

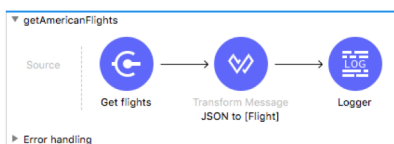


# Module 8: Consuming Web Services

## Goal



Call an operation of a connector in Exchange



Call a RESTful web service



Call a SOAP web service



```

1 package com.mulesoft.training;
2
3 import java.util.Comparator;
4
5 public class Flight implements
6
7     String flightCode;
8     String origination;
9     int availableSeats;
10    String departureDate;
11    String airlineName;
12    String destination;
13    double price;
14    String planeType;
  
```

At the end of this module, you should be able to



- Consume web services that have a connector in Anypoint Exchange
- Consume RESTful web services
- Consume SOAP web services
- Pass parameters to SOAP web services using the Transform Message component
- Transform data from multiple services to a canonical format

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## Consuming web services that have a connector in Exchange



## Connectors and modules



- **Modules** are extensions to the Mule runtime that you can use when building a Mule app
  - HTTP, Database, Salesforce, SAP, Slack, Validation, Java, and many more
- **Connectors** are modules that connect to an external server
  - HTTP, Database, Salesforce, SAP, Slack
- For module reference
  - <https://docs.mulesoft.com/connectors/>

Connectors and Modules (for Mule 4)

> Amazon DynamoDB Connector	> Java Module	> Salesforce Analytics Connector
> Amazon EC2 Connector	> JMS Connector	> Salesforce Composite Connector
> Amazon RDS Connector	> Kafka Connector	> Salesforce Connector
> Amazon S3 Connector	> LDAP Connector	> Salesforce Marketing Connector
> Amazon SNS Connector	> Microsoft Dynamics 365 Connector	> SAP Connector
> Amazon SQS Connector	> Microsoft Dynamics 365 Operations Connector	> SAP Concur Connector
> Anypoint MQ Connector	> Microsoft Dynamics AX Connector	> Scripting Module
> BMC Remedy Connector	> Microsoft Dynamics CRM Connector	> ServiceNow Connector
> Box Connector	> Microsoft Dynamics NAV Connector	> SFTP Connector
> Cassandra Connector	> Microsoft MSMQ Connector	> SharePoint Connector
> Database Connector	> Microsoft PowerShell Connector	> Siebel Connector
> EDIFACT EDI Connector	> MongoDB Connector	> Spring Module
> Email Connector	> Neo4j Connector	> TRADACOMS EDI Connector
> File Connector	> NetSuite Connector	> Twilio Connector
> FTP Connector	> OAuth Module Documentation Reference	> Validation Module
> FTPS Connector	> Object Store Connector	> VM Connector
> HDPS (Hadoop) Connector	> Oracle EBS 12.1 Connector	> Web Service Consumer Connector
> HL7 EDI Connector	> Oracle EBS 12.2 Connector	> Workflow Connector
> HTTP Connector	> PeopleSoft Connector	> X12 EDI Connector
> IBM CTG Connector	> Redis Connector	> XML Module
		> Zuora Connector

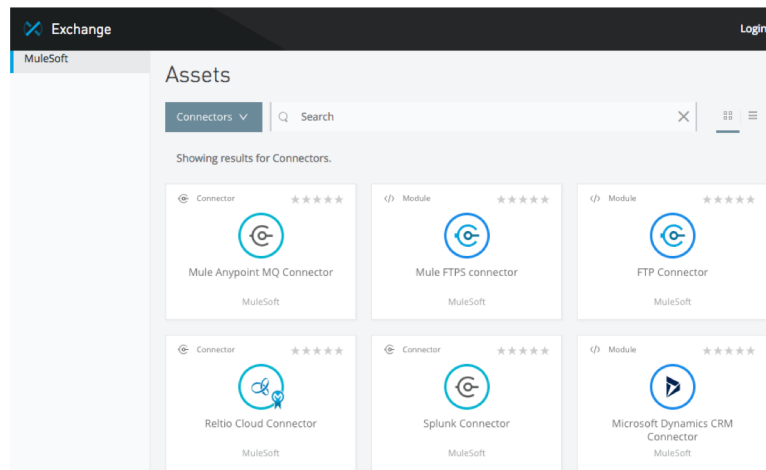
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## Connectors in Anypoint Exchange



- Many connectors in Exchange package a much easier way to make calls to APIs



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## Connector types specify creator and support level



- The type of selector is specified in its tags on Exchange

Tags

community

	Premium	Select	MuleSoft Certified	Community
Additional cost	x			
Updated APIs	x	x		
Fully tested	x	x		
MuleSoft Support	Tier 1-3	Tier 1-3	Tier 1 (From developer: T2/T3)	Tier 1
Connector examples	HL7 SAP Siebel	Salesforce Workday	AS/400 Oracle JD Edwards Microsoft Azure Storage	LinkedIn Slack

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## Connector support levels



- Tier 1
  - MuleSoft will isolate the problem and diagnose it
- Tier 2
  - MuleSoft will find a workaround
- Tier 3
  - MuleSoft will fix the code

	Premium	Select	MuleSoft Certified	Community
Not included in Platform license	x			
Tier 2-3 Support	x	x		
Tier 1 Support	x	x	x	x

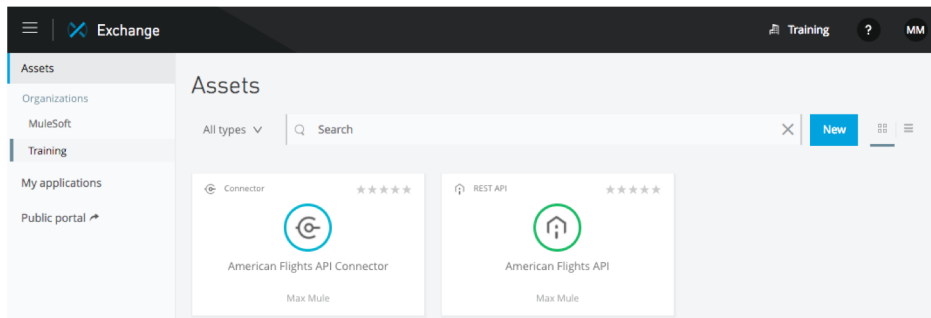
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## REST Connectors in Anypoint Exchange



- REST Connect converts a RAML 1.0 API specification added to Exchange to a connector
  - You did this in Module 4
- You can use the connector in Anypoint Studio or flow designer



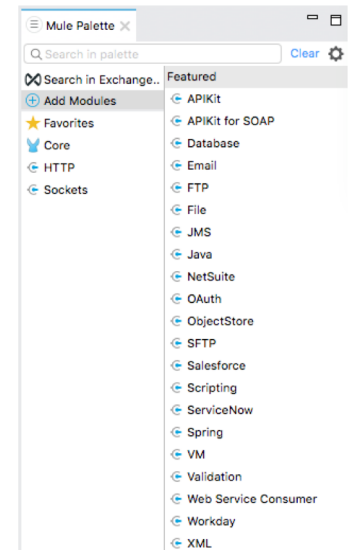
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## Connectors in Anypoint Studio



- Some modules are **pre-installed** in Studio
  - HTTP, Database, Salesforce, Validation, Java
- Some modules are **not pre-installed** in Studio
  - SAP, Slack



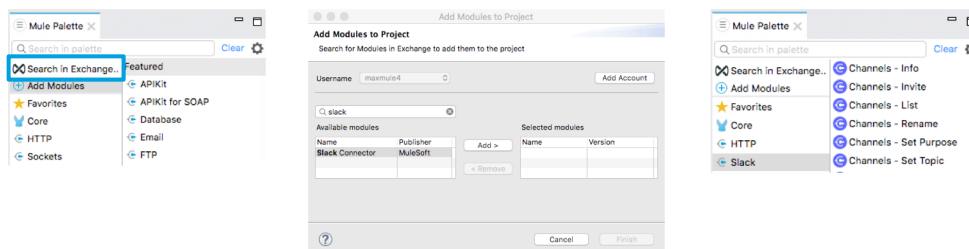
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## Adding connectors from Exchange



- If connectors are not pre-installed in Anypoint Studio, you can search Exchange and add them to a project



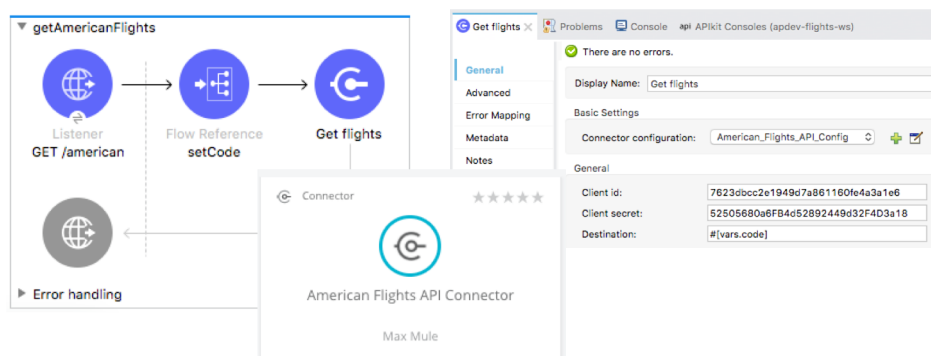
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## Walkthrough 8-1: Consume a RESTful web service that has a connector in Exchange



- Create a new flow to call the American RESTful web service
- Add a REST connector from Exchange to an Anypoint Studio project
- Configure and use a REST connector to make a call to a web service
- Dynamically set a query parameter for a web service call



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# Consuming RESTful web services



## Consuming RESTful web services



- First check and see if there is an existing Anypoint Connector in Studio or Exchange to connect to the service provider
- If there is not, use the **HTTP** connector and its **Request** operation
  - Configure the operation and/or global element configuration
  - Specify any headers, query parameters, or URI parameters to pass to the call



Request

Name	Value
"dest"	vars.code

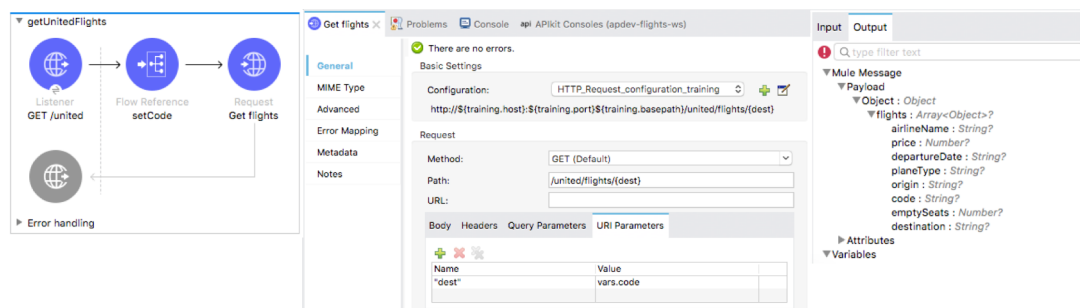
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## Walkthrough 8-2: Consume a RESTful web service



- Create a new flow to call the United RESTful web service
- Use the HTTP Request operation to call a RESTful web service
- Dynamically set a URI parameter for a web service call
- Add metadata for an HTTP Request operation's response



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## Consuming SOAP web services

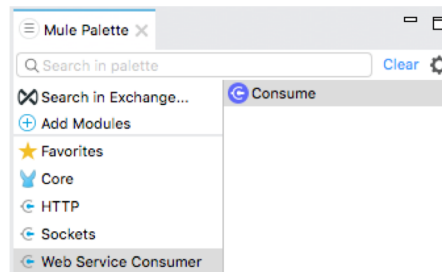




## Consuming SOAP web services



- First check and see if there is an existing Anypoint Connector in Studio or Exchange to connect to the service provider
- If there is not, use the **Web Service Consumer** connector
  - Add the Web Service Consumer module to the project
  - Configure a global element configuration, which includes the location of the WSDL
  - Use the Consume operation
  - Select the SOAP operation to invoke



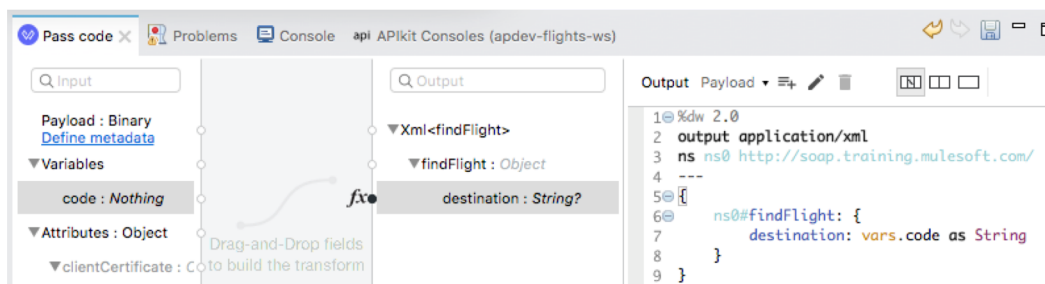
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## Passing data to a SOAP web service



- Use the **Transform Message** component to pass arguments to a SOAP web service
- When you add it before the Consume operation, DataSense is used to create metadata for the input that includes the arguments



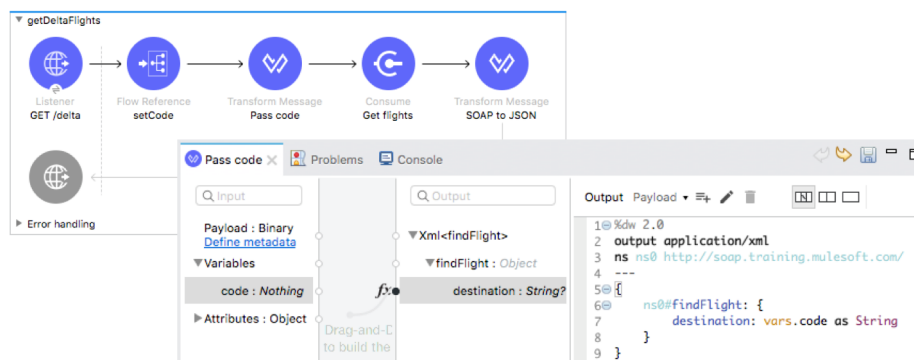
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## Walkthrough 8-3: Consume a SOAP web service



- Create a new flow to call the Delta SOAP web service
- Use the Web Service Consumer connector to call a SOAP web service
- Use the Transform Message component to pass arguments to a SOAP web service



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# Combining data from multiple services



## Combining data from multiple services



- Data from different services is pretty much always going to be in different formats
- To combine the data sets, you need to transform each of them to a canonical, or standard format
  - In this module, you will use a Java class as the canonical format
  - In module 11, you will learn to use the DataWeave format as a canonical format

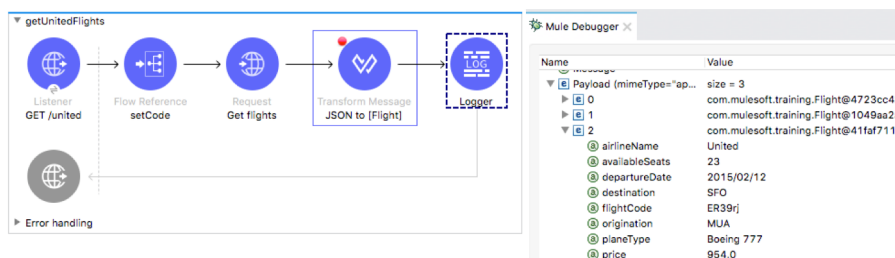
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## Walkthrough 8-4: Transform data from multiple services to a canonical format



- Define a metadata type for the Flight Java class
- Transform the results from RESTful and SOAP web service calls to a collection of Flight objects



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# Summary



## Summary



- To consume a web service, first look to see if it has a **connector in Anypoint Exchange**
  - Easiest way to consume a web service
- Use the **HTTP Request** operation to consume any REST web service
  - With or without URI parameters and query parameters
  - With or without a RAML definition
- Use the **Web Service Consumer** connector to consume any SOAP web service
- Use the Transform Message component to pass arguments to SOAP web services