



# Module 8: Monitoring Instrumented Applications with Business Events



# Goals

The screenshot displays the MuleSoft Flow Analyzer interface. At the top, a flow diagram for 'EchoFlow' is shown, consisting of an HTTP connector, a 'Message received' event, a filter '#[payload.contains("Test")]', and a 'Payload is test' event. Below this, the 'Flow Analyzer' tab is active, showing a search bar and a table of events. The search criteria are set to 'Application Name' containing 'business'. The table lists two events, both completed. A yellow box highlights the second event's ID, '0f47b796-5f65-11e2-b3b9-6b46d5e8b502'. Yellow arrows point from this ID to the 'Servers' tab and the 'Flow Name' column in the 'Business Events' table below. The 'Business Events' table shows two events for the 'EchoFlow' application, both completed, with timestamps from January 15, 2013.

**Flow Diagram:**

```
graph LR; HTTP[HTTP] --> MR[Message received]; MR --> Filter["#[payload.contains('Test')]"]; Filter --> PE[Payload is test];
```

**Flow Analyzer Search Results:**

Id	Timestamp	Processing Time	Application	Status
0f1ab419-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	4 ms	businessEvents	Completed
0f47b796-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	3 ms	businessEvents	Completed

**Business Events Table:**

Event	Flow Name	Duration	Type	Server	Result	Date/Time Started
Message received	EchoFlow		Custom	Mule-3.3.2@192.168.56.1:7777	message: /Test	Tue Jan 15 14:42:14.720 UTC-8 2013
Payload is test	EchoFlow		Custom	Mule-3.3.2@192.168.56.1:7777		Tue Jan 15 14:42:14.721 UTC-8 2013

# Objectives

- Identify how Business Events are included in Mule applications
- Monitor Business Events in an MMC server
- Distinguish between the behavior of default and custom business events
- Identify how developers create custom business events
- Identify how developers enable default business events on a Mule flow

# Topics

- Introducing Business Events:
  - What are business events
  - Creating business events
  - Relation to MMC
- Business Events; Use Cases


# Introducing Business Events




# Intro to Business Events

- Business-level logging of events that occur in your app:
  - As opposed to just logging message flow
  - Include Business objects, contexts, etc.
- Intended for business analysts, not just developers
- Event data + metadata:
  - Metadata could be any key-value pair
- Searchable
- Default events or custom events:
  - Default events are enabled at flow or inbound-endpoint level:
    - Register everything that happens (e.g. every building block is logged)
  - Custom events are placed by developers:
    - May include metadata, as much as needed

# Searching for Business Events

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Welcome, Administrator  4 Unread Alerts | [Help](#) | [Log Out](#)

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

**Summary**

**Search**

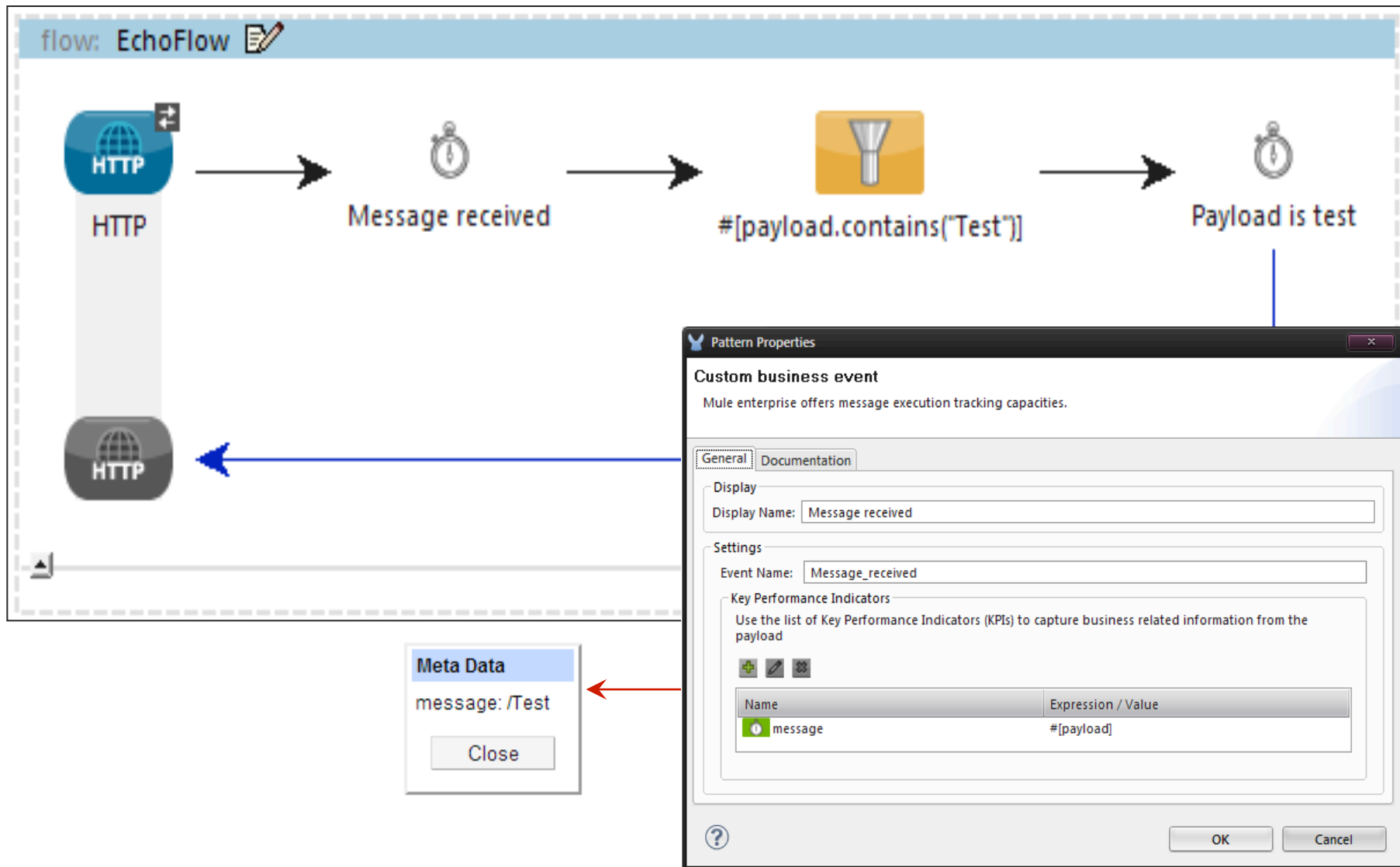
Match following rule (limiting to  transactions):



Id	Timestamp	Processing Time	Application	Status
f52be93d-5f64-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:18 UTC-8 2013	13 ms	businessEvents	Completed
f54e8c7a-5f64-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:19 UTC-8 2013	11 ms	businessEvents	Completed
0d0edf07-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:58 UTC-8 2013	8 ms	businessEvents	Completed
0d2af294-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:59 UTC-8 2013	8 ms	businessEvents	Completed
0d5efaf1-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:59 UTC-8 2013	7 ms	businessEvents	Completed
0d8c4c8e-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:43:59 UTC-8 2013	7 ms	businessEvents	Completed
0e1578cb-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:00 UTC-8 2013	13 ms	businessEvents	Completed
0e2aae88-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:00 UTC-8 2013	7 ms	businessEvents	Completed
0e691725-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:01 UTC-8 2013	8 ms	businessEvents	Completed
0e953042-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:01 UTC-8 2013	5 ms	businessEvents	Completed
0ef48e5f-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	5 ms	businessEvents	Completed
0f068fcc-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	5 ms	businessEvents	Completed
0f1ab419-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	4 ms	businessEvents	Completed
0f47b796-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	3 ms	businessEvents	Completed

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# Custom Events





# Viewing Business Events in MMC

The screenshot displays the MuleSoft MMC interface, specifically the Business Events and Flow Analyzer sections. The top navigation bar includes Dashboard, Servers, Deployments, Applications, Flows, Flow Analyzer, and Business Events. The Business Events section shows a search filter for 'business' and a table of events. The Flow Analyzer section shows a flow diagram for 'EchoFlow'.

**Business Events Table:**

Id	Timestamp	Processing Time	Application	Status
0f1ab419-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	4 ms	businessEvents	Completed
0f47b796-5f65-11e2-b3b9-6b46d5e8b502	Tue Jan 15 14:44:02 UTC-8 2013	3 ms	businessEvents	Completed

**Flow Analyzer - EchoFlow:**

```
graph LR; HTTP[HTTP] --> MR[Message received]; MR --> Filter["#[payload.contains('Test')]"]; Filter --> PT[Payload is test];
```

**Business Events Detail View:**

The detail view for the event with ID **cee72867-5f64-11e2-b3b9-6b46d5e8b502** shows the following data:

Event	Flow Name	Duration	Type	Server	Result	Date/Time Started
Message received	EchoFlow		Custom	Mule-3.3.2@192.168.56.1:7777	message: /Test	Tue Jan 15 14:42:14.720 UTC-8 2013
Payload is test	EchoFlow		Custom	Mule-3.3.2@192.168.56.1:7777		Tue Jan 15 14:42:14.721 UTC-8 2013

# MMC storage of Business Events

- Events tracking is not free (though build to be low cost):
  - Overhead in collection
  - Overhead in transmission to MMC
  - Overhead in management/housekeeping
- MMC polls each Mule server every couple of seconds:
  - And events are read
- All events are stored within MMC's databases:
  - In *mmc-data*/ by default
  - In an external database if configured
- Every event takes ~1KB of storage:
  - Keep it in mind if you have lots and lots of messages
  - Old events are purged after a week, checked once a day

# Business Events: Use Cases



# Use Cases for Business Events

- Root Cause Analysis:
  - Customer's Order Failed
  - Customer Calls in a Order Number
  - Use business Events to track orders

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Dashboard

Servers

Applications

Flows

Flow Analyzer

Business Events

Alerts

Administration

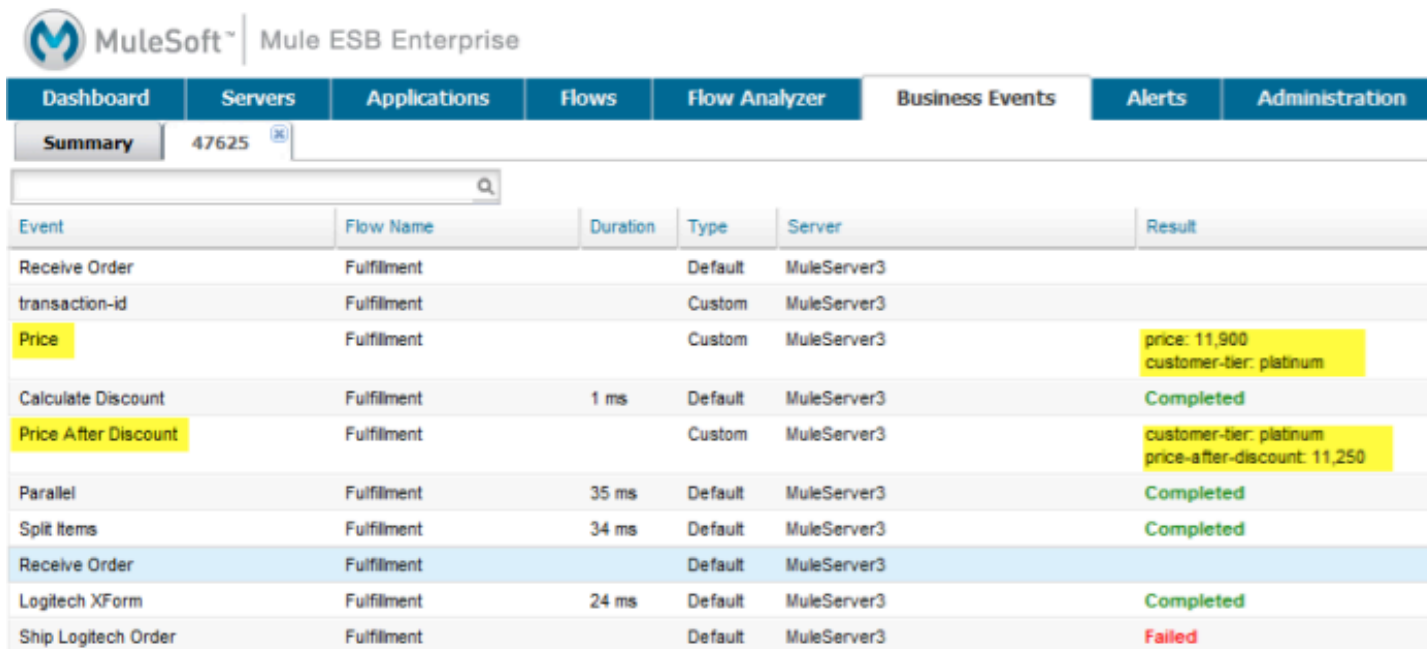
Summary

47625

Event	Flow Name	Duration	Type	Server	Result
Receive Order	Fulfilment		Default	MuleServer3	
Calculate Discount	Fulfilment	8 ms	Default	MuleServer3	Completed
Parallel	Fulfilment	301 ms	Default	MuleServer3	Completed
Split Items	Fulfilment	299 ms	Default	MuleServer3	Completed
Receive Order	Fulfilment		Default	MuleServer3	
Logitech XForm	Fulfilment	14 ms	Default	MuleServer3	Completed
Ship Logitech Order	Fulfilment		Default	MuleServer3	Failed

# Use Cases for Business Events

- Logic Testing:
  - Customer has a specific Order Discount
  - Check before and after events by order number
  - Check to see the order processed correctly



Event	Flow Name	Duration	Type	Server	Result
Receive Order	Fulfilment		Default	MuleServer3	
transaction-id	Fulfilment		Custom	MuleServer3	
Price	Fulfilment		Custom	MuleServer3	price: 11,900 customer-tier: platinum
Calculate Discount	Fulfilment	1 ms	Default	MuleServer3	Completed
Price After Discount	Fulfilment		Custom	MuleServer3	customer-tier: platinum price-after-discount: 11,250
Parallel	Fulfilment	35 ms	Default	MuleServer3	Completed
Split Items	Fulfilment	34 ms	Default	MuleServer3	Completed
Receive Order	Fulfilment		Default	MuleServer3	
Logitech XForm	Fulfilment	24 ms	Default	MuleServer3	Completed
Ship Logitech Order	Fulfilment		Default	MuleServer3	Failed

# Use Cases for Business Events

- Big Data:
  - An External database gives big data possibilities
  - Gain Statistics on customer bulk prices
  - Success/Failure ratio
  - Monitor KPIs

Dashboard	Servers	Applications	Flows	Flow Analyzer	Business Events	Alerts	Administration
Summary	47625						
<input type="text"/>							
Event	Flow Name	Duration	Type	Server	Result		
Receive Order	Fulfilment		Default	MuleServer3			
transaction-id	Fulfilment		Custom	MuleServer3			
Price	Fulfilment		Custom	MuleServer3	price: 11,900 customer-tier: platinum		
Calculate Discount	Fulfilment	1 ms	Default	MuleServer3	Completed		
Price After Discount	Fulfilment		Custom	MuleServer3	customer-tier: platinum price-after-discount: 11,250		
Parallel	Fulfilment	35 ms	Default	MuleServer3	Completed		
Split Items	Fulfilment	34 ms	Default	MuleServer3	Completed		
Receive Order	Fulfilment		Default	MuleServer3			
Logitech XForm	Fulfilment	24 ms	Default	MuleServer3	Completed		
Ship Logitech Order	Fulfilment		Default	MuleServer3	Failed		

## Walkthrough 8-1: Monitor Business Events

- Deploy “businessEvents.zip” in ONE of your Mules
- Search for the events for some requests:
  - How many do you see?
  - What does the third request log? What are all those events?

# Summary

- Developers can include BusinessEvents in their flows
  - Instrument applications
  - Custom and/or Default BusinessEvents
- BusinessEvents can be viewed in the MMC GUI
- Can be used for troubleshooting
  - Example: Root cause analysis



