# Using WebSphere Virtual Enterprise V7 to Build Reliable and Resilient Infrastructures

Lab Exercise 2-3



IBM

## WebSphere STEW

Lab Number

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# Lab 1 Application Health Management Lab

## **1.1** Passwords, shortcuts and starting the image

Password information	
VMware Guest Image Authentication	User: Administrator Password: passw0rd
WebSphere Console Authentication	User: username Password: password
Naming conventions	
File system shortcuts	

## Lab objectives

- How to use WebSphere Virtual Enterprise to monitor and manage application health without any loss in service
- How to use WebSphere Virtual Enterprise to change application editions without any loss of service
- How to configure WebSphere Virtual Enterprise to use either the high availability manager or bulletin board service overlay network for application infrastructure communications to enhance performance and scalability

## Prerequisite knowledge

Basic Microsoft Windows knowledge

- Basic VMware Workstation knowledge
- Basic IBM WebSphere Application Server knowledge

### **Getting Started**

- This virtual machine requires a T60+ Thinkpad with 3GB+ RAM and 10GB HD available
- Open the virtual machine using VMware Workstation 6.5+ by double clicking on the file base-image-2003-SE-server.vmx
- Power on the virtual machine by selecting VM -> Snapshot -> Revert to Snapshot, Yes, then wait for the guest's CPU to settle as observed in the Task Manager

If you are asked if the image has been copied or moved, select moved

15	Removable Devices		/
2010 IMPACT 18	ACE	•	
2010 IMPAC	Snapshot	+	Take Snapshot.
State:	Replay	Revert to Snapshot	
Guest OS:	Install VMware Tools		Snapshot Manager Ctrl+M
Location: Version:	Change Version	1 HOT	
Snapshot:	Connected Users	17 F1361:	
VMware Workstati	ion		

## **1.2** Application Health Management Lab

Health management is the ability of the system to take a policy-driven approach to monitoring the application server environment and taking action when certain predefined criteria are discovered. The health monitoring and management subsystem continuously monitors the operation of servers to detect functional degradation that is related to user application malfunctions. A health policy defines a set of conditions that are interpreted by WebSphere Virtual Enterprise as a degradation of server function. Health policies are a combination of a health condition to monitor, actions to take if the condition occurs, the deployment target to be monitored, and a reaction mode that defines whether the action occurs automatically or with operator intervention.

In this section of the lab an application has been deployed to a dynamic cluster. A health policy has been defined that has a health condition identified to be when 50% of the heap has been exceeded for more than 1 minute. When this condition is breached, WebSphere Virtual Enterprise will start additional application resources, route new work to these new resources, drain the troubled resource, and finally restart it, while maintaining continuous availability. You will drive a workload that continuously leaks memory, slowly reducing the amount of free heap, visualizing this using WebSphere Virtual Enterprise's charting capabilities.

At the end of this lab section we will explore the environment using the WebSphere Console.

- Using the open Firefox browser, log into the WebSphere Console using the values given at the start of this lab for user/password.
- 2. Navigate in the left-hand frame Runtime Operations -> Reports

Integrated Solutions Console welco	vme username
View: All tasks	
Welcome	
Guided Activities     Guided Activi	
🕀 Servers	
Applications	
🕀 Resources	
Runtime Operations	
Dashboard	
Applications	
Deployment Targets	
Service Policies	
Extended Deployment	
Reports	

3. Select the saved chart **AppHealthChart** located towards the bottom of the central frame



4. Open the chart in a new window by selecting the View Chart in New Window button



- 5. From the Windows Desktop open the **Labs** folder (it should be open), then the **HealthLab** folder
- 6. Double-click startJMeter, then from the JMeter menu bar select Run -> Start



localbos	t https://loc/ \WINDOWS	alhost:90437 \system32	hm/console/ :\cmd.exe	rom.ihm.ws.co	nsole.)	donerations/chartLa
Vie C:\I	Labs 📖 Ke	althLab.im	x (C:\Labs	HealthLab\F	lealth	Lab.imx) - Apach
ab\l	leal Eile	Edit Run	Options	Help		
wv		Sta	rt /	Ctrl-R		
60	9	Ren	note Start		•	Test Plan
40		🦉 Ren	note Start	All Ctrl+Shift-	R	Name: MO/E Ha
48	, Y	Sto	р	Ctrl-Period	E S	Name: WVE He
36		Shu	rtdown	Ctrl-Comm	ia 🕴	Comments:
24		Ren	note Stop		•	
24		Wor Ren	note Stop /	Alt-X		
12		Ren	note Exit			
		Rer	note Exit A	I		
		Clea	аг	Ctrl+Shift-	E	
		Clea	ar All	Ctrl-E		

- Watch the browser window with the chart for the following to happen over ~10 minutes:
  - a new application server instance being started
  - the application server instance in ill health being stopped
  - consistent service response times

as shown in the following screenshot. The red ovals denote when the instances change state. Notice that even as a new instance is started the response times remain consistent, ensuring that the service level agreements can be met.

An explanation of the choice of metrics to chart:

- Up Time displays the operational state of an application server
- Average Response Time indicates the quality of service
- Used Heap Memory is the metric followed by the health policy

Notice that as the second instance is started the service times become more erratic. This is due to the fact that all components are running on the same physical resource (your laptop) and there is no strong infrastructure enforcement of component isolation (i.e., VMware Workstation), leading to resource contention. Still, service times remain reasonable and no user transaction is lost.



- 8. When the health policy has run to completion, from the JMeter menu bar select Run > Stop, File -> Exit, then close the browser window displaying the chart by selecting the 'X' in the upper right corner
- Let's explore how health management was configured to achieve this result. From the WebSphere Console, navigate to the health policy we have been watching: Operational policies -> Health Policies, select myHealthPolicy

	Select	Name 🛟	Reaction mode 🗘
Operational policies		Default Excessive Memory Usage	Supervise
<ul> <li>Service policies</li> <li>Service policy topology</li> </ul>		Default Excessive Request Timeout	Supervise
Health Policies		Default Excessive Response Time	Supervise
		Default Memory Leak 2	Supervise
Environment     ■		Default Storm Drain	Supervise
System administration		myHealthPolicy	Automatic

The relevant details of our health policy are the size of the JVM heap to trigger a health condition and the time period over which the condition has been breached, the reaction mode that the health controller is in (automatic or supervised) for this condition, the resulting action(s) and the target of the health controller's action(s). In our case, if the JVM heap exceeds 50% of the maximum for 1 minute the health controller will automatically restart the offending application server in the dynamic cluster named myDynamicCluster. As this dynamic cluster's operational mode is set to Automatic, the restart is performed without any loss of service.

Health condition properties		
* JVM heap size 50 % * Offending time period 1 Minutes	)	
Health management monitor reaction		
Reaction mode Automatic <b>I</b> Take the following actions when the health cond	dition breaches	
Add Action Remove Action	1ove Up   Move Down	
Select Step Action	Target server	Target node
1     Restart server	Sick server	Node hosting sick server
Memberships Filter by Select a member type 💽		
Available for membership		Members of myHealthPolicy:
	Add >> << Remove	myDynamicCluster (Dynamic clusters)

10. Let's explore how health management effected this result. From the WebSphere Console, navigate to the health policy we have monitored: System administration -> Task Management, select Runtime Tasks. Listed chronologically are the tasks emitted by the system. Find the one that resulted from the health condition breech, and note that the task explanation indicates the cause "The memory consumption limit..." Select this Task ID for details of the action(s) taken

#### **IBM Software**



The task detail include the explanation, the target of the actions, and the action plan enacted. In our case, the action plan started a second cluster instance before stopping the instance in ill health, ensuring service availability.

untime Tasks							
Runtime Tasks > Task Targets							
Situation description							
The memory consumption limit specified by policy myHealthPolicy was exceeded by server myI node oneNode. The limit is 50 % and the current heap size is 61 % of the maximum of 26214							
Show additional task detail in     A state     Show additional task detail in     Show additional task detail     Show additional task     Show add	nformation						
Explore the data used to diagno	se the situation						
Target Object 🗘	Target Type 🗘	Severity 🗘					
myDynamicCluster_oneNode_1	server	Critical					
Action plan to resolve the situat	ion						
The action plan expires at 3/2/1	1 10:45:33.						
Step 1 : Start server myDynam	Step 1 : Start server myDynamicCluster_oneNode on node oneNode.						
Step 2 : Stop server myDynam	Step 2 : Stop server myDynamicCluster_oneNode_1 on node oneNode.						

Extra credit: check that indeed that myDynamicCluster has an operational mode of Automatic; what is the JVM heap size in MB at which the health controller is triggered?

This concludes section one of the WebSphere Virtual Enterprise lab.

## Lab 2 Application Edition Management Lab

WebSphere Virtual Enterprise contains an application edition manager that provides advanced application management capabilities.

These capabilities address five functional requirements:

- Application versioning capability.
- Interruption-free application rollout.
- Ability to back-out an application update.
- A validation mode to test and verify an application before rolling it out to production.
- Ability to host concurrent versions of an application to support needs of more complicated rollout strategies, such as piloting and branch upgrade.

In this section of the lab you will deploy two editions of an application. While driving a constant workload, you will change application edition using two rollout strategies, group and atomic, while maintaining continuous availability.

- 1. In the WebSphere Console, select **Applications** -> **New Application**
- 2. Select **New Enterprise Application**, then **Browse** to C:\Labs\EditionLab and **Open** labAppEditionOne.ear, select **Next**, then **Next**

View: All tasks	Cell=wveCell, Profile=dmgr
Welcome	New Application
	New Application 3
🗄 Servers 🔪 🖌 🥌	This page provides links to create new application
Applications	Install a New Application
All applications	
New Application	New Enterprise Application
Install New Middleware Application	

Path to the n	ew application	
C Local fi	e system	
Full pa	th	The accession of the local sector of the local
		Browse
C Remo	File Upload	
Full p	Look jr	:: CitionLab
		i i i i i i i i i i i i i i i i i i i
Next		🛃 EditionLab
	My Recent	🕒 jmeter
	Documents	abAppEditionOne.ear
		IabAppEditionTwo.ear
		● startJMeter

3. Enter '1' for Application edition, then select Next, Next, Finish, Save

Specify the various options that
speak, are renear spaces are
L Precompile JavaServer Pag
Directory to install application
☑ Distribute application
🗖 Use Binary Configuration
🗖 Deploy enterprise beans
Application name

- Select Applications -> New Application -> New Enterprise Application, then Browse to C:\Labs\EditionLab and Open labAppEditionTwo.ear, select Next, then Next
- 5. Enter '2' for Application edition, then select Next, Next, Finish, Save
- 6. Start application edition 1. Select **Applications** -> **All applications**, select the checkbox for edition Lab Edition 1, then select **Submit Action**

Applications	Preferences	
<ul> <li>All applications</li> <li>New Application</li> </ul>	Add Remove S	Submit Action
<ul> <li>Install New Middleware Application</li> </ul>	D D # Y	
<ul> <li>Application Types</li> <li>Edition Control Center</li> </ul>	Select Name 🔷	Edition 🗘
	editionLab	1

- 7. Select Runtime Operations -> Reports, select Open a New Chart Tab, Add Data...
- For Data Set Type choose Application, choose editionLab-edition 1 and editionLabedition2 from the Data Set, Average Response Times from the available metrics, OK, then View Chart in New Window

Edition Control Center	
🕀 Services	V Organize the metrics by data set
	You can further organize the metrics in the chart by selecting a specific data set. Alternatively, to view metrics from the scope of the chart, select "Use current
🖃 Runtime Operations	scope as data set".
<ul> <li>Dashboard</li> <li>Applications</li> <li>Deployment Targets</li> <li>Service Policies</li> <li>Extended Deployment</li> <li>Reports</li> </ul>	Data Set Type     Data Set       Application     Image: Constraint of the constra
	Available metrics
🛨 Operational policies	Concurrent Requests
🕀 Environment	Average Response Times (ms) Recrentile Response Time
	Average Wait Times in queue (ms)
🕀 Users and Groups	Display data from the selected on demand routers only
🖽 Monitoring and Tuning	
	OK Cancel
	Add Data Change Scope Remove View Table

9. From the Windows Desktop navigate to the **EditionLab** folder, then double-click **startJMeter** 

#### 10. From the JMeter menu bar select **Run -> Start**

When using the <u>group rollout strategy</u>, the administrator defines the number of servers in the deployment target. That is, how many clustered application servers the application edition manager should update at the same time. Naturally, servers that are changed from one edition to another are offline and not processing application requests during the transition. In this lab there are only 2 servers due to resource constraints.

# 11. In the WebSphere Console select **Applications -> Edition Control Center ->** editionLab

12. Select the checkbox for edition 2, then **Rollout**, **OK**; in this window you can watch the step-by-step progress of the rollout, and in the chart window for a smooth change of application editions as shown in the screenshot shown in step 14

Acti	Activate Deactivate		ctivate Deactivate Validate Cancel Valid		alidation (	Rollout
D	ß					
Select	Editio	ns 🛟	Descript	ion	Targ	et 🗘
			No description available	WebSphere:cell=		
	2		No desci available	ription ≥	Web	Sphere:cell=
Total	2		oldini.			

<u>Atomic is a rollout strategy</u> whereby all user requests are served by the same application version. After it is online, the active new edition completely replaces the old edition. For a server cluster, this is done by releasing (rolling out) the new edition to half the cluster at a time. The previous edition is served until the first half of the cluster is available to serve the next edition. At that time, the old edition is taken offline and the remaining half of the cluster is released.

- In the WebSphere Console select Applications -> Edition Control Center -> editionLab
- 14. Select the checkbox for edition 1, then **Rollout**, change to **Atomic**, **OK**; watch the two browser windows for a smooth change of application editions as shown in the following screenshot



15.When finished, from the JMeter menu bar select **Run** -> **Stop**, **File** -> **Exit**, then close the browser window displaying the chart by selecting the 'X' in the upper right corner

# Lab 3 BBSON Lab (optional)

WebSphere Virtual Enterprise offers a bulletin board service overlay network (BBSON) that is independent of the WebSphere Application Server Network Deployment high availability manager. The advantage of enabling BBSON is that it alleviates the dependency on the WebSphere Application Server Network Deployment high availability manager. The other benefit of using BBSON is that it removes the time-intensive requirement of constructing and managing core groups and bridges.

In this section of the lab you will enable BBSON, learning how to determine if it is enabled both from the WebSphere Console and from the WebSphere logs. To effect this change using the resources available, we will shut down components that are not directly involved.

- 1. In the WebSphere Console navigate to **System administration** -> **Cell**, then under **Additional Properties** select **Custom Properties**: notice that only enableAdminAuthorizationCache is defined
- Shut down unnecessary components: In the WebSphere Console navigate to Servers -> All servers, select the checkbox for All Servers, then Stop

Ne	ew Delete Templates	Start S	itop Terminate	Submit Act	tion
D	6 # 4				
Selec	Name 🗘	Node 🗘	Cluster Name 🗇	Status ሷ	Main
	myDynamicCluster oneNode	oneNode	myDynamicCluster	\$	
	myDynamicCluster oneNode 1	oneNode	myDynamicCluster	\$	
	odr	oneNode		€>	
Tota	al 3		V		

3. Navigate to **System administration -> Middleware nodes**, select the checkbox for **oneNode**, select the operational action **Stop agent**, then **Run** 

	₫₩₽		1 1
Select	Name 🛟	Version 🗘	Synchronization ሷ
	dmarNode.	ND 7.0.0.7 WXDOP 6.1.1.0 XD 6.1.1.0	⊕ 3
<b>v</b>	oheNode_	ND 7.0.0.7 WXDOP 6.1.1.0 XD 6.1.1.0	• •

4. From the Windows Desktop navigate to the BBSONLab folder, then double-click WASHOME bin

🕙 Integrated	l Solutions Console - Mozilla Firefox		
<u>E</u> ile <u>E</u> dit ⊻	iew History <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp		
< > - (	🗦 🗙 🏠 📔 localhost https://localhos	t:9043/ibm/console/login.do?action=secure	
Integrated Sc	📛 C:\Labs\BB50NLab		
View: All 1	Eile Edit View Favorites » 🧦	eCell, Profile=dmgr	
Welcome	🔇 Back 🔹 🕥 👻 🏂 🔎 Search 🛛 🎽		
🕀 Guided Ac	Address 🛅 C:\Labs\BBSONL 💌 🛃 Go	Custom properties	
+ Servers	Shortcut to DMar SystemOut	this page to specify an arbitrary name a	nd value pair. 7
🖂 Applicatio	Shortcut	can et internal system configuration pro	operties.
💻 All app			
New Ap	WASHOMS MI	ew Delete	
Install	C: Shortcut	<b>F</b> # 9	
H Applica			
- Edition		t Name 🗘	Value 🗘
Gervices		can administer the following resources:	
		enableAdminAuthorizationCache	true
and the second s			

5. Execute the command enclosed by double quotes on a single line using the values for user and password provided at the start of this lab "wsadmin.bat -lang jython -f useWVEBB.py - username <user> -password <password>" - then leave this DOS window open when complete as we will use it in a following step.

C:\Labs\8850NLab		Help   Logout
Elle Edit View Favorites 🌺 🦺	eCell, Profile=dmgr	
🔇 Back 🔻 🕤 🖌 🏂 🔎 Search 🛛 »		
Address 🛅 C:\Labs\BBSONL 💌 🋃 Go	• Custom properties	
Shorteu Shorteu		
Shortcu Microsoft Window 2KB (C) Copyright 19	s [Version 5.2.3790] 85-2003 Microsoft Corp.	4
c:\IBM\WebSphere	\AppServer\bin>wsadmin.bat −lang jython	-f useWVEBB.py -username
C:\ XB XB XB XB XB XB XB XB XB XB	ord password cted to process "dmgr" on node dmgrNode ss is: DeploymentManager	using SOAP connector; T
C:\IBM\WebSphere	\AppServer\bin>	

To effect this change the entire cell needs to be restarted. For this lab, only the deployment manager will be restarted to show how to establish if BBSON is active. The following steps demonstrate how to accomplish this from a DOS command window.

- 6. In the DOS window execute the following command enclosed by double quotes and substituting the user and password provided at the beginning of this lab: "stopManager.bat -username <user> -password <password>" and wait until the deployment manager has stopped.
- 7. In the DOS window execute the command enclosed by double quotes "startManager.bat" and wait until the deployment manager has started.

There are two ways to determine if BBSON has been enabled for the WebSphere Virtual Enterprise cell: first, messages are written to the deployment manager's stdout log file; second, a new WebSphere cell environment variable is defined.

 From the Windows Desktop navigate to the BBSONLab folder, then double-click Shortcut to DMgr SystemOut - look for the message prefix CWOBB in yellow highlighting the change from using HAM to BBSON as shown in the following screenshots



Systen	nOut.log (835.4 KE	i) - Bare	Tail			
File Edit	View Preferences	Help				
子 Open	🌽 Highlighting 🛛	Follo <u>w</u> 1	ail ANSI	• (	D:NBMV	WebSphere\AppServer\profiles\dmgr\logs\dmgr\SystemOut.log (835.4 KB)
[3/23/	10 16:39:35:62	3 PDT]	00000004	ViewReceiver	I	DCSV1033I: DCS Stack DefaultCoreGroup at Member wveCell\dmgrNode\dmgr: Confirmed all net
[3/23/	10 16:39:35:63	9 PDT]	00000000	TCPChannel	I	TCPC0001I: TCP Channel TCP 5 is listening on host * (IPv4) port 9352.
[3/23/	10 16:39:35:63	9 PDT]	00000000	WSChannelFram	n A	CHFW0019I: The Transport Channel Service has started chain DCS.
[3/23/	10 16:39:35:65	4 PDT]	00000000	WSChannelFram	n A	CHFW0019I: The Transport Channel Service has started chain DCS-Secure.
[3/23/	10 16:39:35:65	4 PDT1	00000000	DCSPluginImpl	LI	HMGR00011. The DCS Core Stack transport has been started for core group DefaultCoreGroup
13/23/	10 16:39:35:85	8 PDTI	00000000	TCPChannel	I	TCPC0001I: TCP Channel sonIncomingTcpConnectorInboundChannel SonIncomingTCPSubsystem 0
13/23/	10 16:39:35:85	8 PDT1	00000000	WSChannelFram	n A	CHFW00191: The Transport Channel Service has started chain sonIncomingTcpInputChain Son
13/23/	10 16:39:35:85	8 PDT1	00000000	Peer	Ι	ODCF85101: The unstructured overlay is setting up: 10.10.10.100 udp port=11001 tcp por
3/23/	10 16:39:35:96	7 PDT1	00000000	WSChannel Fran	n A	CHEMOD191: The Transport Channel Service has started chain sonOutnutTonOutnutChain 0.
3/23/	10 16:39:36:04	5 PDT1	00000000	InterestManac	тт	CNOBB30001: The bulletin board interest aware membership service has initialized.
[3/23/	10 16:39:36:06	1 PDT1	00000000	BBFactoryImpl	ΪT	CWOBBIO001: The overlay-based bulletin board has been initialized in process wwefell/dw
[3/23/	10 16:39:36:12	3 PDT1	P0000000	Peer	т	ODCF85177: The unstructured overlay is operational, with security: 10.10.10.10.100 udp no
[3/23/	10 16:39:36:49	8 PDT1	00000000	FyternalNodes	зŤ	XINTOOIOIT. The external node stats service started successfully
13/23/	10 16:39:36:67	O PDT1	000000000	NameServerIm	- A	May Moller, Mane server available on hoststran nort 9809

 Log into the WebSphere Console (if you left the browser open, simply select Home) and navigate to System administration -> Cell, then select Custom Properties: notice that now WXDBulletinBoardProviderOption is defined, indicating that BBSON is enabled

Use thi that ca	s page to specify an arbitrary name a n set internal system configuration pro	nd value pair. The valu operties.
New	Delete	
Select	Name 🗘	Value 🗘
You	an administer the following resources:	
rt	WXDBulletinBoardProviderOption	WXD
	enableAdminAuthorizationCache	true

10. When finished, shut down the virtual machine by selecting the red power off icon, then **File** -> **Exit** from the VMware Workstation menu bar.

### Lab summary

- You have seen how to build use WebSphere Virtual Enterprise to change application editions without any loss of service
- You have seen how to build use WebSphere Virtual Enterprise to monitor and manage application health without any loss in service
- You have seen how to configure WebSphere Virtual Enterprise to use either the high availability manager or bulletin board service overlay network for application infrastructure communications