



Module 2: Using the Mule Management Console (MMC)



Goals

The screenshot shows the MuleSoft Mule ESB Enterprise interface. The top navigation bar includes 'Dashboard', 'Servers', 'Deployments', 'Applications', 'Flows', 'Flow Analyzer', 'Business Events', 'Alerts', and 'Administration'. The 'Servers' tab is active, displaying a list of server groups on the left and a table of 'Development Servers' on the right. A dropdown menu is open for the 'Development' group, showing options: Barren, Development, Production, Staging, and Test.

Development Servers

A server is a single instance of Mule ESB, either standalone or embedded in an application server. Servers are organized into groups... [more]

Buttons: Add, Remove, Add to Group, Remove from Group, Add to Cluster, Control

Name	Version	Location	Flows	Group	Type	Standalone
HABarren	3.7.0	11.0.3.5, 11.0.3.5	- / - / -	Barren	Cluster	Yes

The screenshot shows the MuleSoft Mule ESB Enterprise interface. The top navigation bar includes 'Dashboard', 'Servers', 'Deployments', 'Applications', 'Flows', 'Flow Analyzer', 'Business Events', 'Alerts', and 'Administration'. The 'Servers' tab is active, displaying a list of server groups on the left and a table of 'All Servers' on the right. The 'All Servers' view shows a single server instance, 'Max', with details including version, location, flows, and type.

All Servers

A server is a single instance of Mule ESB, either standalone or embedded in an application server. Servers are organized into groups... [more]

Buttons: Add, Remove, Add to Group, Remove from Group, Add to Cluster, >>

Name	Version	Location	Flows	Type	Standalone
Max	3.7.0	172.16.12.209	1 / 0 / 0	Single Server	Yes

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Objectives

- Identify the product architecture of Mule wrappers and agents.
- Start an MMC server.
- Login to an MMC server.
- Verify a Mule Agent starts with a Mule server.
- Register Mule servers with MMC through Mule Agents.
- Distinguish between auto-discovery and manual discovery of Mule Servers in MMC.
- Monitor Mule servers in MMC.
- Manage Users and Groups.
- Restrict access to MMC features.

Topics

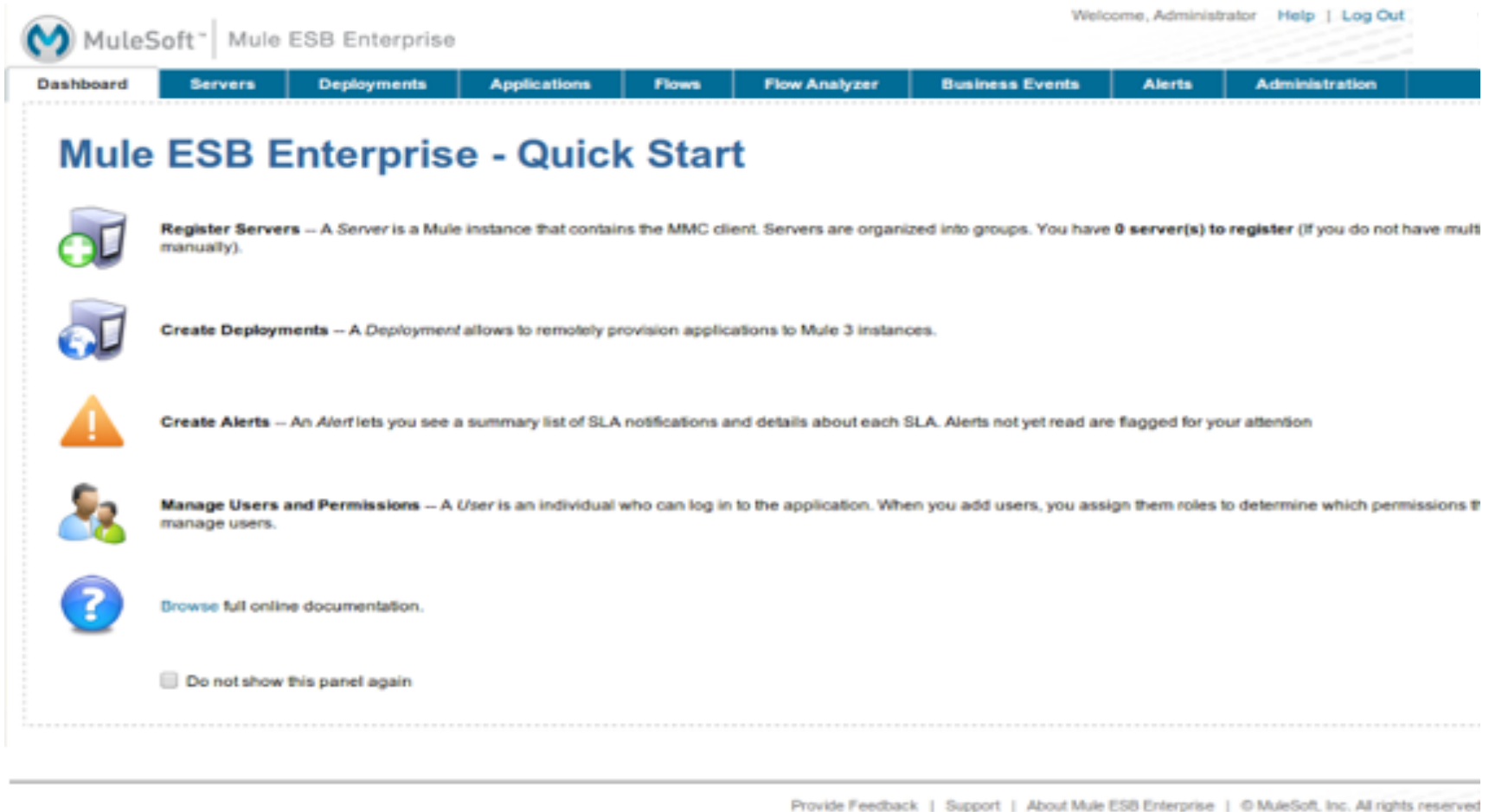
- Wrappers and Agents
- Registering Mule Servers
- Walkthrough 2 - Using MMC:
 - Start an MMC server
 - Register Mule servers with MMC
 - Restricting MMC User and Group permissions

Wrappers and Agents



MMC Overview

- MMC is a management console that allows you to control multiple Mule instances remotely:



MMC

- A Web Archive (.war) file which runs in an application server or container
 - %MMC_HOME%\apache-tomcat-7.0.52\webapps\mmc-3.7.x.war
- Trial version: already packaged in an Apache Tomcat server
- <http://localhost:8585/mmc-3.7.x>

- Start from the Apache folder

```
> $MULE_HOME/../../mmc-3.7.x/apache-tomcat-7.0.52/bin
```

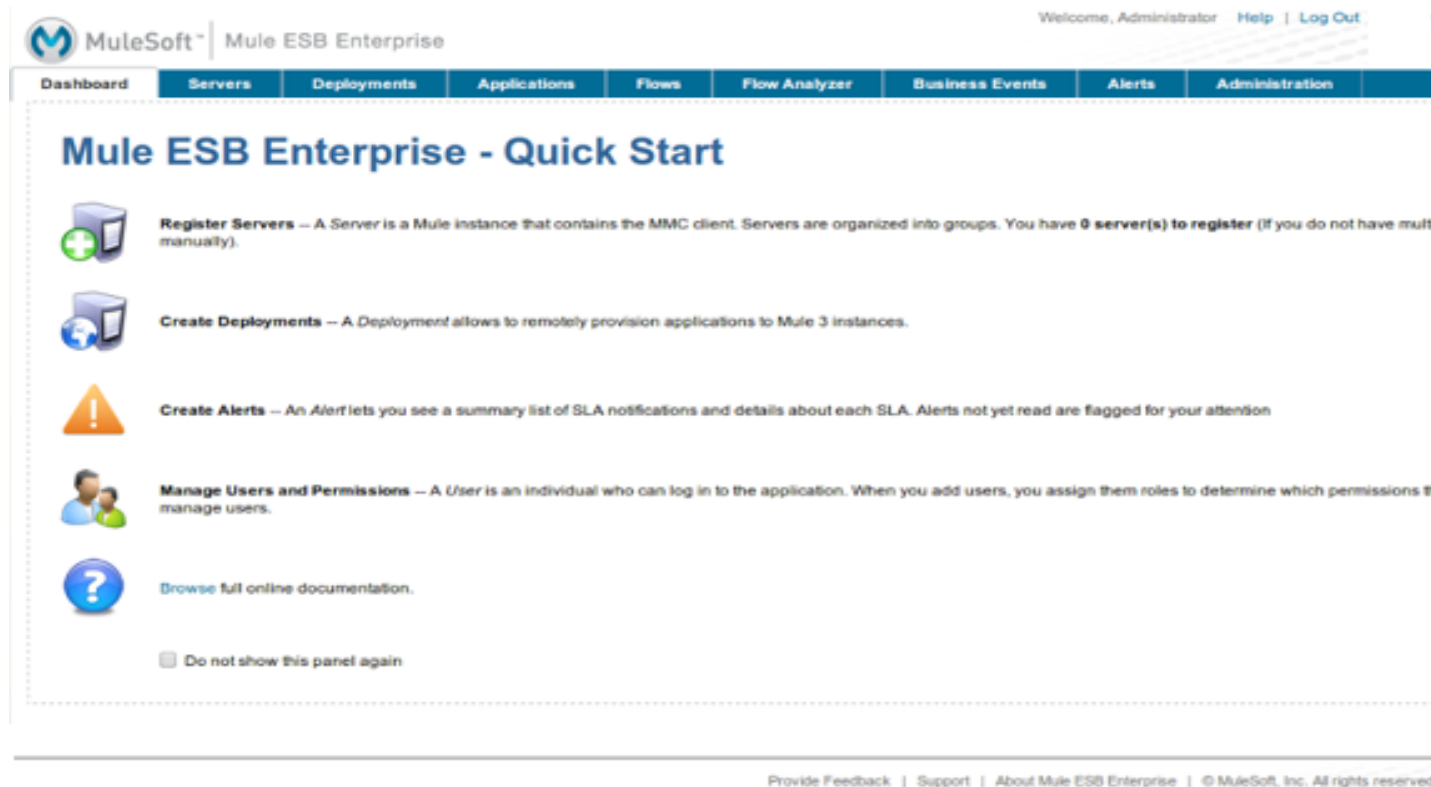
- Combined startup scripts
 - Register Mule as a service
 - Start Mule server instance (default port 7777)
 - Start MMC (default port 8585)

```
> %MULE_HOME%\..\startup.bat
```

```
> $MULE_HOME/../../startup
```

Walkthrough 2-1: Start MMC

- Startup: %MULE_HOME%\..\mmc-3.7.x\apache-tomcat-7.0.52\bin\startup.bat
- <http://localhost:8585/mmc-3.7.x/>
- Go ahead and log in to your console now (user: admin, password: admin)

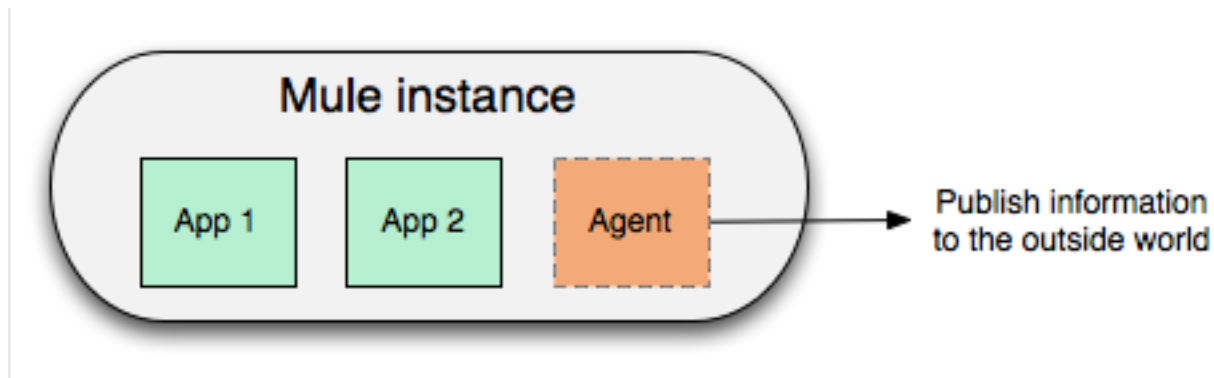


MMC Logging

- The Mule Management Console is also logged
 - **catalina.out**
- This MMC log can be found under `$MMC_HOME/apache-tomcat-7.0.52/logs`
 - Tomcat hosts the MMC webapp
 - the *catalina* script runs Tomcat with MMC along with it
- Logs
 - when Tomcat initialises and shuts down
 - when it runs webapps (in our case MMC)
 - communication with Mule servers
 - when errors are thrown

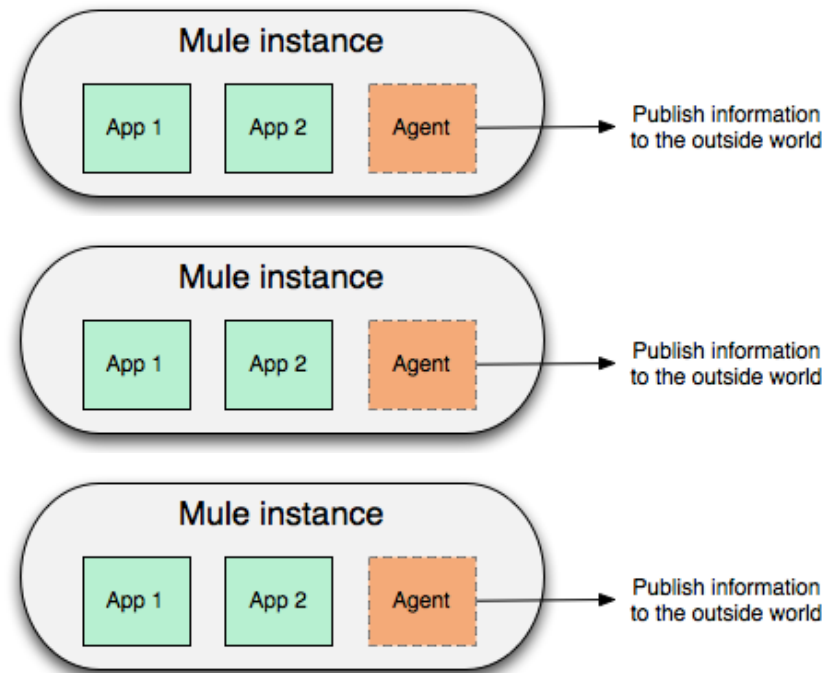
Monitoring Mule Servers and Applications

- Privileged Mule Agent application
- Administrative communication with external consoles



The Agents

- A Mule Agent is a privileged Mule application that publishes information about the Mule instance and its applications
- It also allows you to perform Ops tasks in the instance without the necessity of running scripts
- The Mule Agent is embedded within the Mule server and is run automatically

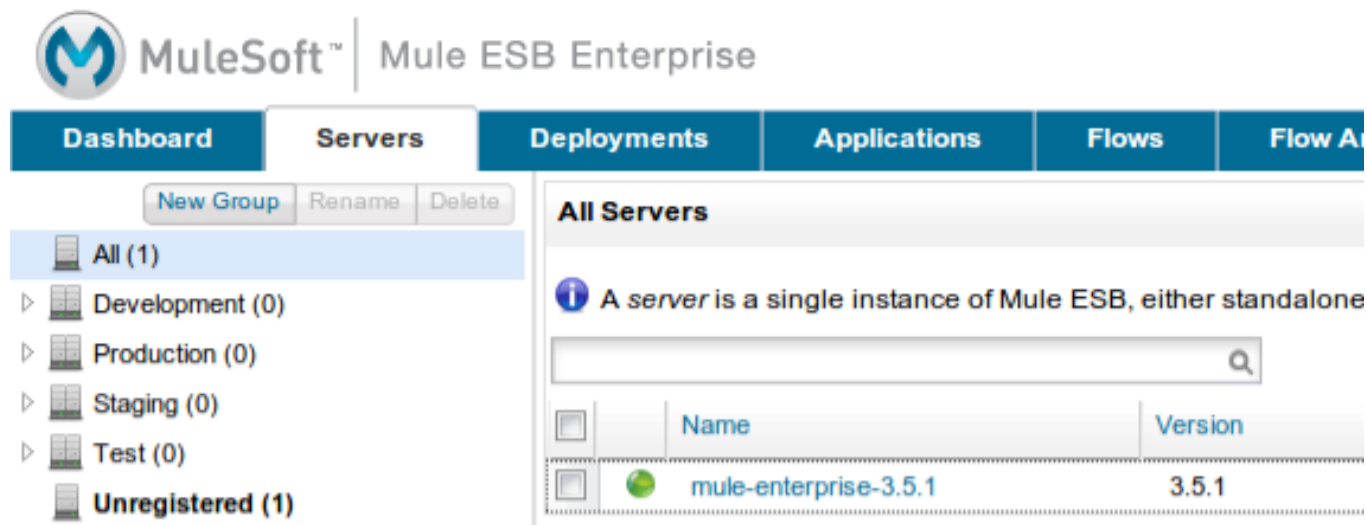


Registering a Server



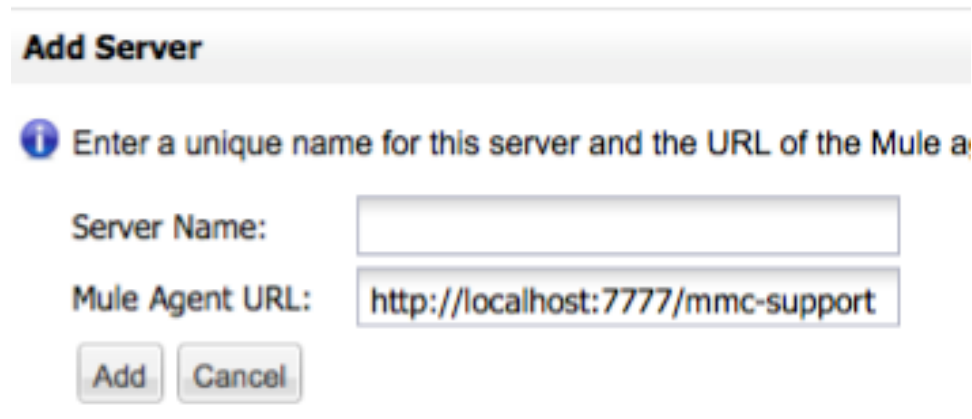
Adding a Mule server (semi-automatically)

- To check out your servers go to the Server tab
- If your Mule instance and your MMC are on the same network the Mule instance can be auto-discovered
 - Once discovered the instance will show up in the Servers tab
 - Auto-discovery is highly dependent on how your network is configured, so your server might not always show up




Adding a Mule Server (manually)

- You can also add servers manually through a form but you have to manually type the URL where the agent is listening:



Add Server

 Enter a unique name for this server and the URL of the Mule a

Server Name:

Mule Agent URL:

- Once registered it will appear in the All group
- Then you can move the server to a specific group to provide a classification

Walkthrough 2-2: Register Mule Servers with an MMC Server

- Register Mule Servers with MMC (via Mule Agents)
- Identify discovery options

Mule instance health

- To check the health of an instance you have to select the Mule server in the Servers tab
- You will see if the instance is running or not

Server Details: Mule-3.5.1@192.168.3.104:7777

Overview

Server OS: Mac OS X **OS Version:** 10.9.4 **Last Restart:** 2014 Sep 1 13:51:43 **Uptime:** 7 mins 31 secs
VM Vendor: Oracle Corporation **Server Group:** "None"

Deployment Status		
Name ▲	Status	Last Modified
No data to display		

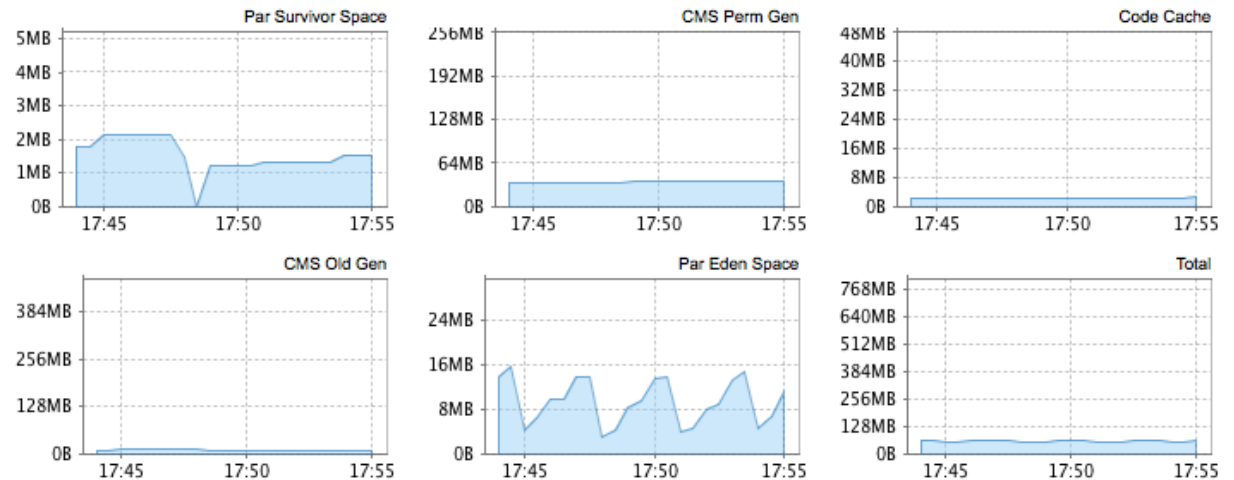
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Server Metrics		
Name	Last Data	Trend Changes
OS CPU Usage	1 %	
OS Memory Usage	7 GB	
OS Swap Usage	0 bytes	
JVM Memory Usage	155 MB	

Memory health

- Graphs
 - About memory and CPU usage
 - With only a short delay

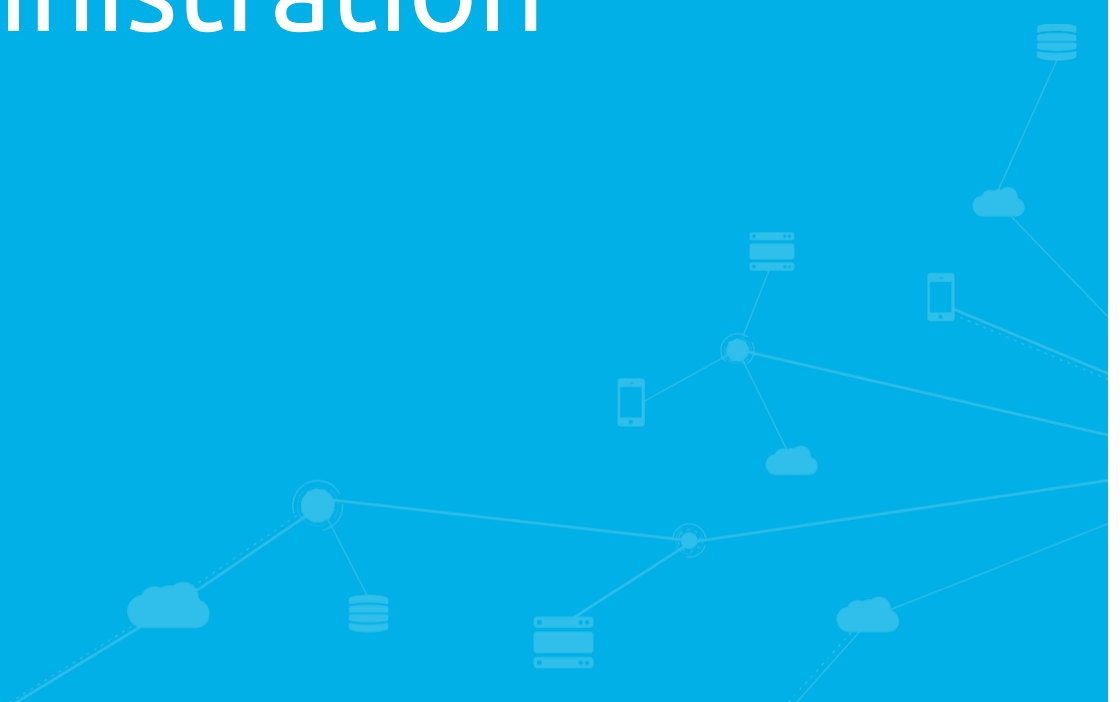
Heap Memory Usage				
Manage your application Deployments				
		9 MB	470 MB	62 MB
Par Eden Space	38%	12 MB	31 MB	15 MB
Par Survivor Space	29%	1 MB	5 MB	2 MB
Total	5%	22 MB	506 MB	80 MB
Non-Heap Memory Usage				
CMS Perm Gen	14%	36 MB	256 MB	20 MB
Code Cache	5%	2 MB	48 MB	2 MB
Total	13%	39 MB	304 MB	23 MB
Memory Usage				
Total	7%	61 MB	810 MB	103 MB



Walkthrough 2-3: Start multiple Mule servers

- Copy a Mule folder to another folder
- Modify the wrapper.conf file to avoid port conflicts (reported as bind errors)
- Start the second server
- Test behavior of multiple independent Mule Servers

Administration



User Administration

- To control MMC users, check the Administration tab.
- MMC's authorization model is group-based and by default it is shipped with a set of predefined groups:

The screenshot displays the MuleSoft User Administration interface. On the left, a sidebar contains a 'Manage' section with 'Users' and 'User Groups' (highlighted), and a 'Utility' section with 'Admin Shell', 'Scheduler', 'Audit Log', and 'Stop Flow Analysis'. The main area is titled 'User Groups' and includes an information icon and a message: 'For each role, select the permissions you want users with that role to have. To change the'. Below this is a search bar. A table lists predefined groups with checkboxes, names, and descriptions.

<input type="checkbox"/>	Name	Description
<input type="checkbox"/>	Administrators	
<input type="checkbox"/>	Deployers	
<input type="checkbox"/>	Monitors	A read only view into Mule ESB Enterprise.
<input type="checkbox"/>	Server Administrators	

Creating/Updating a Group

- You can modify the permissions of a group in different panels and also edit the name and description.

Edit Group: Monitors

i For each role, select the permissions you want users with that role to have. To change

Name:

Description:

Global Permissions: Server Group Permissions:

<input type="checkbox"/> Applications - Start, Stop, Restart	<input type="checkbox"/> Clusters - Create
<input type="checkbox"/> Applications - View	<input type="checkbox"/> Clusters - Disband
<input type="checkbox"/> Audit Flows	<input type="checkbox"/> Files - Delete
<input type="checkbox"/> Audit Flows - Admin Functions	<input type="checkbox"/> Files - Modify
<input type="checkbox"/> Deployments - Create	<input checked="" type="checkbox"/> Files - View
<input type="checkbox"/> Deployments - Delete	<input type="checkbox"/> Servers - Modify
<input type="checkbox"/> Deployments - Deploy	<input type="checkbox"/> Servers - Register
<input type="checkbox"/> Deployments - Modify	<input type="checkbox"/> Servers - Restart
<input checked="" type="checkbox"/> Deployments - View	<input type="checkbox"/> Servers - Unregister
<input type="checkbox"/> Endpoints - Start, stop	<input checked="" type="checkbox"/> Servers - View
<input type="checkbox"/> Execute Scripts	<input type="checkbox"/> Threads - Kill
<input type="checkbox"/> Flows - Start, Stop, Clear Statistics	<input checked="" type="checkbox"/> Threads - View
<input checked="" type="checkbox"/> Flows - View	
<input type="checkbox"/> Manage Alert Definitions	

Creating/Updating a User

- Fill in the information required to create a user and select the groups that the user belongs to:

Add User

Username:

Name:

Email:

Password:

Confirm Password:

Groups:

Available Groups		Joined Groups
Users	> <	Administrators
Deployers		
Monitors		
Server Administrators		

Walkthrough 2-4: Manage Users and Groups

- Create a User Group that can only View certain GUI areas
- Test the new group permissions
- Use a second “incognito” browser to test different User logins to MMC

Summary

- MMC is a central monitoring and management console
 - Register, control, monitor Mule Servers
 - Using the embedded Mule Agent in each Mule Server
 - Upload applications to the Repository
 - Deploy to servers, server groups and HA/LB clusters
- Users and Groups allow delegation of restricted administrative permissions

