Websphere Server 8.5 Best Practices Oracle FLEXCUBE Universal Banking Release 14.1.0.0.0 [May] [2018]



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## 1. Introduction

### 1.1 Background

IBM® WebSphere® Application Server 8.5 supports a range of applications, each with their own unique set of features, requirements, and services. Just as no two applications will use an application server in exactly the same way, no single set of tuning parameters will likely provide the best performance for any two different applications.

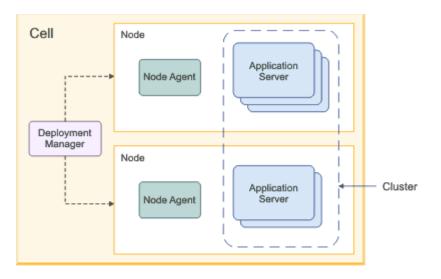
This document explains the best practices followed for Web Sphere application server tuning in the perspective of FLEXCUBE UBS.

### 1.2 Basics of Websphere

IBM websphere application server cluster deployment contains the below key elements

- Cell
- Nodes
  - Deployment Manager Node- "DMGR"
  - Node- "NodeXX"
  - Node Agent- "NAXX"
- Profiles
- Cluster
- Cluster Members
- Data Sources

#### 1.3 Profile



Following are the details about profile:



#### Cell

A cell is a grouping of nodes into a single administrative domain. In a Network Deployment environment, a cell can consist of multiple nodes (and node groups), which are all administered from a single point, the deployment manager.

#### Node

A node is an administrative grouping of application servers for configuration and operational management within one operating system instance

#### Node Agent

In distributed server configurations, each node has a node agent that works with the deployment manager to manage administration processes. A node agent is created automatically when you add (federate) a stand-alone node to a cell.

#### Cluster:

A cluster is a logical collection of application server processes that provides workload balancing and high availability. Application servers that belong to a cluster are members of that cluster and must all have identical application components deployed on them.

A profile is a Websphere runtime environment formed by collection of User data and Product files. Product Files are shared application binaries for Websphere. User data is set of user customizations for a specific runtime environment.

Prominent profile types are:

- Stand-alone Application Server
- An application server environment runs Enterprise Application. Application server is managed from its own administrative console and functions independently from other application server.
- Deployment Manager:

A Deployment Manager manages operations for a logical group or cell of other servers. It is the central administration point of a cell that consists of multiple nodes and node groups in a distributed server configuration. The deployment manager uses the node agent to manage the application servers within one node. A deployment manager provides management capability for multiple federated nodes and can manage nodes that span multiple systems and platforms. A node can only be managed by a single deployment manager and must be federated to the cell of that deployment manager.

Deployment Manager is part of Network Deployment Edition of Websphere.



### 1.4 <u>References</u>

Before proceeding with the document, ensure the below documents are followed for setup

- For resource creation(JDBC Provider, Datasource, Queue connection factory, JMS queue), refer to Resource\_Creation\_WAS.doc
- For cluster configuration, refer to FCUBS\_Cluster\_Creation\_WAS.doc
- For application deployment, refer to FCUBS\_Application\_WAS.doc
- For deployment of Gateway applications, refer to GATEWAY\_Applications\_WAS.doc
- For SSL configuration in Websphere, refer to SSL\_Configuration\_WAS.doc



# 2. JDBC Tuning

The JDBC provider object encapsulates the specific JDBC driver implementation class for access to the specific vendor database of your environment. The datasource object supplies your application with connections for accessing the database. In a typical production environment database and application needs to use the perfect combination of parameters to achieve higher throughput.

Navigation Path >> Resources->JDBC->Data Sources ->DATA\_SOURCE\_NAME->Connection Pools ->

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Control Activities	Data sources > Oracle HOC Oriver XA DataSource >	Connection pools
	Use this page to set properties that impact the timing	of connection management testis, which can affect the performance
Servers	of your application. Consider the default values careful values.	By: your application requirements might versant changing these
CApplications	Configuration	
(John	Competen	
Services	General Properties	
<ul> <li>Service providers</li> </ul>		Additional Properties
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If Cache instances		
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# URL	Apply DK Reset Cancel	

Parameter	Value
Connection Time out	180
Maximum Connection	10
Minimum Connections	1
Reap Time	180
Unused Time	180
Aged Timeout	0
Purge Policy	Entire Pool

Navigation Path >> Resources-> JDBC->Data Sources ->DATA\_SOURCE\_NAME->Connection Pools ->Advanced Connection Pool Properties



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Parameter	Value
Number of shared pool partitions	0
Number of free pool partitions	0
Free pool distribution table size	0
Surge threshold	-1
Surge creation interval	0
Stuck timer interval	0
Stuck time interval	0
Stuck threshold	0



# 3. JVM Tuning

### 3.1 JVM Heap Size

When a Java Virtual Machine (JVM) is started, it obtains a large area of memory from the underlying operating system. This area is called the heap, and Java performs its own memory management by allocating areas of the heap as memory is needed by the process. Performance tuning generally starts with the Java Virtual Machine (JVM), which serves as the foundation for the application server. From that point forward, tuning is primarily driven by the application server components that are used by the application.

Every 75 concurrent FLEXCUBE users require one websphere application server of size 4GB. I.e. for 300 concurrent FLEXCUBE users, it is recommended to have 4 websphere application servers.

Navigation Path >> Application Server->APPLICATION\_SERVER\_NAME-> Server Infrastructure->Java And Process Management->Process Definition-> Java Virtual machine

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R. Co. Inc. Inc. Inc.						

Parameter	Value
Initial Heap Size	1024
Maximum Heap Size	4096



### 3.2 Thread Pool Size

Each task performed by the server runs on a thread obtained from one of WebSphere Application Server's many thread pools. A thread pool enables components of the server to reuse threads, eliminating the need to create new threads at run time to service each new request. Three of the most commonly used (and tuned) thread pools within the application server are:

Web container: Used when requests come in over HTTP.

Default: Used when requests come in for a message driven bean or if a particular transport chain has not been defined to a specific thread pool.

ORB: Used when remote requests come in over RMI/IIOP for an enterprise bean from an EJB application client, remote EJB interface, or another application server.

Navigation Path >> Application Server->APPLICATION\_SERVER\_NAME->Additional Properties->Thread Pools->

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				startup.		
		Total				

Parameter	Minimum Size	Maximum Size	Thread Inactive Timeout
Default	20	20	5000
ORB.thread.pool	10	50	3500
Web Container	50	50	60000



	to use. A thread pool enables server components to reuse threads inste reads is typically a time and resource intensive operation.
General Properties	Additional Properties
* Name Default	Custom properties
* Minimum Size 20 threa	ds
* Maximum Size	ds
* Thread inactivity timeout 5000 millis	econds
Allow thread allocation beyond maximum th	nread size
Apply OK Reset Cancel	



## 4. Logging

When working with IBM to debug request processing problems, there might be occasions where low-level tracing components must be enabled to capture details for how the request is processed. These low-level Application server trace components do not have knowledge of the request intent or the potential data within. Therefore, when enabled, it is possible that these tracing components might potentially include sensitive information, in plain text, in the trace file.

It is recommended whenever possible to not enable these types of tracing components on a production system and attempt to simulate the problem on a quality assurance environment to capture the appropriate information.

Navigation Path >> Application Server->APPLICATION\_SERVER\_NAME->Process Definition-> Logging And Tracing

#### 4.1 Diagnostic Trace

ddleware servers	?
Middleware servers > MS01 > Process definition > MS01 > Diagnostic	c trace service
Use this page to view and modify the properties of the diagnostic trac about how the application server components run within this managed the server is restarted. Changes on the Runtime panel apply immedia	process. Changes on the Configuration panel apply when
Configuration Runtime	
General Properties	Additional Properties
Trace Output	Change log detail levels
None None	
Memory Buffer	
* Maximum Buffer Size	
<ul> <li>File</li> <li>* Maximum File Size</li> </ul>	
20 MB	
* Maximum Number of Historical Files	
* File Name	
\${SERVER_LOG_ROOT}/trace.log	
Trace Output Format	
Basic (Compatible) 💌	
Apply OK Reset Cancel	

Parameter	Value
Trace Output	File



## 4.2 JVM Logs

dleware servers	
liddleware servers > MS01 > Process definition >	MS01 > JVM Logs
rocess. The JVM logs are created by redirecting th ystem.out log is used to monitor the health of the formation that is used to perform problem analys	the Java virtual machine (JVM) System.out and System.err logs for a manage the System.out and System.err streams of the JVM to independent log files. The e running application server. The System.err log contains exception stack trad sis. One set of JVM logs exists for each application server and all of its loyment manager and each node manager. Changes on the Configuration on the Runtime panel apply immediately.
Configuration Runtime	
General Properties	
System.out	
* File Name:	
\${SERVER_LOG_ROOT}/SystemOut.log	
File Formatting	
Basic (Compatible)	
Log File Rotation	
V File Size	Time
Maximum Size	Start Time
1 MB	24
	Repeat Time
Maximum Number of Historical Log Files. Num 5	nber in range 1 through 200.
Installed Application Output	
Show application print statements	
Format print statements	
System.err	
-	
* File Name: \${SERVER_LOG_ROOT}/SystemErr.log	
Log File Rotation	
V File Size	Time
Maximum Size	Start Time
I MD	Z4 Repeat Time

Parameter	Value	Remarks
System. out	\${SERVER_LOG_ROOT}/SystemOut.log	File Name and File Size
Sysem.err	\${SERVER_LOG_ROOT}/SystemErr.log	File Name and File Size



## 4.3 Process Logs

Middleware servers
<u>Middleware servers</u> > <u>MS01</u> > <u>Process definition</u> > <u>MS01</u> > <u>Process Logs</u> Use this page to view or modify settings to specify the files to which standard out and standard error streams write. The process logs are created by redirecting the standard out and standard error streams of a process to independent log files. Native code writes to the process logs. These logs can also contain information that relates to problems in native code or diagnostic information written by the JVM. One set of process logs is created for each application server and all of its applications. Process logs are also created for the deployment manager and each node manager. Changes on the Configuration panel apply when the server is restarted. Changes on the Runtime panel apply immediately.
Configuration Runtime General Properties
* Stdout File Name \${SERVER_LOG_ROOT}/native_stdout.log
* Stderr File Name \${SERVER_LOG_ROOT}/native_stderr.log
Apply OK Reset Cancel

Parameter	Value
Stdout File Name	\${SERVER_LOG_ROOT}/native_stdout.log
Stderr file name	\${SERVER_LOG_ROOT}/native_stderr.log

## 4.4 IBM Service Logs

ddleware servers	? -
<u>Middleware servers</u> > <u>MS01</u> > <u>Process definition</u> > <u>MS01</u> > IBM Service Logs	
Use this page to configure the IBM service log, also known as the activity log. The IBM service log contains both t server messages that are written to the System.out stream and special messages that contain extended service i you can use to analyze problems. One service log exists for all Java virtual machines (JVMs) on a node, including servers and their node agent, if present. A separate activity log is created for a deployment manager in its own lo The IBM Service log is maintained in a binary format. Use the Log Analyzer or Showlog tool to view the IBM service	nformation that all application ogs directory.
Configuration	
General Properties  Enable service log  * File Name:	
\${LOG_ROOT}/activity.log	
* Maximum File Size 2 MB	
Enable Correlation ID	
Apply OK Reset Cancel	



Parameter	Value
Enable Service Log	False
Maximum File Size	2
File Name	\${LOG_ROOT}/activity.log
Enable Correlation Id	True

## 4.5 Change Log Level Details

	s to control which events are processed by Java logging. Click Components to specify a log detail level for individu
onents,	or click Groups to specify a log detail level for a predefined group of components. Click a component or group
e to sele s.	ct a log detail level. Log detail levels are cumulative; a level near the top of the list includes all the subsequent
-	
iguratio	n Runtime
eneral I	Properties
Chan	ge log detail levels
	isable logging and tracing of potentially sensitive data (WARNING: This might cause the log detail level
	g to be modified when it is applied on the server.)
Selec	t components and specify a log detail level. Log detail levels specified here will apply to the entire
serve	r. Expand Components and Groups and click Components to specify a log detail level for individual
comp	onents, or click Groups to specify a log detail level for a predefined group of components. Click a
comp	onents, or click Groups to specify a log detail level for a predefined group of components. Click a onent or group name to select a log detail level. Log detail levels are cumulative.
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Parameter	Value
Disable logging	False
Enable Log and Trace Correlation	False



## 4.6 NCSA Access and HTTP Error Logging

Middleware servers	? -
<u>Middleware servers</u> > <u>MS01</u> > <u>Process definition</u> > <u>MS01</u> > NCSA access and HTTP error logging	
Use this page to configure HTTP error logs and National Center for Supercomputing Applications (NCSA) access logs.	
Configuration	
General Properties	
Enable logging service at server start-up	
Enable logging service at server start-up	
NCSA Access logging	
Enable access logging	
* Access log file path	
\${SERVER_LOG_ROOT}/http_access.log	
Access log maximum size	
500 MB	
Maximum number of historical files	
1	
* NCSA access log format	
Error logging	
Enable error logging	
* Error log file path	
\${SERVER_LOG_ROOT}/http_error.log	
Error log maximum size	
500 MB	
Maximum number of historical files	
1	
* Error logging level	
Warning 💌	

Parameter	Value
NCSA Access logging Enable	True
Error logging Enable	True



## 5. Session Management

Web browsers and applications use HTTP to communicate. Since HTTP is a stateless protocol (meaning that each command is executed independently without any knowledge of the commands that came before it), there must be a way to manage sessions between the browser side and the server side. Session management is used to configure session manager properties to control the behavior of Hypertext Transfer Protocol (HTTP) session support.

Navigation Path >> Enterprise Application->APPLICATION\_NAME->Web Module Properties->Session Management

figuration	
eneral Properties	Additional Properties
Override session management	Custom properties
Session tracking mechanism:	Distributed environment settings
Enable SSL ID tracking	
Enable cookies	
Enable URL rewriting     Enable protocol switch rewriting	
Enable protocol switch rewriting	
Maximum in-memory session count:	
1000 sessions	
Allow overflow	
Session timeout:	
No timeout	
Set timeout	
30 minutes	
Security integration	
Serialize session access:	
Allow serial access	
0 seconds	
Allow access on timeout	

Parameter	Value
Enable SSL ID Tracking	False
Enable Cookies	True
Enable URL rewriting	False
Maximum in-memory session count	1000
Session timeout	30 Minutes
Security Integration	False



Parameter	Value
Serialization Session access	True



## 6. Appendix A: Frequently Encountered Errors

Error 1: Websphere is causing too many database locks.

Solution: In order to avoid problems with database locks issue, change the custom property "webSphereDefaultIsolationLevel=2". By default Webpshere uses Repeatable Read isolation level(4) for transactions. Before proceeding with the isolation level change make sure these locks are not caused by the application.

Possible Values	JDBC Isolation Level	Isolation Level
8	TRANSACTION_SERIALIZABLE	Repeatable Read (RR)
4 (default)	TRANSACTION_REPEATABLE_READ	Read Stability (RS)
2	TRANSACTION_READ_COMMITTED	Cursor Stability (CS)
1	TRANSACTION_READ_UNCOMMITTED	Uncommitted Read (UR)
0	TRANSACTION_NONE	No Commit (NC)

Navigation Path >> Resources-> JDBC->Data Sources ->DATA\_SOURCE\_NAME-> Custom Properties

If this property is found then update the value to 4 and Save, else create a new property with below mentiond steps:

- 1. Click New.
- 2. Enter webSphereDefaultIsolationLevel for the name field.
- 3. Enter 2 for the value field.

Scope [cells:ofss222565Node01Cell:nodes:ofss222565Node01:servers:server1 * Name webSphereDefaultIsolationLevel Value 2X Description Type	sources	2
his page to specify custom properties that your enterprise information system (EIS) requires for the resource providers and roc factories that you configure. For example, most database vendors require additional custom properties for data sources to iguration  igu	ata sources :	> Default Datasource > Custom properties > New
Scope [cells:ofss222565Node01Cell:nodes:ofss222565Node01:servers:server1 * Name webSphereDefaultIsolationLevel Value 2X Description Type	e this page to source factori	o specify custom properties that your enterprise information system (EIS) requires for the resource providers and es that you configure. For example, most database vendors require additional custom properties for data sources
Scope cells:ofss222565Node01Cell:nodes:ofss222565Node01:servers:server1  Name webSphereDefaultIsolationLevel 2 2 x Description Type	Configuration	
Scope cells:ofss222565Node01Cell:nodes:ofss222565Node01:servers:server1  Name webSphereDefaultIsolationLevel 2 2 x Description Type		
Scope cells:ofss222565Node01Cell:nodes:ofss222565Node01:servers:server1  Name webSphereDefaultisolationLevel Value 2 x Description Type	General Pi	roperties
Name     webSphereDefaultIsolationLevel Value 2 x Description Type	Scope	
webSphereDefaultIsolationLevel Value 2 x Description Type	cells:ofss	;222565Node01Cell:nodes:ofss222565Node01:servers:server1
Value 2	* Name	
2 × Description	webSpher	reDefaultIsolationLevel
Description		
Type	2	x
	Descriptio	nc
		^
		~
java.lang.String		a.String
Apply OK Reset Cancel	Apply	OK Reset Cancel





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