.io/api/songs Send ↴

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

Body Cookies Headers (6) Test Results

Status: 401 Unauthorized Time: 1035 ms Size: 394 B Save Response ↴

Pretty Raw Preview Visualize JSON ↴

```

1 {
2   "error": "Registered authentication is set to HTTP basic authentication but there was no security context on the session.
          Authentication denied on connector HTTP listener"
3 }
```

api-autodiscovery-demo.us-e2.cloudhub.io/api/songs

Save Send

GET api-autodiscovery-demo.us-e2.cloudhub.io/api/songs

Params Authorization Headers (9) Body Pre-request Script Tests Settings Cookies

Type Basic Auth Username MuleSoft  
Password  Show Password

The authorization header will be automatically generated when you send the request. [Learn more about authorization](#)

Body Cookies Headers (5) Test Results Status: 200 OK Time: 597 ms Size: 312 B Save Response

Pretty Raw Preview Visualize JSON

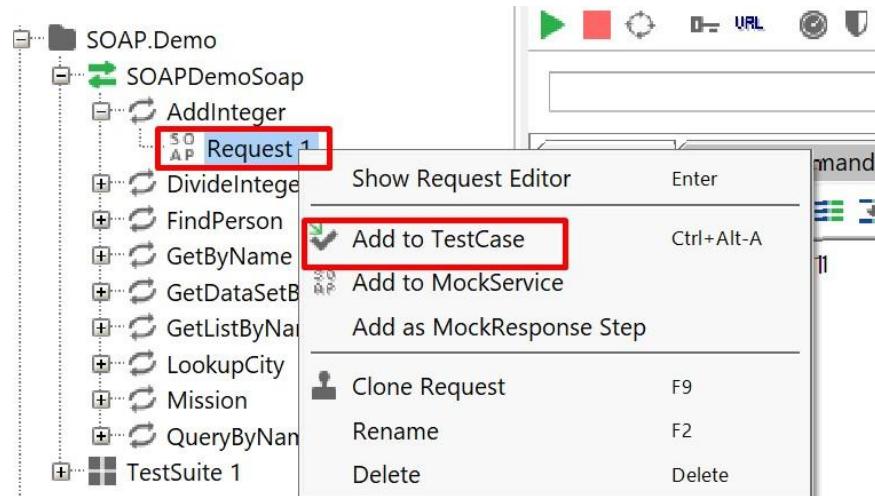
```
1 "a": "Hey Brother. Avicii",
2 "b": "See You Again (feat. Charlie Puth) Wiz Khalifa",
3 "c": "Wake Me Up. Avicii",
4 "d": "Shivers. Ed Sheeran."
```

# Chapter 11: Testing your application

The screenshot shows the Postman interface. A red box highlights the 'GET' method and the URL 'localhost:8081/hello'. Another red box highlights the 'Headers (6)' section. A red arrow points from the 'Send' button to a box labeled 'Specify required standard/custom HTTP headers'. A red box highlights the response status '200 OK' and the response body, which contains the JSON object: { "message": "Hello World" }. A red arrow points from the response body area to the text 'After sending the request, response will appear here'.

The screenshot shows the 'New SOAP Project' dialog in SoapUI. It includes fields for 'Project Name' (set to 'SOAP Demo'), 'Initial WSDL' (with a 'Browse...' button), and several checkboxes: 'Create Requests' (checked), 'Create TestSuite' (unchecked), and 'Relative Paths' (unchecked). At the bottom are 'OK' and 'Cancel' buttons.

The screenshot shows the SoapUI 5.7.0 interface. The 'Projects' tree on the left shows a project named 'SOADEMO' with various operations like 'AddInteger', 'DivideInteger', etc. The 'Request' tab in the center displays an XML envelope for an 'AddInteger' operation. The 'Response' tab on the right shows the XML response received from the server. A red arrow points from the 'Run button' in the toolbar to the 'Request' tab.

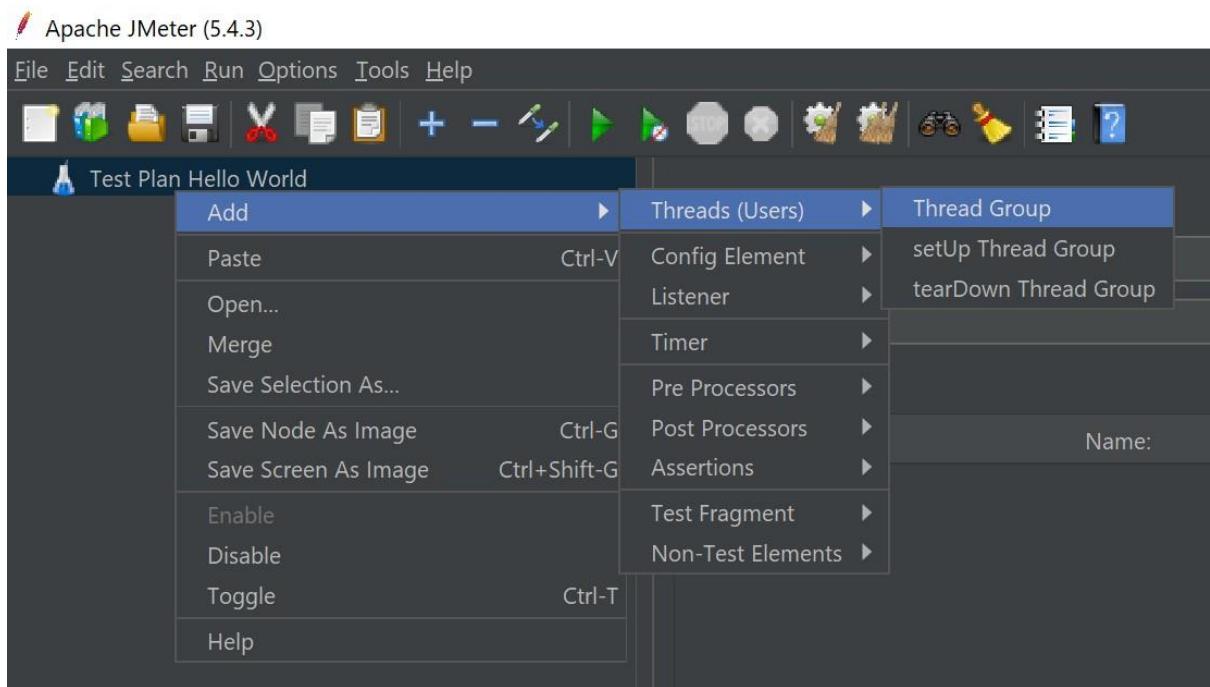
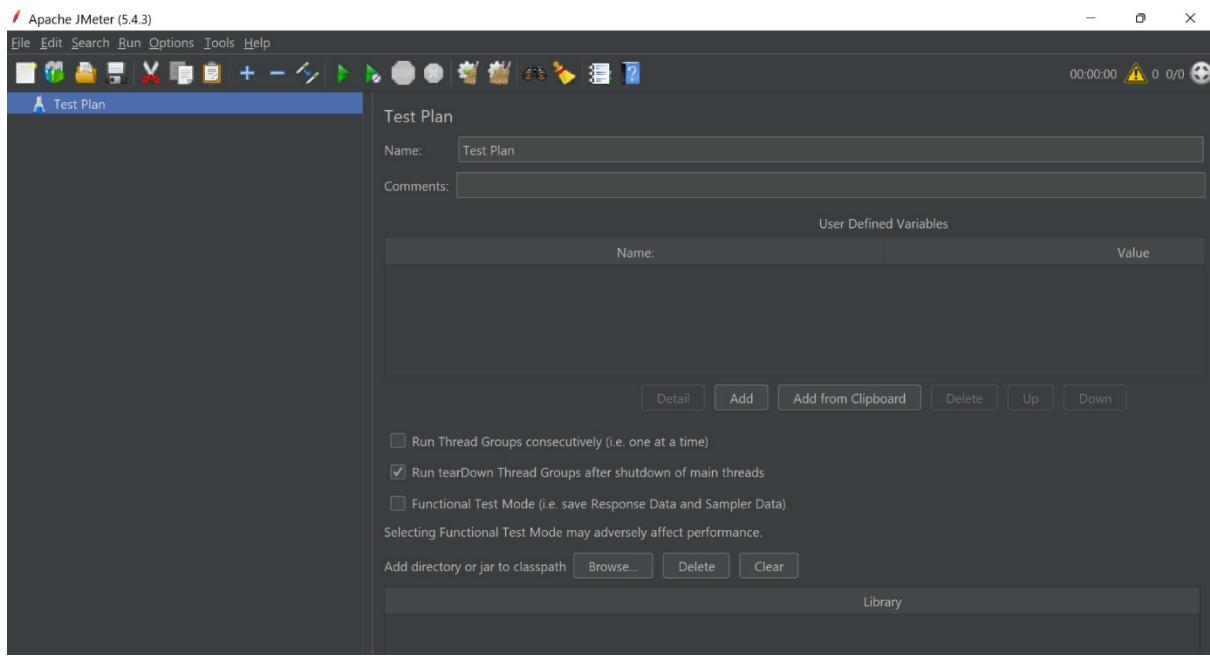


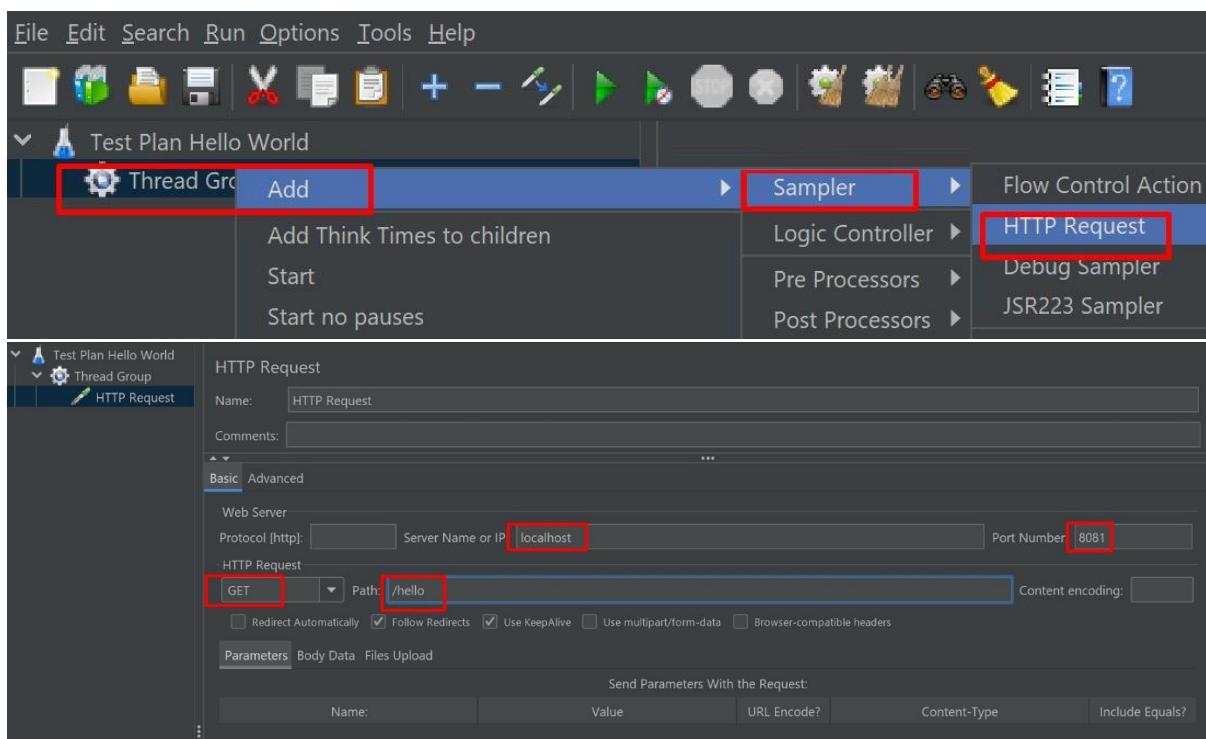
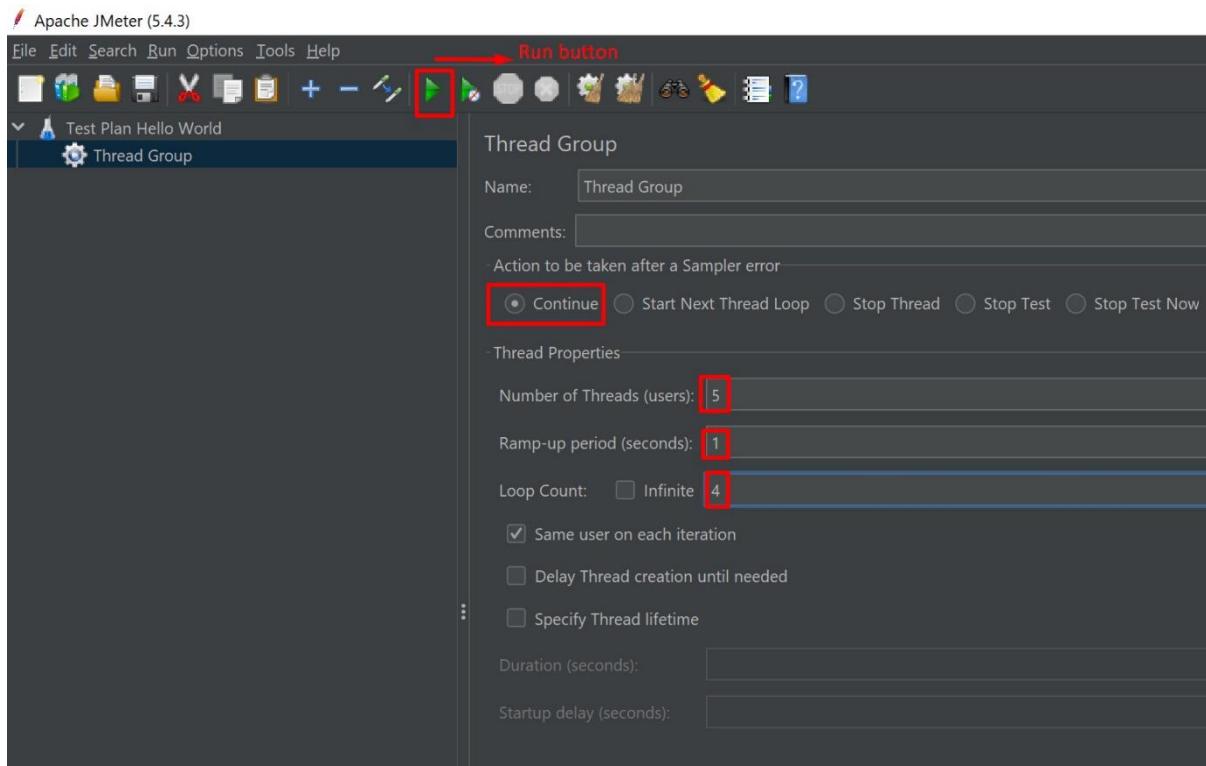
A screenshot of the SoapUI interface showing a 'LoadTest 1' configuration. The 'Threads' field is set to 5. The 'Strategy' dropdown is set to 'Simple'. The 'Test Delay' is set to 1000 ms with a random factor of 0.5. The results table shows performance metrics for two steps: 'AddInteger - Request 1' and 'TestCase:'. The 'LoadTest Properties' panel at the bottom shows log entries for 'LoadTest started' and 'LoadTest ended'.

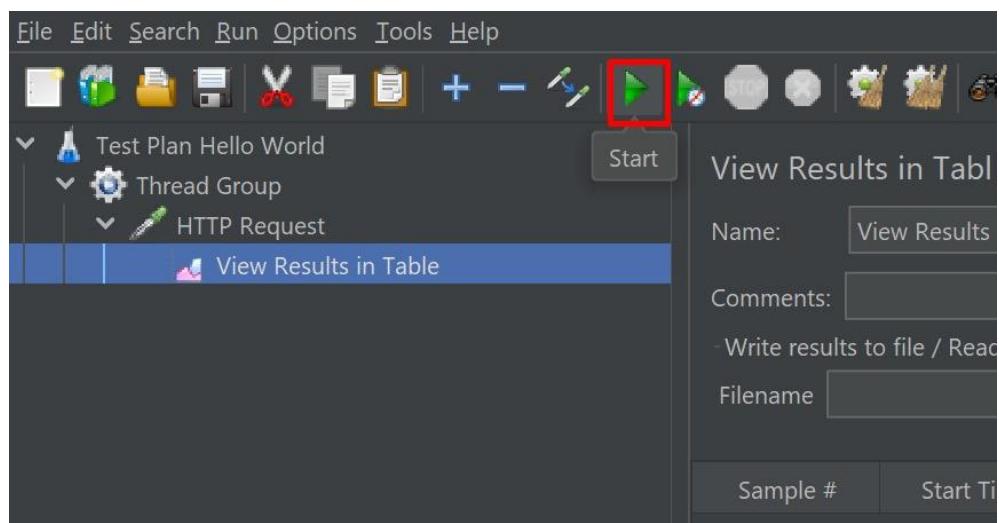
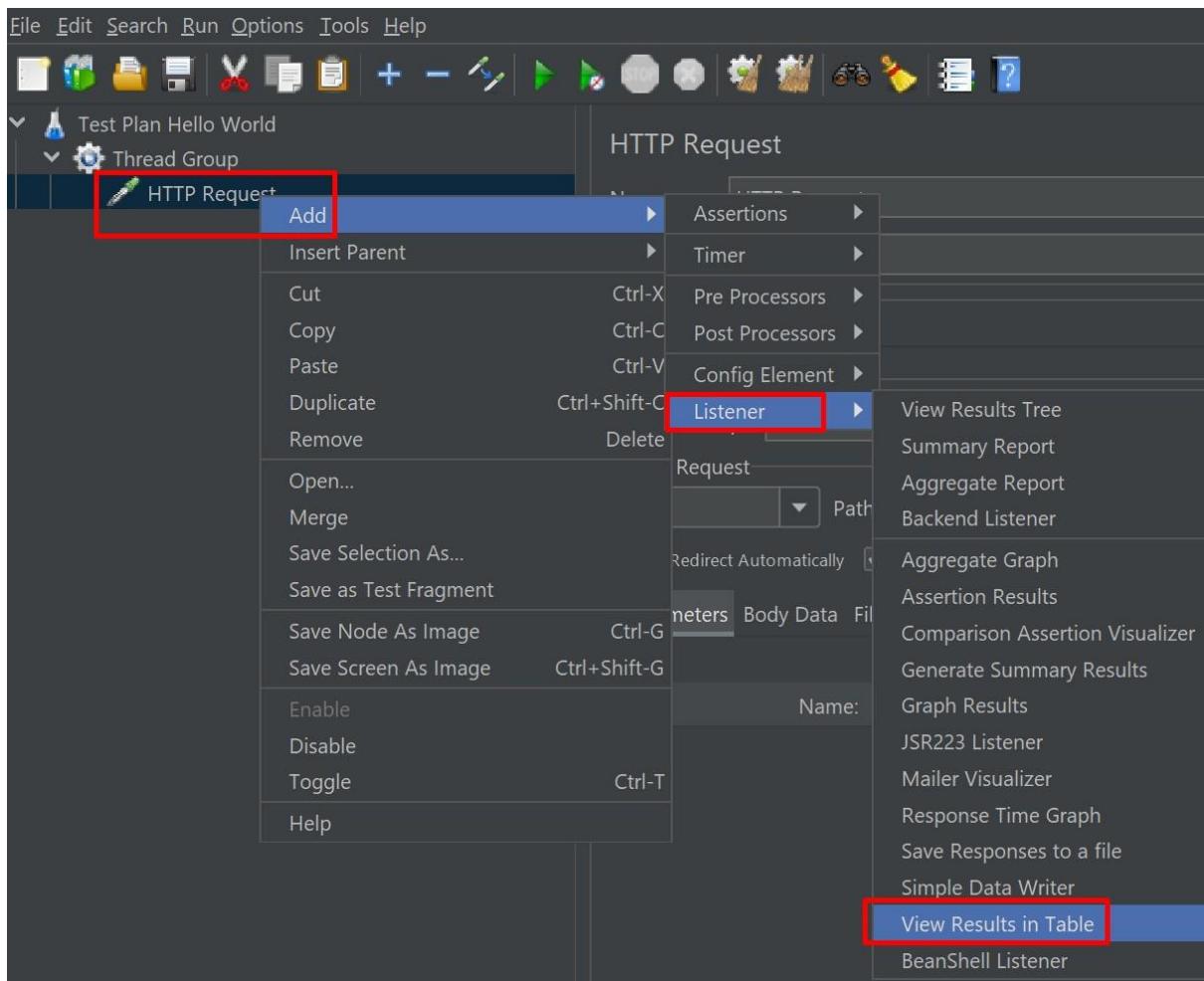
Test Step	min	max	avg	last	cnt	tps	bytes	bps	err	rat
AddInteger - Request 1	254	1169	317.95	275	100	4.5	38300	1726	0	0
TestCase:	254	1169	317.95	275	100	4.5	38300	1726	0	0

```
C:\ Select C:\Windows\System32\cmd.exe - jmeter
Microsoft Windows [Version 10.0.22000.556]
(c) Microsoft Corporation. All rights reserved.

C:\apache-jmeter-5.4.3\bir>jmeter
=====
Don't use GUI mode for load testing !, only for Test creation and Test debugging.
For load testing, use CLI Mode (was NON GUI):
  jmeter -n -t [jmx file] -l [results file] -e -o [Path to web report folder]
& increase Java Heap to meet your test requirements:
  Modify current env variable HEAP="-Xms1g -Xmx1g -XX:MaxMetaspaceSize=256m" in the jmeter batch file
Check : https://jmeter.apache.org/usermanual/best-practices.html
=====
```







HTTP Request.jmx (C:\JMeter\HTTP Request.jmx) - Apache JMeter (5.4.3)

File Edit Search Run Options Tools Help

Test Plan Hello World  
Thread Group  
HTTP Request  
View Results in Table

00:12:08 ⚠ 0 0/5

**View Results in Table**

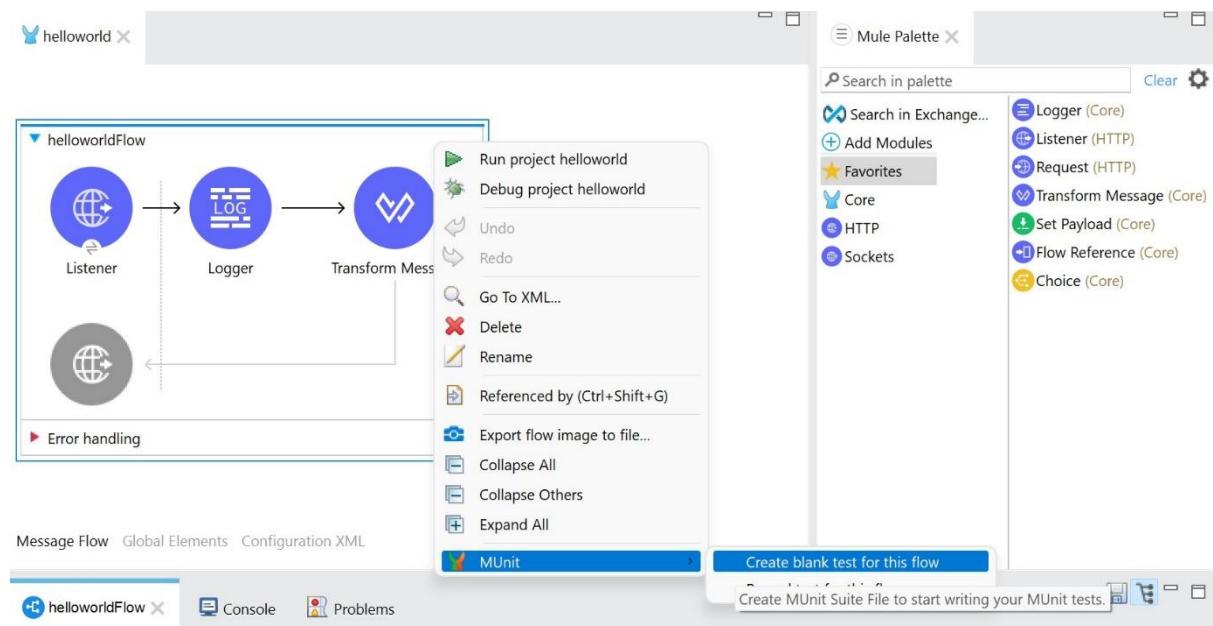
Name: View Results in Table

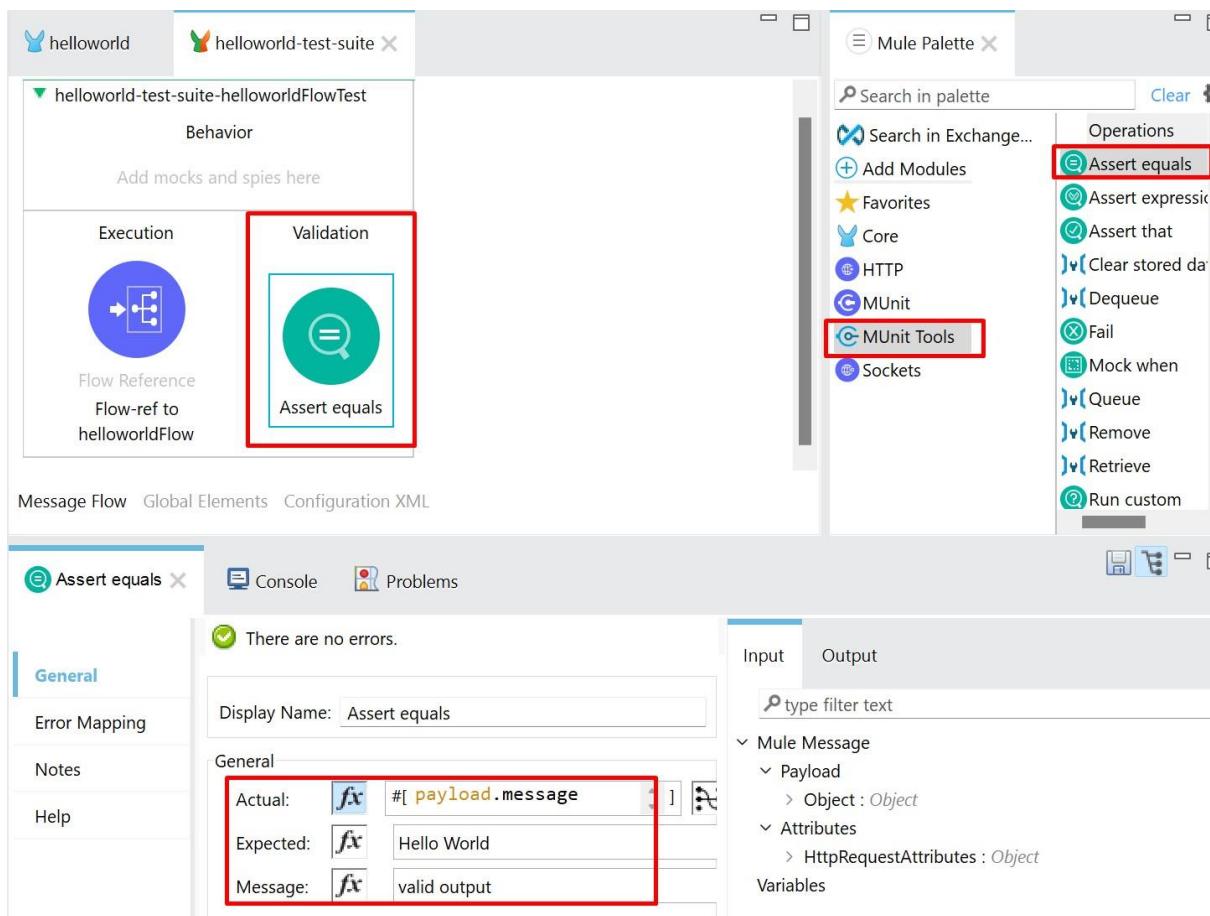
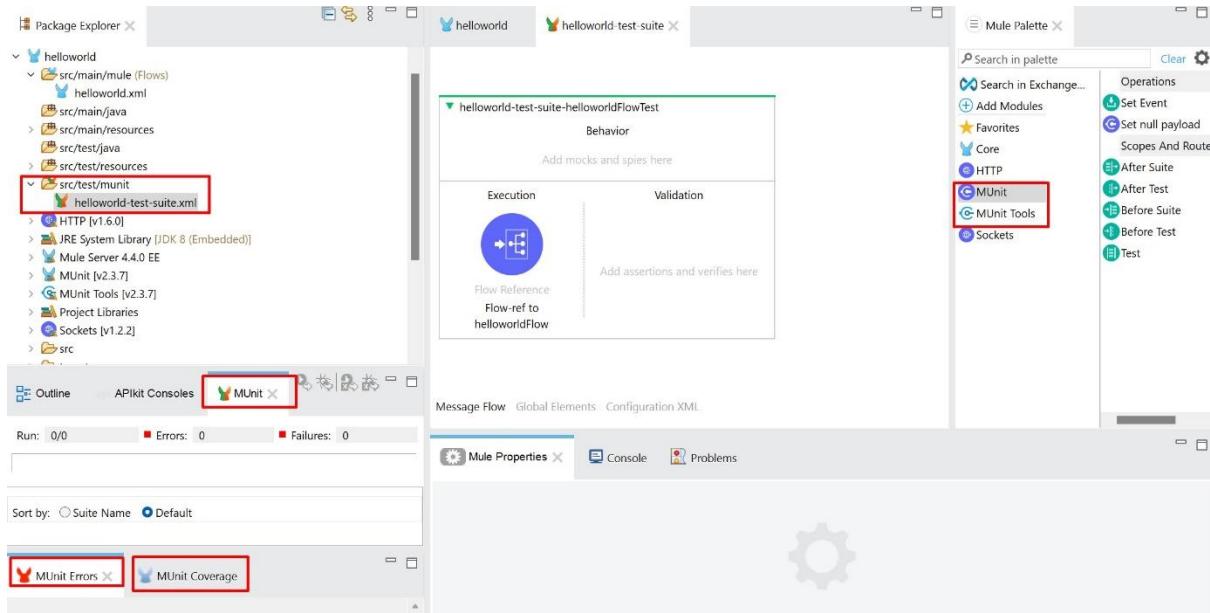
Comments:

Write results to file / Read from file

Filename: Browse... Log/Display Only: Errors Successes Configure

Sample #	Start Time	Thread Name	Label	Sample Time(…)	Status	Bytes	Sent Bytes	Latency	Connect Time(…)
1	16:49:29.298	Thread Group...	HTTP Request	93	OK	151	122	89	65
2	16:49:29.334	Thread Group...	HTTP Request	57	OK	151	122	53	29
3	16:49:29.391	Thread Group...	HTTP Request	10	OK	151	122	10	0
4	16:49:29.391	Thread Group...	HTTP Request	10	OK	151	122	10	0
5	16:49:29.402	Thread Group...	HTTP Request	4	OK	151	122	4	0
6	16:49:29.402	Thread Group...	HTTP Request	4	OK	151	122	4	0
7	16:49:29.407	Thread Group...	HTTP Request	5	OK	151	122	5	0
8	16:49:29.407	Thread Group...	HTTP Request	5	OK	151	122	5	0
9	16:49:29.534	Thread Group...	HTTP Request	8	OK	151	122	8	1
10	16:49:29.543	Thread Group...	HTTP Request	6	OK	151	122	6	0
11	16:49:29.549	Thread Group...	HTTP Request	9	OK	151	122	9	0
12	16:49:29.558	Thread Group...	HTTP Request	16	OK	151	122	16	0
13	16:49:29.737	Thread Group...	HTTP Request	12	OK	151	122	11	2
14	16:49:29.749	Thread Group...	HTTP Request	9	OK	151	122	9	0
15	16:49:29.758	Thread Group...	HTTP Request	10	OK	151	122	10	0
16	16:49:29.769	Thread Group...	HTTP Request	9	OK	151	122	9	0
17	16:49:29.949	Thread Group...	HTTP Request	8	OK	151	122	8	1
18	16:49:29.949	Thread Group...	HTTP Request	5	OK	151	122	5	0
19	16:49:29.954	Thread Group...	HTTP Request	6	OK	151	122	6	0
20	16:49:29.960	Thread Group...	HTTP Request	4	OK	151	122	4	0





The screenshot displays the Anypoint Studio interface with three main panes:

- Package Explorer**: Shows the project structure under "helloworld".
  - src/main/mule (Flows):
    - helloworld.xml
  - src/main/java
  - src/main/resources
  - src/test/java
- MUnit Test Suite**: Shows the test results for "helloworld-test-suite".
  - Run: 1/1 (highlighted with a red box)
  - Errors: 0
  - Failures: 0
- Transform Message Configuration**: Shows the message flow "helloworldFlow".

```
graph LR; Listener((Listener)) --> Logger((Logger)); Logger --> Transform[Transform Message]; Transform --> Listener
```

The "Transform Message" component has the following configuration:

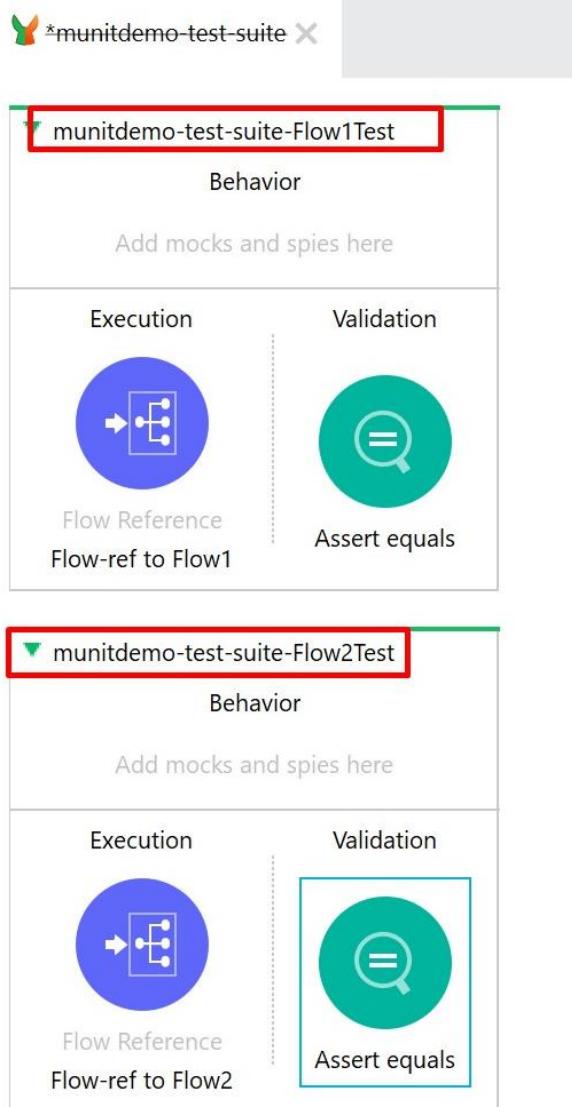
  - Input**: Payload : Any [Define](#)
  - Output**: Undefined [Define metadata](#)
  - Attributes : Object** (expanded):
    - listenerPath : String
    - rawRequestPath : String
    - relativePath : String
    - maskedRequestPath
  - Context**: Drag-and-Drop fields to build the transform

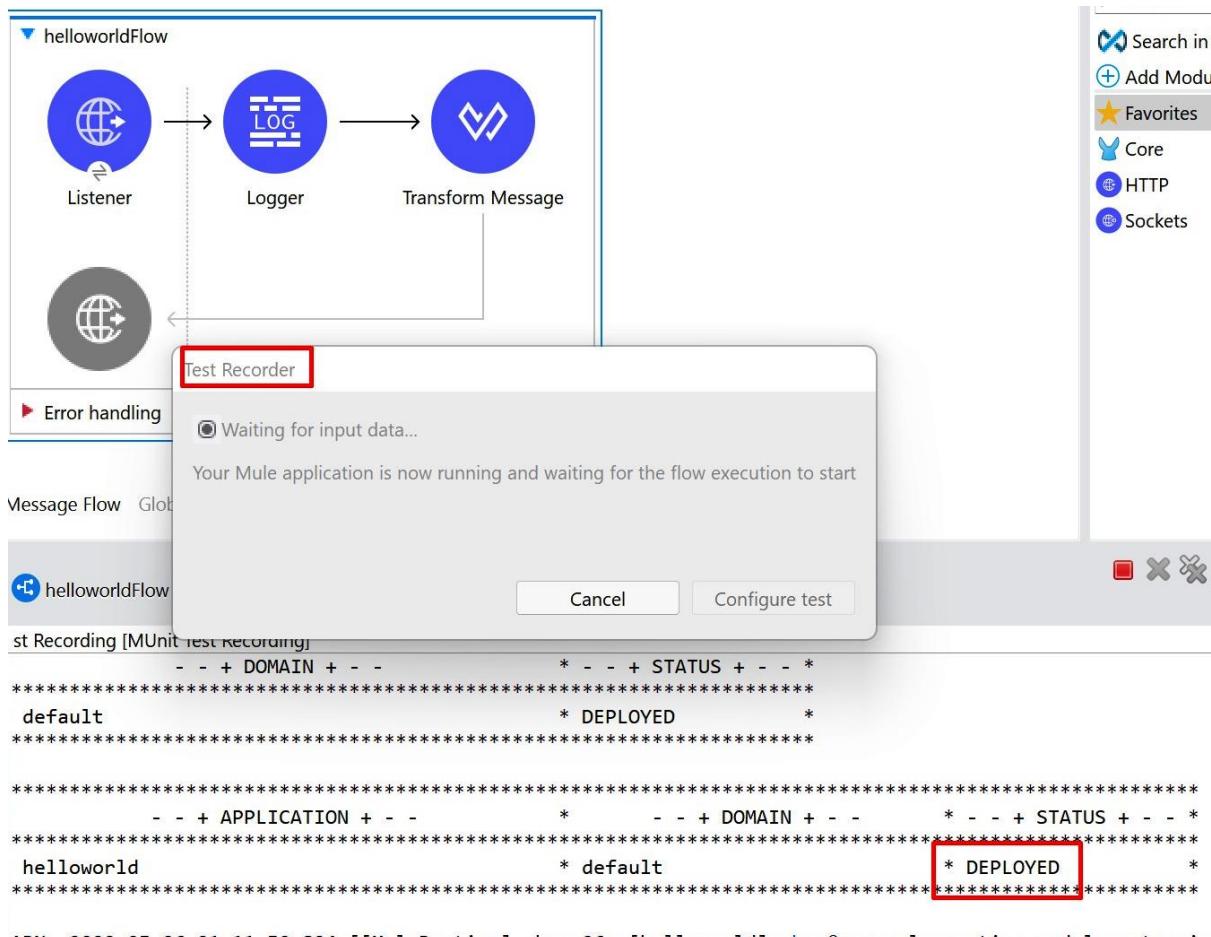
The screenshot shows the Anypoint Studio interface with the MUnit plugin active. The left pane displays the Package Explorer with a project named 'helloworld' containing 'src/main/mule (Flows)', 'src/main/java', 'src/main/resources', and 'src/test/java'. The right pane shows the 'helloworld-test-suite-helloworldFlowTest' configuration under the 'Behavior' tab, with sections for 'Execution' and 'Validation'. The 'Execution' section includes a 'Flow Reference' icon (blue circle with a flowchart) and a 'Flow-ref to helloworldFlow' message. The 'Validation' section includes an 'Assert equals' icon (green circle with a magnifying glass). Below these tabs are 'Message Flow', 'Global Elements', and 'Configuration XML' buttons. The bottom pane features the MUnit interface with tabs for 'Outline', 'APIkit Consoles', and 'MUnit'. The 'MUnit' tab is selected, showing a summary: 'Run: 1/1', 'Errors: 0', and 'Failures: 1'. A red box highlights the 'MUnit Errors' tab, which contains the following error message:

```
java.lang.AssertionError: valid output at file: [helloworld-test-suite.xml], line: [16]
Expected: "Hello World"
  as String {encoding: "UTF-8", mediaType: "*/*", mimeType: "*/*",
  but: "Hello World"
  as String {encoding: "UTF-8", mediaType: "application/json; charset="}
  at org.hamcrest.MatcherAssert.assertThat(MatcherAssert.java:20)
```

The 'Console' tab shows the application log output:

```
<terminated> helloworld (1) [MUnit] C:\AnypointStudio\plugin
INFO 2022-05-05 07:53:13,606 [Embedded] org
=====
+ Disposing domain 'default'
=====
INFO 2022-05-05 07:53:13,606 [Embedded] org
INFO 2022-05-05 07:53:13,606 [Embedded] org
=====
* Domain "default" shut down normally on: 5/
* Up for: 0 days, 0 hours, 0 mins, 18.221 se
=====
INFO 2022-05-05 07:53:14,505 [Embedded] org
INFO 2022-05-05 07:53:14,601 [Embedded] org
INFO 2022-05-05 07:53:15,713 [main] org.mule
```





GET <localhost:8081/hello> Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit
Body				
Cookies				
Headers	(3)			
Test Results				

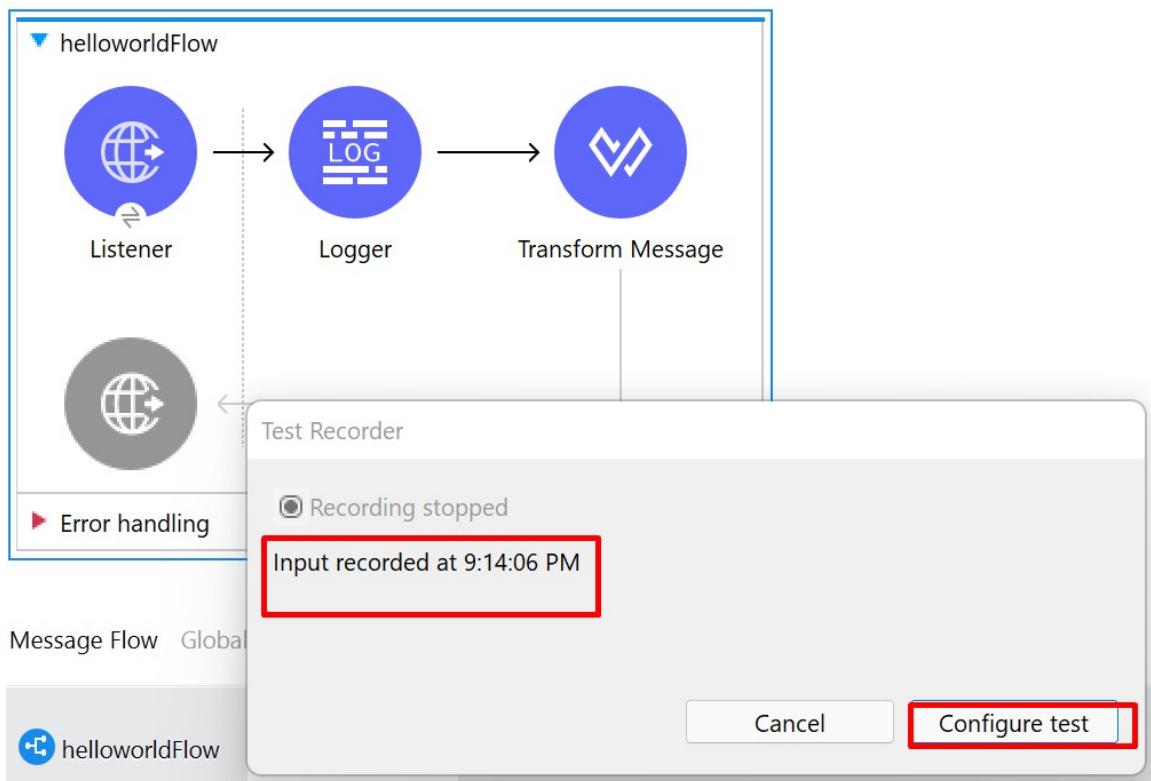
200 OK 872 ms 153 B Save Response

Pretty Raw Preview Visualize JSON

```

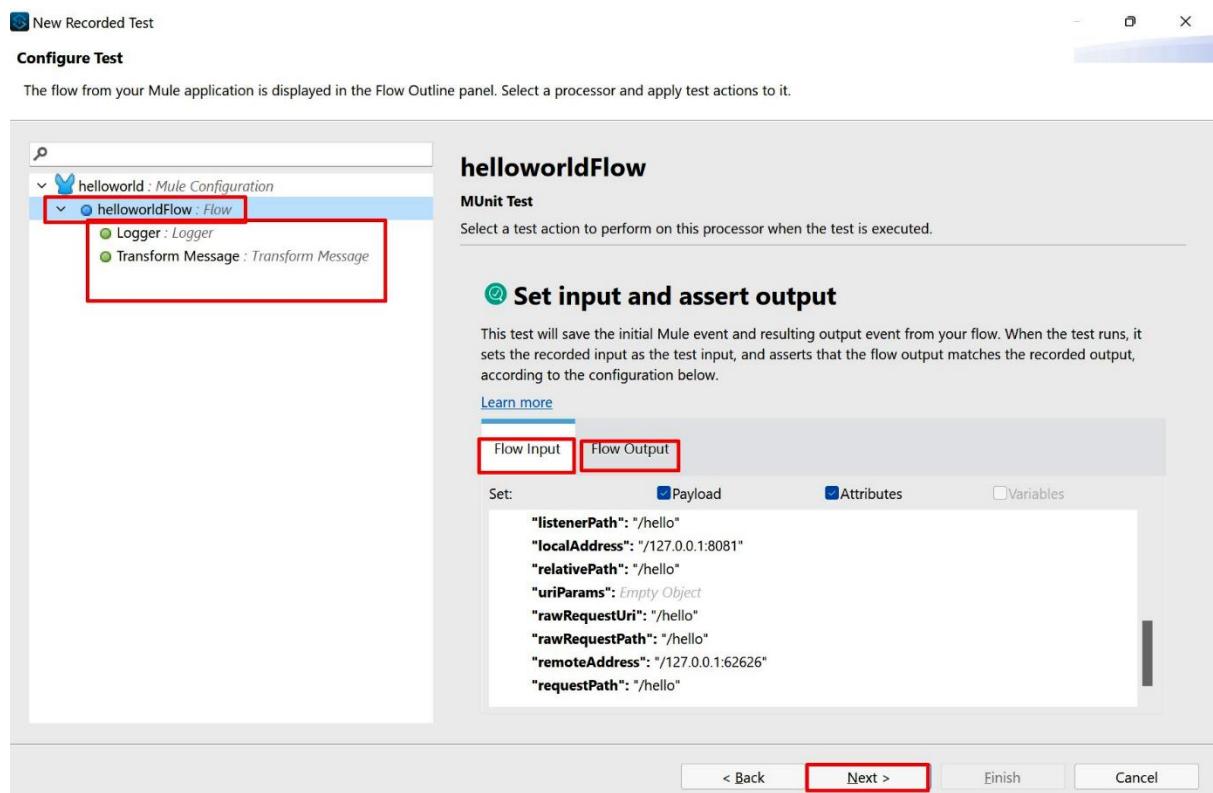
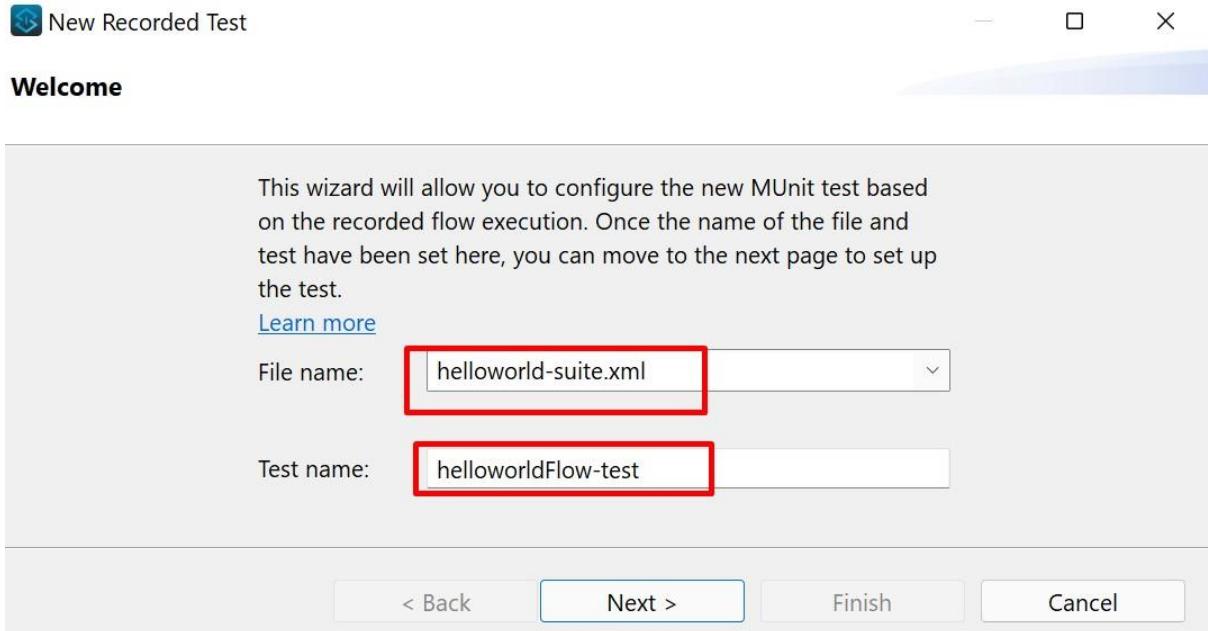
1 {
2     "message": "Hello World"
3 }

```



terminated> Test Recording [MUnit Test Recording] Mule Server 4.4.0 EE (Terminated May 6, 2022, 9:14:07 PM)

```
odule.extension.internal.runtime.source.ExtensionMessageSource: Message source
ssor.LoggerMessageProcessor: Welcome to Hello world application
```



Flow Input	Flow Output
Set:	<input checked="" type="checkbox"/> Payload <input checked="" type="checkbox"/> Attributes <input type="checkbox"/> Variables
<b>"listenerPath":</b> "/hello" <b>"localAddress":</b> "/127.0.0.1:8081" <b>"relativePath":</b> "/hello" <b>"uriParams":</b> <i>Empty Object</i> <b>"rawRequestUri":</b> "/hello" <b>"rawRequestPath":</b> "/hello" <b>"remoteAddress":</b> "/127.0.0.1:62626" <b>"requestPath":</b> "/hello"	

Flow Input	Flow Output
Assert:	
<ul style="list-style-type: none"> <li>✓ <input checked="" type="checkbox"/> <b>Payload:</b> <i>Object</i> <ul style="list-style-type: none"> <li>✓ "message": "Hello World"</li> </ul> </li> <li>✗ <input type="checkbox"/> <b>Attributes:</b> <i>Object</i> <ul style="list-style-type: none"> <li>&gt; <input type="checkbox"/> "headers": <i>Object</i> <ul style="list-style-type: none"> <li>✗ "clientCertificate": null</li> <li>✗ "method": "GET"</li> <li>✗ "scheme": "http"</li> <li>✗ "queryParams": <i>Empty Object</i></li> </ul> </li> </ul> </li> </ul>	

 New Recorded Test**Test Summary**

Here's a summary of the test that will be automatically generated for your project.

[Learn more](#)

**Behavior**

All the preconditions to be set before executing the test logic.



Set Event

Flow: helloworldFlow

**Execution**

Testing logic which will wait for all processes to finish before running the validations.



Flow Ref

Flow: helloworldFlow

**Validation**

The validations for the results of the execution.



Assertion(s)

Flow: helloworldFlow

< Back

Next >

Finish

Package Explorer

- src/test/java
- src/test/resources
  - log4j2-test.xml
- helloworldFlowtest
  - {!} assert\_expression\_payload.dwl
  - {!} set-event\_attributes.dwl**
  - {!} set-event\_payload.dwl
- src/test/munit
  - helloworld-suite.xml
  - helloworld-test-suite.xml
- > HTTP [v1.6.0]
- > JRE System Library [JDK 8 (Embedded)]
- > Mule Server 4.4.0 EE
- > MUnit [v2.3.7]
- > MUnit Tools [v2.3.7]

helloworld-suite

Behavior

Execution      Validation

Message Flow    Global Elements    Configuration XML

APIkit Consoles

Set Input

Console    Problems

General

Metadata

Notes

Help

Display Name: Set Input

Set Event

Define the new event that will be output by this operation

Start with an empty event  
 Clone the incoming event and override values

Payload    Attributes    Error    Variables

Value: **#readUrl('classpath://helloworldFlowtest/set-event\_attributes.dwl')**

Package Explorer

- src/test/java
- src/test/resources
  - log4j2-test.xml
- helloworldFlowtest
  - {!} assert expression payload.dwl**
  - {!} set-event\_attributes.dwl
  - {!} set-event\_payload.dwl
- src/test/munit
  - helloworld-suite.xml

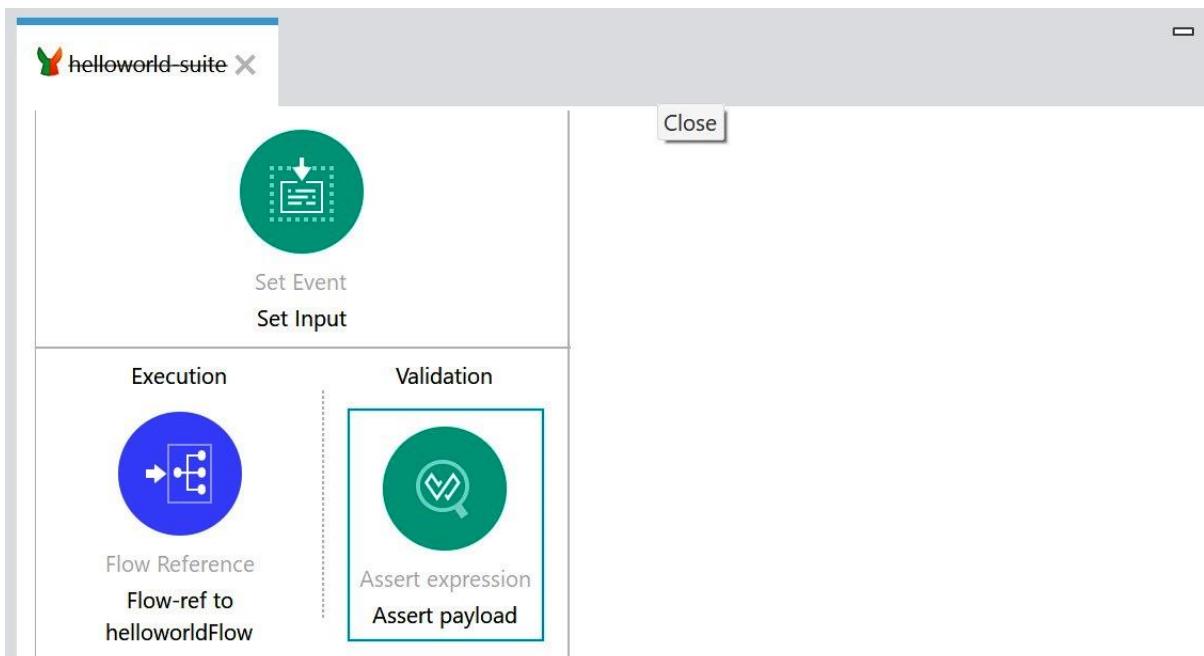
helloworld-suite

{!} assert\_expression\_payload.dwl

```

1 ⊕ %dw 2.0
2 import * from dw::test::Asserts
3 ---
4 payload must equalTo({
5   "message": "Hello World"
6 })

```



Message Flow Global Elements Configuration XML

The screenshot shows the Mule Studio properties editor for the 'Assert payload' component. The left sidebar lists tabs: General, Error Mapping, Notes, and Help. The 'General' tab is selected. The main area displays the following information:

- Display Name:** Assert payload
- General** section:
  - Expression:** `fx` (with a preview window showing DWScript code)
  - Message:** `fx` (with a red box around the text 'The payload does not match')

A status message at the top indicates: **There are no errors.**

```
1 ⊕ %dw 2.0
2 import helloworldFlowtest::assert_e>
3 ---
4 assert_expression_payload::main({pa} )
```

Package Explorer

- src/test/java
- src/test/resources
  - log4j2-test.xml
- helloworldFlowtest
  - {!} assert\_expression\_payload.dwl
  - {!} set-event\_attributes.dwl**
  - {!} set-event\_payload.dwl
- src/test/munit
  - helloworld-suite.xml
  - helloworld-test-suite.xml
- HTTP [v1.6.0]
- JRE System Library [JDK 8 (Embedded)]
- Mule Server 4.4.0 EE
- MUnit [v2.3.7]
- MUnit Tools [v2.3.7]

helloworld-suite

Behavior

Set Event  
Set Input

Execution Validation

Message Flow Global Elements Configuration XML

Set Input

Console Problems

General

Metadata Notes Help

Display Name: Set Input

Set Event

Define the new event that will be output by this operation

Start with an empty event

Clone the incoming event and override values

Payload Attributes Error Variables

Value: **#[readUrl('classpath://helloworldFlowtest/set-event\_attributes.dwl')]**

Package Explorer

- src/test/java
- src/test/resources
  - log4j2-test.xml
- helloworldFlowtest
  - {!} assert expression payload.dwl**
  - {!} set-event\_attributes.dwl
  - {!} set-event\_payload.dwl
- src/test/munit
  - helloworld-suite.xml

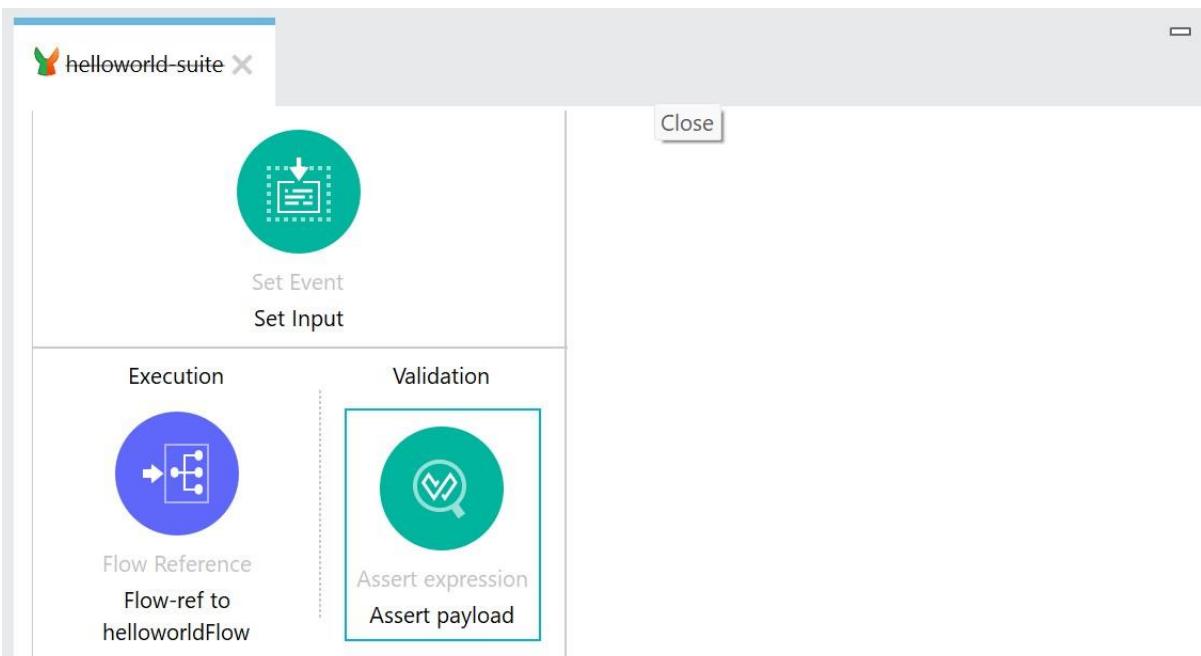
helloworld-suite

{!} assert\_expression\_payload.dwl

```

1@ %dw 2.0
2 import * from dw::test::Asserts
3 ---
4 payload must equalTo({
5   "message": "Hello World"
6 })

```



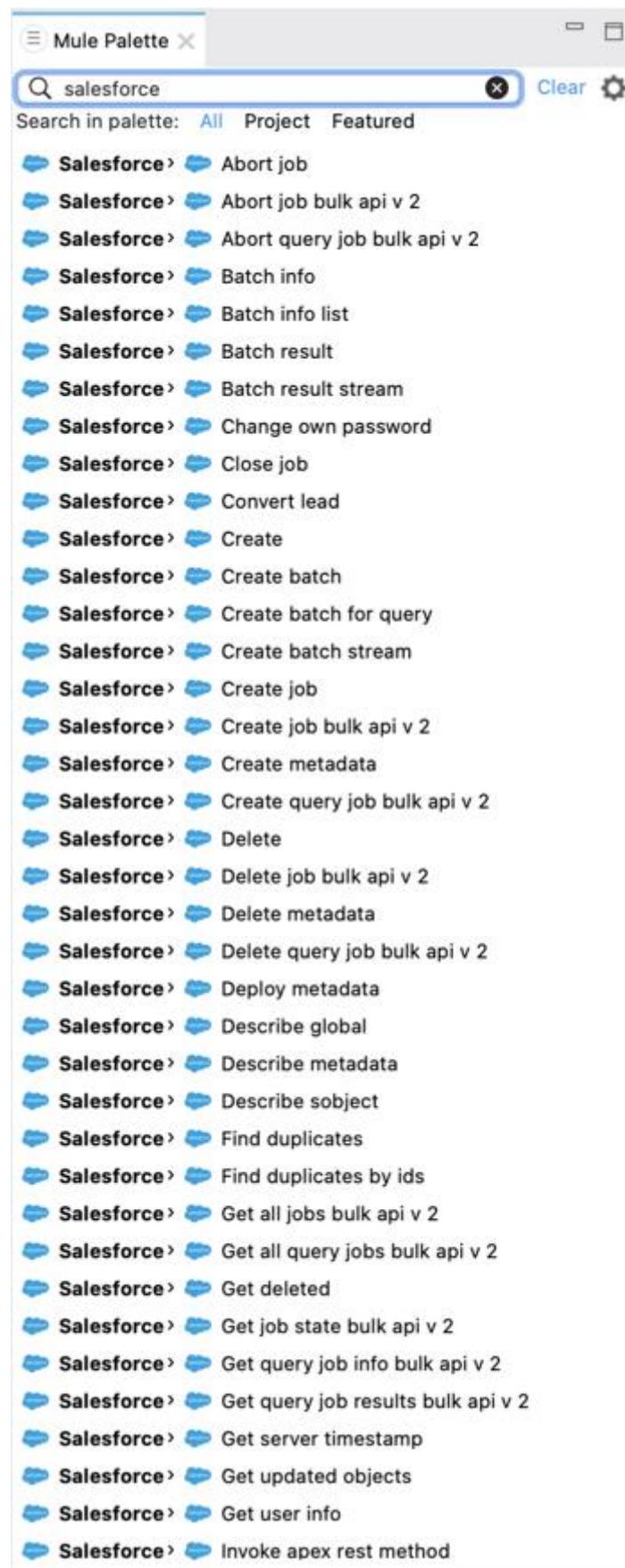
Message Flow Global Elements Configuration XML

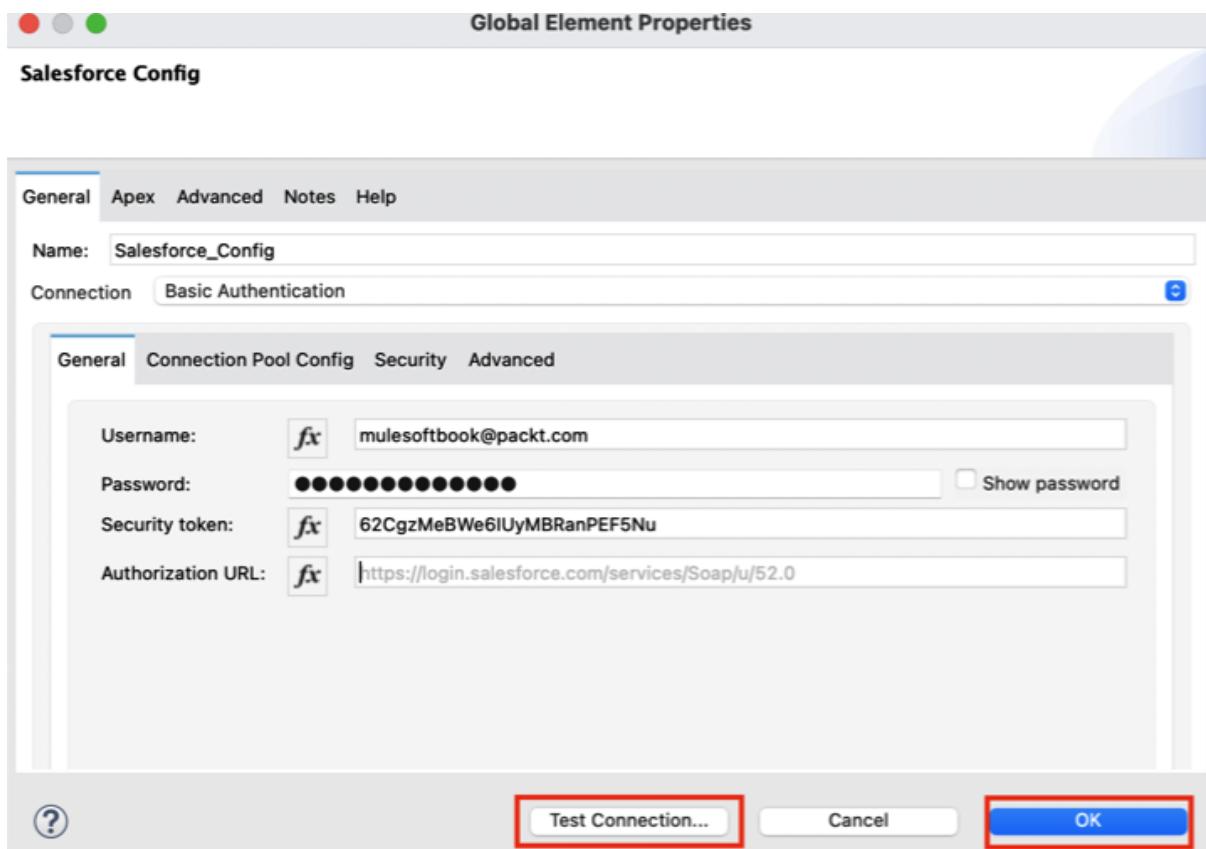
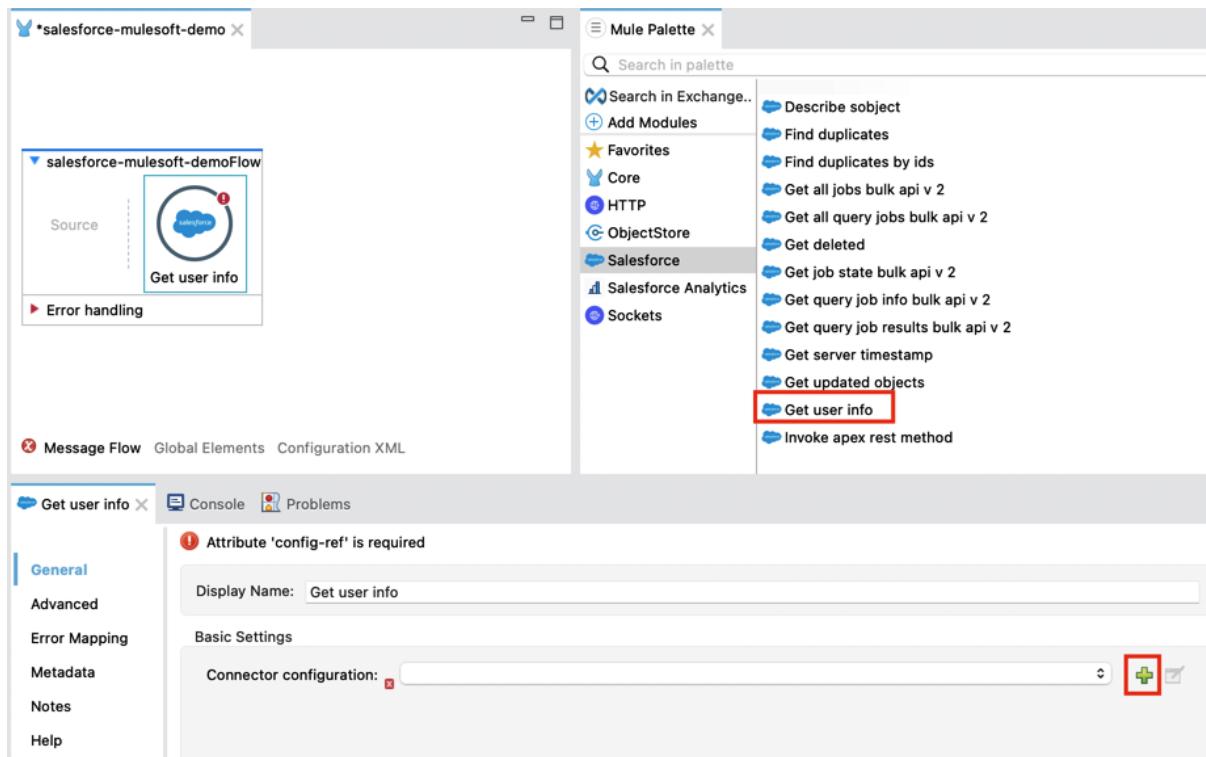
The screenshot shows the Mule Studio properties editor for the 'Assert payload' component. The 'General' tab is selected. The 'Validation' status indicates 'There are no errors.' The 'Display Name' is set to 'Assert payload'. In the 'General' section, the 'Expression:' field contains the following DWScript code:

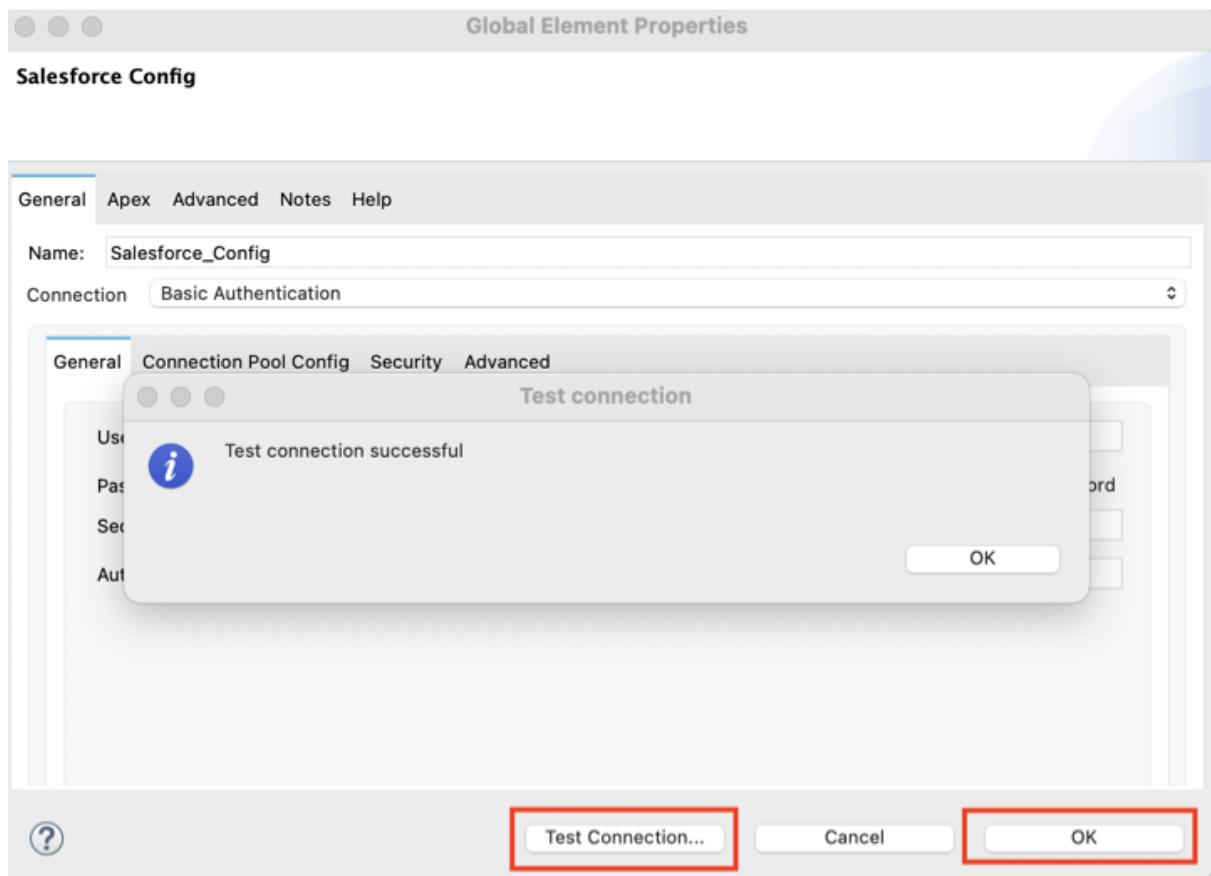
```
1 ⊕ %dw 2.0
2 import helloworldFlowtest::assert_e>
3 ---
4 assert_expression_payload::main({pa}
```

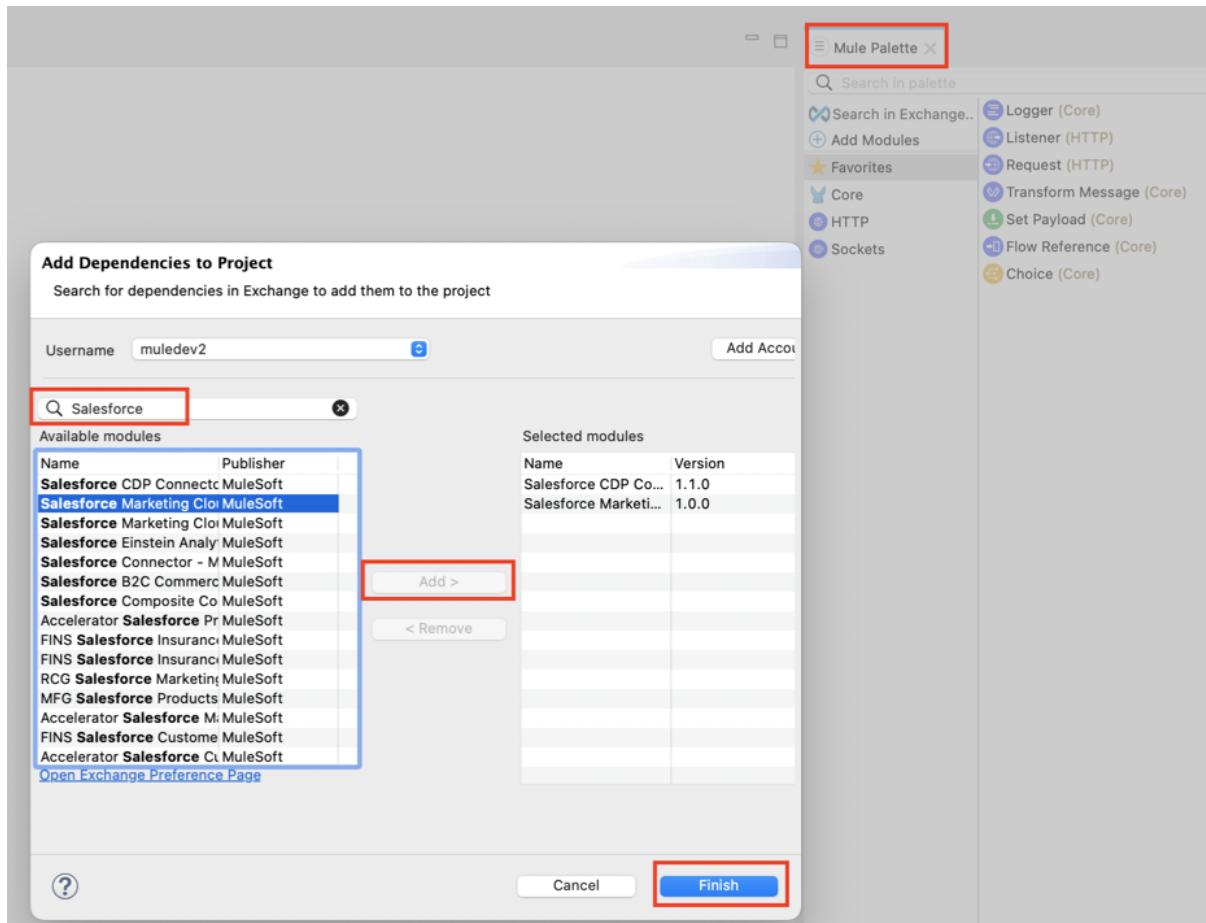
The 'Message:' field displays the error message 'The payload does not match', which is highlighted with a red border.

## Chapter 12: MuleSoft integration with Salesforce









**MuleSoft Accelerator for Salesforce Service Cloud** 1.5.x

This asset is a component of **MuleSoft Accelerators for Salesforce Clouds**, which accelerates implementation of essential integration use cases for Service Cloud.

The goal of MuleSoft Accelerator for Salesforce Service Cloud is to provide service agents with direct access to critical data they need to service the customer, all within Salesforce Service Cloud. We'll also provide them with the ability to trigger actions in other relevant applications they may not have access to, but need to be connected with.

**Diagram:**

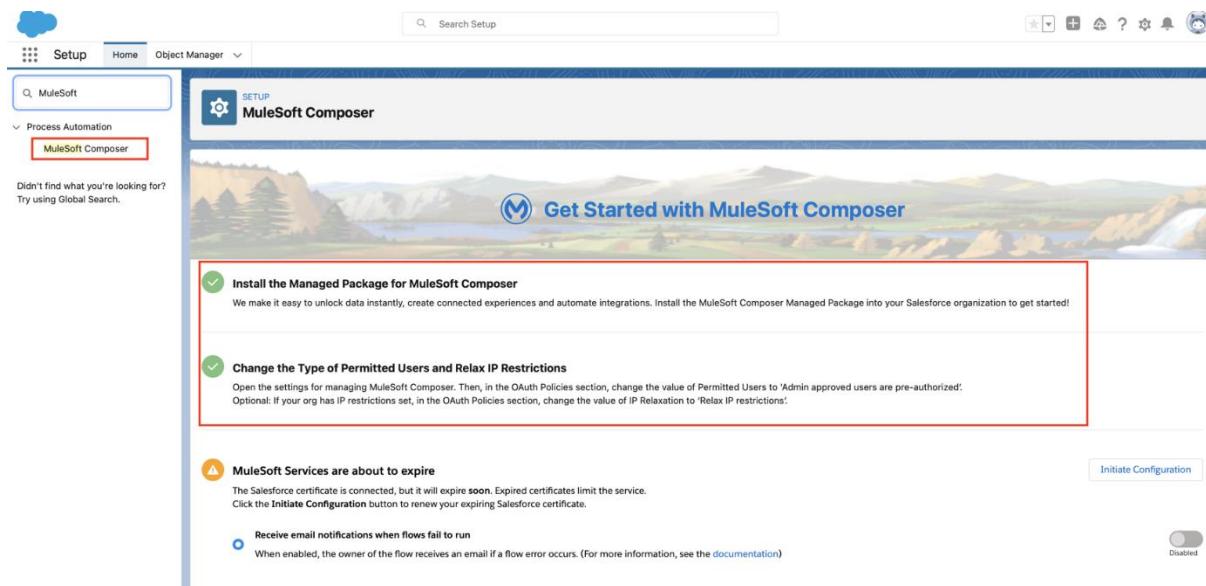
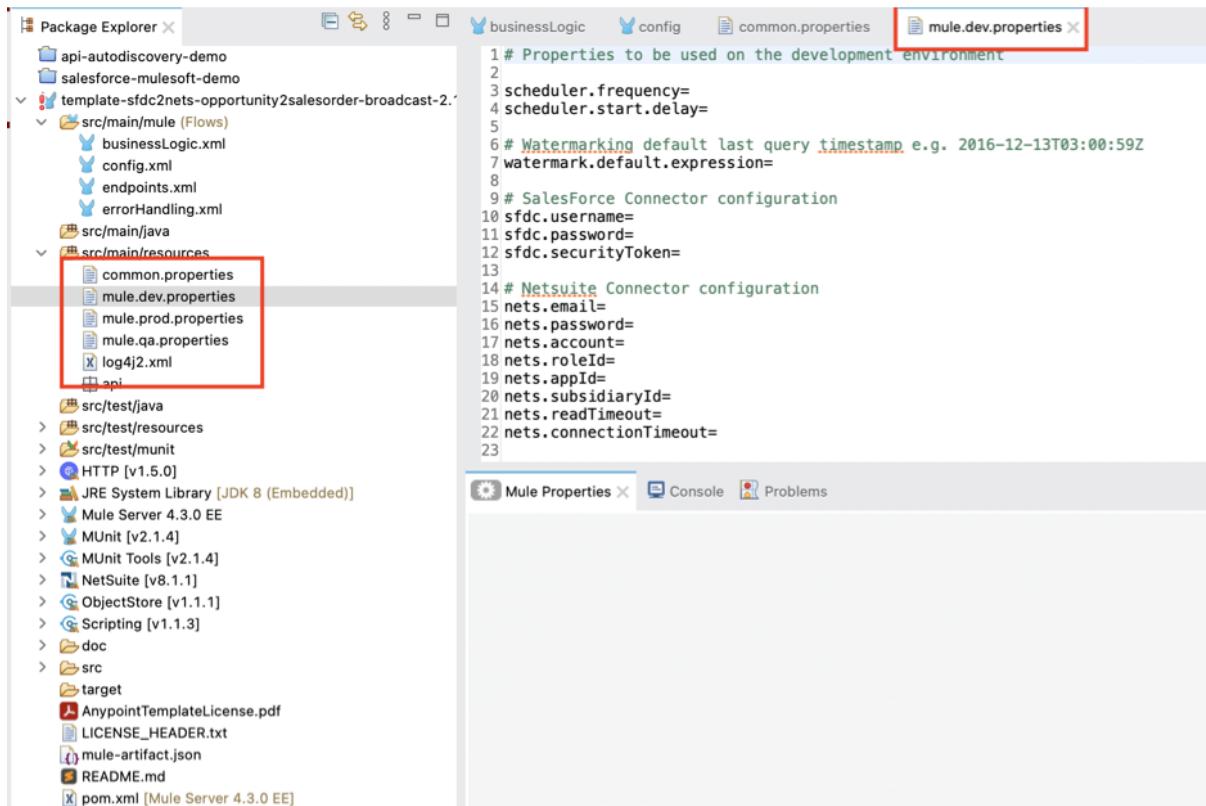
```

graph TD
    SC((Service Cloud)) --> CSNS((Common Services Notification, Scheduling))
    Jira((Jira  
Bug tracking system)) --> SC
    OMS[OMS] --> SC
    ITtickets[IT tickets  
servicenow  
(Ticketing system)] --> SC
    
```

**Asset details:**

- Type: Custom
- Organization: MuleSoft
- Published by: MuleSoft Solutions
- Published on: Jun 29, 2021
- Asset versions for 1.5.x:
 

1.5.1
1.5.0
- Categories:
  - Industry Vertical: Retail
  - Accelerator: Service Cloud
- Products: Salesforce, SAP, ServiceNow
- Tags: salesforce, service



MuleSoft Composer Home Composer Flows

Welcome to MuleSoft Composer  
Check out helpful resources to get started and learn more about how to use MuleSoft Composer

Create New Flow

Intro to Composer

PRODUCT SPOTLIGHT

## Getting Started with MuleSoft Composer

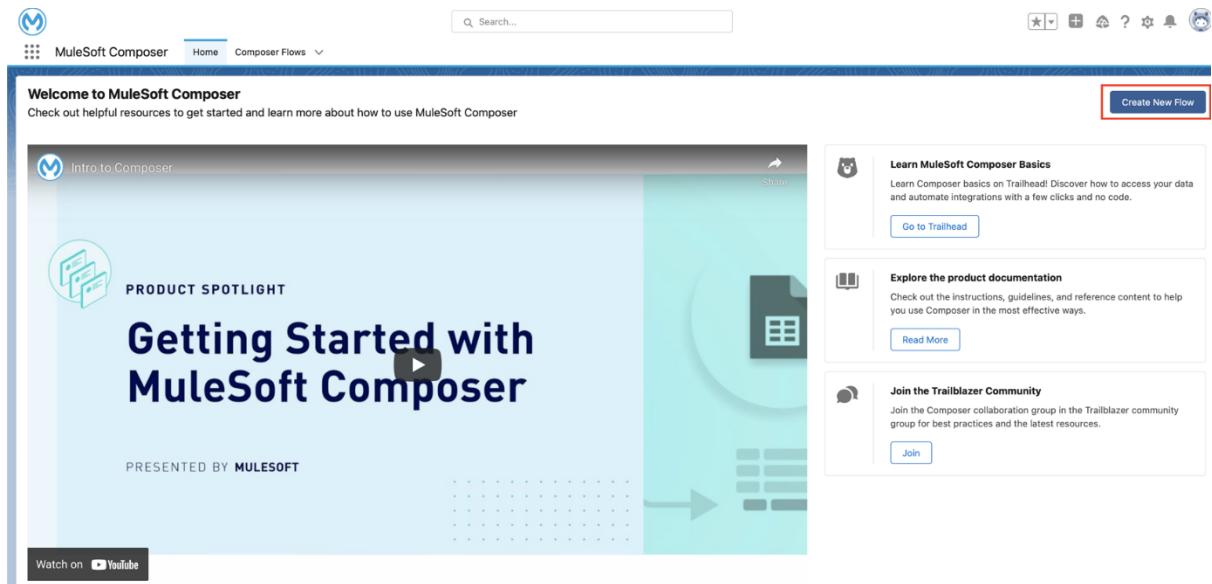
PRESNTED BY MULESOFT

Watch on YouTube

Learn MuleSoft Composer Basics

Explore the product documentation

Join the Trailblazer Community



MuleSoft Composer Home Composer Flows

Flow Details > Untitled Flow

What Should Start This Flow?

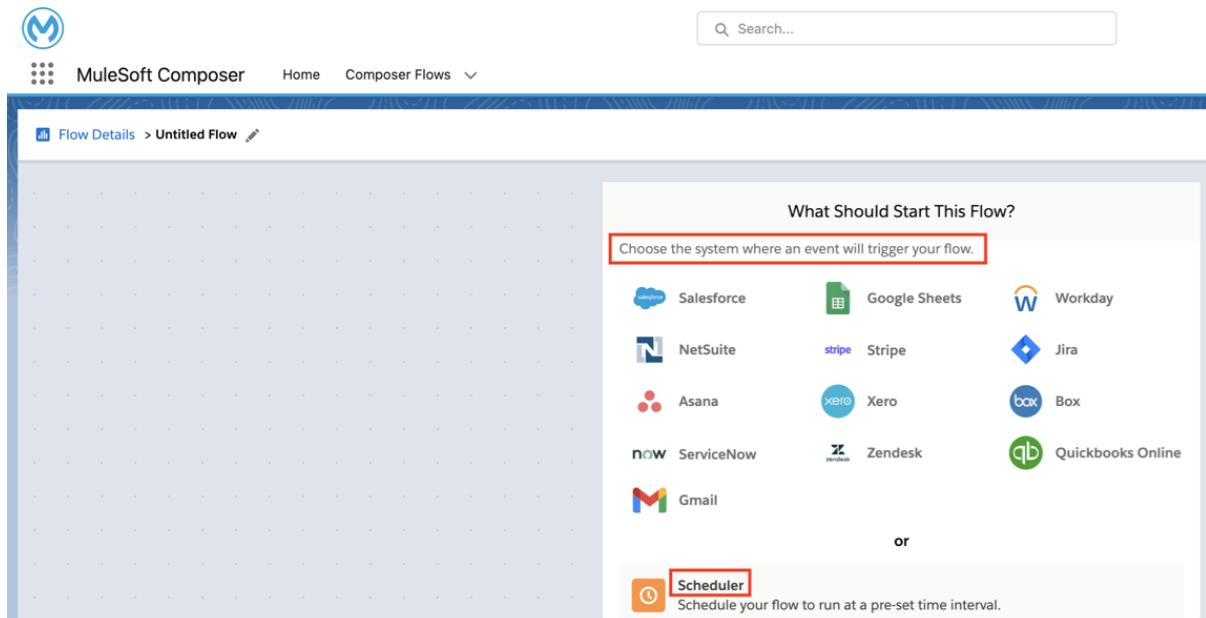
Choose the system where an event will trigger your flow.

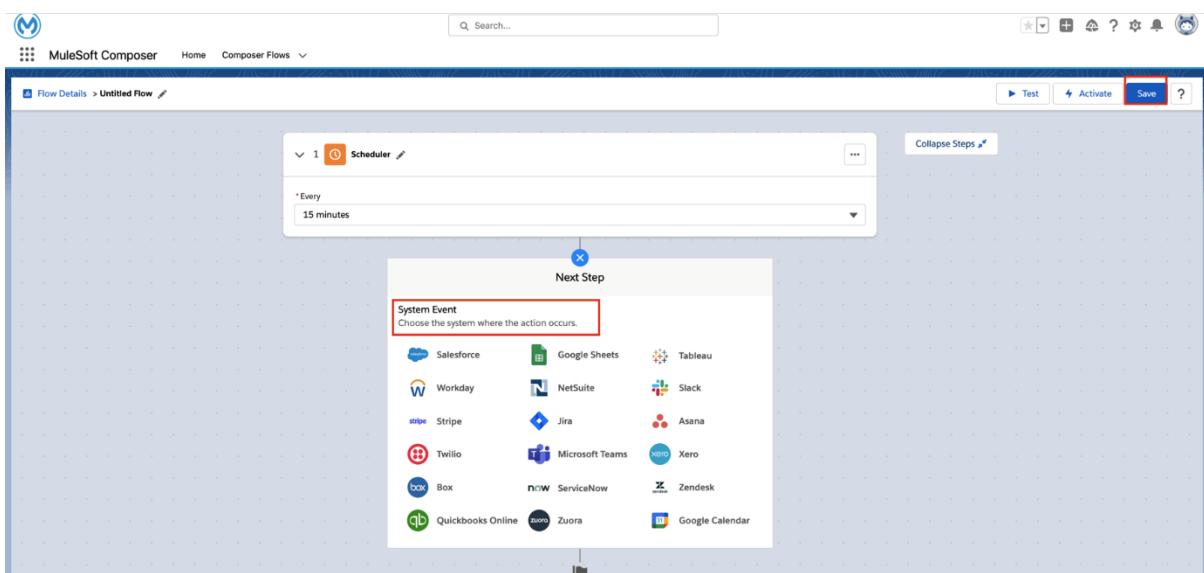
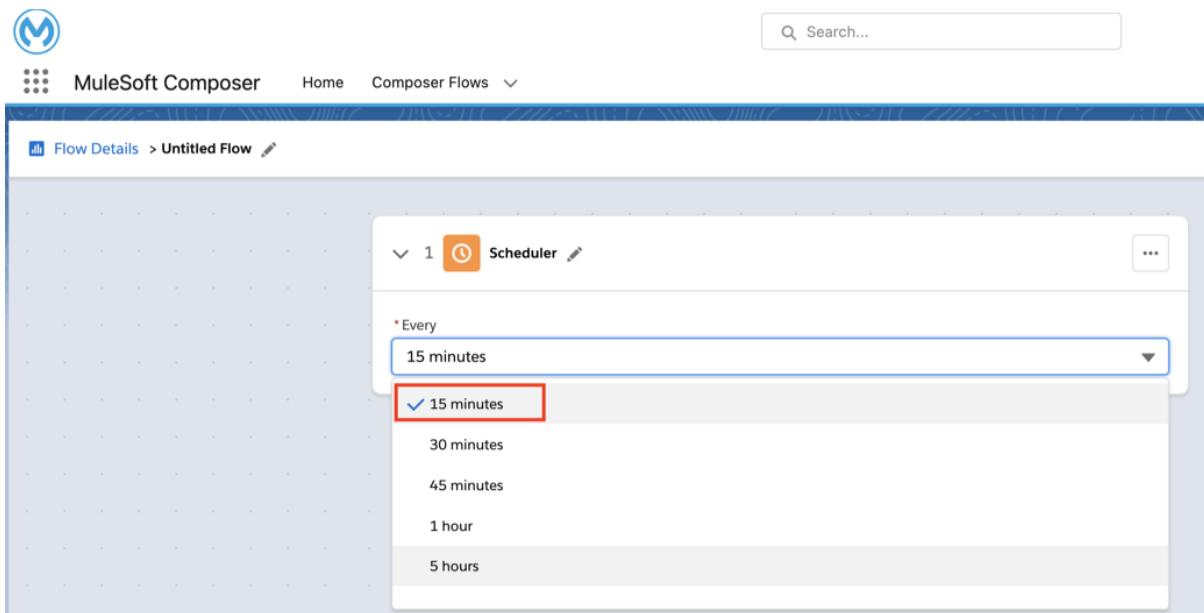
Salesforce	Google Sheets	Workday
NetSuite	Stripe	Jira
Asana	Xero	Box
ServiceNow	Zendesk	Quickbooks Online
Gmail		

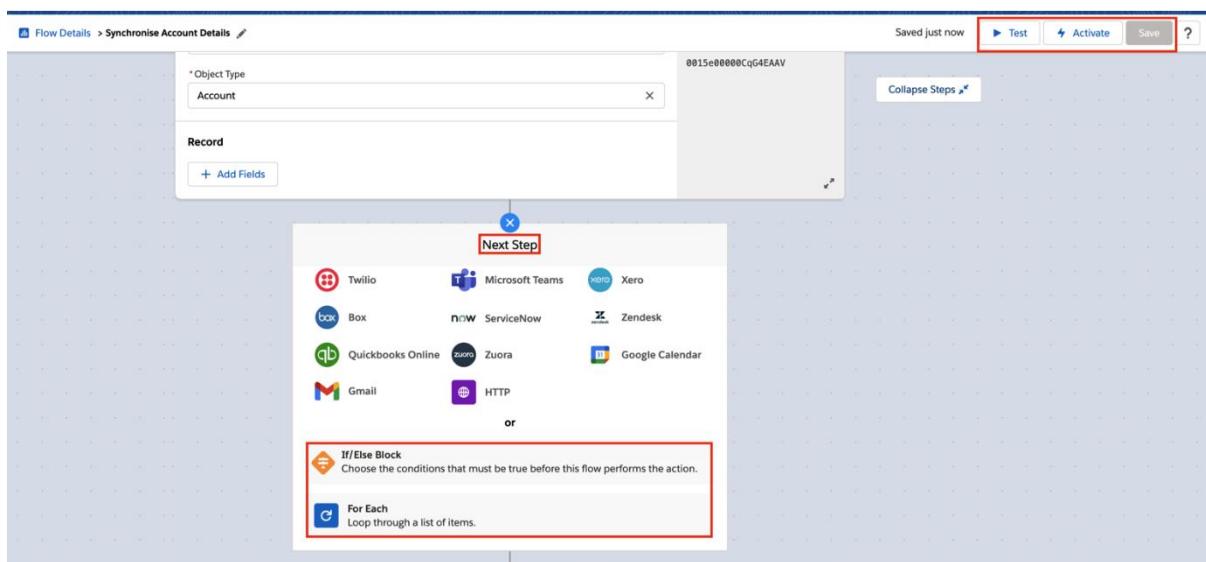
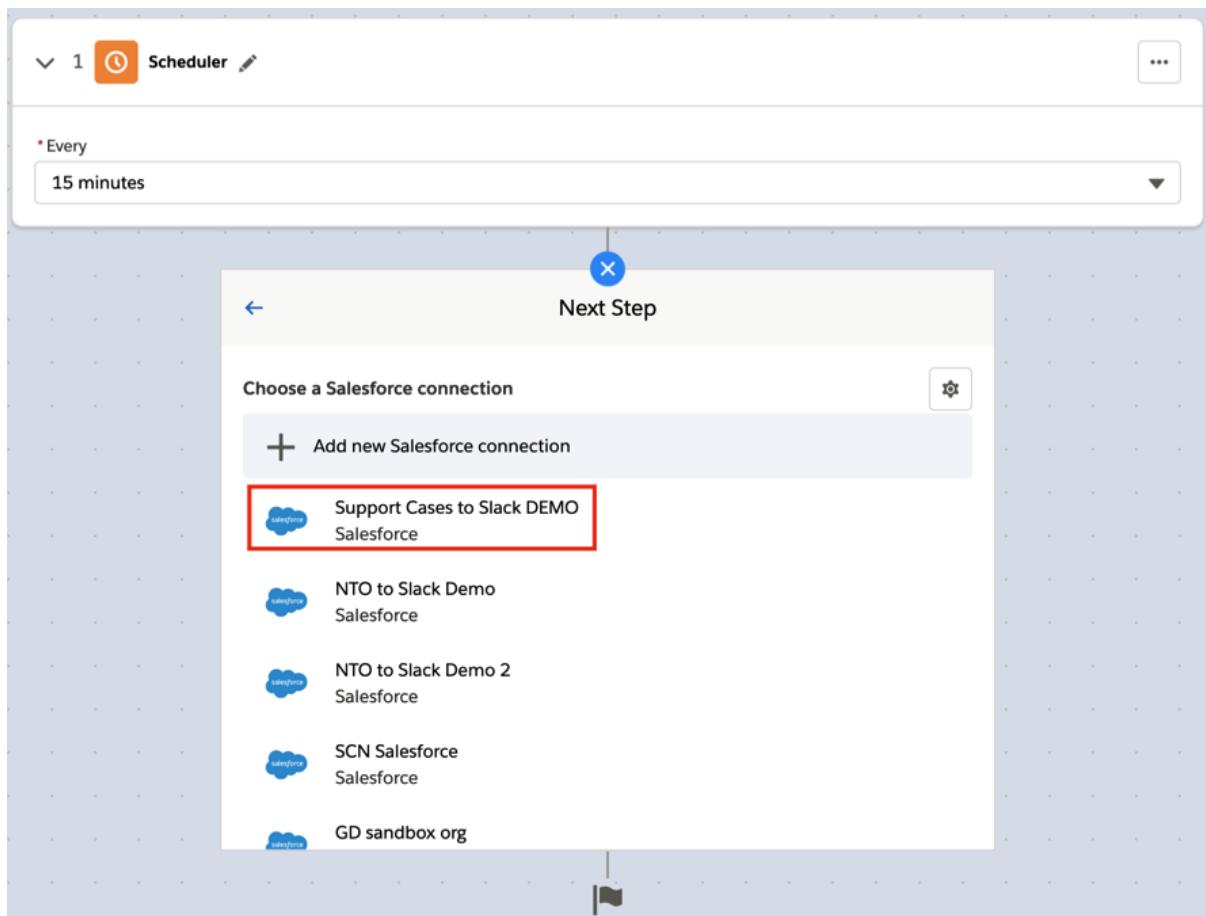
or

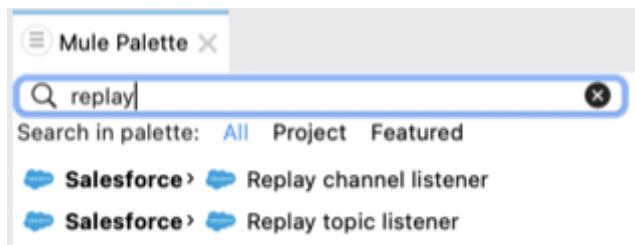
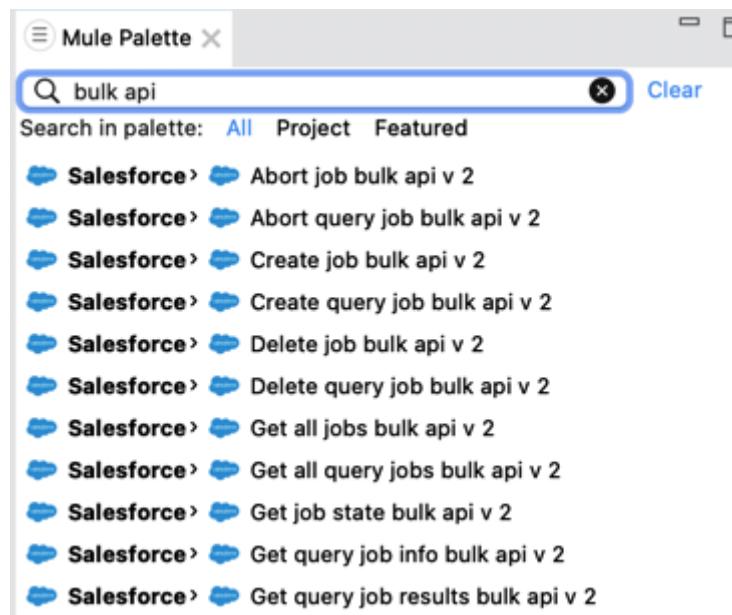
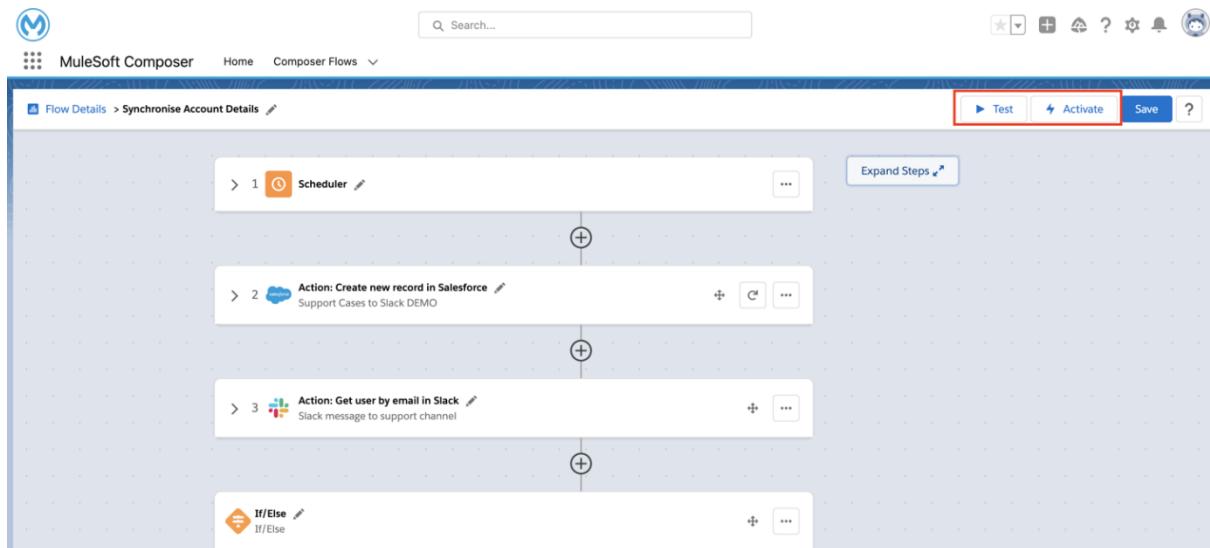
Scheduler

Schedule your flow to run at a pre-set time interval.

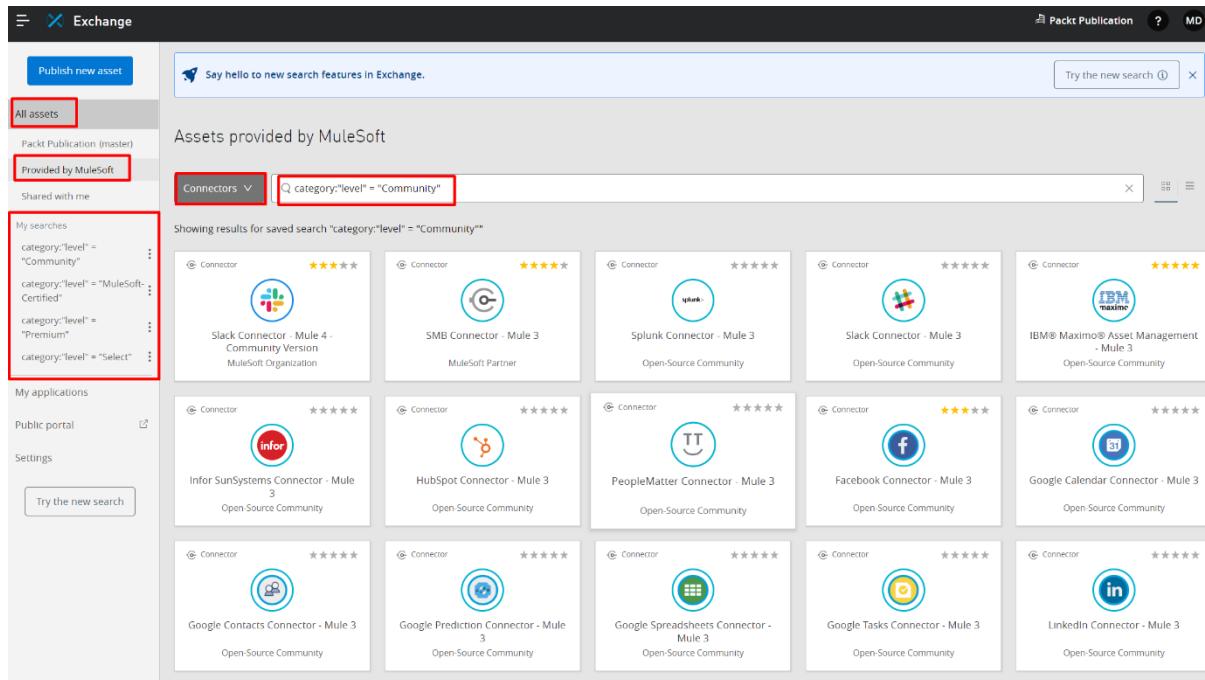




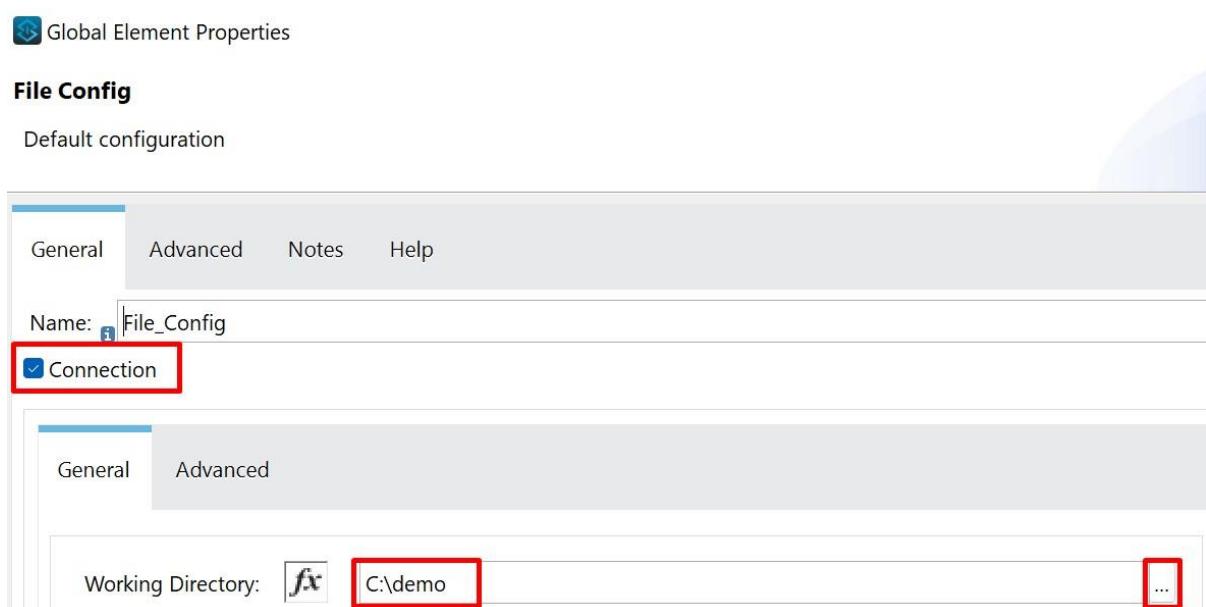
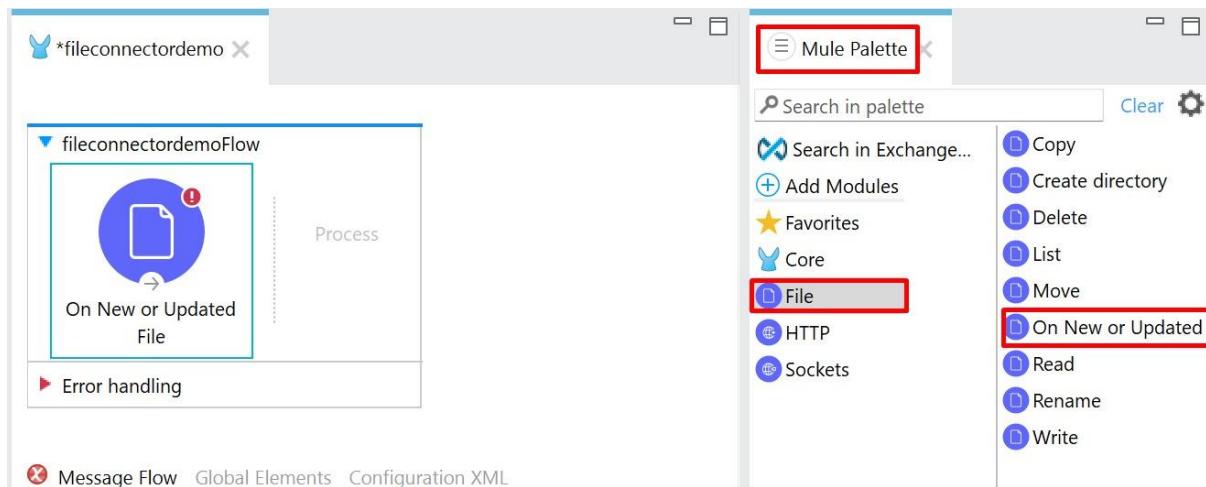




# Chapter 13: MuleSoft connectors and Use cases



```
✓ [E] attributes = {LocalFileAttributes} LocalFileAttributes[creationTime=2022-05-28T21:32:06.393870,directory=false,lastAccessTime=2022-05-28T21:32:06.393870]
  @ ^mediaType = */*
> [E] creationTime = {LocalDateTime} 2022-05-28T21:32:06.393870
  @ directory = false
  @ fileName = "mySample.json"
> [E] lastAccessTime = {LocalDateTime} 2022-05-28T22:12:58.287558
> [E] lastModifiedTime = {LocalDateTime} 2022-05-28T21:33:43.040369
  @ path = "C:\demo\input\mySample.json"
  @ regularFile = true
  @ serialVersionUID = 3249780732227598
  @ size = 66
  @ symbolicLink = false
  @ correlationId = "47acda11-de90-11ec-b16c-fac3ccbc1491"
✓ [E] payload = {
  @ ^mediaType = text/json; charset=UTF-8
  @ rootId = "47acda11-de90-11ec-b16c-fac3ccbc1491"
  @ vars = {Map} size = 0
```



On New or Updated File X Console Problems

General

MIME Type

Redelivery

Advanced

Metadata

Notes

Help

There are no errors.

Display Name: On New or Updated File

Basic Settings

Connector configuration: File\_Config

General

Directory: C:\demo\input

Recursive

Matcher: None

Watermark mode: DISABLED (Default)

Time between size check:

Time between size check unit: -- Empty --

Scheduling Strategy: Fixed Frequency

Frequency: 10

Start delay: 0

Time unit: SECONDS

Post processing action

Auto delete: True

Move to directory: C:\demo\output

Rename to:

Apply post action when failed: True (Default)

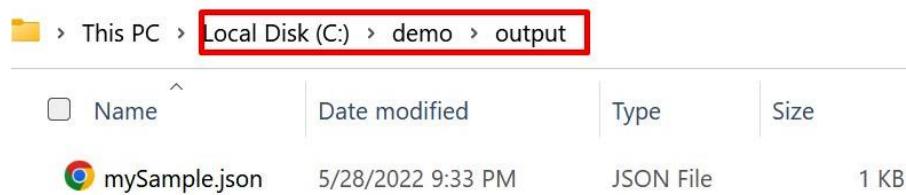
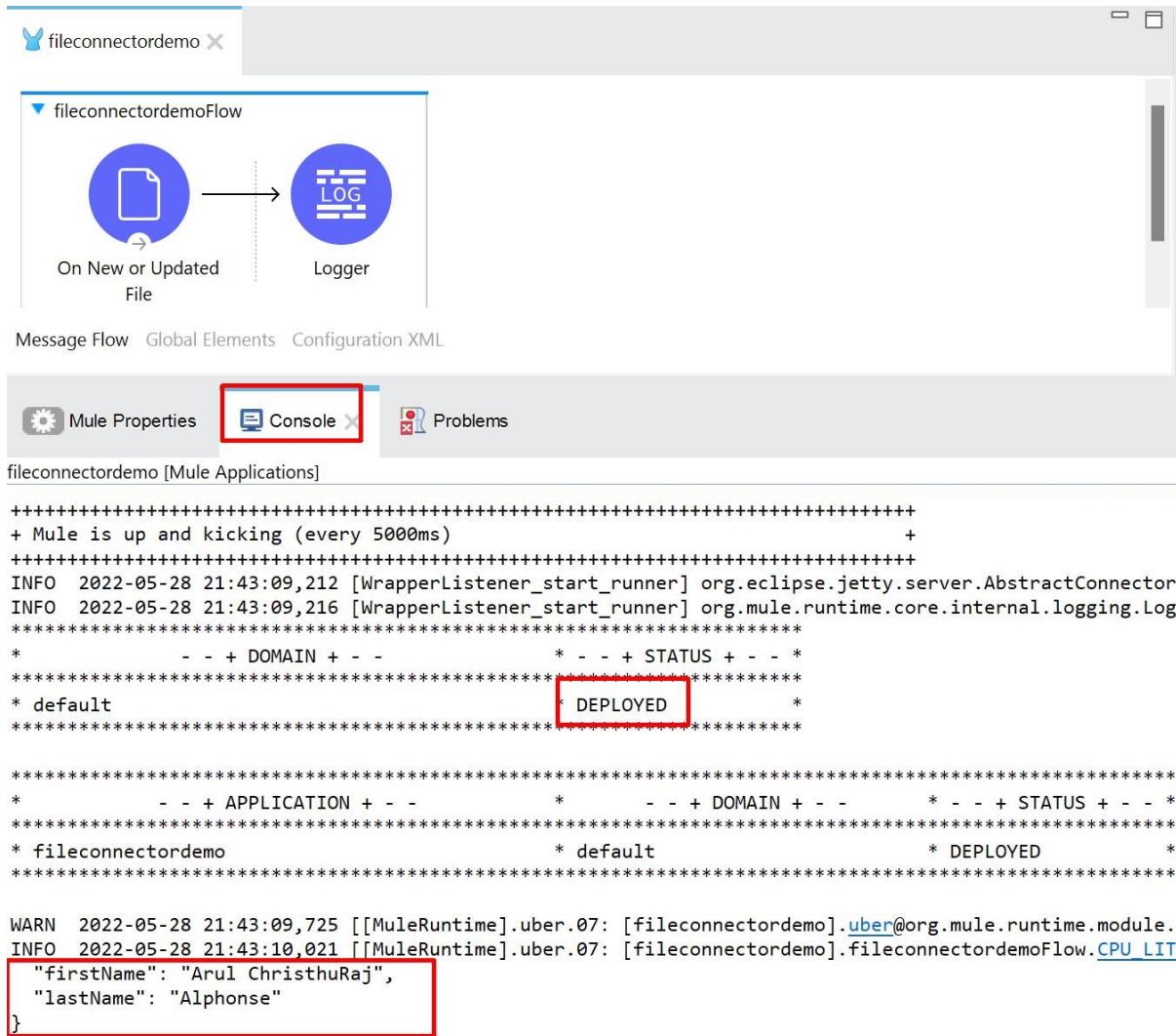
Local Disk (C:) > demo > input

Name	Date modified	Type	Size
mySample.json	5/28/2022 9:33 PM	JSON File	1 KB

mySample.json - Notepad

{  
  "firstName": "Arul ChristuRaj",  
  "lastName": "Alphonse"  
}

Ln 1, Col 1 | 60% | Windows (CRLF) | UTF-8



## Global Element Properties

### FTP Config

Default configuration

General   Advanced   Notes   Help   Contextual Help Documentation

Name: **FTP\_Config**

Connection

General   Advanced

Working Directory:   

Transfer mode:   BINARY (Default) 

Passive:  True (Default) 

Enable Remote Verification:  True (Default) 

Connection

Host:   

Port:   21

Username:  

Password:   Show password

?

Test Connection...   OK   Cancel

## SFTP Config

Default configuration

General   Advanced   Notes   Help

Name: SFTP\_Config

Connection

General   Advanced

Working Directory:

Preferred authentication methods:

Known hosts file:   ...

Sftp proxy config:

Connection

Host:

Port:

Username:

Password:   Show password

Identity file:   ...

Passphrase:   Show password

?

Test Connection...   OK   Cancel

 databaseconnectordemo X

## Global Configuration Elements

Type

 HTTP Listener config (Config)

 Database Config (Configurat

Message Flow Global Elements

 Mule Properties X

 Global Element Properties

### Database Config

Default configuration

General

Advanced

Notes

Help

Name: Database\_Config

Connection Oracle Connection

General

TLS

Transactions

Advanced

#### Required Libraries

 Oracle JDBC Driver (com.mycompany:ojdbc8:0.1)

#### Connection

Host:  localhost

Port:  1521

User:  c##demouser

Password:  ······

Instance:  orcl

Service name: 

Display Name: Select

#### Basic Settings

Connector configuration: Database\_Config



#### Query

SQL Query Text:

```
select * from employee where ID = :myID
```

Input Parameters:



```
1 ⊕ {  
2   "myID": "1034"  
3 }
```



Output Payload



```
1 ⊕ %dw 2.0  
2   output application/json  
3   ---  
4   payload
```

GET localhost:8081/dbdemo Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

Body Cookies Headers (3) Test Results 200 OK 56 ms 206 B Save Response

Pretty Raw Preview Visualize JSON

```
1 [  
2   {  
3     "NAME": "ArulChristhuraj",  
4     "ID": "1034",  
5     "DEPARTMENT": "IT"  
6   }  
7 ]
```

## Global Element Properties

X

### Web Service Consumer Config

Default configuration

General   Advanced   Notes   Help

Name: Web\_Service\_Consumer\_Config

Connection

General   Security   Transport   Advanced

Soap version:  SOAP11 (Default)

Mtom enabled: False (Default)

Encoding:

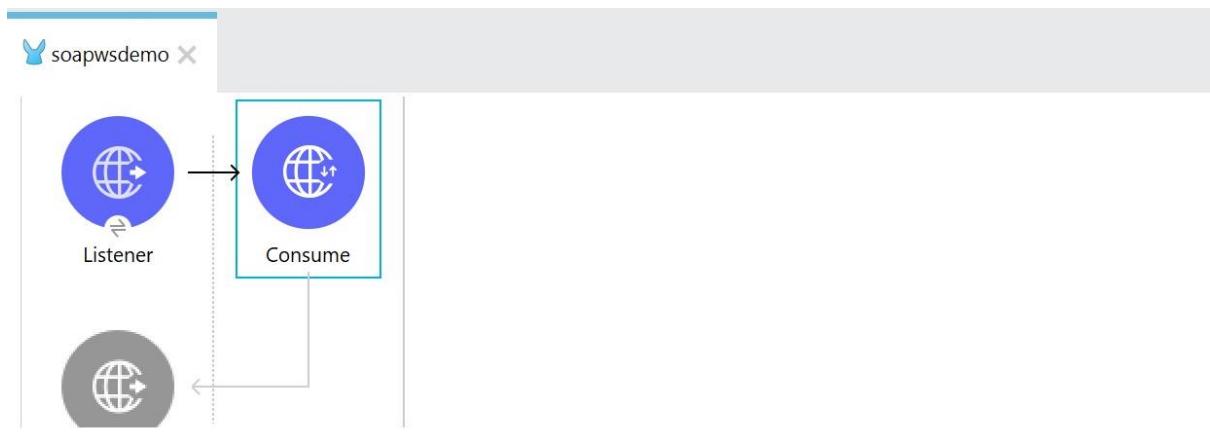
Connection

Wsdl location:  http://localhost:5555/ws/TestPackage.ws:Math?WSDL

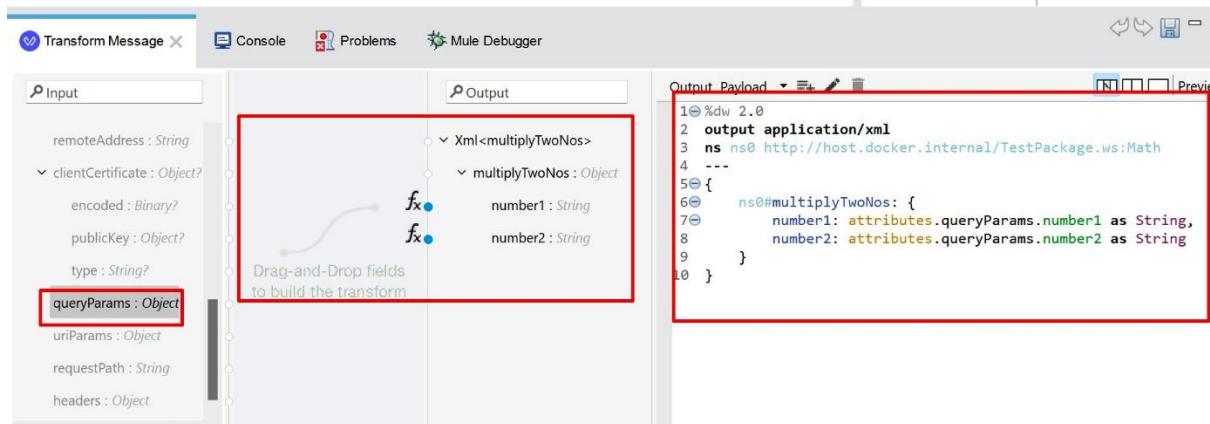
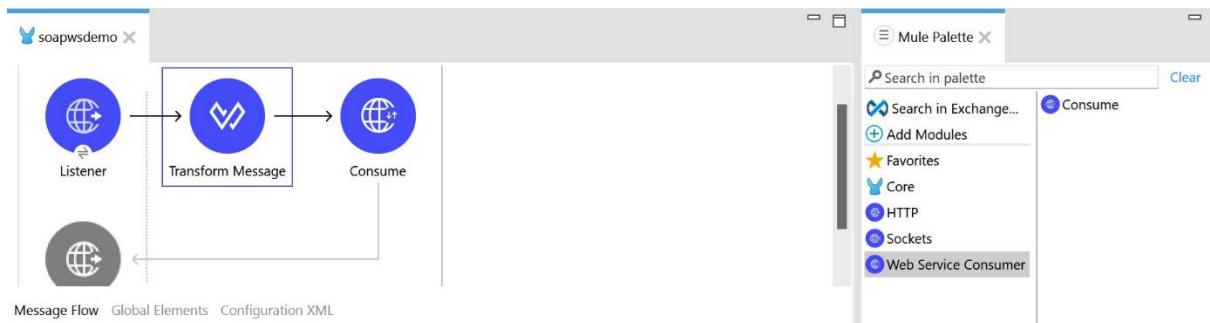
Service:  TestPackage.ws.Math

Port:  TestPackage\_ws\_Math\_Port

Address:  http://host.docker.internal:5555/ws/TestPackage.ws:Math/TestPackage\_ws\_Math\_Port



The screenshot shows the Mule Studio interface with the "Consume" component selected. The top navigation bar includes "Console", "Problems", and "Mule Debugger". On the left, a sidebar lists "General", "Advanced", "Error Mapping", "Metadata", "Notes", and "Help". The main configuration area shows the "Display Name" set to "Consume". Under "Basic Settings", the "Connector configuration" is set to "Web\_Service\_Consumer\_Config". In the "General" section, the "Operation" dropdown is open, showing three options: "multiplyTwoNos", "addTwoNos", and "multiplyTwoNos" again, with the first one highlighted. The "Message" section shows a "Body" field with an "fx" button and the value "1 payload". The "Headers" section also has an "fx" button.



This screenshot shows a POSTMAN request to "localhost:8081/soapdemo?number1=13&number2=3". The "Params" tab is selected, showing "number1" and "number2" with values "13" and "3" respectively. The "Body" tab is selected, showing the XML response:

```

1<{
2<body:
3<<ser-root:multiplyTwoNosResponse xmlns:ser-root="http://host.docker.internal/TestPackage.ws:Math" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
4<<output>39</output>
5</ser-root:multiplyTwoNosResponse>
6<headers: []>
7<attachments: []>
8<}>

```

## VM Config

Default configuration

General   Advanced   Notes   Help

Name: VM\_Config

Connection

Advanced

Connection

Reconnection

Fails deployment when test connection fails

Reconnection strategy: None

General

Queues

Queues Edit inline

+ [edit] X X

Queue name: vm:queue

Send correlation id: fx AUT

?

i Queue

Queue name: mytestqueue

Queue type: PERSISTENT

Max outstanding messages: fx 0

Advanced

Display Name: Publish

Error Mapping

Metadata

Notes

Help

Basic Settings

Connector configuration: VM\_Config  

General

Content:  1 payload 

Send correlation id:  ALWAYS

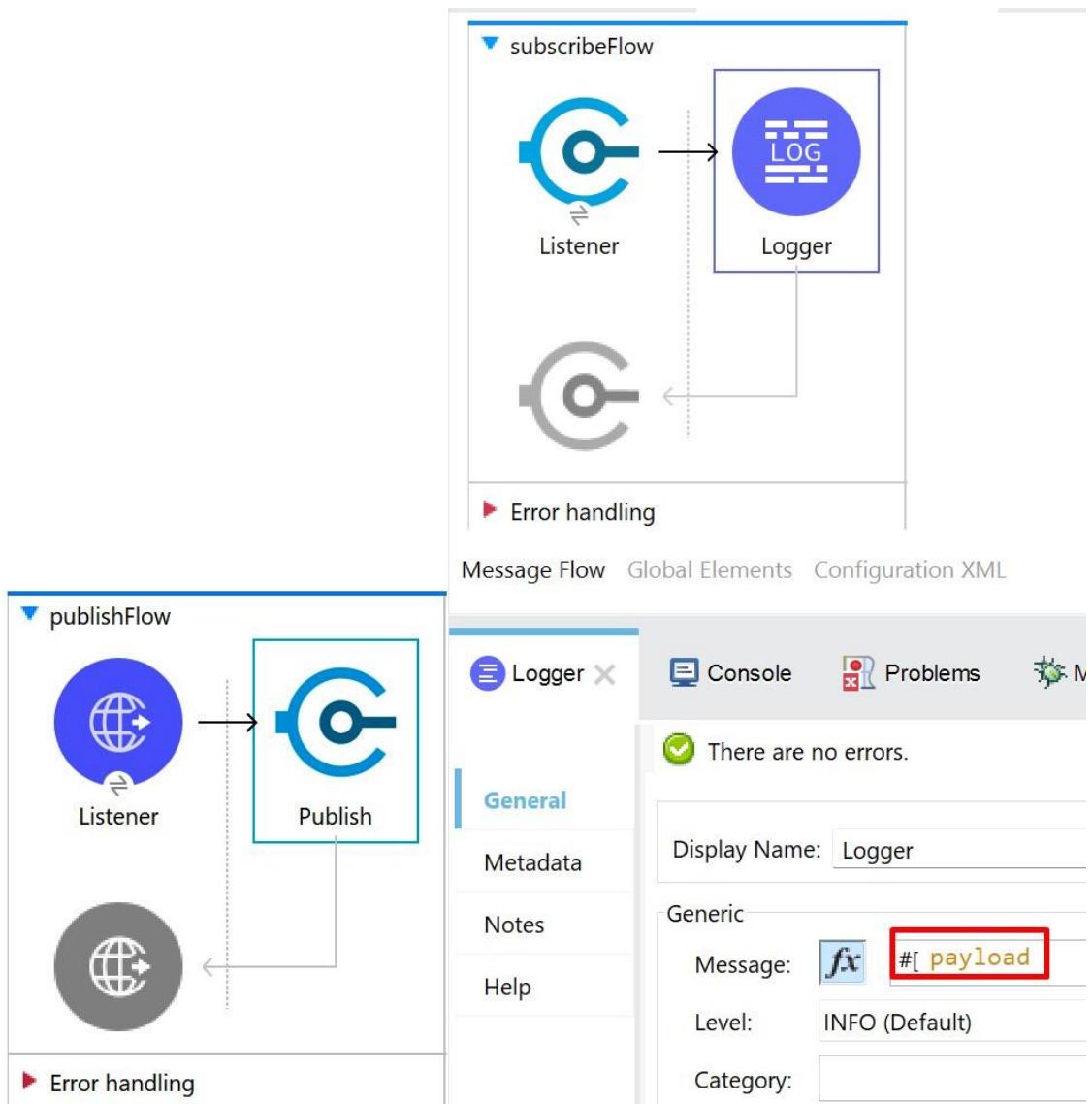
Correlation id: 

queue

Queue name:  mytestqueue 

Timeout:  5

Timeout unit:  SECONDS (Default)



POST **localhost:8081/publish** Send

Params Authorization Headers (8) Body **JSON** Pre-request Script Tests Settings Cookies Beautify

Body

```

1 {
2   "message" : "sample message to verify publish"
3 }

```

200 OK 288 ms 179 B Save Response

Pretty Raw Preview Visualize JSON

```

1 {
2   "message": "sample message to verify publish"
3 }

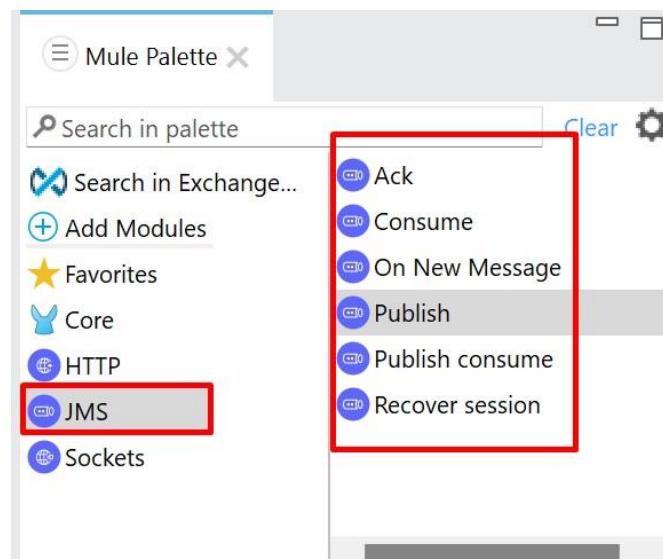
```

The screenshot shows the Mule Studio interface with the 'Console' tab selected. The log output is as follows:

```
vmconnectordemo [Mule Applications]
INFO 2022-05-29 19:24:16,456 [WrapperListener_start_runner] org.eclipse.jetty.server.AbstractConnector: Started ServerConnector@70d07a4{HTTP/1.1}
INFO 2022-05-29 19:24:16,458 [WrapperListener_start_runner] org.mule.runtime.core.internal.logging.LogUtil:
*****
* - - + DOMAIN + - - * - - + STATUS + - - *
*****  
* default * DEPLOYED *  
*****  

*****  
* - - + APPLICATION + - - * - - + DOMAIN + - - * - - + STATUS + - - *
*****  
* vmconnectordemo * default * DEPLOYED *  
*****  

WARN 2022-05-29 19:24:16,464 [[MuleRuntime].uber.06: [vmconnectordemo].uber@org.mule.runtime.module.extension.internal.runtime.source.Extension
WARN 2022-05-29 19:24:16,480 [[MuleRuntime].uber.03: [vmconnectordemo].uber@org.mule.runtime.module.extension.internal.runtime.source.Extension
INFO 2022-05-29 19:26:11,494 [[MuleRuntime].uber.03: [vmconnectordemo].subscribeFlow CPU_LITE @66194e2b] [processor: subscribeFlow/processors,
"message" : "sample message to verify publish"
}
```

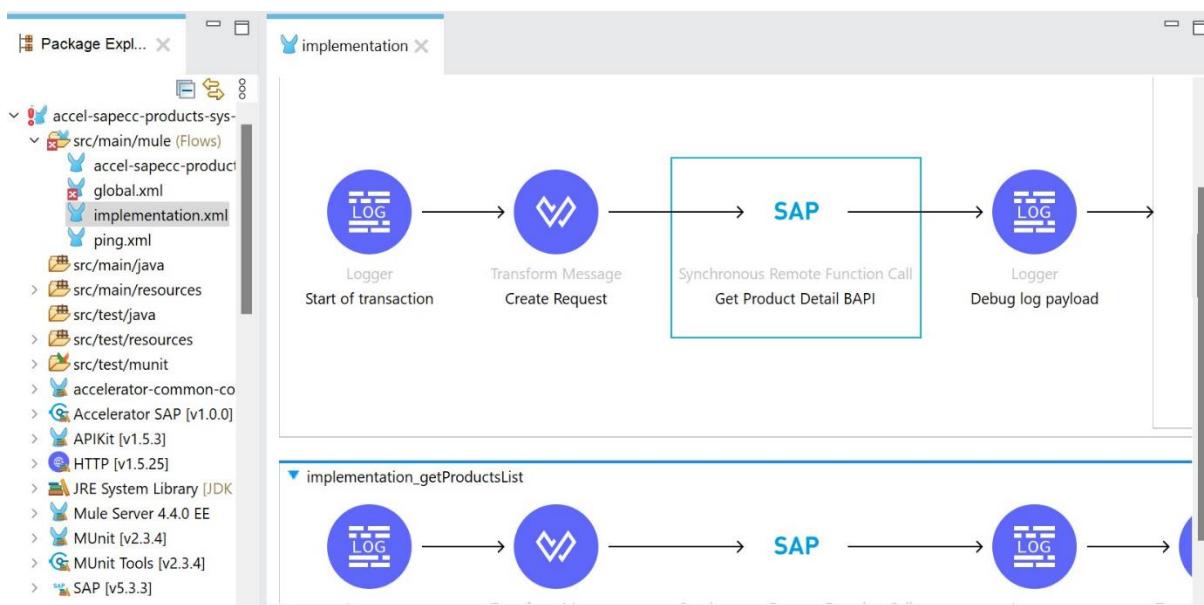


## Global Element Properties

### JMS Config

Base configuration for JmsConnector

General	Consumer	Producer	Advanced	Notes	Help				
Connection factory <a href="#">Edit inline</a>									
Connection factory jndi name: <a href="#">fx</a> /jms/cf/default Lookup destination: <a href="#">fx</a> NEVER (Default) Custom jndi name resolver <a href="#">Simple jndi name resolver</a>									
Context factory: <a href="#">fx</a> <input type="text"/> Jndi initial factory: <a href="#">fx</a> com.solacesystems.jndi.SoJNDIInitialContextFactory Jndi provider properties <a href="#">Edit inline</a>									
 <table border="1"> <thead> <tr> <th>Key</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td><a href="#">Solace_JMS_VPN</a></td> <td>techlightning_broker_servi</td> </tr> </tbody> </table>						Key	Value	<a href="#">Solace_JMS_VPN</a>	techlightning_broker_servi
Key	Value								
<a href="#">Solace_JMS_VPN</a>	techlightning_broker_servi								
Jndi provider url: <a href="#">fx</a> tcps://solace-cloud-client:houlf0nl392vmt2kbkobro0bs4@mraksrh2t1bc1.messaging.solace.cloud:55443 <input type="checkbox"/> Name resolver builder									
Jndi initial context factory: <a href="#">fx</a> <input type="text"/> Jndi provider url: <a href="#">fx</a> <input type="text"/> Provider properties None									
Connection Username: <a href="#">fx</a> solace-cloud-client									
<a href="#">?</a> <a href="#">Test Connection...</a> <a href="#">OK</a> <a href="#">Cancel</a>									



## **Chapter 14: MuleSoft Best practices, Tip and Tricks**

\*\*\*\*\* *no images* \*\*\*\*\*

## **Chapter 15: Mulesoft Certification and Interview Tips**

\*\*\*\*\* *no images* \*\*\*\*\*