

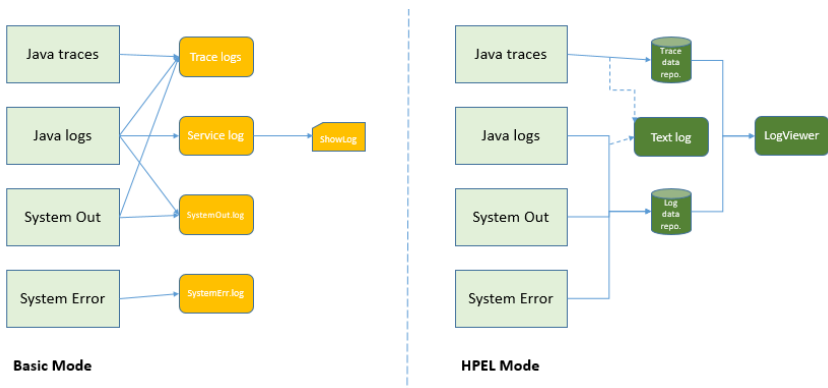
## CHAPTER 19: TROUBLESHOOTING

### Theory

Troubleshooting of WebSphere Application Server may be required due to several reasons like performance issues or application unavailability. In order to resolve the problem, we need to collect as much data as possible to identify it. There are multiple ways of data collection in WebSphere Application Server including java log files, java traces, thread dumps, heap dumps and system dumps.

Here is the list of log files that are used in problem determination:

- *SystemOut.log and SystemErr.log*: In these files standard JVM output and errors are stored.
- *stopServer.log and startServer.log*: These logs store information during stop and start of application servers.
- *trace.log*: This file contains diagnostic trace information if the tracing is enabled.
- *native\_stdout.log and native\_stderr.log*: These files are used by operating system to log memory exceptions and garbage collection data.



WebSphere Application Server provides 2 different modes of logging and tracing:

- **Basic Mode:** This is the standard and default mode for logging and tracing. This mode is available from older versions of WebSphere Application Server.
- **HPEL Mode:** High Performance Extensible Logging (HPEL) mode is a new framework for logging and tracing which provides a log data repository

that contains SystemOut and SystemErr logs, and a trace data repository for trace content. In order to see the logs, you need to use the “logViewer” command. It is also possible to mirror the logs in the repositories to a text log which is the default option.

For further troubleshooting, you can use java core and heap dumps. You can trigger these dumps from WebSphere administrative console. These dumps are mostly used to diagnose memory problems like memory leaks. Although in certain cases, these logs must be collected, you should take into consideration the impact of this process to system performance.

WebSphere Application Server provides features to help you to capture more data for problem determination such as:

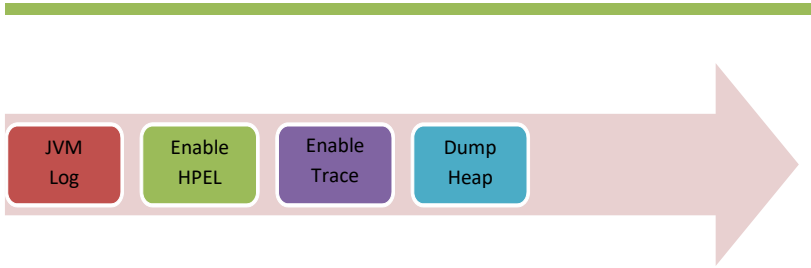
- Hang detection policy is enabled by default to report potential hangs. A hung thread can be a result of many different causes and without a proper reporting system will run in a degraded mode.
- Memory leak detection policy can be configured to detect, prevent and take action against potential application memory leaks.

## AIM

In this lab exercise, you will configure most used configuration items of WebSphere Application Server for problem determination. To achieve this goal, you will need to complete following tasks:

- Change JVM log settings
- Enable HPEL
- Enable trace
- Generate heap dump

## Lab Exercise 19: TROUBLESHOOTING



1. **Change JVM log settings**
2. **Enable HPEL**
3. **Enable trace**
4. **Generate heap dump**



JVM  
Log

Enable  
HPEL

Enable  
Trace

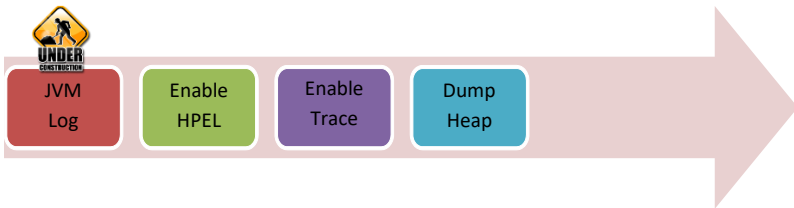
Dump  
Heap

## Task 1: Change JVM log settings

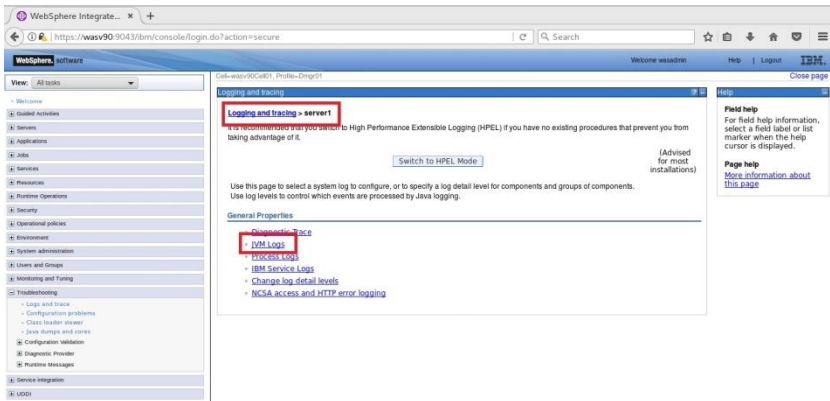
**Step 1:** Navigate to “Troubleshooting>Logs and trace” and click on the application server name that you want to work on.

WebSphere Integrated Solutions console screenshot showing the 'Logging and tracing' page. The left sidebar shows the navigation tree with 'Troubleshooting' and 'Logs and trace' highlighted. The main content area shows a table of resources with columns: Server ID, Node, Host Name, Version, Type, and Status. The 'server1' entry is highlighted in red.

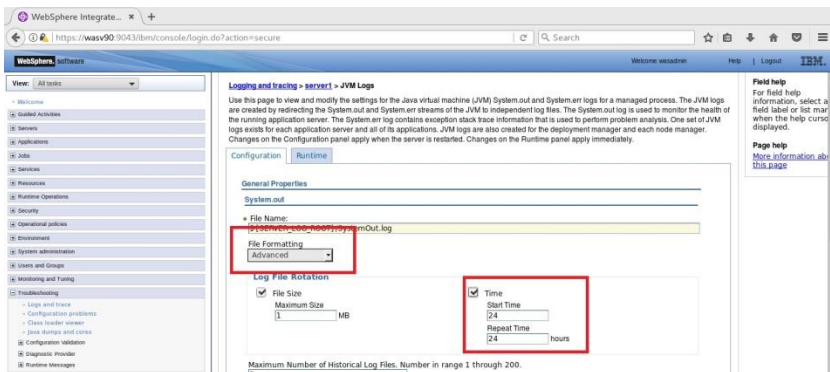
Server ID	Node	Host Name	Version	Type	Status
App_Server01	wasv90Node01	wasv90	ND 9.0.0.0	servers	→
App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers	→
CCR	wasv90Node02	wasv90	ND 9.0.0.0	servers	→
dmgr	wasv90CellManager01	wasv90	ND 9.0.0.0	servers	→
nodeagent1	wasv90Node01	wasv90	ND 9.0.0.0	servers	→
nodeagent2	wasv90Node02	wasv90	ND 9.0.0.0	servers	→
server1	wasv90Node01	wasv90	ND 9.0.0.0	servers	→
server2	wasv90Node02	wasv90	ND 9.0.0.0	servers	→
Total	8				

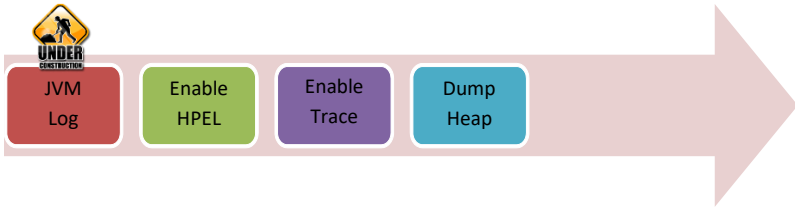


**Step 2:** Click “JVM Logs”.

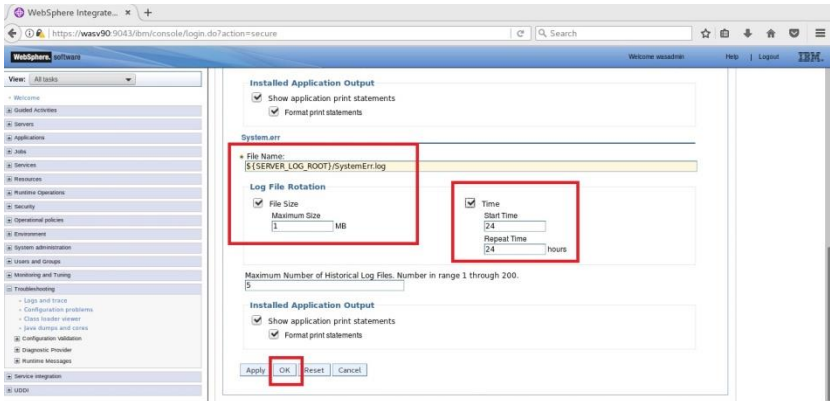


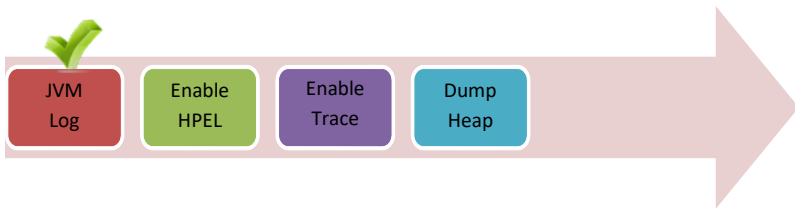
**Step 3:** You can now configure the details of JVM logging of “server1” for “System.out” logging.



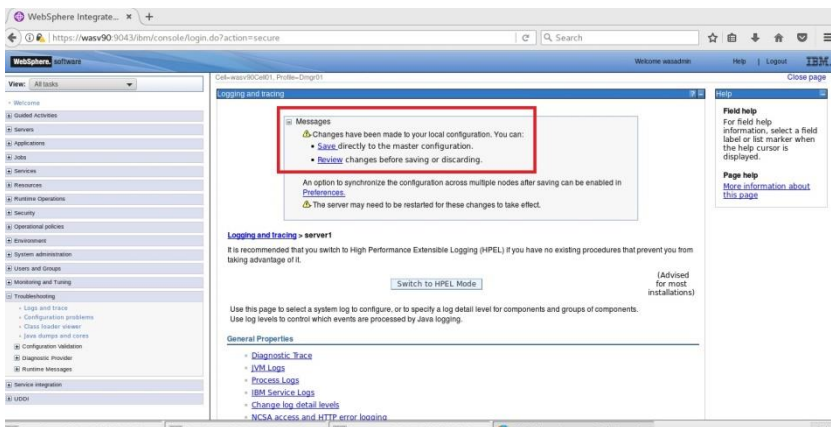


**Step 4:** Configure the “System.err” logging and click “OK”.



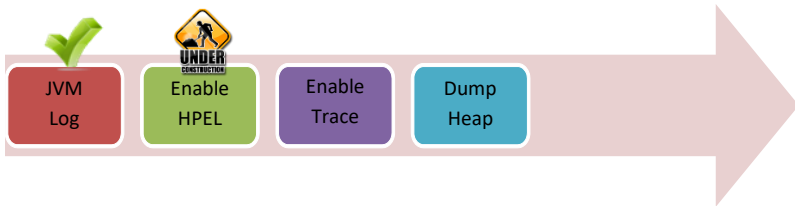


**Step 5:** Click “Save” to write changes to the master file.



**Task 1 is complete!**



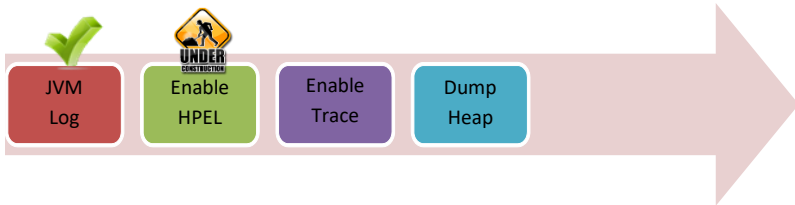


## Task 2: Enable HPEL

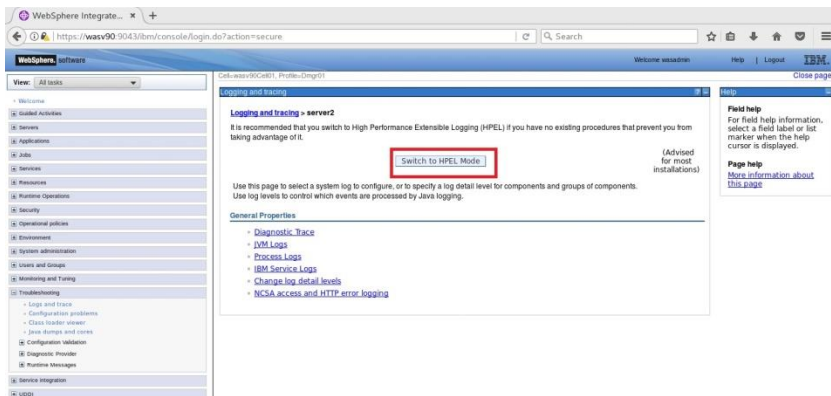
**Step 1:** Navigate to “Troubleshooting>Logs and trace” and click on the application server name you want to enable HPEL logging.

The screenshot shows the WebSphere Integrated Solutions console. The left-hand navigation pane has 'Troubleshooting' and 'Logs and trace' highlighted with red boxes. The main content area is titled 'Logging and tracing' and contains a table of servers. The 'server2' entry in the table is highlighted with a red box.

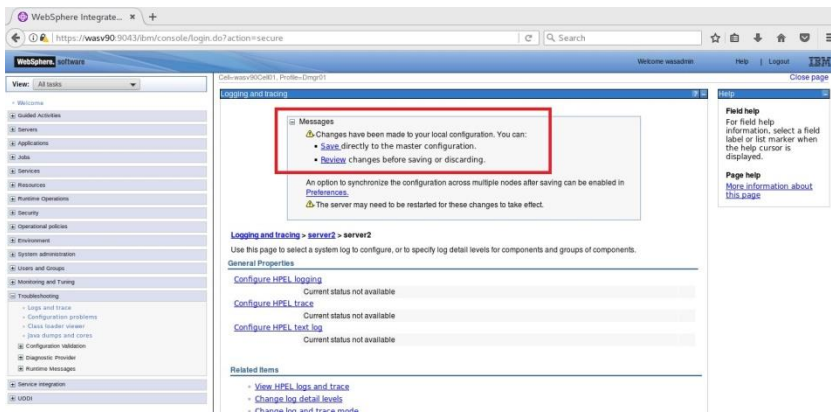
Server	Node	Host Name	Version	Type	Status
You can administer the following resources:					
App_Server01	wasv90Node01	wasv90	ND 9.0.0.0	servers	➡
App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers	➡
OCU8	wasv90Node02	wasv90	ND 9.0.0.0	servers	❌
smg	wasv90CellManager01	wasv90	ND 9.0.0.0	servers	➡
nodeagent	wasv90Node01	wasv90	ND 9.0.0.0	servers	➡
nodeagent	wasv90Node02	wasv90	ND 9.0.0.0	servers	➡
server1	wasv90Node01	wasv90	ND 9.0.0.0	servers	➡
<b>server2</b>	wasv90Node02	wasv90	ND 9.0.0.0	servers	➡
total: 8					

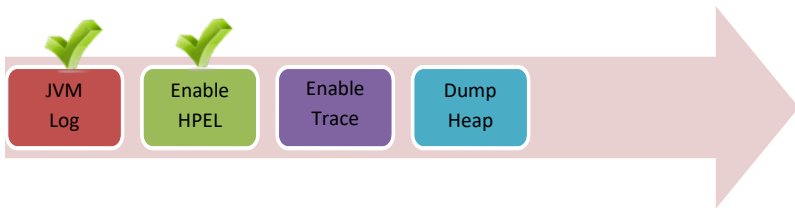


**Step 2:** Click on the button “Switch to HPEL Mode”.

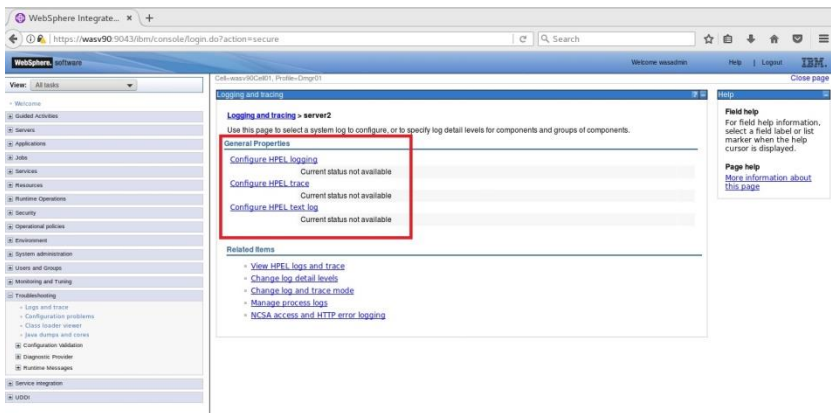


**Step 3:** Click “Save” to write changes.

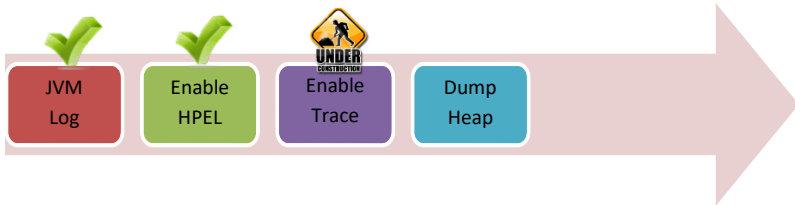




**Step 4:** When HPEL is enabled, you can see and change properties of HPEL logging.



**Task 2 is complete!**



## Task 3: Enable Trace

**Step 1:** Navigate to “Troubleshooting>Logs and trace” and click on the application server name.

WebSphere Integrated Solutions console

View: All tasks

Logging and tracing

Logging and tracing

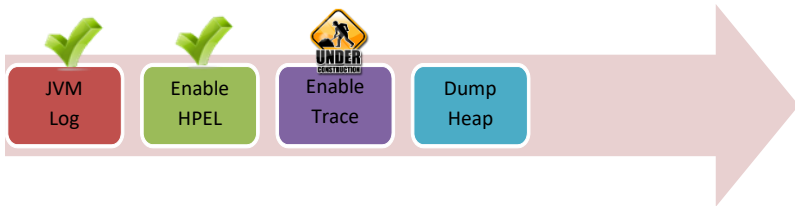
Use this page to specify how the server handles log records. You can select an application server to enable or disable a system log for that server, specify where log data is stored, and choose a format for log content. You can also specify a log detail level for components and groups of components.

Preferences

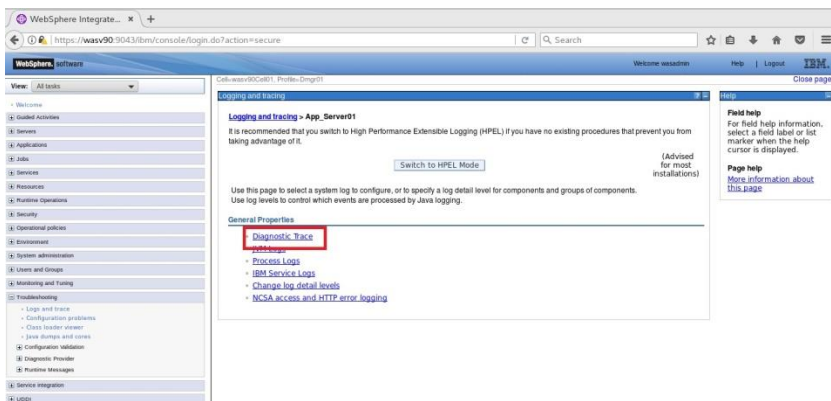
Server	Node	Host Name	Version	Type	Status
<b>App_Server01</b>	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
CDR	wasv90Node02	wasv90	ND 9.0.0.0	servers	-
dmgr	wasv90CellManager01	wasv90	ND 9.0.0.0	servers	+
nodeagent	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
nodeagent	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
server1	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
server2	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
Total	8				

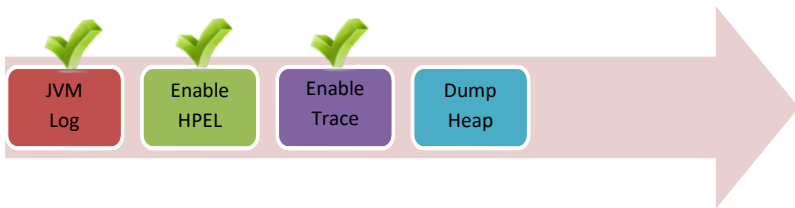
Field help: For field help information, select a field label or list marker when the help cursor is displayed.

Page help: More information about this page

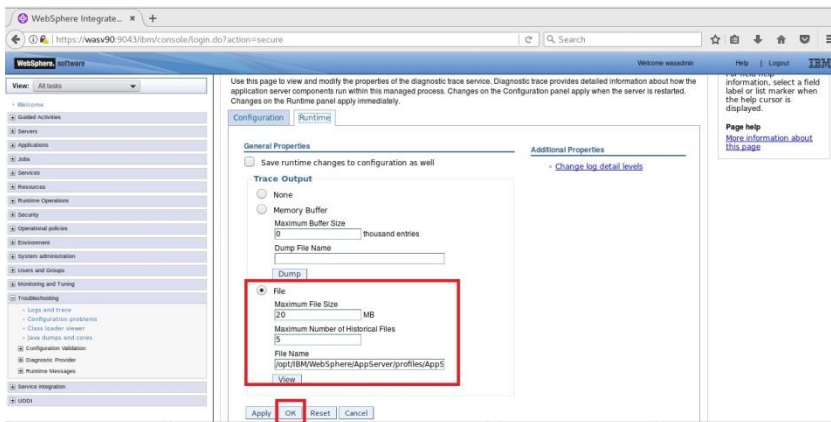


**Step 2:** Click on “Diagnostic Trace” to configure.

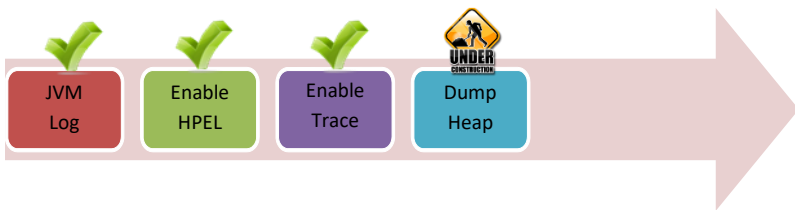




**Step 3:** On the “Runtime” tab, where the changes takes effect immediately, configure the file size, location and number of archive and click “OK”.



**Task 3 is complete!**



## Task 4: Generate heap dump

**Step 1:** Navigate to “Troubleshooting>Java dumps and core” and select the application server from the list and click “Heap dump” button.

**WebSphere Integrated Solutions console**

View: All tasks

Cell: wasv90Cell1, Profile: Dmgr01

Welcome wasv90adm | Help | Logout

**Java dumps and cores**

Use this panel to generate heap dumps, Java cores or system dumps for a running process. The files resulting from these operations are placed on the local file system.

**Preferences**

heap dump | Java core | System dump

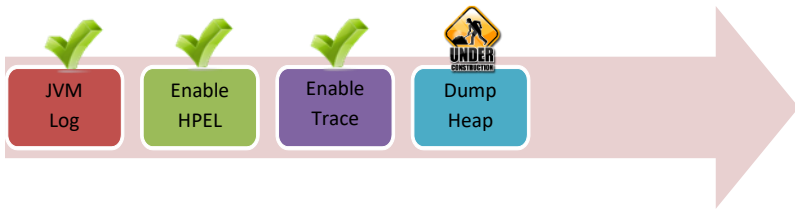
Select: Server

You can administer the following resources:

Select	Server	Node	Host Name	Version	Type	Status
<input type="checkbox"/>	App_Server01	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	CDR	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	dmgr	wasv90CellManager01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	nodeagent1	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	nodeagent2	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	server1	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	server2	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
Total: 8						

**Field help**  
For field help information, select a field label or list marker when the help cursor is displayed.

**Page help**  
More information about this page



**Step 2:** You need to wait for the dump to be ready.

WebSphere Integrated Solutions console

Java dumps and cores

Use this panel to generate heap dumps, Java cores or system dumps for a running process. The files resulting from these operations are placed on the local file system.

Preferences

Heap dump | Java core | System dump

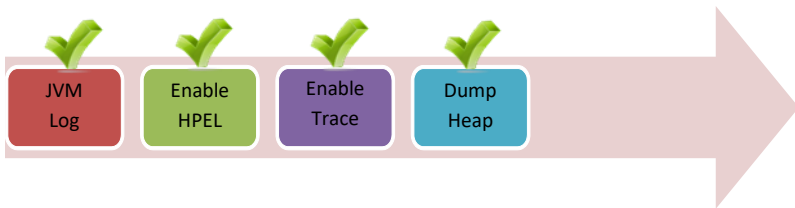
Select Server: **App\_Server01**

**Please Wait...**

	Host Name	Version	Type	Status
<input checked="" type="checkbox"/> App_Server01	wasv90Node01	wasv90	ND 9.0.0.0	servers
<input checked="" type="checkbox"/> App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> ODR	wasv90Node02	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> dmgr	wasv90CellManager01	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> nodeagent	wasv90Node01	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> nodeagent	wasv90Node02	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> server1	wasv90Node01	wasv90	ND 9.0.0.0	servers
<input type="checkbox"/> server2	wasv90Node02	wasv90	ND 9.0.0.0	servers

Total: 8





**Step 3:** When it's ready, you should have a similar success message with the location of the dump file.

The screenshot shows the WebSphere Integrated Solutions console. The left sidebar contains a navigation menu with categories like 'View: All tasks', 'WebSphere software', 'Environments', 'Servers', 'Applications', 'Jobs', 'Services', 'Resources', 'Performance Operations', 'Security', 'Operational policies', 'Environment', 'System administration', 'Users and Groups', 'Monitoring and Tuning', 'Troubleshooting', 'Diagnostic Tools', 'Service integration', and 'UDDI'. The main content area is titled 'Task dumps and cores' and shows a success message for a heap dump operation. The message is highlighted with a red box and contains the following text:

**Messages**

- Heap dump request was sent successfully to server App\_Server01.
- The output file for the operation is op8BMWebSphereAppServer/profiles/AppSrv01/heapdump.20180523.171024.4956.0001.phd.

Below the message, there is a section titled 'Java dumps and cores' with a sub-section 'Preferences' and a table of resources. The table has columns for 'Selected', 'Server', 'Node', 'Host Name', 'Version', 'Type', and 'Status'.

Selected	Server	Node	Host Name	Version	Type	Status
<input type="checkbox"/>	App_Server01	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	App_Server02	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	OCR	wasv90CellManager01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	nodesagent	wasv90Node01	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	nodesagent	wasv90Node02	wasv90	ND 9.0.0.0	servers	+
<input type="checkbox"/>	server1	wasv90Node01	wasv90	ND 9.0.0.0	servers	+

**Task 4 is complete!**

## **SUMMARY**

In order to resolve issues like response time, application unavailability and so on, WebSphere Application Server provides several different ways for problem determination. There are multiple ways of data collection in WebSphere Application Server including java log files, java traces, thread dumps, heap dumps and system dumps. It is also possible to use java core and heap dumps for troubleshooting purposes. Moreover, built-in policies such as hang detection policy and memory leak policy, allow WebSphere Application Server to identify possible issues and even take proper action to fix them.

## REFERENCES

- <http://www-304.ibm.com/support/docview.wss?uid=swg27005324>
- [http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp?topic=/com.ibm.iea.was\\_v8/was/8.5/ProblemDetermination.html](http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp?topic=/com.ibm.iea.was_v8/was/8.5/ProblemDetermination.html)
- <http://www-01.ibm.com/support/docview.wss?uid=swg27036217>

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