



Module 3: Deploying Applications through MMC



Goals

The screenshot displays the MuleSoft Mule ESB Enterprise web interface. The top navigation bar includes tabs for Dashboard, Servers, Deployments (active), Applications, Flows, Flow Analyzer, Business Events, Alerts, and Administration. The left sidebar shows a tree view with Deployments, Applications, and Repository. The main content area is divided into several sections:

- Deployment Name:** A text input field containing "DeployReservation".
- Applications:** A section with buttons "Add From Repository" and "Upload New Application". Below is a table with columns "Name" and "Version". One entry is visible: "mule-example-flight-reservation-..." with version "201407251137" and a red "X" icon.
- Servers:** A section with a dropdown menu "Select a server...". Below is a table with columns "Name" and "Version". One entry is visible: "mule-enterprise-3.5.1" with a red "X" icon.
- All Flows:** A section with a description: "A flow is a configuration that wraps the component (class or web service that performs the main logic on the message)". Below is a table with columns "Name" and "Type". Four flows are listed: "acquireFlightPrice", "acquireSeatsInfo", "makeReservation", and "processReservation", all of type "flow".

An inset window in the bottom left shows a similar interface but with the "Deployments" tab selected and the "Deployment Name" field containing "Flights". It also shows a "Servers" list with "Max", "Production", "Staging", "Test", and "Development" environments.

Objectives

- Deploy applications through MMC.
- Upload application files.
- Create a deployment descriptor.
- Use the Flow Analyzer.

Topics

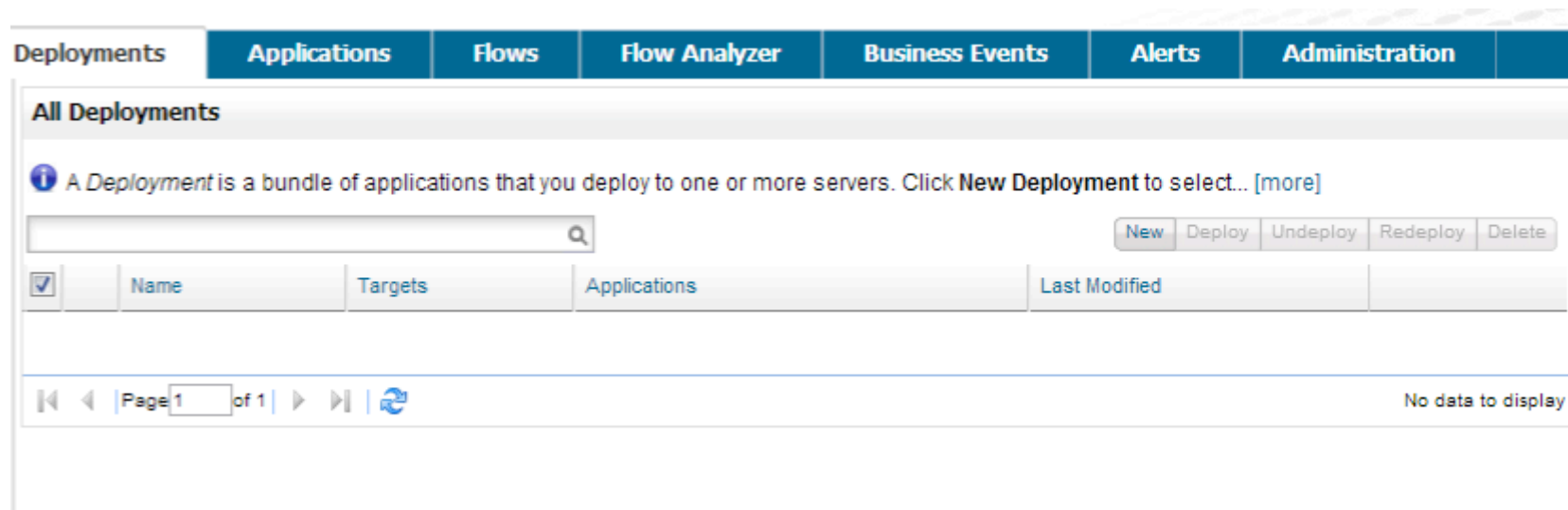
- Deploying an Application
- Using the Flow Analyzer:
 - Brief description of a flow
 - How to use flow analyzer

Deploying Applications through MMC



Application Deployment with MMC

- MMC allows the deployment of 1+ applications to 1+ Mule instances through the *Deployments* tab
- First create a Deployment Descriptor (yellow status)
- Then actually deploy (green status)



Server Groups and Clusters

- Servers can be combined into HA/LB Clusters
 - Cluster behaves as a single “server”
 - More details in a later Module
- Servers and Clusters can be combined into Server Groups
- Applications can be deployed to Server(s), Server Group(s) and/or Clusters

Creating Deployments

- Upload an application or select one from the repository
 - Uploaded applications are stored in the repository for reuse later
 - The Repository is a DB that stores copies of all versions of all apps
 - Application can be re-used in other deployments
 - Applications can be versioned in the repository

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Dashboard Servers **Deployments** Applications Flows Flow Analyzer Business Events Alerts Administration

Deployments
Deployments
Repository

Enter a unique name for this Deployment. To add a server, or server group to the Deployment, start typing its name... [more]

Deployment Name
DeployReservation

Applications
Add From Repository or Upload New Application

Name	Version	
mule-example-flight-reservation-...	201407251137	✖

Servers
Select a server...

Name	
mule-enterprise-3.5.1	✖

Cancel Save Deploy


Walkthrough 3-1: Deploy applications using MMC

- Upload an application to the MMC Repository
 - Application can be re-used in other deployments
 - Applications can be versioned in the repository
- Create a deployment
- Deploy the deployment

Flight Reservation System


Search Best Flight

Origin Destination

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Dashboard Servers **Deployments** Applications Flows Flow Analyzer Business Events Alerts Administration

Deployments
Deployments
Repository


 Enter a unique name for this Deployment. To add a server, or server group to the Deployment, start typing its name... [\[more\]](#)

Deployment Name

Applications or

Name	Version	
mule-example-flight-reservation-...	201407251137	

Servers

Name	
mule-enterprise-3.5.1	

Flow Analyzer

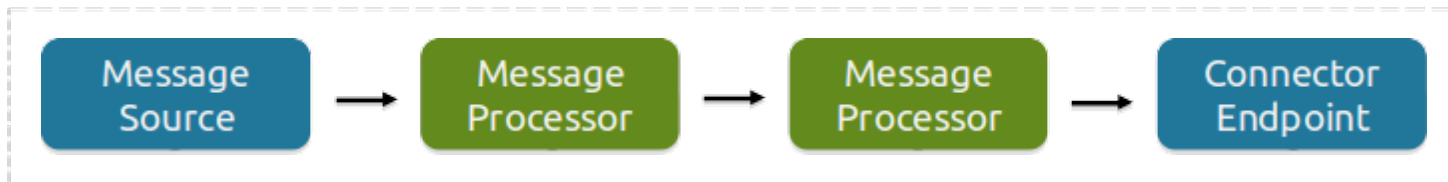


Flows

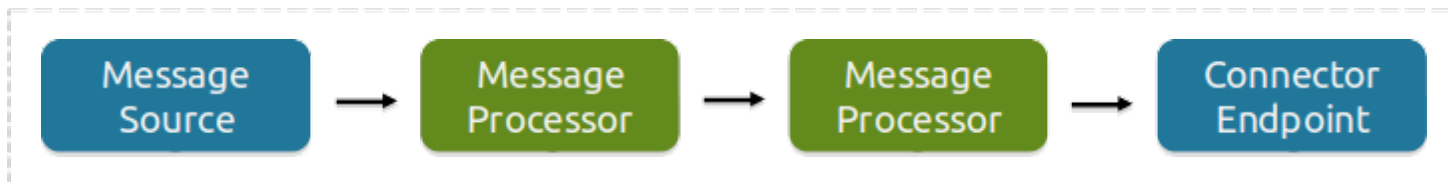
- A Mule application is composed of one or more flows
- A flow generally consists of:
 - An inbound endpoint, which receives an incoming message
 - One or more processors, which process the message
 - An outbound endpoint, which sends out a message
- Flows are initiated when there is a message that the inbound endpoint can take, or when they are called by other flows
- For example, a flow can receive a HTTP request through its HTTP inbound endpoint, process the request and send a reply from the outbound endpoint

Flow Example

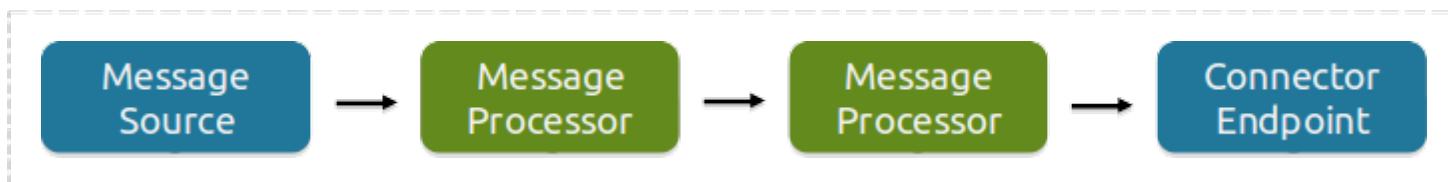
acquireFlightPrice



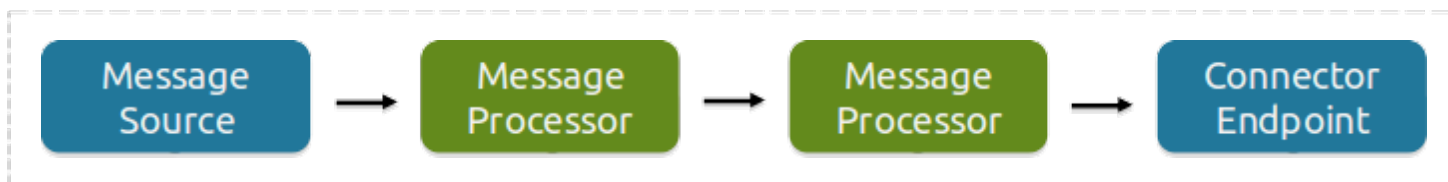
acquireSeatsInfo



makeReservation

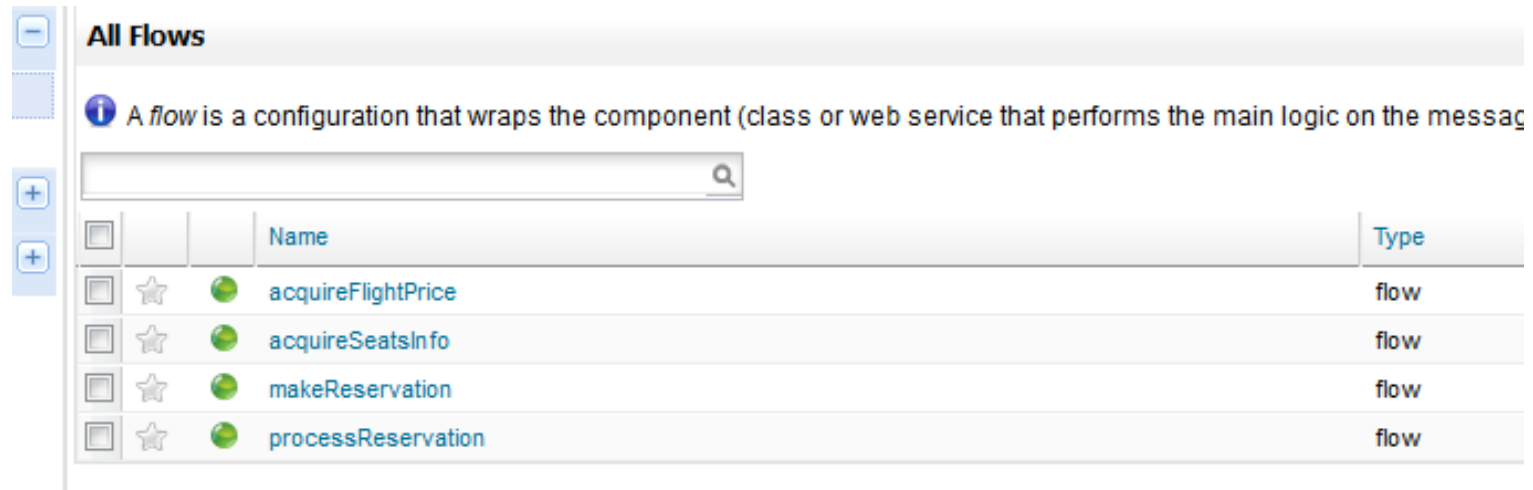


processReservation



Flows in MMC

- After deploying your application, you can view the flows in your application in the Flows tab



The screenshot shows the 'All Flows' tab in the MuleSoft MMC interface. It includes a search bar and a table of flows. The table has columns for selection, status, name, and type. Four flows are listed: 'acquireFlightPrice', 'acquireSeatsInfo', 'makeReservation', and 'processReservation', all of type 'flow'.

		Name	Type
<input type="checkbox"/>		acquireFlightPrice	flow
<input type="checkbox"/>		acquireSeatsInfo	flow
<input type="checkbox"/>		makeReservation	flow
<input type="checkbox"/>		processReservation	flow

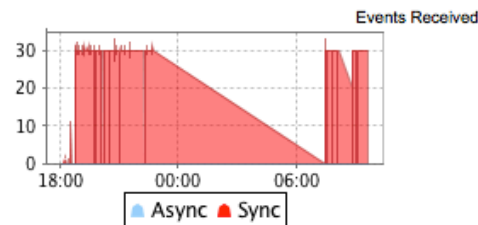
Flow Performance

- You can view performance metrics of a flow simply by clicking it

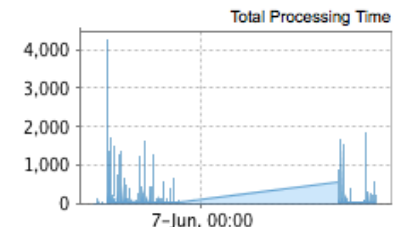
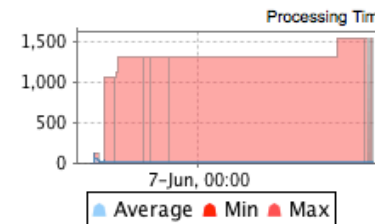
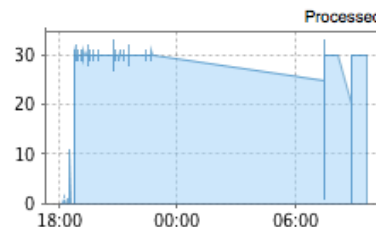
Flow Name:	EchoFlow (mule-example-echo-3.1.2)	Status:	
Description:	None		
Inbound Endpoints:	http://localhost:65082/services/EchoUMO	Message Processors:	process-if-started-message-processor processing-time-interceptor logging-interceptor default-message-processor-chain flow-construct-statistics-message-processor optional-async-intercepting-message-processor flow-configuring-message-processor

Events Received

Async Events Received: 0 Sync Events Received: 19513

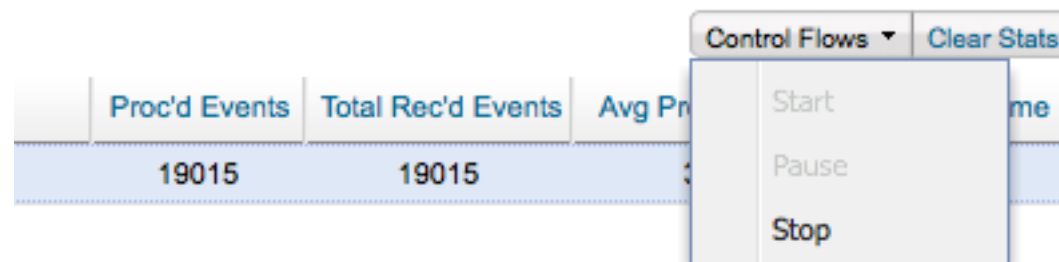


Events Processed



Controlling the flow

- Endpoints are interaction points where the applications receive messages
- You can start or stop either flows or endpoints
- To control the flow, select it in the flow list and then the action you want to perform



Selectively control the flow

- Can start or stop individual endpoints of a flow
 - Instead of stopping all the endpoints of the flow)
 - Must switch to the endpoints tab inside the flow and select the endpoint you want to control

Flow Details: mule-enterprise-3.5.1 - acquireFlightPrice (mule-example-flight-reservation-3.5.1-v201407251137)

The Endpoints tab provides more detailed information about the endpoints configured on this flow.

Summary Endpoints

<input checked="" type="checkbox"/>	Type	Address	Connector	Filtered	Synchronous	Transactions
<input checked="" type="checkbox"/>	VM	acquireFlightPrice	connector.VM.mule.default	false	true	false

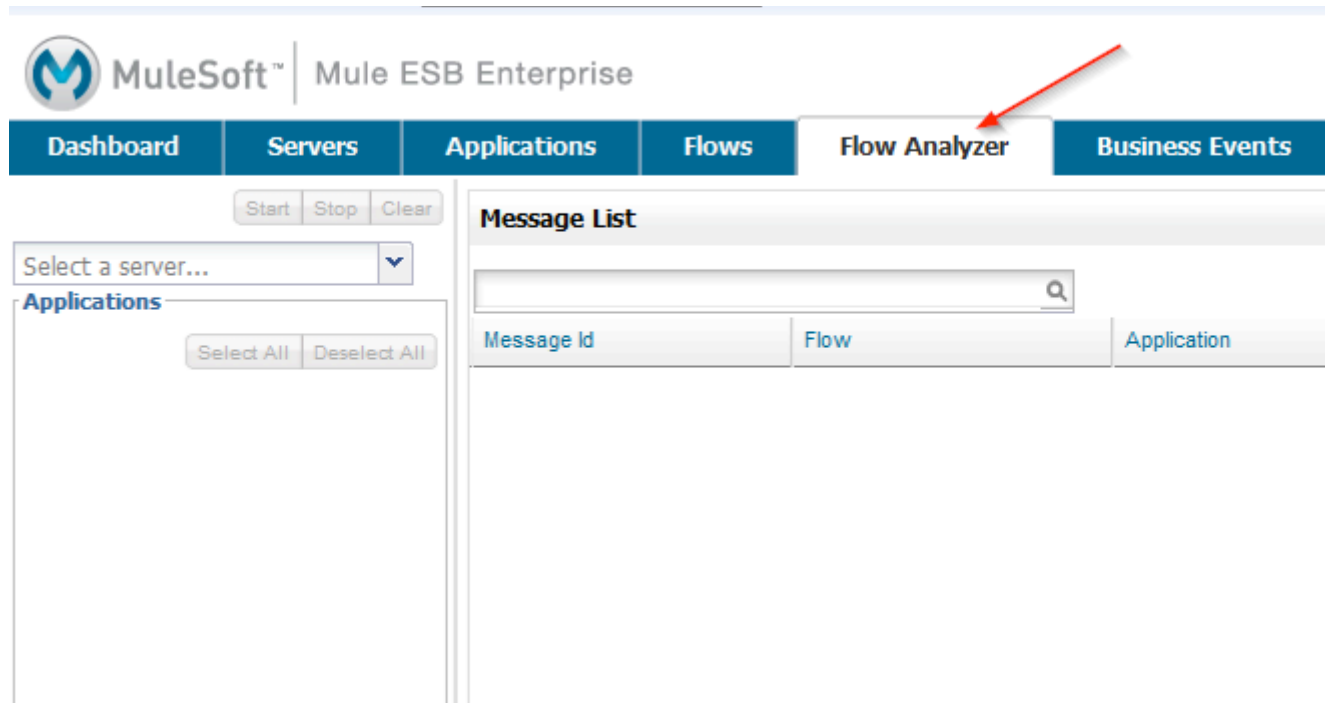
Control Endpoints ▾

Start

Stop

Flow Analyzer

- Track and analyze messages:
 - Passing through the flow
 - Troubleshoot in QA or STAGING environments



Using the Flow Analyzer

- Analyze individual flows
 1. Select the server
 2. Select the application
 3. Select the flow(s) you wish to analyze
 4. Click Start
- Analysis Timeout should be set
 - Stop analyzing flow(s) after a period of time
 - *Unlimited*
 - Analysis continues until you manually click Stop

The screenshot displays the MuleSoft Flow Analyzer interface. At the top, there are navigation tabs: Dashboard, Servers, Deployments, and Applications. Below these, there are buttons for Start, Stop, and Clear. The Analysis Timeout is set to 15 mins. The selected application is mule-enterprise-3.5.1. Under the Applications section, the application mule-example-flight-reservation-3.5.1-v201407251137 is selected, while the default application is not. Under the Flows section, four flows are listed and all are selected: acquireFlightPrice, acquireSeatsInfo, makeReservation, and processReservation.

Analysis Timeout	Selected Application	Selected Flows
15 mins	mule-enterprise-3.5.1	acquireFlightPrice, acquireSeatsInfo, makeReservation, processReservation

Analyzer Message List

- After analysis starts:
 - Messages listed as they pass through the flow

Message List				
<input type="text"/>				
Message Id	Flow	Application	Processing Time	TimeStamp
28ffacb0-13f4-11e4-9712-902b3	makeReservation	mule-example-flight-reservat...	99 ms	Fri Jul 25 14:06:50 GMT+200 2014
28ffacb0-13f4-11e4-9712-902b3	processReservation	mule-example-flight-reservat...	97 ms	Fri Jul 25 14:06:50 GMT+200 2014
2a7f6ee0-13f4-11e4-9712-902b	makeReservation	mule-example-flight-reservat...	7 ms	Fri Jul 25 14:06:53 GMT+200 2014
2a7f6ee0-13f4-11e4-9712-902b	processReservation	mule-example-flight-reservat...	5 ms	Fri Jul 25 14:06:53 GMT+200 2014
2c087fe0-13f4-11e4-9712-902b	makeReservation	mule-example-flight-reservat...	32 ms	Fri Jul 25 14:06:55 GMT+200 2014
2c087fe0-13f4-11e4-9712-902b	processReservation	mule-example-flight-reservat...	30 ms	Fri Jul 25 14:06:55 GMT+200 2014
2c094330-13f4-11e4-9712-902t	processReservation	mule-example-flight-reservat...	26 ms	Fri Jul 25 14:06:55 GMT+200 2014
2c094330-13f4-11e4-9712-902t	acquireSeatsInfo	mule-example-flight-reservat...	19 ms	Fri Jul 25 14:06:55 GMT+200 2014
2c094330-13f4-11e4-9712-902t	acquireFlightPrice	mule-example-flight-reservat...	15 ms	Fri Jul 25 14:06:55 GMT+200 2014

Message Details

- Selecting a message lists its details.
- It provides useful information for detecting problems in PROD or STAGING:

The screenshot displays the 'Message Details' window, which is divided into three main sections:

- Message Flow:** A list of components in the message flow, including 'Message Processor', 'Inbound Endpoint', 'Acquire seats info service', 'ExpressionLanguageComponent' (which is currently selected and highlighted), and 'Component'. Below the list is a scrollbar.
- Before Payload:** A text area showing the message payload before processing. The payload is a JSON object:

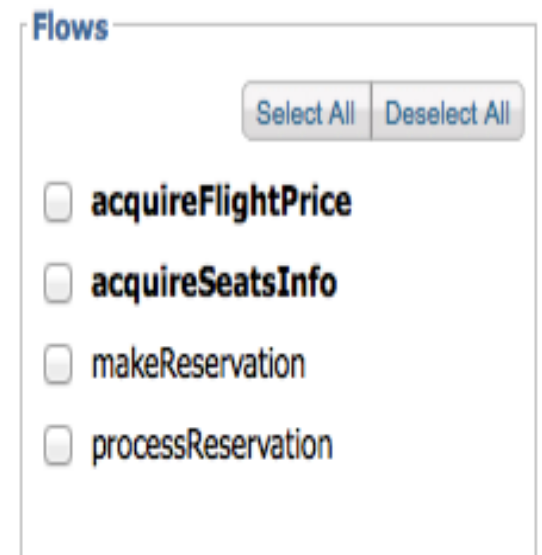
```
org.mule.example.Flight@68c40fe1[  
  flightNumber=915  
  seatInfo=<null>  
  ticketPrice=<null>  
]
```
- After Payload:** A text area showing the message payload after processing. The payload is a JSON object:

```
org.mule.example.Flight@68c40fe1[  
  flightNumber=915  
  seatInfo=No seat info available  
  ticketPrice=<null>  
]
```
- Message Properties:** A section on the right with a 'Name' column and a 'Value' column. It contains three expandable sections: 'Inbound Properties', 'Invocation Properties', and 'Outbound Properties'.

- While it can be used in Production, it is a heavyweight monitoring system and will affect performance.

Flow Analyzing and Logging Out

- You can log out of MMC while the Flow Analyzer is still running.
- While logged out, the Analyzer will continue running until it reaches the timeout. If the timeout is *Unlimited*, then it will still be running when you log in to MMC.
- Flows in **bold** indicate that they are still being analyzed.
- To check which flows analysis you have running, go to:
- **Administration -> Stop Flow Analysis**



Walkthrough 3-2: Use the Flow Analyzer

- Perform "root cause analysis"

The screenshot displays the MuleSoft Mule ESB Enterprise Flow Analyzer interface. The top navigation bar includes links for Dashboard, Servers, Deployments, Applications, Flows, Flow Analyzer (active), Business Events, Alerts, and Administration. The user is logged in as Administrator.

Analysis Timeout: 4:34

Auditing Flows:

- acquireFlightPrice [mule-example-flight-reservation-3.5.2-v201506191524]
- acquireSeatsInfo [mule-example-flight-reservation-3.5.2-v201506191524]
- makeReservation [mule-example-flight-reservation-3.5.2-v201506191524]
- processReservation [mule-example-flight-reservation-3.5.2-v201506191524]

Message List

Message Id	Flow	Application	Processing Time	TimeStamp
64a24dd0-16dd-11e5-bdd0-985	makeReservation	mule-example-flight-reservat...	78 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a24dd0-16dd-11e5-bdd0-985	processReservation	mule-example-flight-reservat...	75 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b10-16dd-11e5-bdd0-985	processReservation	mule-example-flight-reservat...	22 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b10-16dd-11e5-bdd0-985	acquireSeatsInfo	mule-example-flight-reservat...	7 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b10-16dd-11e5-bdd0-985	acquireFlightPrice	mule-example-flight-reservat...	2 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b11-16dd-11e5-bdd0-985	processReservation	mule-example-flight-reservat...	14 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b11-16dd-11e5-bdd0-985	acquireSeatsInfo	mule-example-flight-reservat...	3 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b11-16dd-11e5-bdd0-985	acquireFlightPrice	mule-example-flight-reservat...	1 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b12-16dd-11e5-bdd0-985	processReservation	mule-example-flight-reservat...	21 ms	Fri Jun 19 16:46:23 GMT-700 201:
64a55b12-16dd-11e5-bdd0-985	acquireSeatsInfo	mule-example-flight-reservat...	6 ms	Fri Jun 19 16:46:23 GMT-700 201:

Message Details

Message Flow

- Message Processor
- Inbound Endpoint
- ExpressionLanguageCompo...

Before Payload

```
org.mule.example.Flight@7d8e9635[
  flightNumber=915
  seatInfo=No seat info available
  ticketPrice=<null>
]
```

After Payload

```
org.mule.example.Flight@7d8e9635[
  flightNumber=915
  seatInfo=No seat info available
  ticketPrice=1830.0
]
```

Message Properties

Name	Before
Inbound Properties	
MULE_SESSION	r00ABXNyACNvcma
MULE_CORRELATION_SEQUENCE	1
MULE_ENCODING	UTF-8
MULE_CORRELATION_GROUP	3
MULE_CORRELATION_ID	64a24dd0-16dd-11e5
MULE_ENDPOINT	vm://acquireFlightPric
MULE_ORIGINATING_ENDPOINT	endpoint.vm.acquireF
Invocation Properties	
Outbound Properties	

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Deploy to Multiple Servers

- Deployments can include multiple servers or server groups
- Some application parameters may need to be changed between servers

Optional Walkthrough 3-3: Deploy applications to multiple servers

- Deploy Flight application to two servers
- Identify and fix TCP bind errors
- <http://localhost:9092/reservation/index.html>



The screenshot displays a web application titled "Flight Reservation System" in a large, bold, blue font. Below the title is a section labeled "Search Best Flight" in a smaller blue font. This section contains two dropdown menus: "Origin" and "Destination", both with white backgrounds and blue text. Below the "Origin" dropdown is a "Search" button with a blue border and white text. The entire form is set against a light blue background.

Summary

- Applications are deployed into Mule server instances
 - Copy the deployable archive into the \$MULE_HOME/apps folder
 - A anchor file is automatically created
 - Delete the anchor file to cleanly undeploy and application
- Deployments bundle together application(s) and server(s), server group(s) and cluster(s)
- Applications are stored and versioned in the MMC repository
- The Flow Analyzer allows detailed debugging and troubleshooting of Mule applications

