

Unit 5 – Modeling Processes

Developing with SAP Integration Suite

C_CPI_14

Agenda

- Modeling Integration Flows
- Learning the Basics
- Using Adapters
- Using Mappings
- Using Adapter Outbound Security
- Performing Exception Handling
- Using Scripting
- Using Adapter Inbound Security
- Using Integration Patterns

Business Scenario - Task flow



Business Scenario – Steps involved

1. Create Integration Package and Integration Flow with **Timer**
2. Add **Content Modifier** (mock data – Product list)
3. Add **General Splitter** (split Products for iteration)
4. Add **Content Modifier** (add Product ID to Exchange Property)
5. Add **Request Reply** (is Product ID in database)
6. Add **Router** (If Product ID exists - CONTINUE, else END)

Using Adapters

- Wide variety of pre-built adapters available
- Support various application, transport protocols, message protocols
- Differentiation made between input and output adapters
- Broadly categorized into 2 groups
 - TCP based
 - Non TCP based

Features of OData Adapter

- Query wizard
 - Navigate the interface to be accessed with metadata document
- Page Processing mode
 - Read entries in multiple pages which are processed sequentially
- Automatically removing namespaces
 - Remove namespaces and prefixes automatically

Details of OData Adapter

Example: OData Adapter

Table 1: Example: Details of an OData Adapter

Detail	Outcome
Category	HTTP based
Transport protocol	TCP/IP
Application protocol	HTTP/HTTPS
Message protocol	Atom Pub as XML or JSON representation

XPath Expressions

The screenshot displays the Visual Studio Code interface with the XPath Notebook open. The notebook shows three XPath expressions and their results:

- Expression 1:** `/ProductSet`
[44] ✓ 0.2s Source: 'Products.xml' Items: 1 XPath
... `"-/ProductSet[1]"`
- Expression 2:** `/ProductSet/count(Product)`
[45] ✓ 0.2s Source: 'Products.xml' Items: 1 XPath
... `1`
- Expression 3:** `/ProductSet/count(Product) > 0`
[46] ✓ 0.2s Source: 'Products.xml' Items: 1 XPath
... `true`

The XML file `Products.xml` is also open, showing the following structure:

```
1 <ProductSet>
2   <Product>
3     <Category>Flat Screen Monitors</Category>
4     <ProductID>HT-1035</ProductID>
5     <Name>Flat Basic</Name>
6   </Product>
7 </ProductSet>
```


XPath Expressions

The screenshot displays an XPath testing application with a dark theme. The top toolbar includes tabs for 'NoProducts.xbook', 'SalesOrders.xml', and 'SalesOrdersModified.xml', along with icons for settings, editing, and a menu. Below the toolbar, there are buttons for '+ Code', '+ Markdown', 'Run All', 'Clear All Outputs', and an 'XPath Notebook' icon.

The main area shows three test cases, each with a status bar indicating success, execution time, source, and item count:

- Test Case [47]:** XPath expression `/ProductSet` returns `"-/ProductSet[1]"`. Status: [✓] 0.2s, Source: 'NoProducts.xml', Items: 1.
- Test Case [48]:** XPath expression `/ProductSet/count(Product)` returns `0`. Status: [✓] 0.2s, Source: 'NoProducts.xml', Items: 1.
- Test Case [49]:** XPath expression `/ProductSet/count(Product) > 0` returns `false`. Status: [✓] 0.2s, Source: 'NoProducts.xml', Items: 1.

On the right side, an XML editor shows the content of 'NoProducts.xml', which is `<ProductSet/>`.

Business Scenario - Task flow



Business Scenario – Steps involved

7. Add **Request Reply** (get all Sales Orders for each Product)
8. Add **XSLT Mapping** (remove namespaces)
9. Add **General Splitter** (split Sales Order for iteration)
10. Add **Content Modifier** (add Sales Order ID, Item to Exchange Property)

Business Scenario - Task flow



Business Scenario – Steps involved

11. Add **Request Reply** (get Sales Header for each Sales Order)
12. Add **XSLT Mapping** (remove namespaces)
13. Add **Content Modifier** (add Customer ID to Exchange Property)

HTTP Adapter

```
SalesOrdersNamespaces.xml x SalesOrders.xml SalesOrdersModified.xml ...
1 <feed xmlns="http://www.w3.org/2005/Atom"
2   xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"
3   xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xml:base="https://sapes5.sapdevcenter.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC"
4   <id>https://sapes5.sapdevcenter.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC
5   <title type="text">SalesOrderLineItemSet</title>
6   <updated>2023-06-04T07:44:49Z</updated>
7   <author>
8     <name/>
9   </author>
10  <link href="ProductSet('HT-1035')/ToSalesOrderLineItems" rel="self" type="application/xml" />
11  <entry>
12    <id>https://sapes5.sapdevcenter.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC/SalesOrderLineItemSet(SalesOrderID='0500000001')
13    <title type="text">SalesOrderLineItemSet(SalesOrderID='0500000001')
14    <updated>2023-06-04T07:44:49Z</updated>
15    <category term="GWSAMPLE_BASIC.SalesOrderLineItem" scheme="http://schemas.microsoft.com/ado/2007/08/dataservices" />
16    <link href="SalesOrderLineItemSet(SalesOrderID='0500000001',ItemPosition='0000000040',DeliveryDate='2018-01-07T23:00:00.0000000')>
17    <content type="application/xml">
18      <m:properties xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices" xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices"
19        <d:SalesOrderID>0500000001</d:SalesOrderID>
20        <d:ItemPosition>0000000040</d:ItemPosition>
21        <d:DeliveryDate>2018-01-07T23:00:00.0000000</d:DeliveryDate>
22      </m:properties>
23    </content>
24  </entry>
25  <entry>
26    <id>https://sapes5.sapdevcenter.com/sap/opu/odata/iwbep/GWSAMPLE_BASIC/SalesOrderLineItemSet(SalesOrderID='0500000007')
27    <title type="text">SalesOrderLineItemSet(SalesOrderID='0500000007')
28    <updated>2023-06-04T07:44:49Z</updated>
```

```
SalesOrdersNamespaces.xbook x NoProducts.xml NoProducts.xbook
+ Code + Markdown | ▶ Run All ☰ Clear All Outputs ... XPath Notebook
```

```
//content/m:properties/d:SalesOrderID
```

```
[53] ✓ 0.2s Source: 'SalesOrdersNamespaces.xml' Items: 2 XPath
```

```
... [
    "-/feed[1]/entry[1]/content[1]/m:properties[1]/d:SalesOrderID[1]",
    "-/feed[1]/entry[2]/content[1]/m:properties[1]/d:SalesOrderID[1]"
]
```

```
//content/m:properties/d:ItemPosition
```

```
[54] ✓ 0.2s Source: 'SalesOrdersNamespaces.xml' Items: 2 XPath
```

```
... [
    "-/feed[1]/entry[1]/content[1]/m:properties[1]/d:ItemPosition[1]",
    "-/feed[1]/entry[2]/content[1]/m:properties[1]/d:ItemPosition[1]"
]
```

Namespaces are not automatically removed in HTTP adapter...
So your XPath needs to take that into account

Mappings

- Message Mapping
 - Mapping editor provides tools to map XML or JSON messages
- XSLT Mapping
 - Language designed for transforming XML docs to other formats
 - Stylesheet is processed by an XSLT processor (Xalou or Saxon)
- Mapping with scripting
- Operation Mapping from Enterprise Service Repository (On-Premise)

Mappings

- Process of converting source format into different target formats
- **Message Mapping** offers context handling, UDF, testing functions
- **XSLT Mapping** requires XML as input
 - Can create more target formats
 - Useful for creating attachments
- **Mapping via scripting** offers most flexibility

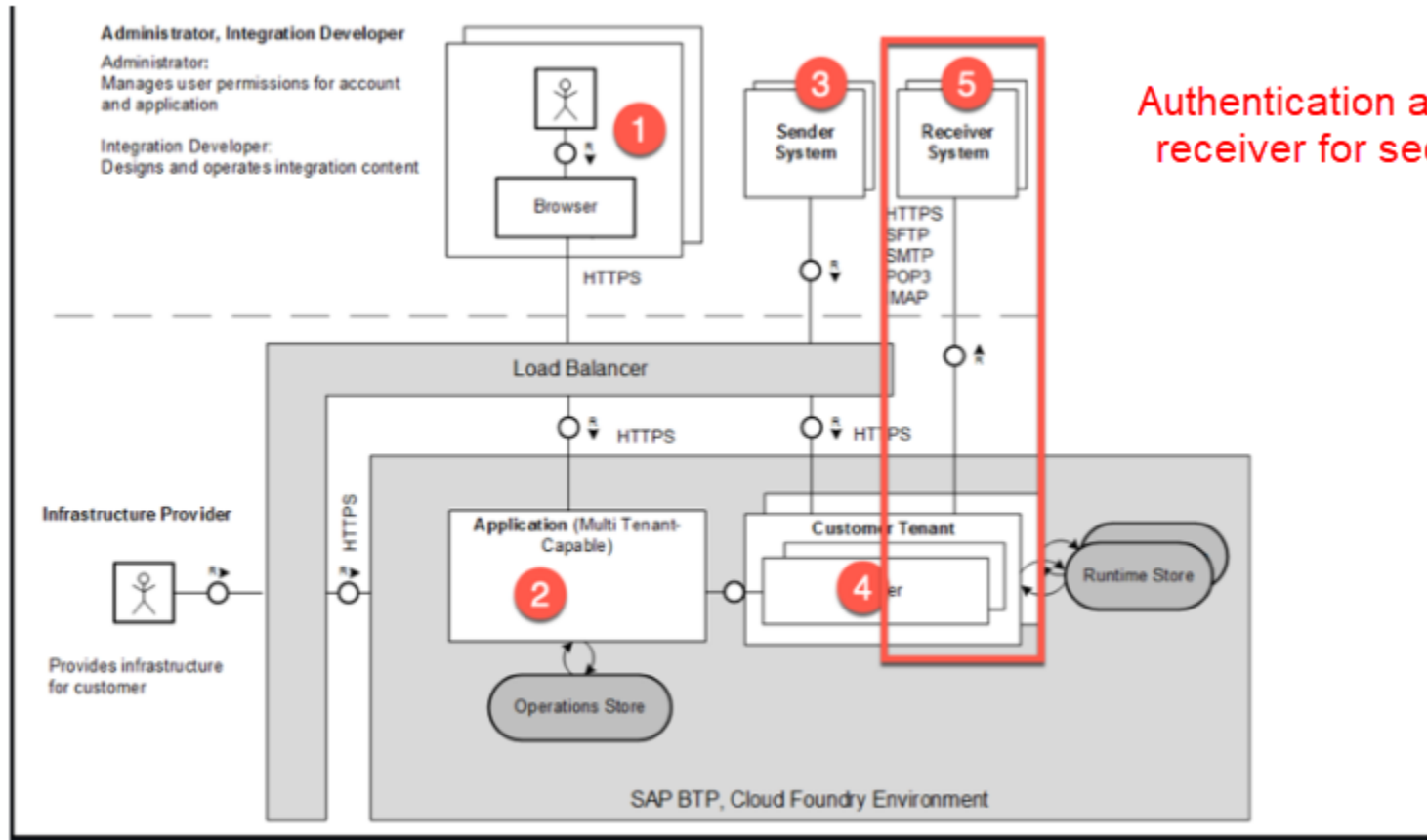
Business Scenario - Task flow



Business Scenario – Steps involved

14. Add **Data Store** (write Customer ID to Data Store)

Using Adapter Outbound Security



Authentication and Authorization with receiver for secure communication

Example of a Direct Receiver and Sender Adapter

Options for Authentication / Authorization

- Basic
- Client Certificate
- None
- OAuth2 Client Credentials
- OAuth2 SAML Bearer Assertion

Business Scenario - Task flow



Business Scenario – Steps involved

15. Add [Exception Subprocess](#) (barebone)

16. Add [Groovy Script](#) (read exception messages to payload)

Business Scenario - Task flow

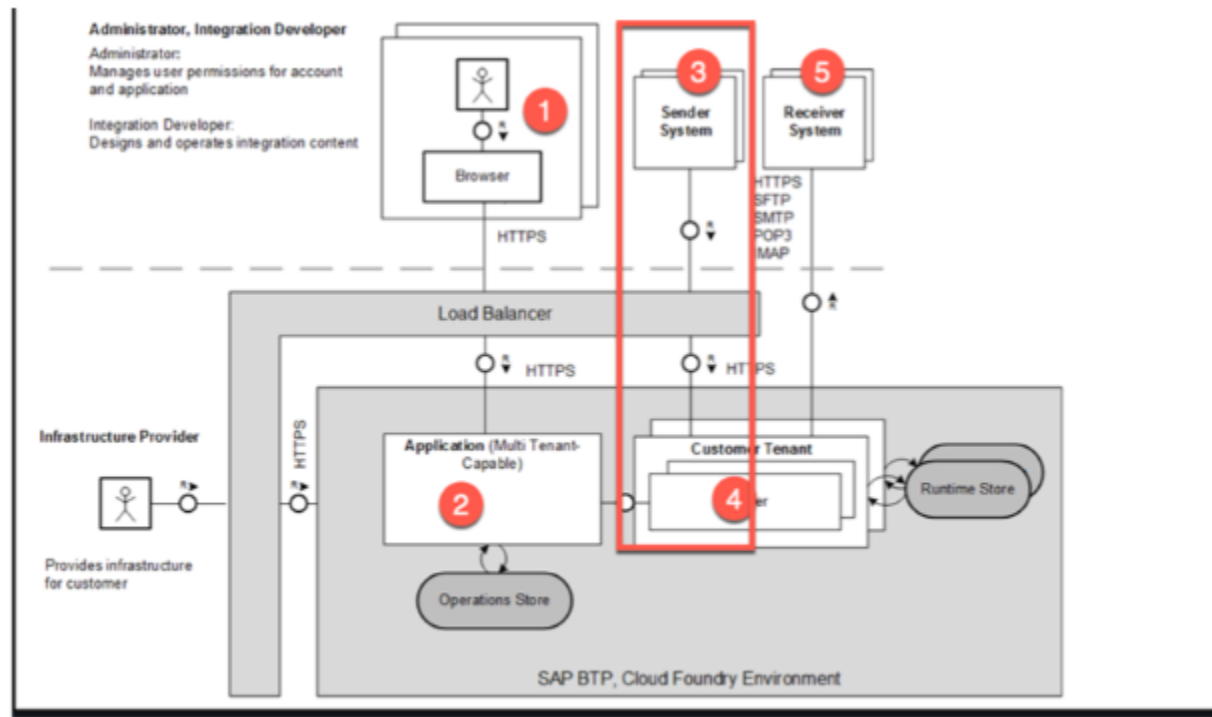


Business Scenario – Steps involved

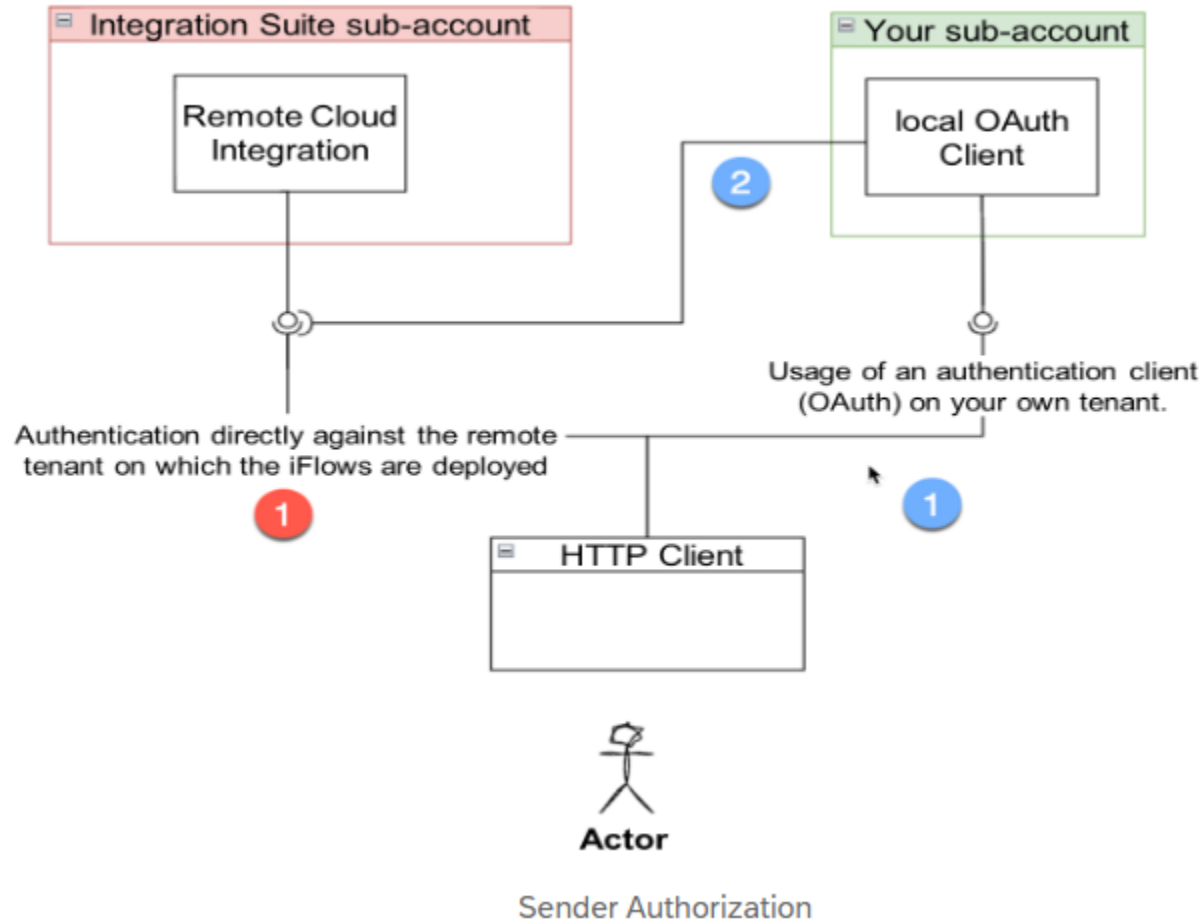
17. Add **Message Start** (remove Timer)
18. Add **SOAP adapter** (asynchronous call)
19. Remove \$stop clause (power of asynchronous call)

Using Adapter Inbound Security

- Certificates between sender and load balancer for HTTPS connection
- Sender's authorization validated against Integration flow endpoint



Authorization of sender



Authentication against remote endpoint

- Assign user role [ESBMessaging.send](#)
- Not recommended for production use

Authentication (OAuth) client on your own Tenant

- Set up Process Integration Runtime instance
- Supports
 - Authorization code
 - Client credentials
 - Password
 - Refresh Token
 - SAML2 Bearer
 - JWT Bearer

Sample Integration Flows

The screenshot displays the SAP Integration Suite user interface. On the left, a navigation menu is visible with the following items: Home, Discover, Integrations (highlighted with a red circle containing the number 1), APIs, Type Systems, Design, Test, Configure, Monitor, Monetize, and Settings. The main content area is titled 'Discover (Integrations) / Discover (542)'. Below this, there is a filter section with a dropdown menu set to 'ALL' and a search bar containing the text 'Examples' (highlighted with a red circle containing the number 2). Below the search bar, it states '9 package(s) found'. A list of integration packages is displayed, each with a hexagonal icon and a title. The first package is 'Integration Flow Design Guidelines - Scripting Guidelines'. The second package is 'Integration Flow Design Guidelines - Learn the Basics' (highlighted with a red circle containing the number 3). The third package is 'Integration Flow Design Guidelines - Enterprise Integration Patterns'. The fourth package is 'Integration Flow Design Guidelines - Handle Errors Gracefully'. The fifth package is 'First Steps Integration to Cloud Integration Migration'.

SAP Integration Suite

Discover (Integrations) / Discover (542)

ALL

Examples

9 package(s) found

- Integration Flow Design Guidelines - Scripting Guidelines
This integration package contains integration flows to illustrate the design guidelines for ...
- Integration Flow Design Guidelines - Learn the Basics
This integration package contains integration flows to illustrate the design guidelines for ...
- Integration Flow Design Guidelines - Enterprise Integration Patterns
This integration package contains integration flows to illustrate the design of the ...
- Integration Flow Design Guidelines - Handle Errors Gracefully
This integration package contains integration flows to illustrate the design guidelines for ...
- First Steps Integration to Cloud Integration Migration

☰

SAP

Integration Suite

Home

Discover

Integrations

APIs

Type Systems

Design

Integrations

APIs

Custom Type Systems

MIGs

MAGs

Test

Configure

Monitor

Monetize

Settings

APIs

MIGs and MAGs

Integrations / Integration Flow Design Guidelines - Learn the Basics / Integration Flow Design Guidelines - Learn the Basics

This integration package contains integration flows to illustrate the design guidelines for modeling integration flows.

Vendor: SAP Mode: Editable

Version: 1.10.0

Overview

Artifacts (35)

Documents (3)

Tags

Comments

<input type="checkbox"/>	Name	Type	Version	Actions
<input type="checkbox"/>	Generic Receiver			
<input type="checkbox"/>	Integration flow mocking a receiver system for test purposes Unmodified	Integration Flow	1.0.0	<div><div>generic</div><div><div>Copy</div><div>View metadata</div><div>Download</div><div>Configure</div><div>Deploy</div></div><div>Deploy</div></div>

1

2

3

4

5

6

7

Integration Suite

Home

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Custom Type Systems

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MAGs

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Settings

APIs

MIGs and MAGs

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Integrations / Integration Flow Design Guidelines - Learn the Basics / Integration Flow Design Guidelines - Learn the Basics

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Version: 1.10.0

Mode: Editable

3

Overview Artifacts (35) Documents (3) Tags Comments

<input type="checkbox"/>	Name	Type	Version	Actions
<input type="checkbox"/>	Modeling Basics - Decouple Flows Using JMS			
<input type="checkbox"/>	Basic integration flow to show how to decouple two integration flows using JMS queues as persistency Modified	Integration Flow	1.0.0	<div>4</div> <div>5</div> <div>6</div> <div>7</div>

Actions JMS

Copy

View metadata

Download

Configure

Deploy

Deploy

2



Integrations / Integration Flow Design Guidelines - Learn the Basics / Integration Flow Design Guidelines - Learn the Basics

This integration package contains integration flows to illustrate the design guidelines for modeling integration flows.

Vendor: SAP
Version: 1.10.0
Mode: Editable

3

Overview Artifacts (35) Documents (3) Tags Comments

<input type="checkbox"/>	Name	Type	Version
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- 4
- Actions JMS
- Copy
- View metadata
- Download
- Configure
- Deploy

Actions



6

7

Deploy

ModelingBasics

SenderInitiatedScenario

AccessHeaderAndPropertiesInMessageMapping

AccessHeaderAndPropertiesInXSLTMapping

AccessHeaderAndPropertiesInXPathAndConditions

CsvToXmlConverter

XmlToCsvConverter

JSONToXMLAndXMLToJSON

MappingContext

FileTransfer

MappingXMLToJSON

Base64EncoderDecoder

MIMEMultipartEncoderDecoder

ConsumeHttpServiceWithQueryParameters

PersistStep

UsageOfDataStore

DecoupleProcessing

DecoupleFlowsWithoutPersistence

DecoupleFlowsUsingPersistence

DecoupleFlowsWithPollingConsumer - Trigger

DecoupleFlowsWithPollingConsumer - Poll

DecoupleFlowsUsingJMS

RestrictHttpMethod

ModelingBasics / DecoupleProcessing / DecoupleFlowsUsingJMS

POSThttps://{{host}}/http/ModelingBasics/DecoupleFlowsUsingJMS

ParamsAuthorizationHeaders (9)BodyPre-request ScriptTestsSettings

Headers8 hidden

	Key	Value	Description	...	Bulk Edit	Presets
<input checked="" type="checkbox"/>	productId	HT-2025				
	Key	Value	Description			

BodyCookiesHeaders (15)Test Results

PrettyRawPreviewVisualizeXML

```
1 <response>
2   <info>product ID HT-2025 has been passed to the JMS queue and will be picked up soon for processing</info>
3   <pattern>InOut</pattern>
4 </response>
```

Status: 202 AcceptedTime: 2.20 sSize: 738 BSave as Example