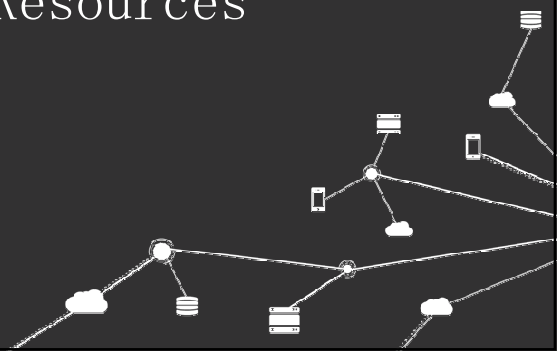
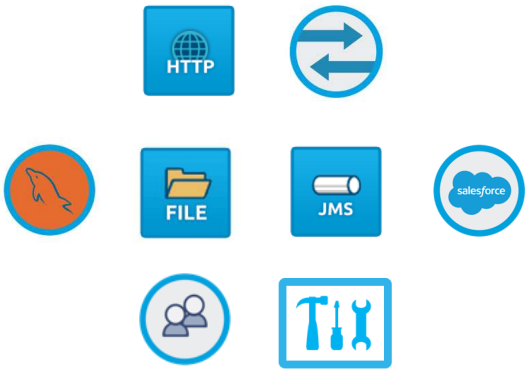
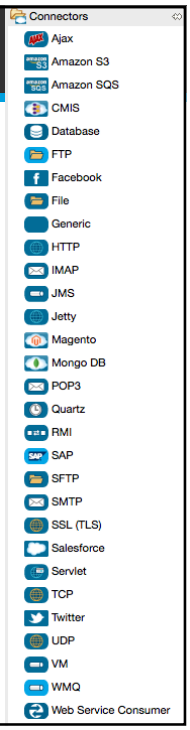
MuleSoft

Module 4: Connecting to Additional Resources



Goal



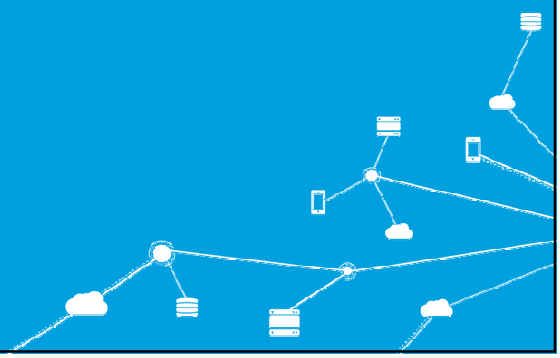


Objectives

- In this module, you will learn:
  - To connect to databases
  - To connect to files
  - To connect to JMS queues
  - To connect to SaaS applications
  - To discover and install connectors not bundled with Anypoint Studio
  - About developing your own custom connectors with Anypoint Connector DevKit

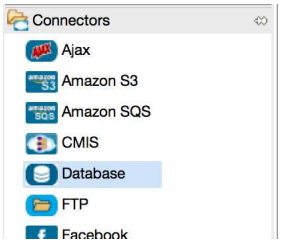
MuleSoft

Connecting to databases



The Database connector

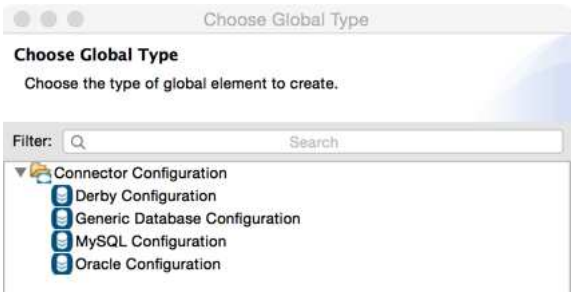
- Can connect to almost any JDBC relational database
  - Any database engine for which you have a driver
- Supports operations including
  - SELECT, INSERT, UPDATE, DELETE
  - Stored Procedures
  - Bulk Execute
  - Data Definition Language (DDL) requests like CREATE and ALTER



MuleSoft

Supported database engines

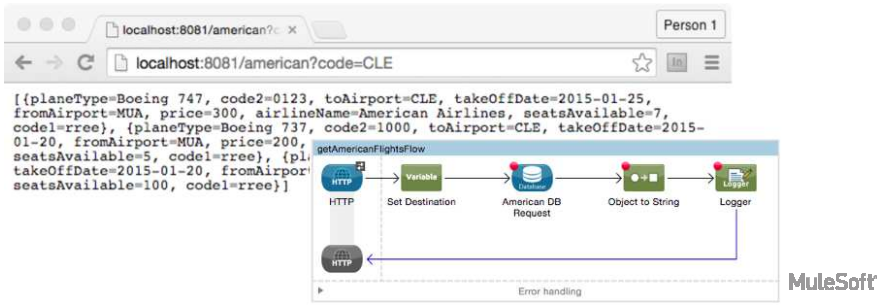
- Out-of-the-box support for
  - MySQL, Oracle, Derby
- Others are supported by a generic database configuration
  - Specify the driver class as one of the connection parameters



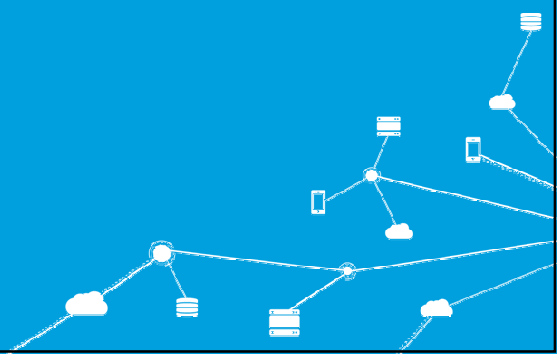
MuleSoft

Walkthrough 4-1: Connect to a database (MySQL)

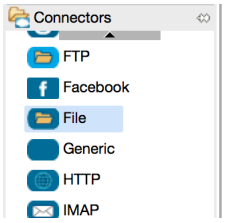
- Create a new flow for requests at http://localhost:8081/american
- Add a Database connector that connects to a MySQL database
- Write a query to return all flights for the static destination SFO
- Modify the query to use a dynamic destination from a query param
- Use the Object to String transformer to return the results as a string



Connecting to files



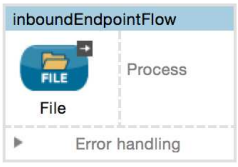
The File connector



- Gives Mule applications the ability to both read and write files in the local file system
  - Read files every certain period of time and delete, move, or leave the file as it is once processed
  - Copy files from one directory to another
  - Read input files while saving a backup of the input file
  - Create new files with a specific names
  - Append output to existing files

MuleSoft

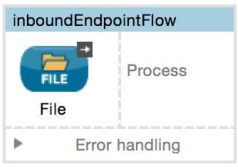
Using the File connector as an inbound endpoint



- If placed at the beginning of a flow
  - It will act as an inbound endpoint, a message source
  - It checks for files in a location at some set frequency
  - It triggers the flow whenever it receives an incoming file
  - It reads the file into the payload and dispatches the message to the next processor
  - By default, it consumes the file, but it can also move and/or rename the file
  - It can filter the files it reads by different name patterns

MuleSoft

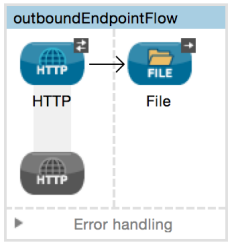
Using the File connector as an inbound endpoint



- By default, it uses streaming
  - Payload is a FileInputStream
  - Streams are closed by transformers reading the input stream
  - Can turn off streaming if you want a byte array instead
- Does not require a connector configuration
- Create and use a connector configuration for
  - Reusability
  - Setting properties, like autoDelete=false or streaming=false

MuleSoft

Using the File connector as an outbound endpoint



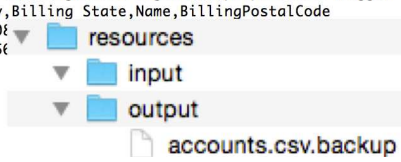
- If placed in the middle or end of a flow
  - It will serve as an outbound endpoint, passing files to the connected file system
  - It can generate new files or append content to an existing file
  - The file name can be set at runtime

MuleSoft

Walkthrough 4-2: Connect to a file (CSV)

- Add and configure a File connector endpoint to watch an input directory, read the contents of any added files, and then rename the files and move them to an output folder
- Add a CSV file to the input directory and watch it moved
- Restrict the type of file read
- Use the File to String transformer to return results as a string

```
INFO  2015-08-19 13:44:16,688 [[apessentials].getCSVAccountsFlow.stage1.02] org.mule.api.processor.Logger
MessageProcessor: Billing Street,Billing City,Billing Country,Billing State,Name,BillingPostalCode
111 Boulevard Hausmann,Paris,France,,Dog Park Industries,75008
400 South St,San Francisco,USA,CA,Iguana Park Industries,91156
777 North St,San Francisco,USA,CA,Cat Park Industries,91156
```



MuleSoft

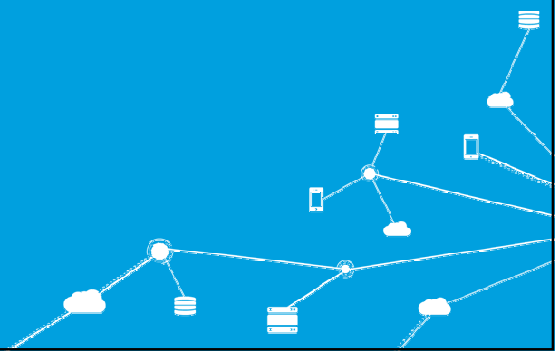
Tips for using the File connector

- The account running Mule must have read and/or write permissions on the specified directories
  - In standalone mode, the user that runs the Mule ESB server
  - Otherwise, the user that runs the application server
- Be careful not to permanently delete or overwrite files
  - Use autoDelete and moveToDirectory attributes wisely
- See both the File connector documentation and the File Transport documentation

  http://www.mulesoft.org/documentation/display/current/File+Transport+Reference

MuleSoft

Connecting to JMS queues



Java Messaging Service (JMS)

- Is a widely-used API for enabling applications to communicate through the exchange of messages
- It simplifies application development by providing a standard interface for creating, sending, and receiving messages
- It supports two messaging models
  - Queues: PTP (point-to-point)
  - Topics: Pub-Sub (publish/subscribe)

MuleSoft

JMS messaging models: Point to Point

- Queues: PTP (point-to-point)
  - One-to-one
  - A sender delivers messages to a queue and a single receiver pulls the message off of the queue
  - The receiver does not need to be listening to the queue at the time the message is sent

MuleSoft

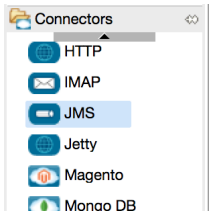
JMS messaging models: Pub-Sub

- Topics: Pub-Sub (publish / subscribe)
  - One-to-many
  - A publisher sends a message to a topic and all active subscribers of the topic receive the message
  - Subscribers that are not actively listening to the topic will miss the published message
    - Unless messages are made durable

MuleSoft

Connecting to JMS queues

- The Mule JMS transport provides support for sending messages via JMS queues
- The JMS connector is a generic connector for sending and receiving messages over JMS queues
  - Can connect to any JMS messaging service that implements the JMS spec
  - Lets you send and receive messages to queues and topics



MuleSoft

Supported JMS providers

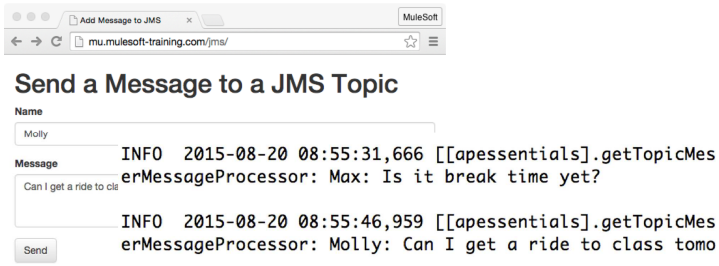
- Out-of-the-box support for
  - ActiveMQ and WebLogic JMS
  - Others are supported by a generic JMS or custom JMS configuration

- HornetMQ, Open MQ, Solace JMS, Tibco EMS
  - Examples in the documentation
- WebSphereMQ
  - Mule Enterprise has an enhanced transport to use

MuleSoft

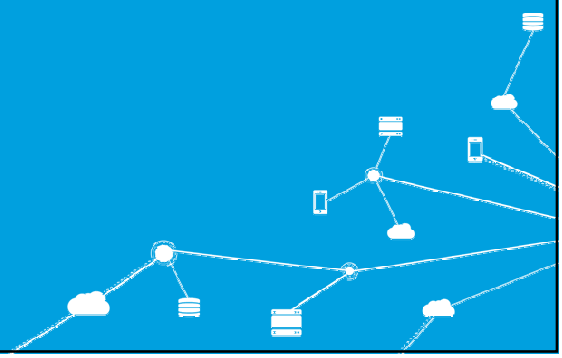
Walkthrough 4-3: Connect to a JMS queue (ActiveMQ)

- Create a flow accessible at http://localhost:8081/jms
- Add and configure an ActiveMQ connector
- Use a JMS endpoint to retrieve messages from a JMS topic
- Add messages to the topic using a web form
- Use a JMS endpoint to send messages to a JMS topic



MuleSoft

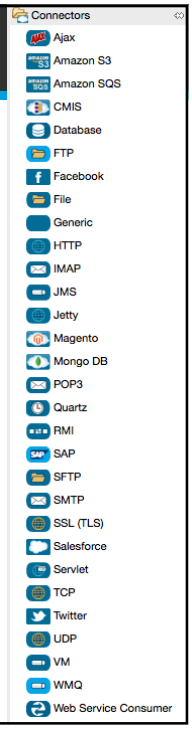
Connecting to SaaS applications



Out-of-the-box SaaS connectors

- SaaS connectors are operation-based endpoints for connecting to third-party APIs
- Many bundled with Anypoint Studio

- Additional SaaS connectors can be found on the Anypoint Exchange



The Salesforce connector

- Is as a secure way to access and act upon Salesforce.com (SFDC) data from a Mule application
  - Eliminates need to custom-code and secure a connection
- Handles all of five of the integration patterns for connecting with Salesforce
  - As identified by Salesforce
- Can perform operations that Salesforce exposes via four of their APIs
  - It does not expose all possible operations

MuleSoft

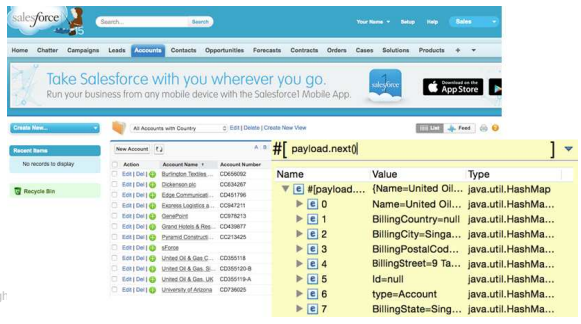
Salesforce connector operations

- Correlate to those Salesforce exposes via their APIs
  - SOAP API
    - For accessing Salesforce data
    - Most of the Salesforce connector operations map to the operations this API exposes
  - REST API
  - Bulk API
    - For loading batches of data in Salesforce
  - Streaming API
    - For receiving notifications for data changes

MuleSoft

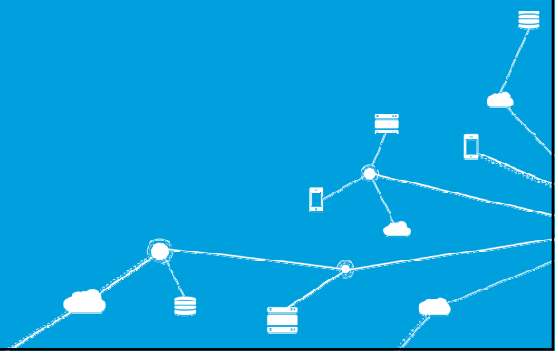
Walkthrough 4-4: Connect to a SaaS application (Salesforce)

- Browse Salesforce data on http://salesforce.com
- Create a flow accessible at http://localhost:8081/sfdc
- Use the Salesforce connector to retrieve accounts for a postal code
- Use the Query Builder to write a query
- Use the Object to JSON transformer to return the results as a string



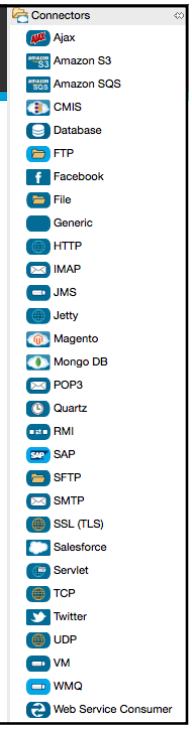
MuleSoft

Discovering and using additional connectors



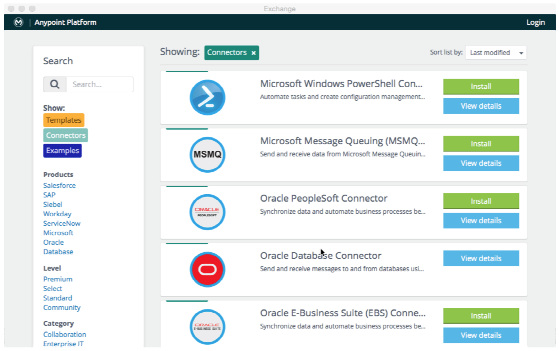
Not-in-the-box connectors

- Anypoint Studio comes with 30 out-of-the-box connectors
  - Endpoint-based connectors
  - Some operation-based connectors
- There are many other connectors you can use to connect to third-party APIs
  - Operation-based endpoints for connecting to third-party APIs
  - Find them on the Anypoint Exchange
  - Install as new software to Anypoint Studio from the Anypoint Connectors Update Site



The Anypoint Exchange: http://mulesoft.com/exchange

- Anypoint Exchange is a library of assets for the Anypoint Platform including
  - Anypoint Connectors
  - Integration templates
  - Examples



MuleSoft

Connector levels

	Premium	Select (*new*)	Standard	Community
Additional cost	x			
Updated APIs	x	x		
Fully tested	x	x		
Support	Tier 1-3	Tier 1-3	Tier 1	Tier 1
Connector example	HL7, SAP, Siebel, etc.	Salesforce, Workday, etc.	Zendesk, Zuora. etc.	LinkedIn, Twilio, etc.

MuleSoft

Connector support levels

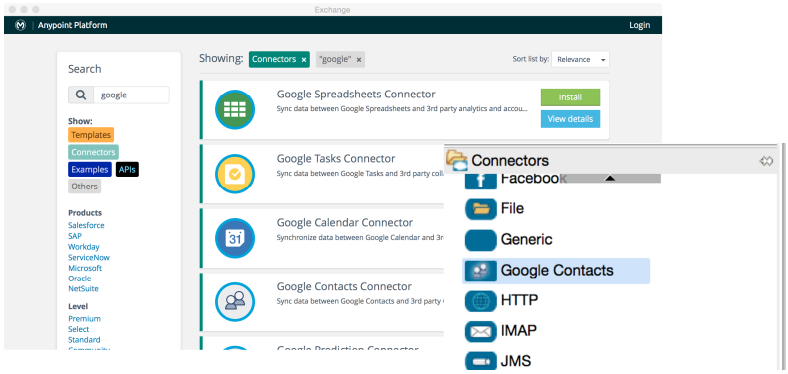
- Tier 1
  - MuleSoft will isolate the problem and diagnose it
- Tier 2
  - MuleSoft will find a workaround
- Tier 3
  - MuleSoft will fix the code

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

MuleSoft

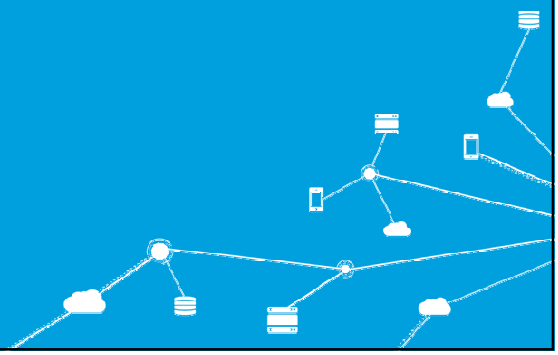
Walkthrough 4-5: Find and install not-in-the-box connectors

- Browse the Anypoint Exchange
- Add a new connector to Anypoint Studio



MuleSoft

Introducing Anypoint Connector DevKit for creating custom connectors



Custom connectors

- A connector is software that provides a connection between a Mule flow and an external resource
  - The resource can be any source of content, such as a database, protocol, or API
- Despite the 120+ connectors created by MuleSoft and the community, you may want a custom connector
  - To facilitate integration with additional SaaS and on-premise web services, applications, or data sources
- You create custom connectors with Anypoint Studio and the Anypoint Connector DevKit

MuleSoft

Creating custom connectors with DevKit

- Anypoint Connector DevKit provides the tools and interfaces for building custom connectors
- Custom connectors
  - Facilitate integration with SaaS and on-premise Web services, applications, and data sources
  - Function as extensions of the core product
  - Are reusable components that hide API complexity from the integration developer
  - Are written in Java version 7
  - Access web resources using REST, SOAP, or the Java SDK
  - Use Maven for development and building

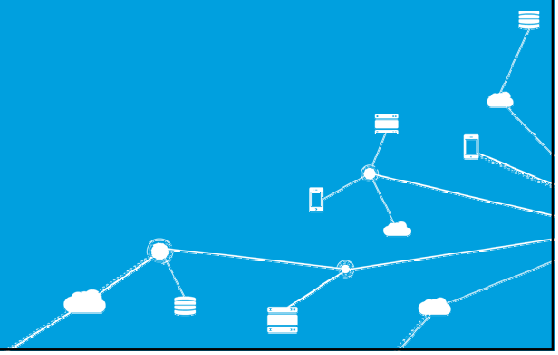
MuleSoft

Training for creating Anypoint Connectors

- Connector Development Essentials (1 day)
  - An instructor-led training class
  - Teaches you to build, implement, and install an Anypoint Connector
    - Creating a connector with the DevKit plugin
    - Implementing connection management
    - Implementing connector message processors
    - Invoking web services with REST annotations
    - Testing and documenting connectors
    - Packaging and installing connectors
  - http://training.mulesoft.com

MuleSoft

Summary



Summary

- In this module, you learned to connect to additional resources
- Use the Database connector to connect to any JDBC database with a driver
  - There are specific configs for Derby, MySQL, and Oracle
  - Use the Generic Database Configuration for all others
- Use the File connector to read or write local files
  - As an inbound endpoint, it checks for files in a location at some set frequency
  - As an outbound endpoint, it creates new files or appends existing files

MuleSoft

Summary

- Use the JMS connector to connect to any JMS messaging service that implements the JMS spec
  - Lets you send and receive messages to queues and topics
  - There are specific configs for Active MQ and WebLogic JMS
  - Use the Generic JMS config for all others
- SaaS connectors are operation-based endpoints for connecting to third-party APIs
  - Many bundled with Anypoint Studio
  - Additional connectors can be found on the Anypoint Exchange

MuleSoft

Summary

- There are 120+ connectors created by MuleSoft and the community
  - Anypoint Studio comes with 30 out-of-the-box connectors
  - Find additional connectors on the Anypoint Exchange
  - Connector levels include Premium, Select, Standard, and Community
- Create custom connectors with Anypoint Studio and the Anypoint Connector DevKit
  - Uses Java 7 and Maven

MuleSoft