Configuring Weblogic Server 12c
Oracle FLEXCUBE Universal Banking
Release 12.87.7.0.0
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ORACLE
FINANCIAL SERVICES

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1. Introduction

1.1 Purpose of this Document

The purpose of this document is to explain the steps required for Configuration and applying best practices in cluster mode for

- FCUBS 14
- Weblogic Version 12.2.1.2.0
- JDK 1.8.0_131

1.2 WebLogic Server Overview

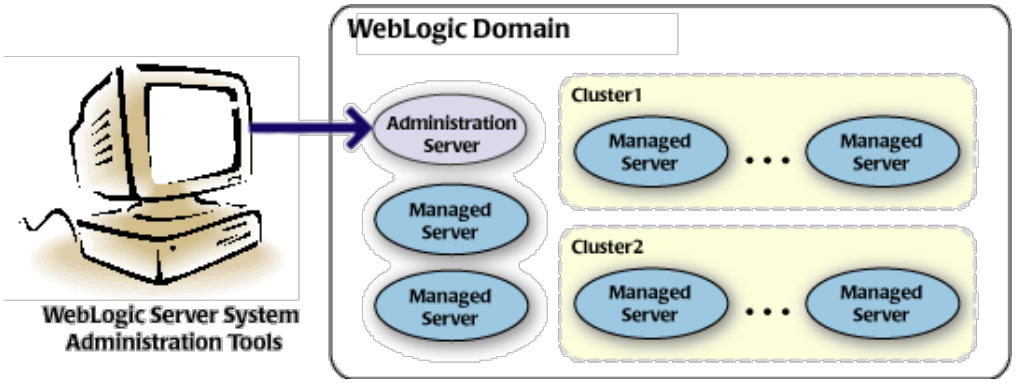
This section of the document provides brief explanation on the main components involved in WebLogic server

Domain

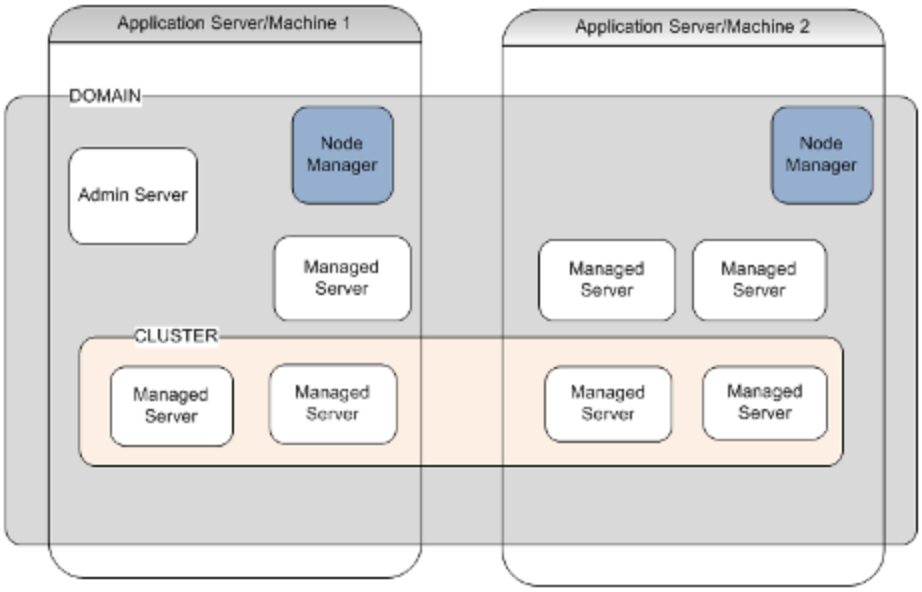
A domain is the basic administration unit for WebLogic Server instances. A domain consists of one or more WebLogic Server instances (and their associated resources) that is managed with a single Administration Server. Multiple domains can be defined based on different system administrators' responsibilities, application boundaries, or geographical locations of servers. Conversely, a single domain can be used to centralize all WebLogic Server administration activities.

Each WebLogic Server domain must have one server instance that acts as the Administration Server. Administration Server can be used via the Administration Console or using the command line for configuring all other server instances and resources in the domain.

WebLogic Domain Structure



Weblogic 12c Domain Overview



Administration Server

A domain includes one WebLogic Server instance that is configured as an Administration Server. All changes to configuration and deployment of applications are done through the Administration Server. The Administration Server provides a central point for managing the domain and providing access to the WebLogic Server administration tools.

These tools include the following:

- WebLogic Server Administration Console: Graphical user interface to the Administration Server.
- WebLogic Server Node Manager: A Java program that lets you start and stop server instances - both Administration Servers and Managed Servers - remotely, and to monitor and automatically restart them after an unexpected failure.

Admin server start mode needs to be configured as Production Mode.

Managed Server

In a domain, server instances other than the Administration Server are referred to as Managed Servers. Managed servers host the components and associated resources that constitute your applications—for example, JSPs and EJBs.

When a Managed Server starts up, it connects to the domain's Administration Server to obtain configuration and deployment settings. In a domain with only a single WebLogic Server instance, that single server works as both the administration server and managed server.

Node Manager

The Managed Servers in a production WebLogic Server environment are often distributed across multiple machines and geographic locations.

Node Manager is a Java utility that runs as separate process from WebLogic Server and allows you to perform common operations tasks for a Managed Server, regardless of its location with respect to its Administration Server. While use of Node Manager is optional, it provides valuable benefits if your WebLogic Server environment hosts applications with high availability requirements.

If you run Node Manager on a machine that hosts Managed Servers, you can start and stop the Managed Servers remotely using the Administration Console or from the command line. Node Manager can also automatically restart a Managed Server after an unexpected failure.

Machine

A machine in the Weblogic Serve context is the logical representation of the computer that hosts one or more Weblogic Server instances(servers). The Admin Server uses the machine definitions to start remote servers through the Node Managers that run on those servers. A machine could be a physical or virtual server that hosts an Admin or Managed Server that belongs to a domain.

Managed Server Cluster

Two or more Managed Servers can be configured as a WebLogic Server cluster to increase application scalability and availability. In a WebLogic Server cluster, most resources and services are deployed to each Managed Server (as opposed to a single Managed Server,) enabling failover and load balancing.

The servers within a cluster can either run on the same machine or reside in different machines. To the client, a cluster appears as a single WebLogic Server instance.

Dynamic Cluster

A dynamic cluster is any cluster that contains one or more dynamic servers. Each server in the cluster will be based upon a single shared server template. The server template allows you to configure each server the same and ensures that servers do not need to be manually configured before being added to the cluster. This allows you to easily scale up or down the number of servers in your cluster without the need for setting up each server manually. Changes made to the server template are rolled out to all servers that use that template.

You cannot configure dynamic servers individually; there are no server instance definitions in the config.xml file when using a dynamic cluster. Therefore, you cannot override the server template with server-specific attributes or target applications to an individual dynamic server instance.

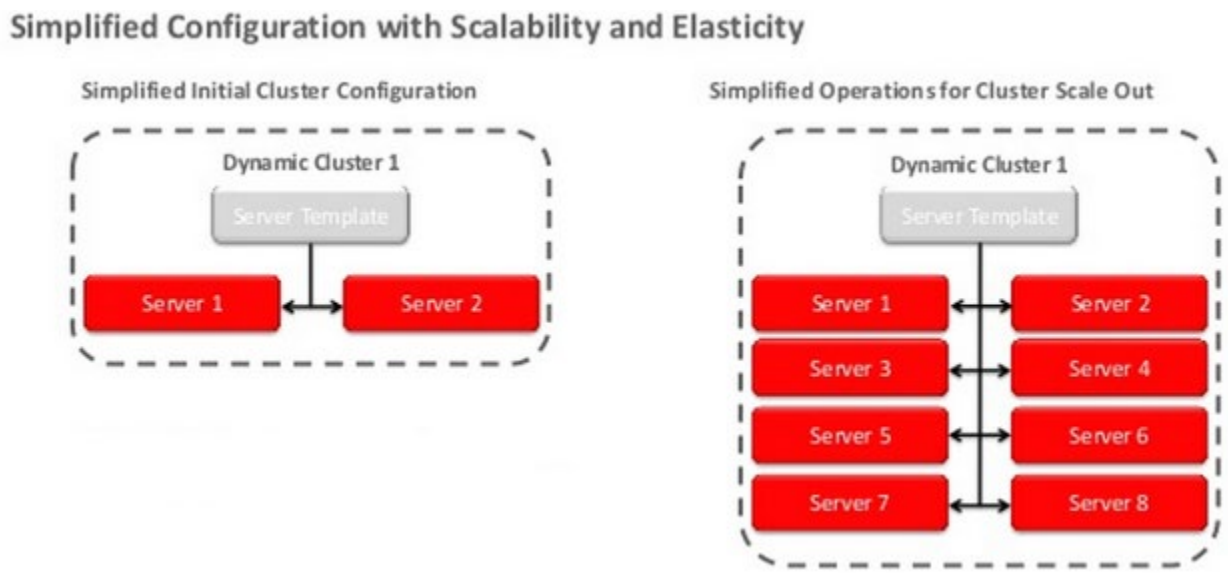
When configuring your cluster you specify the maximum number of servers you expect to need at peak times. The specified number of server instances is then created, each based upon your server template. You can then start up however many you need and scale up or down over time according to your needs. If you need additional server instances on top of the number you originally specified, you can increase the maximum number of servers instances (dynamic) in the dynamic cluster configuration.

Server Templates

A single server template provides the basis for the creation of the dynamic servers. Using this single template provides the possibility of every member being created with exactly the same attributes. Where some of the server-specific attributes like Servername, listen-ports, machines, etc. can be calculated based upon tokens.

You can pre-create server templates and let Weblogic clone one when a Dynamic Cluster is created.

When none is available a server template is created with the Dynamic Cluster. The name and the listen ports are the only server template attributes that you provide during Dynamic Cluster creation.



1.3 Pre-Requisites

In this document, we are going to create a domain with two managed servers. The managed servers are going to be created on two different physical servers (nodes). Note that, this document has been prepared based on a test conducted in Linux servers.

This requires Weblogic Server of same version to be installed on both the machines and services

Environment

2 servers where linux is installed, 1 will be primary where admin console will be running along with managed servers and the other where only managed servers will be.

Softwares

1) Oracle Weblogic Server 12.2.1.2 installed on both the machines under same folder structure.

2) JDK 1.8 Latest available version installed on both the machines. In this document JDK1.8.0_131 version is used.

Clock Synchronization

The clocks of both the servers participating in the cluster must be synchronized to within one second difference to enable proper functioning of jobs otherwise it will lead to session timeouts.

Enable Graphical User Interface (GUI)

Establish a telnet or SSH connection to primary server. Start X-manager (or any similar tool) in windows desktop. Export DISPLAY environment variable to the machine IP where x-manager is running.

Syntax: export DISPLAY=<ip-address>:<port>

Test using xclock

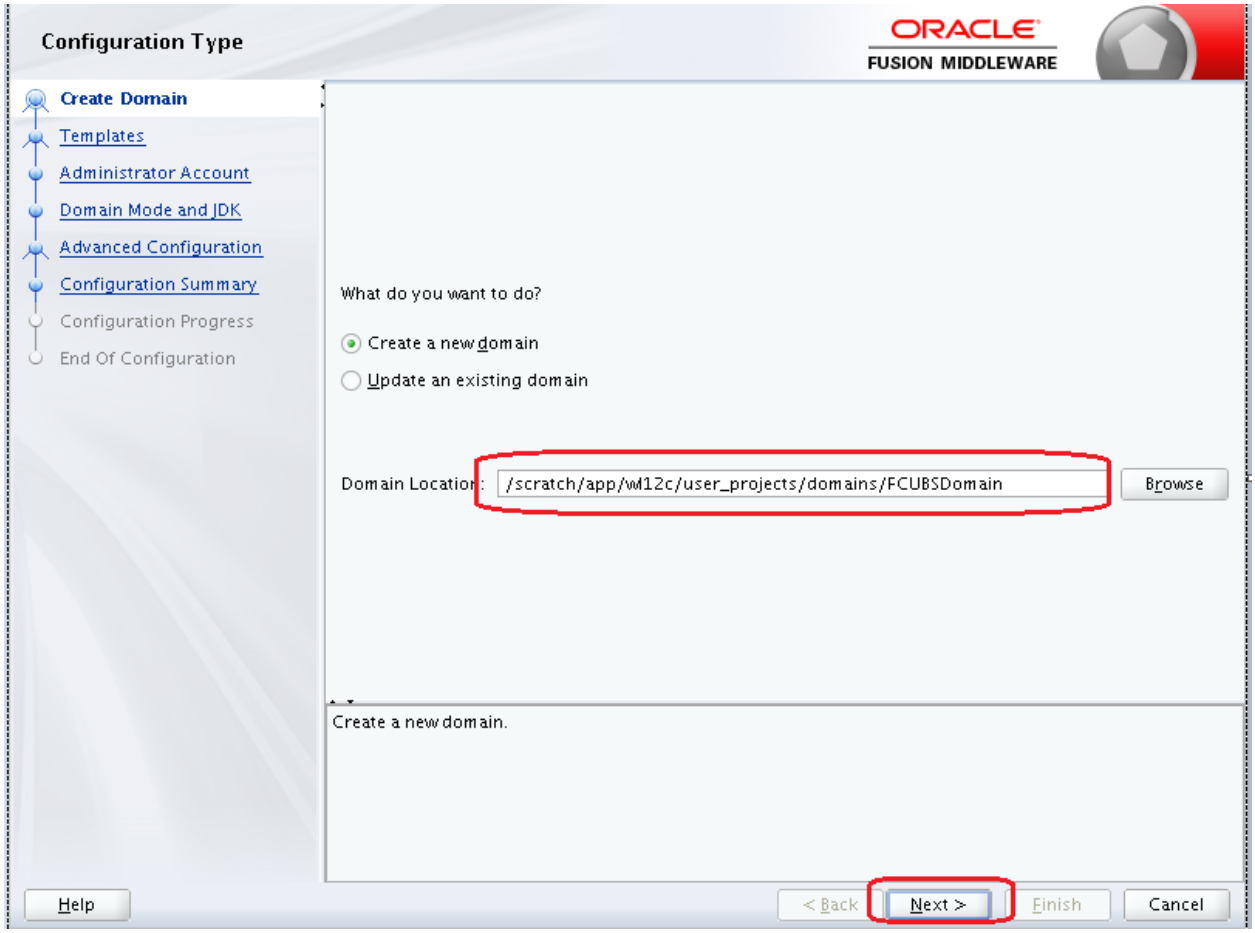
2. Domain Configuration

2.1 Domain Creation

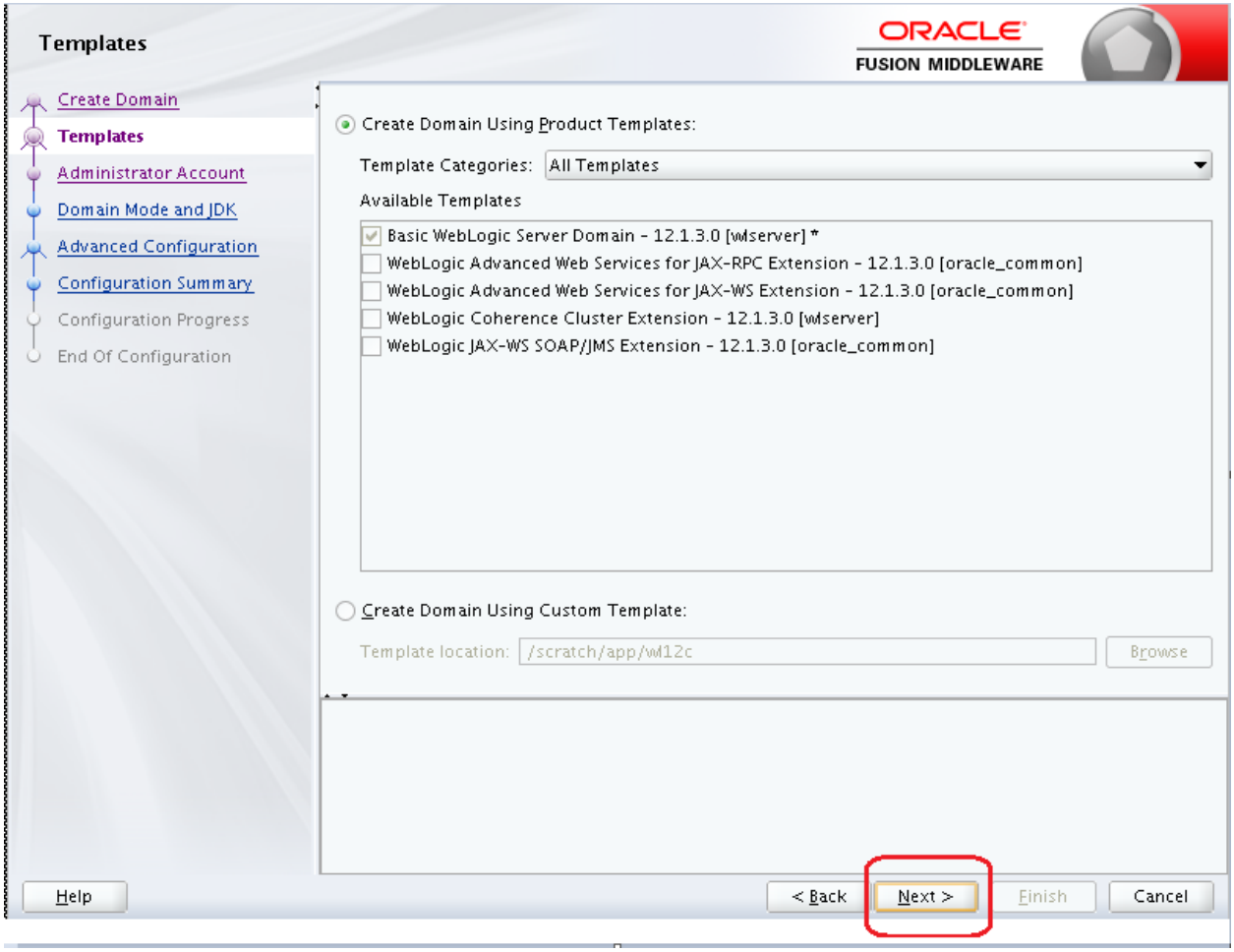
Weblogic domain creation and configuration will be done from primary server.

From primary server, launch the fusion Middleware configuration wizard using the command **config.sh** available under $WLS_HOME/common/bin directory.

1) In the Welcome screen, select “Create a new domain” option. Enter the domain name and Click on **Next**.

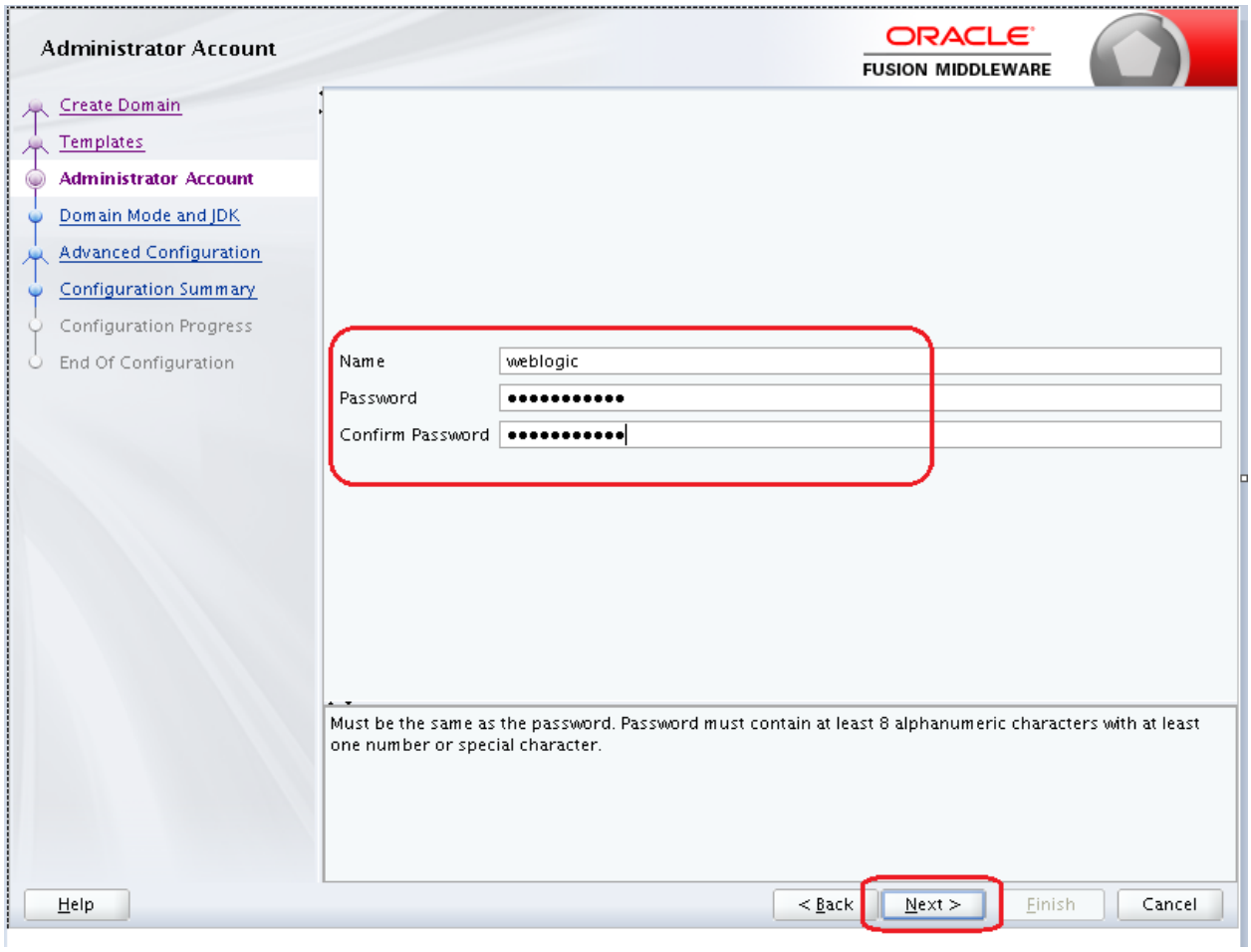


2) Select the required templates from **Available Templates** and click **Next**.

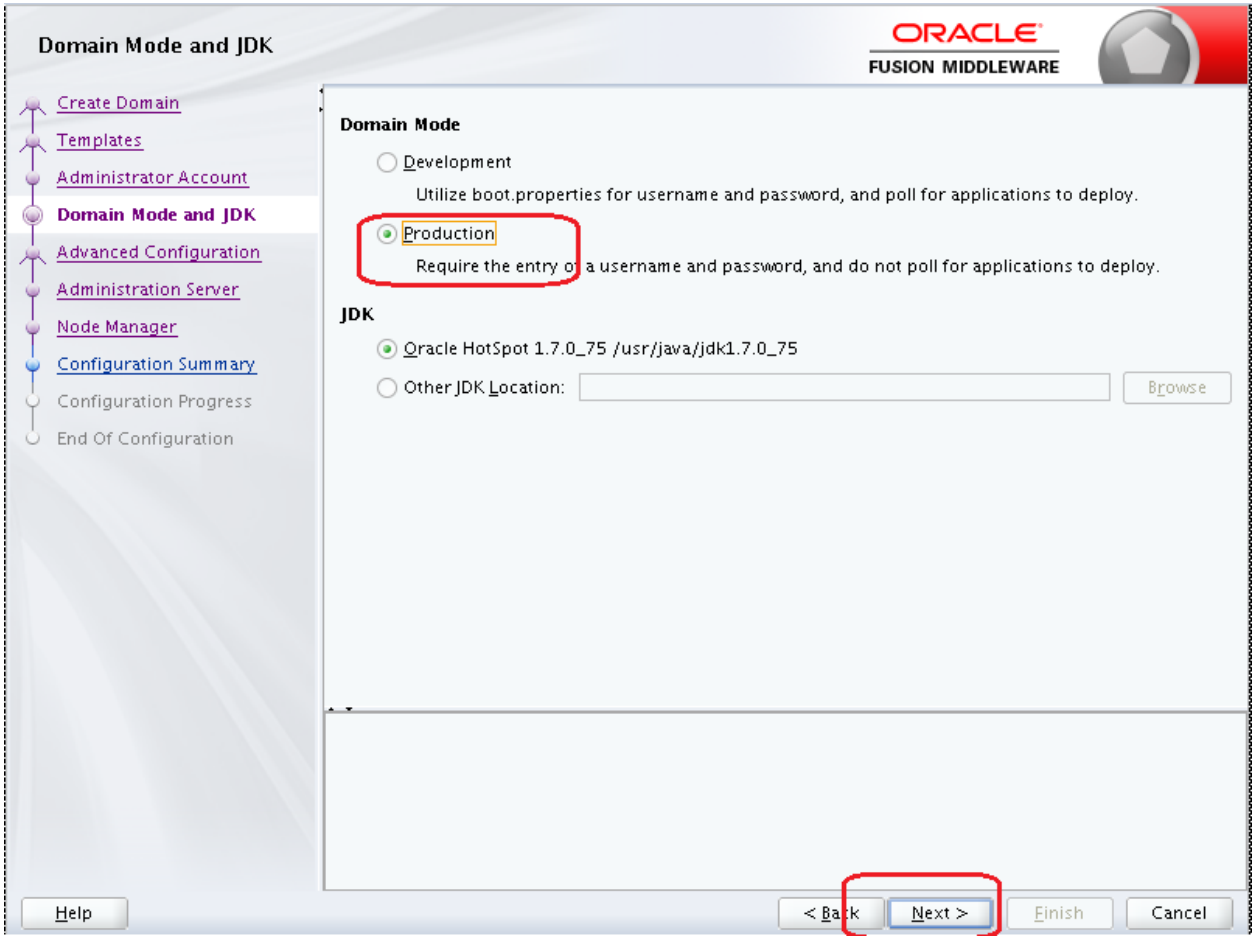


3) Specify Administrator **User Name** and **Password**.

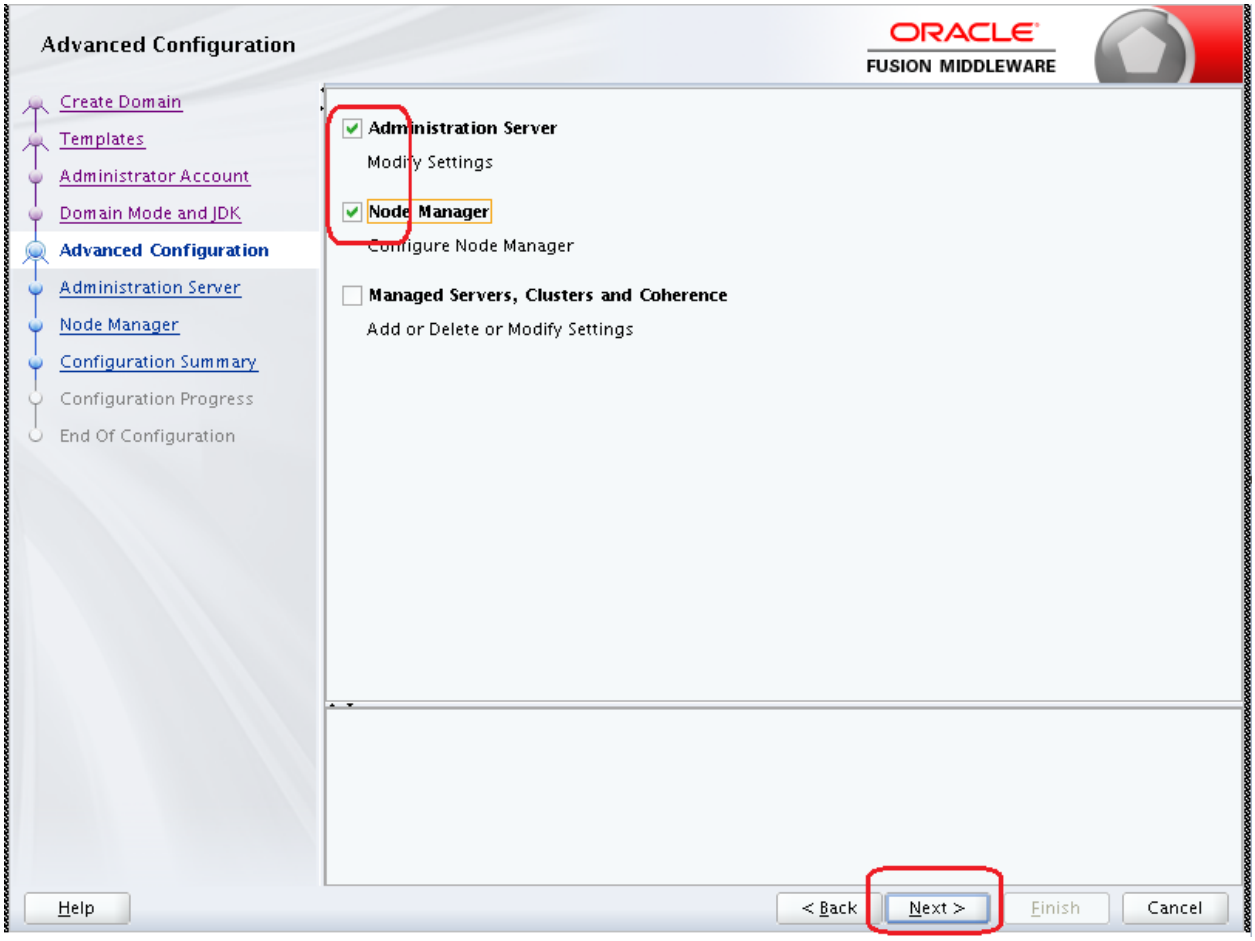
- The specified credentials are used to access Administration console.
- You can use this screen to define the default WebLogic Administrator account for the domain. This account is used to boot and connect to the domain's Administration Server. Click **Next**.


Administrator Account
ORACLE
FUSION MIDDLEWARE
Create Domain
Templates
Administrator Account
Domain Mode and JDK
Advanced Configuration
Configuration Summary
Configuration Progress
End Of Configuration
Name
weblogic
Password
Confirm Password
Must be the same as the password. Password must contain at least 8 alphanumeric characters with at least one number or special character.
Help
< Back
Next >
Finish
Cancel

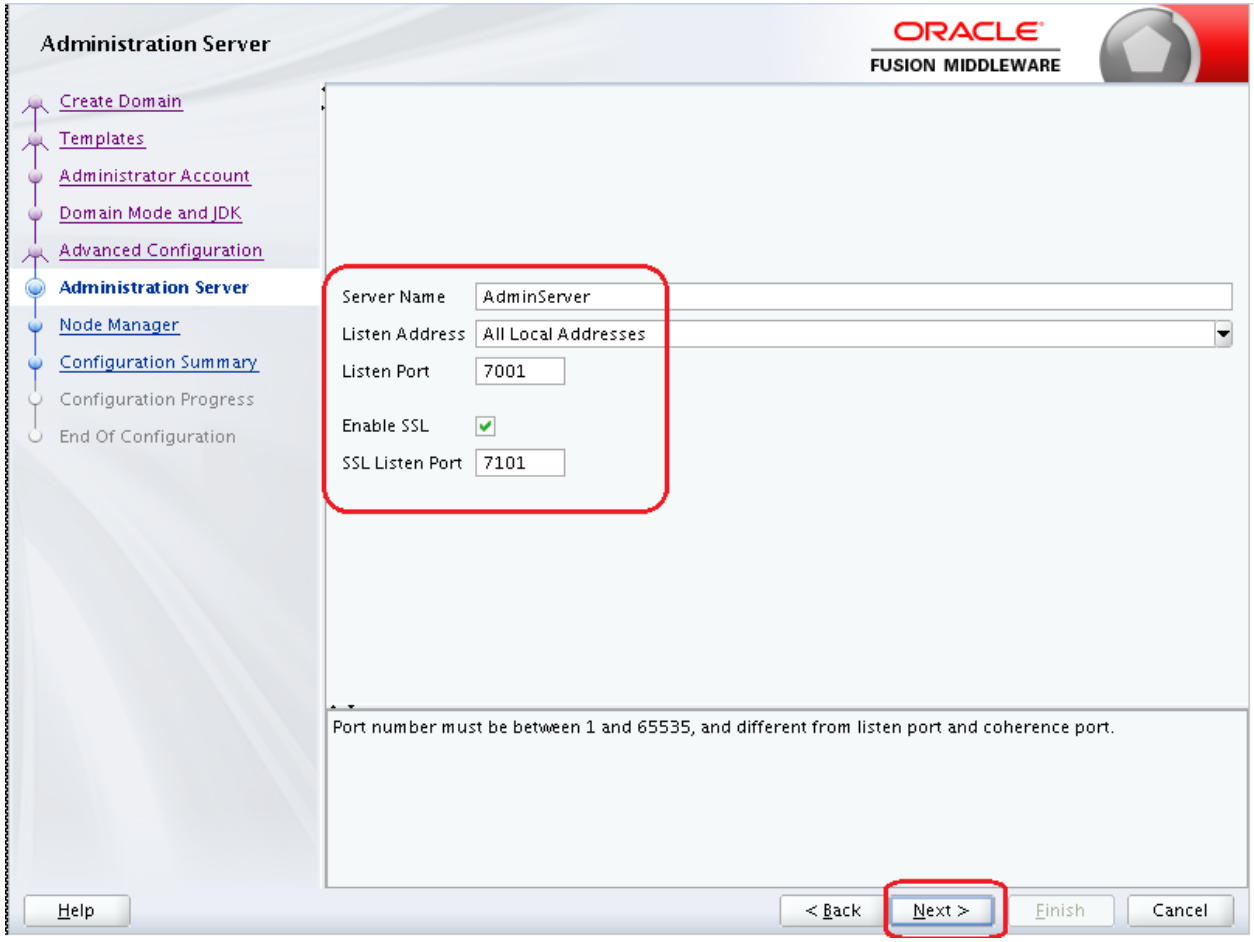
4) Select Server Startup as **Production Mode** and the available **JDKs**. Click **Next**.



5) Select the check box adjacent to **Administration Server** and **Node Manager**. Click **Next**.



6) Specify the Administration server **Listen address** and **Listen port**.



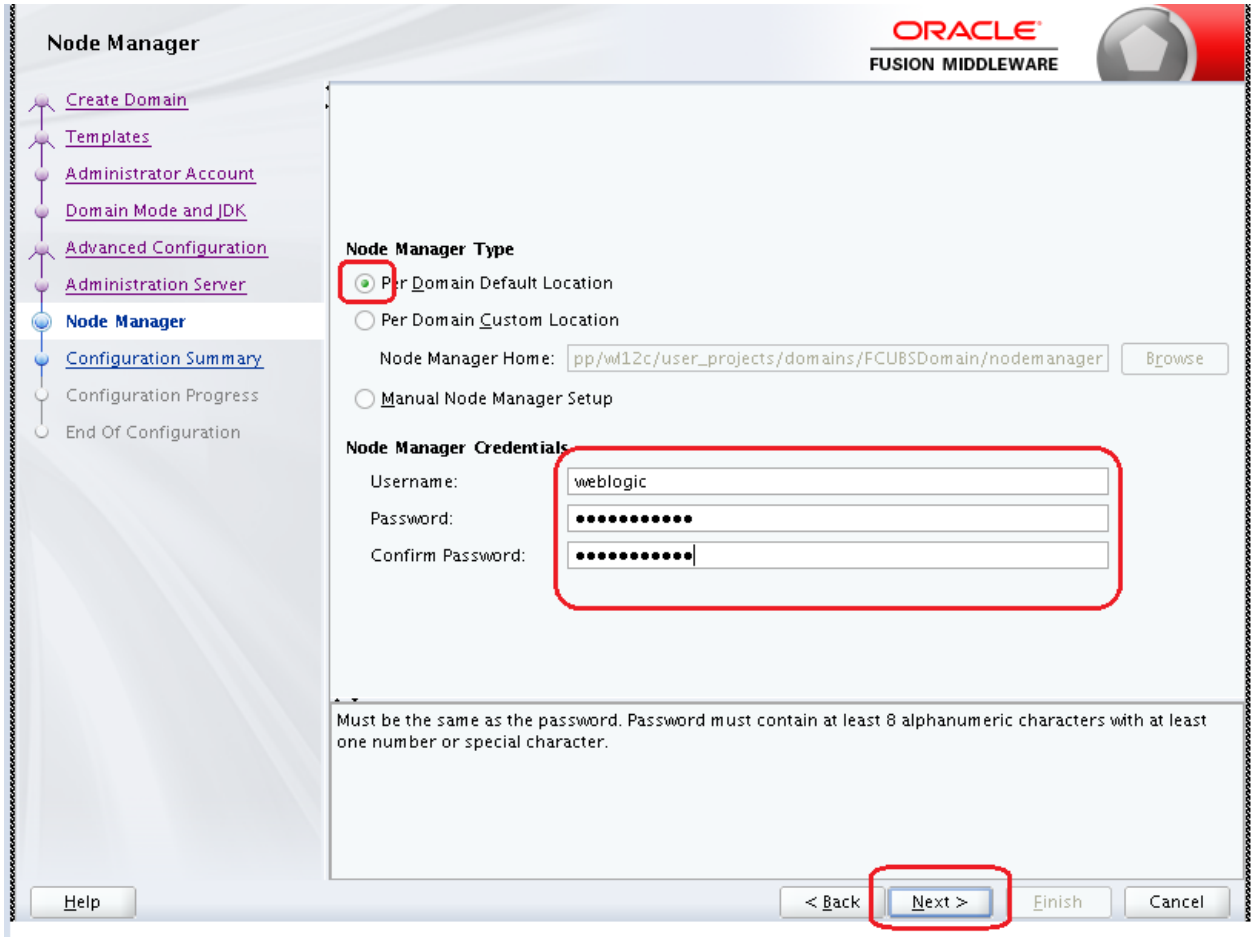
Note: The default Listen port is 7001 and SSL port is 7101. This could be changed to any other available port. Ensure to make a note, of this port since the same is required for launching the Admin console, post domain creation.

Note: Check for the port availability using the command - **netstat -anp |grep <Port no>**

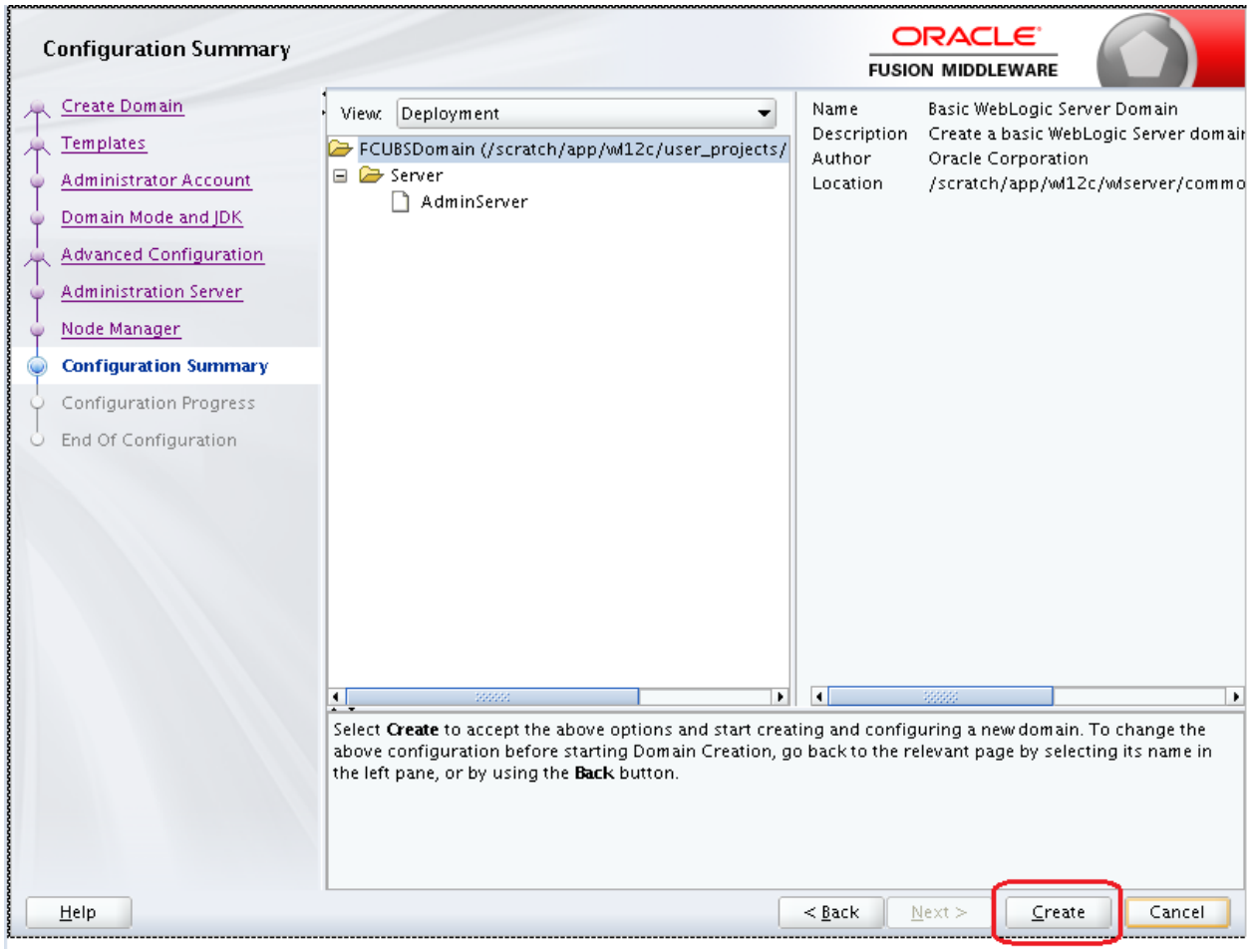
The next screen navigates to **NodeManager configuration**.

7) Configure Node Manager

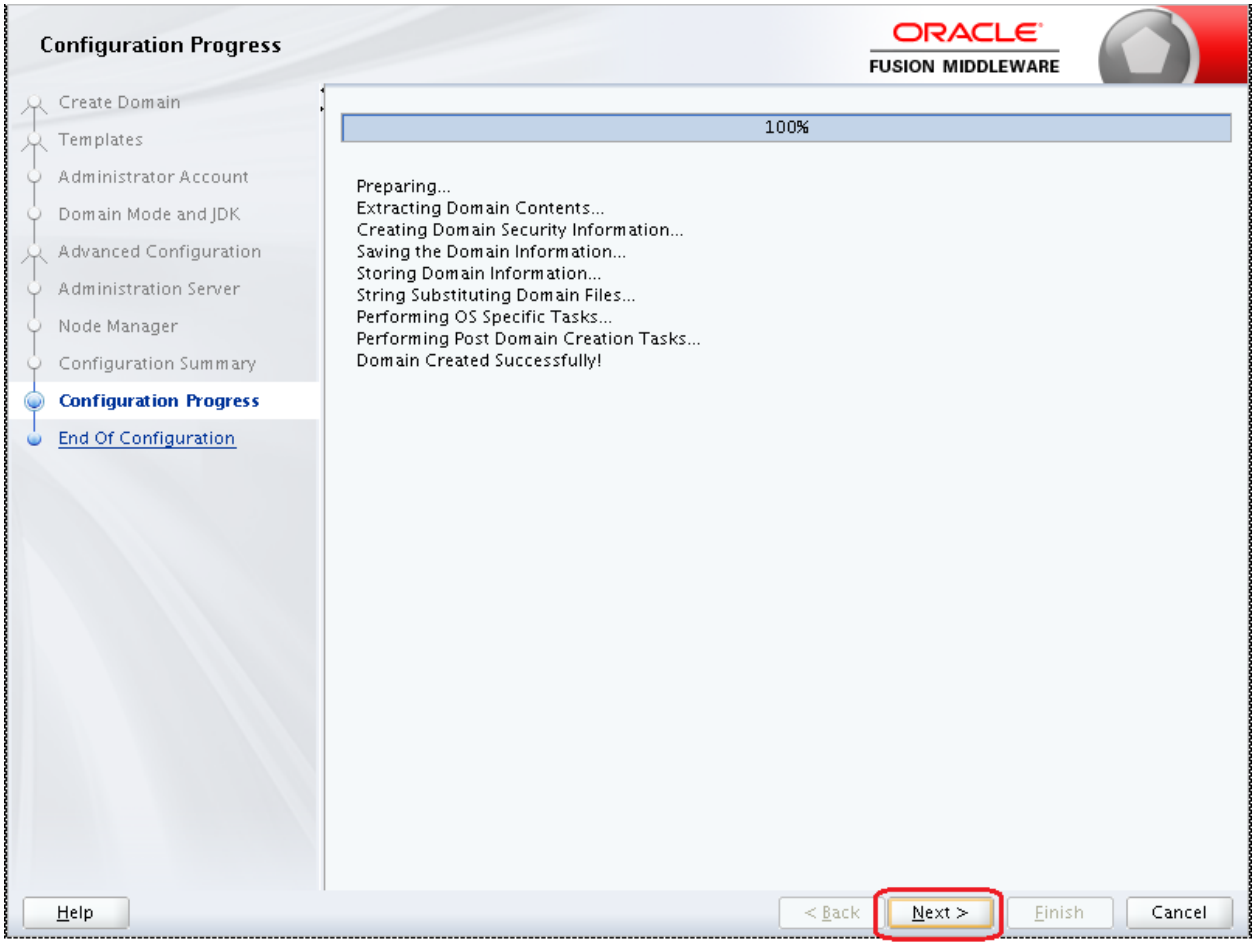
Select **Per Domain Default Location** option from **Node Manager Type.** And in the **Node Manager Credentials**, provide the username and password for the nodemanager. Click **Next**.



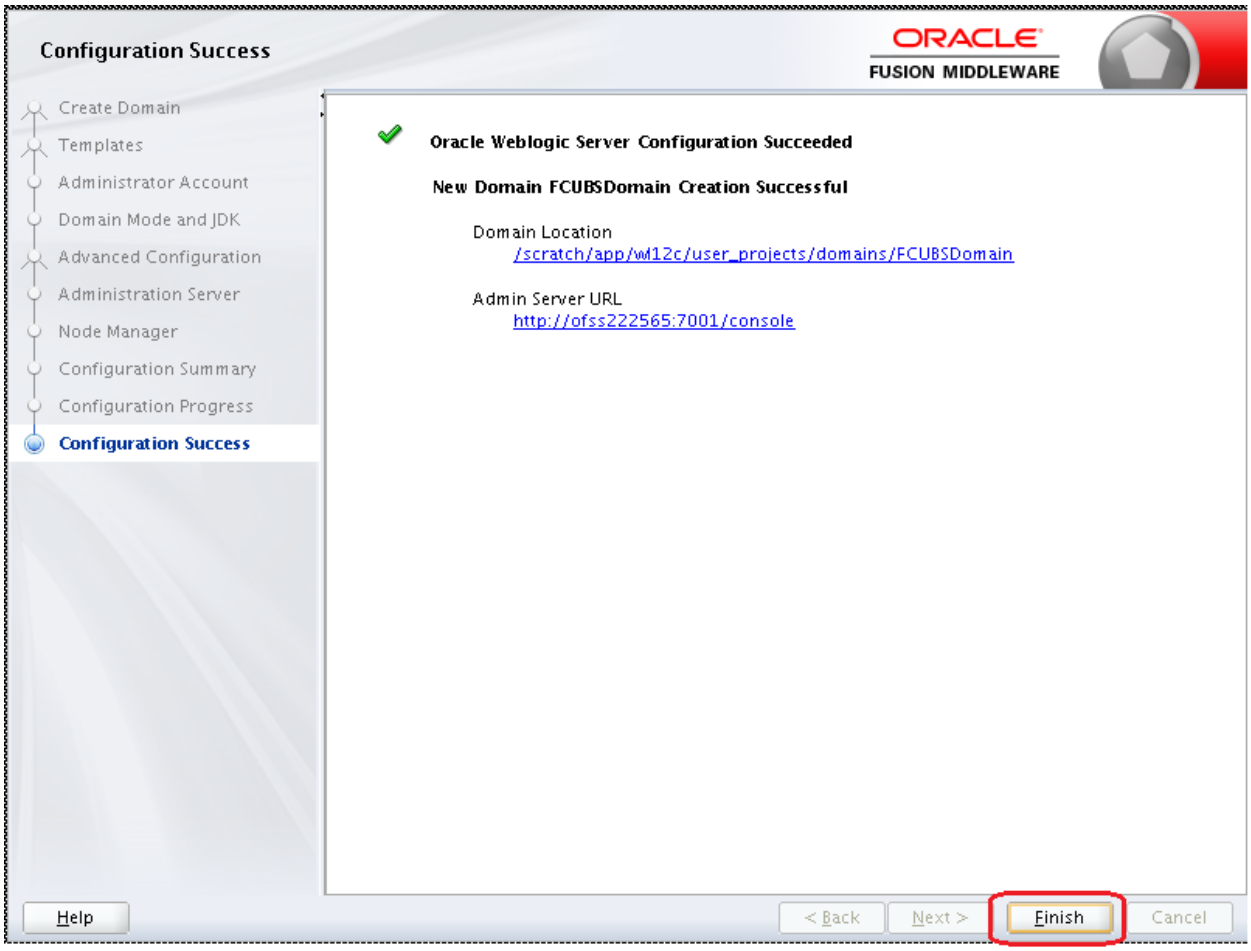
8) Verify the details and click **Create**. The domain creation process is initiated and the progress of completion is indicated.



9) Click **Next.**


Configuration Progress
ORACLE
FUSION MIDDLEWARE
Create Domain
Templates
Administrator Account
Domain Mode and JDK
Advanced Configuration
Administration Server
Node Manager
Configuration Summary
Configuration Progress
End Of Configuration
100%
Preparing...
Extracting Domain Contents...
Creating Domain Security Information...
Saving the Domain Information...
Storing Domain Information...
String Substituting Domain Files...
Performing OS Specific Tasks...
Performing Post Domain Creation Tasks...
Domain Created Successfully!
Help
< Back
Next >
Finish
Cancel

10) The **Configuration Success** message will be displayed as follows:



The Admin Server console URL is as indicated below:

http://<IP address>:<admin console port>/console

- <IP address >: Host on which domain was created.
- <admin console port> : Port specified in Administration Server configuration page.

In this case the Admin Console URL is: https://<server1hostname>:7101/console

2.2 Pack and Unpack Domain

The domain structure is expected to be copied to the second server during domain creation. To copy the same, you can use pack and unpack utility provided under $WLSHOME/common/bin.

Pack

Pack domain in primary server:

./pack.sh -managed=true -domain=/scratch/app/wl12c/user_projects/domains/FCUBSDomain -template=/tmp/FCUBSDomain.jar -template_name="FCUBSDomain"

Unpack

Unpack FTP FCBUSDomain.jar in binary mode to secondary server under /tmp area and unpack the domain using unpack utility provided under $WLSHOME/common/bin

./unpack.sh -domain=/scratch/app/wl12c/user_projects/domains/FCUBSDomain -template=/tmp/FCUBSDomain.jar

2.3 Start Admin server

Admin server is started on the primary server. Login to primary server and navigate to folder *$DOMAIN_HOME/bin* and execute **startWeblogic.sh**.

2.4 Start Node Manager

Node Manager needs to be started on both the servers. Before starting the node mananger update ListenAddress to the Hostname/IP Address of the machine in nodemanager.properties located in folder $DOMAIN_HOME/nodemanager

To start the node manager login to the servers and navigate to folder $DOMAIN_HOME/bin and execute **NodeManager.sh**

3. Cluster Configuration

Dynamic Cluster configuration involves below steps

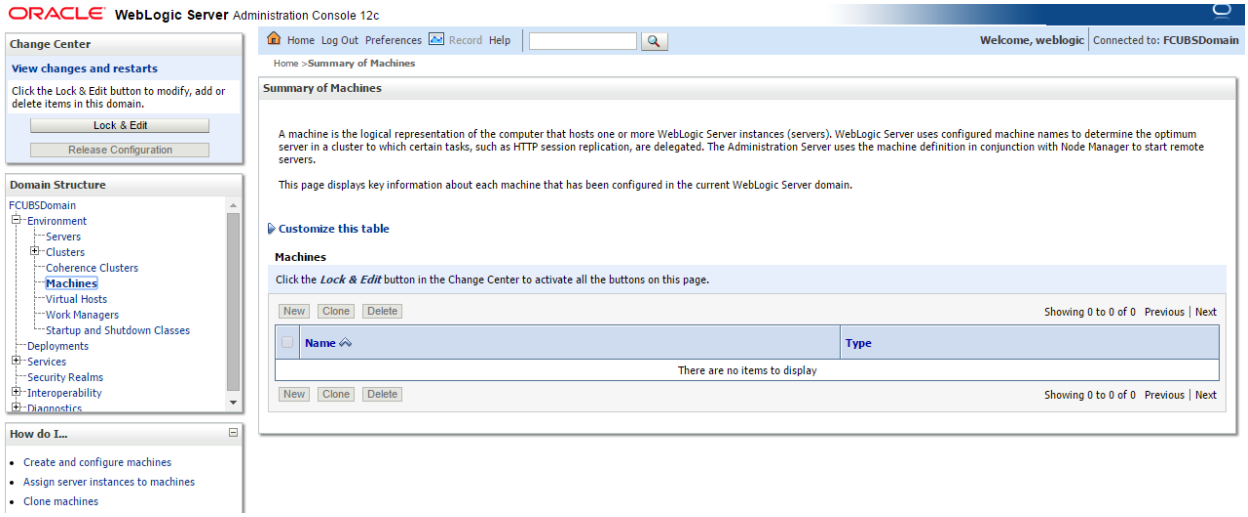
1) Machine Configuration
2) Dynamic Cluster Creation: In a normal WebLogic Cluster you define Managed Server and add them to Cluster. In Dynamic Cluster, you select number of Servers you want in Cluster and Server Template you wish to assign to Servers in this WebLogic Dynamic Cluster.
3) Server template modification: Servers (or Managed Server) that are part of WebLogic Dynamic Cluster will have properties taken from Server Template.
   Modify server template for best practices parameters for Dynamic Servers (part of Dynamic Cluster), you modify Server Template that is applicable to Dynamic Cluster. These settings are applicable to all the managed servers.
4) Activate Changes which would automatically create the managed servers(as mentioned in the number of servers required parameter).

Calculate Number of Servers Required:

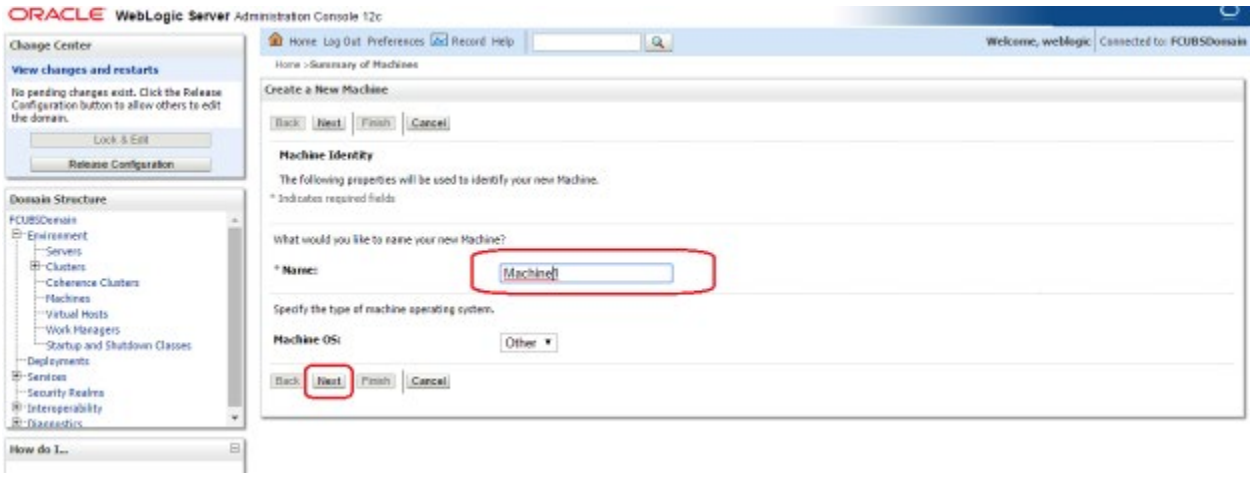
For every 50 logged in FLEXCUBE users require one managed server of size 8GB. i.e. for 300 logged in FLEXCUBE users, it is recommended to have 6 managed servers. Based on the logged in users that needs to be supported decide on the number of the managed servers required. This parameter is required later in the dynamic cluster creation.

3.1 Machines Configuration

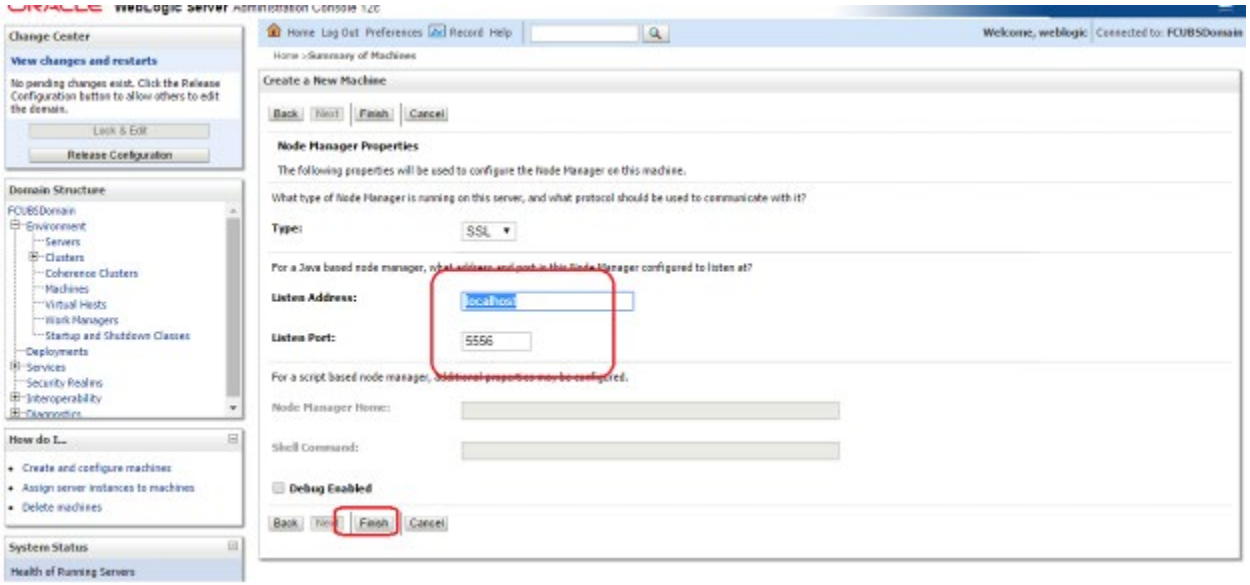
1) Login into Admin Console and Navigate to FCUBSDomain → Environment → Machine and Click **New**



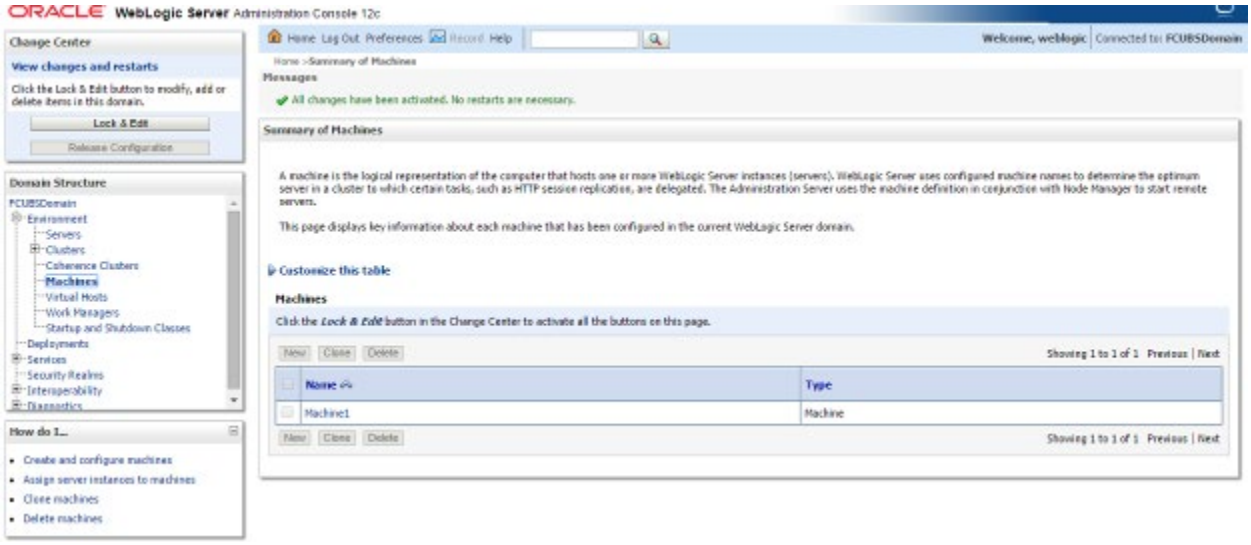
2) Enter the **machine name** and click **Next**



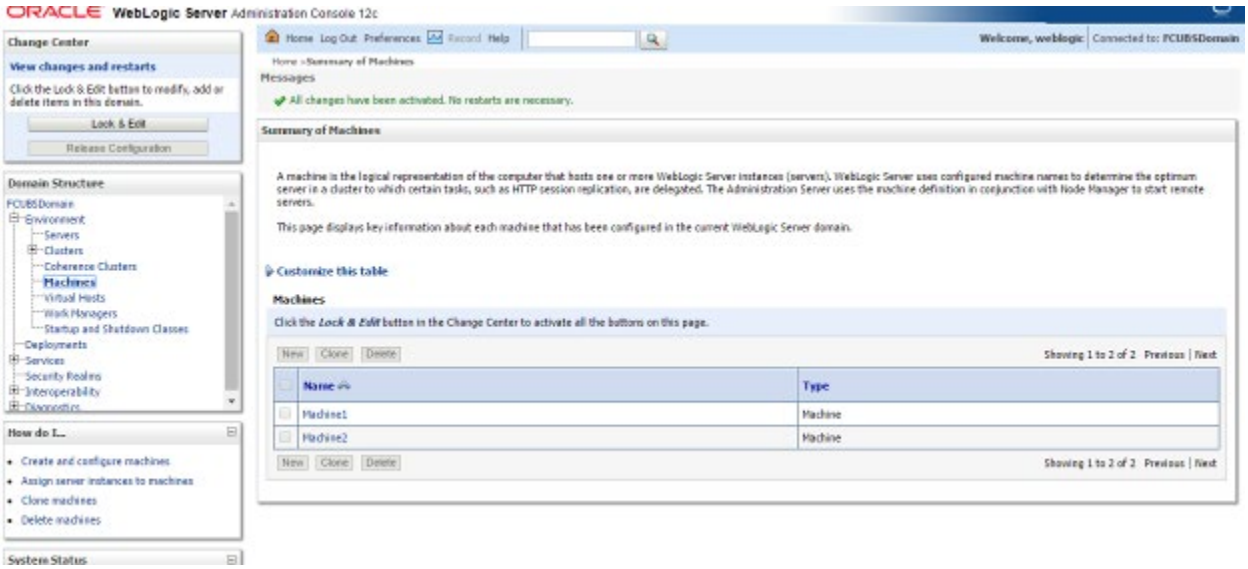
3) Enter the **Listen Address** and **Listen Port**(this is the port mentioned in nodemanager.properties file) and click **Finish**



4) Machine is created



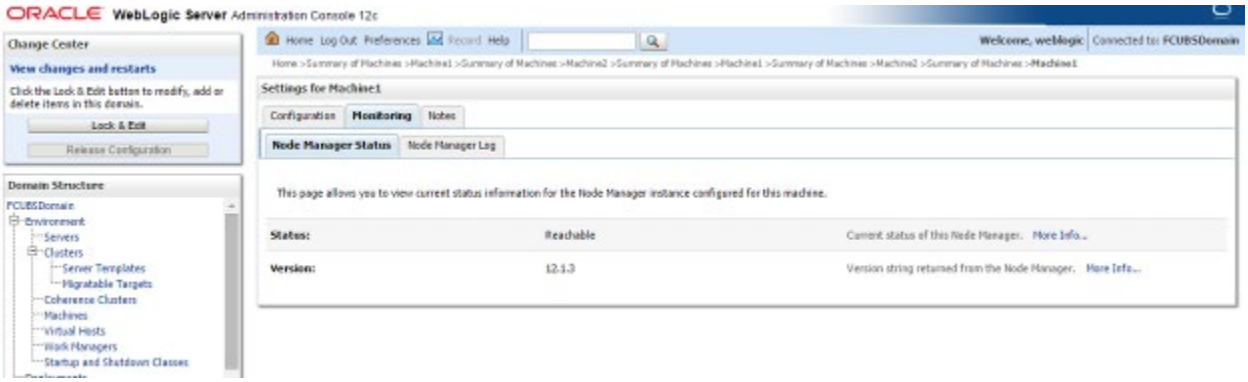
5) Similarly create a new **machine** entry for the other server



Verifying machine status

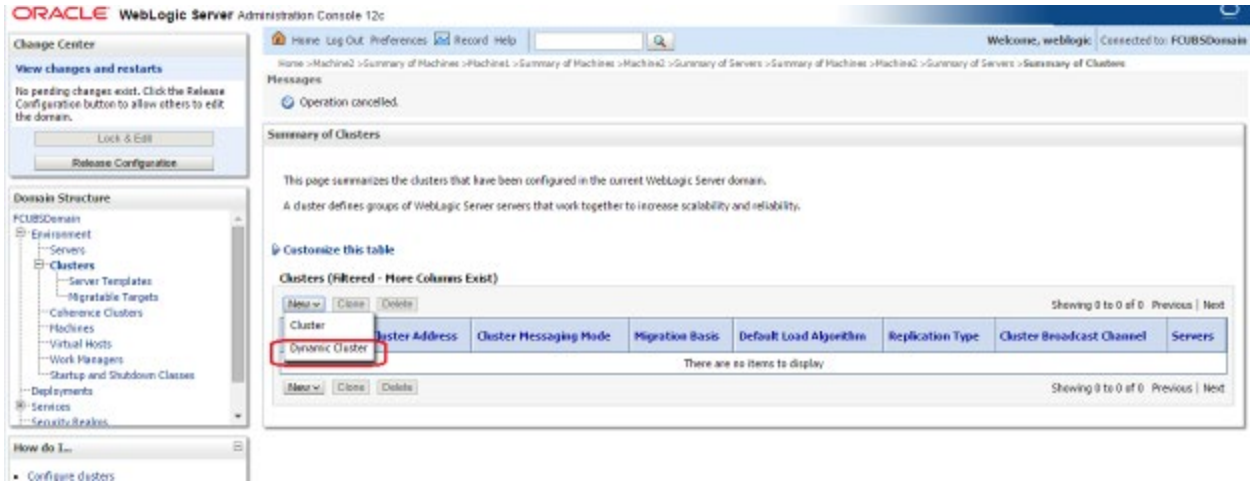
Before starting the managed servers, ensure that the Node manager Status of all the machines are “Reachable”.

In the console, navigate through Domain structure → Machines → machine1 →Monitoring → Node Manager Status. Status should be **Reachable.**

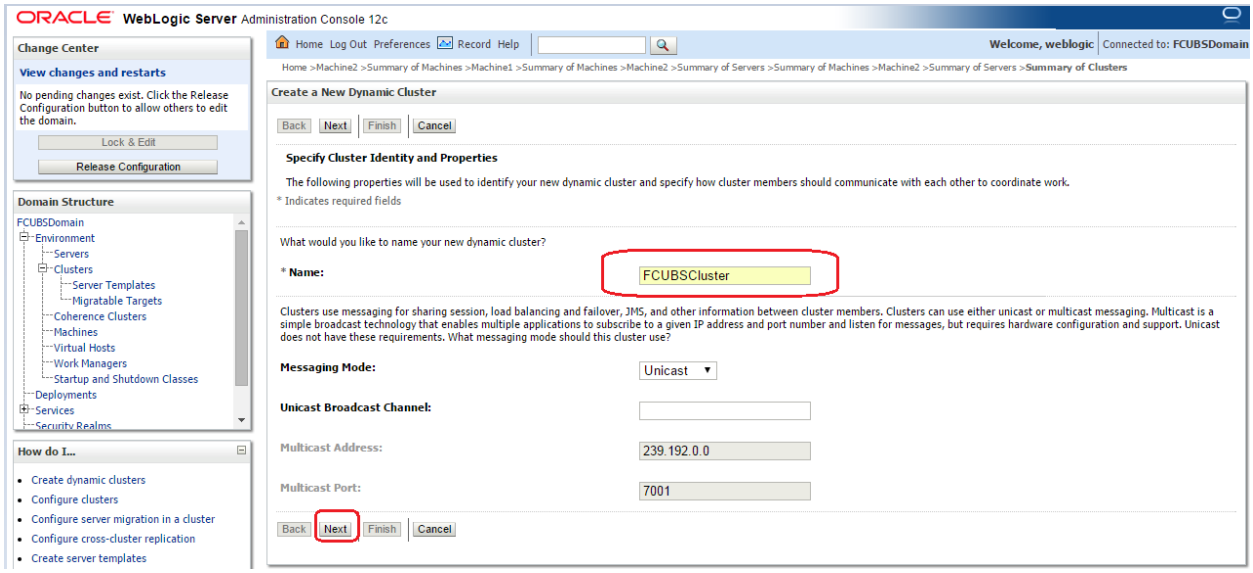


3.2 Dynamic Cluster Creation

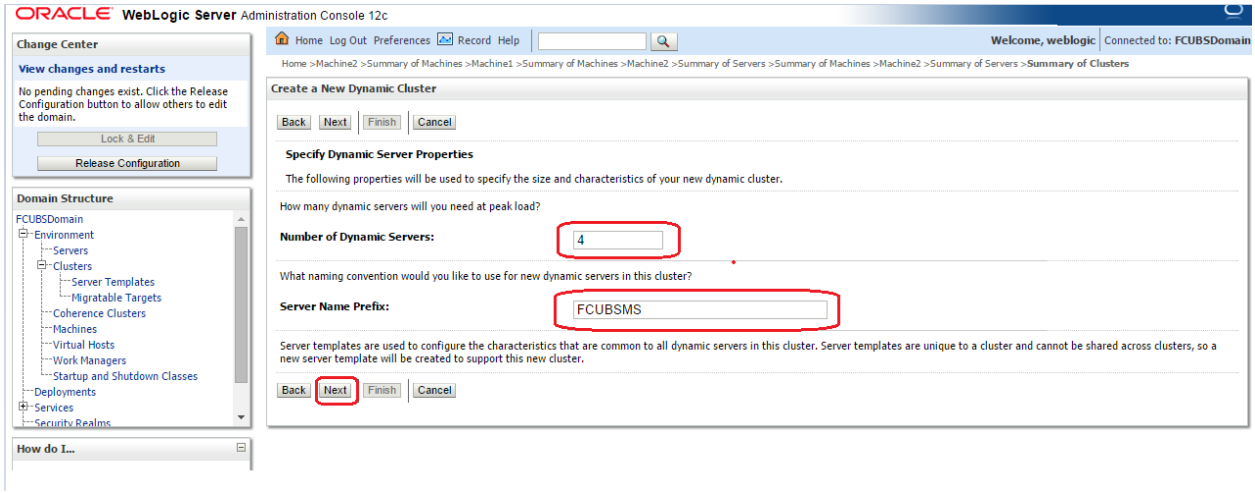
1) Login into Admin Console and Navigate to FCUBSDomain → Environment → Clusters → New → select **Dynamic Cluster**



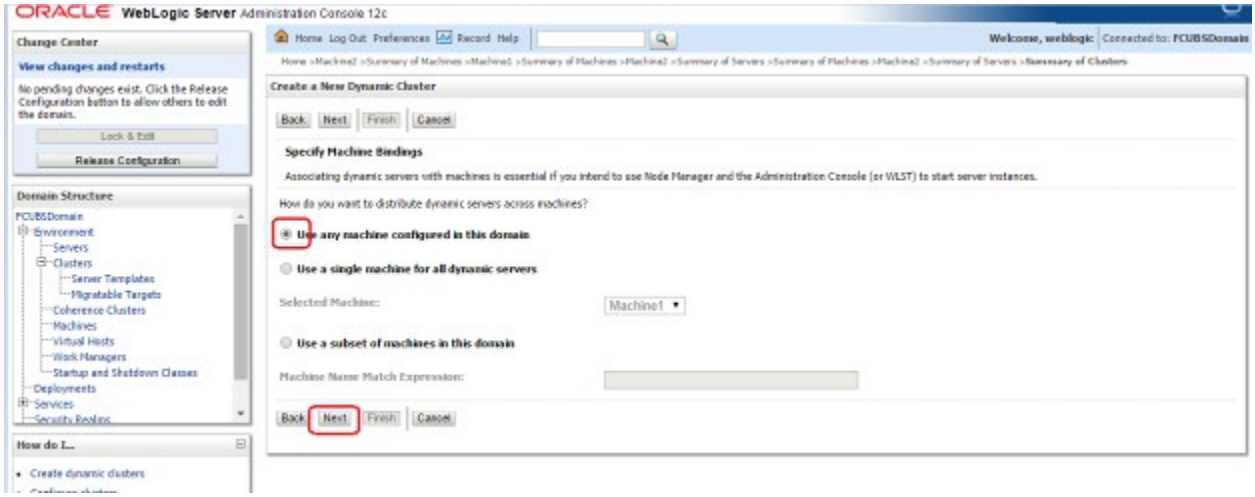
2) Enter the **Cluster Name** and Click on **Next**



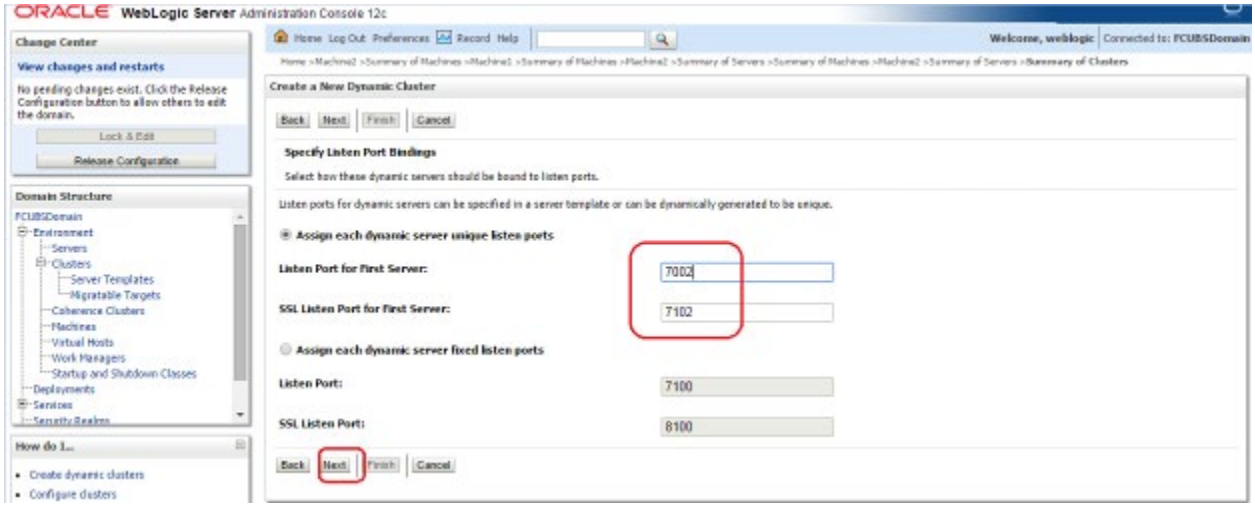
3) Enter the **number of dynamic servers** you want to configure, enter the **server name prefix** and click on **Next**



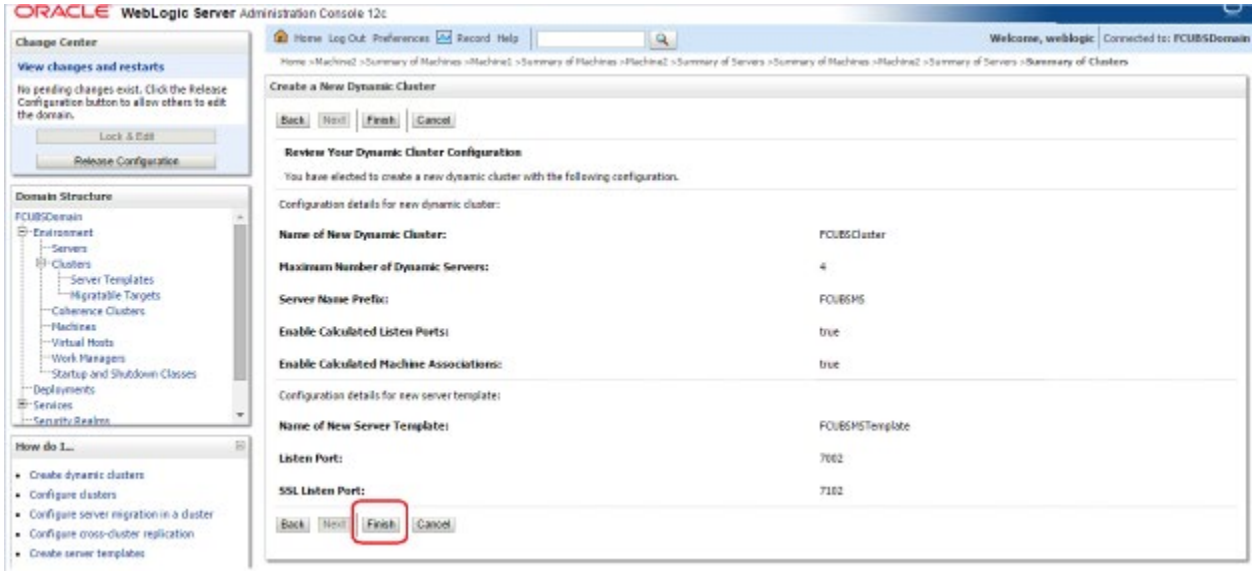
4) Select Machines that participate in domain, in this case all machines will be part of the domain, select **Use any machine configured in this domain** and click on **Next**



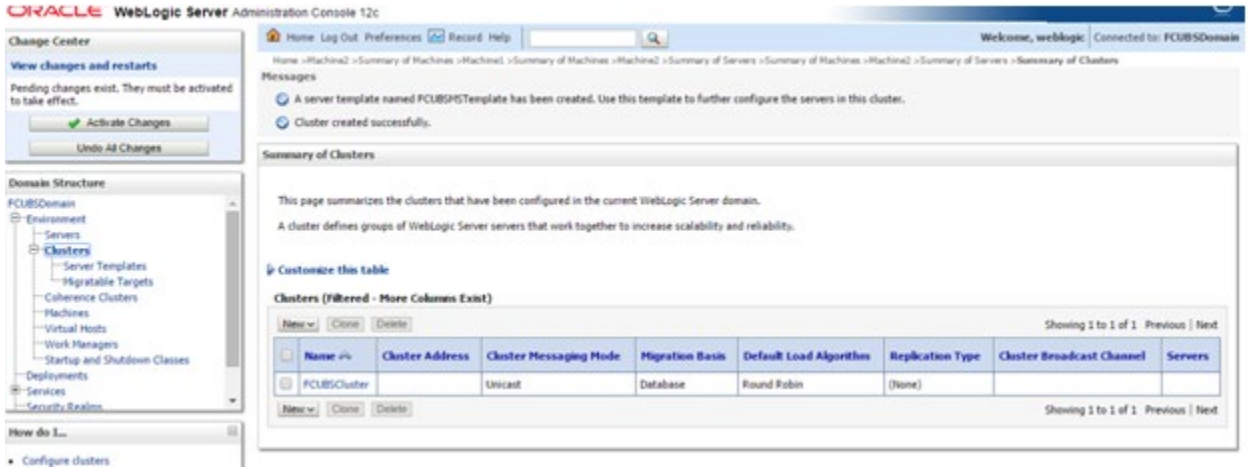
5) Select the **listen port for the first server** in the dynamic cluster and then the **SSL listener port** for the first server in the dynamic cluster. The subsequent servers will be assigned with an incremental port number. Click **Next**



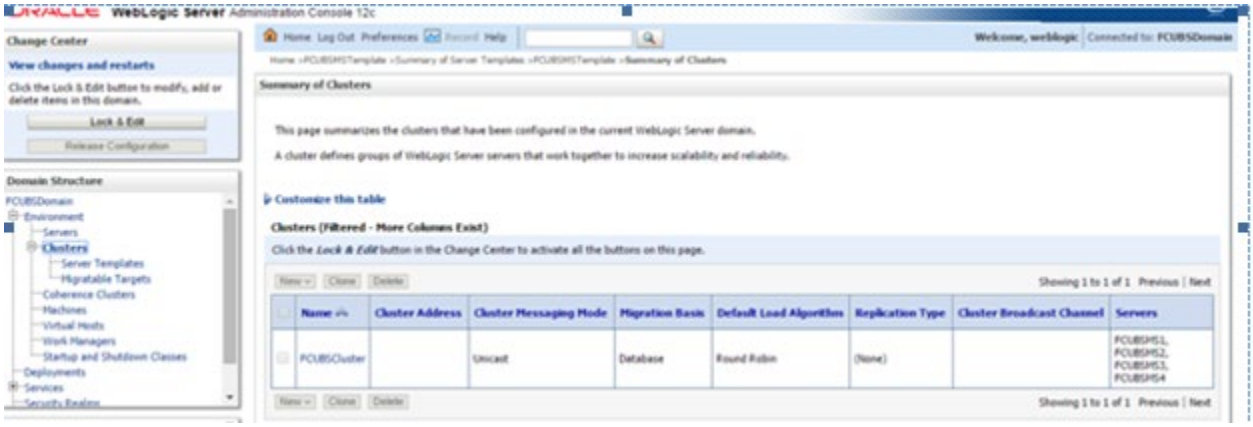
6) Summary of new Dynamic Cluster configuration is presented. Click **Finish** to create



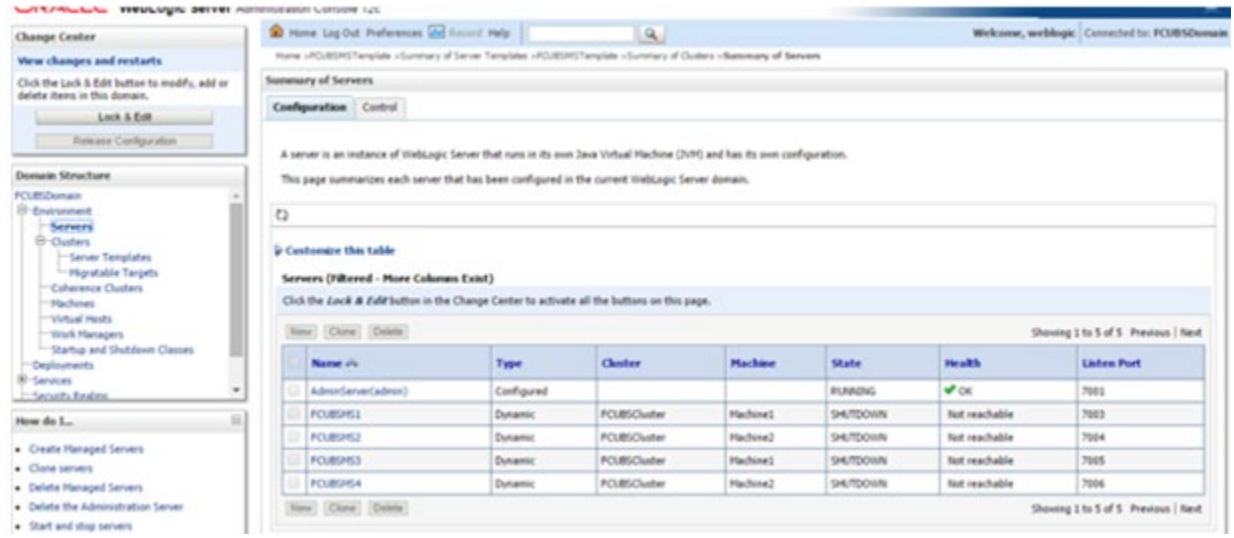
7) The **Summary of Clusters** screens should show the recently created Dynamic Cluster.



8) Upon **Activate Changes** would automatically create 4 managed servers.



9) Navigate to FCUBSDomain → Environment → Servers tab and 4 new servers are created



3.3 Managed Server Template configuration

The server template created is modified to apply the below parameters

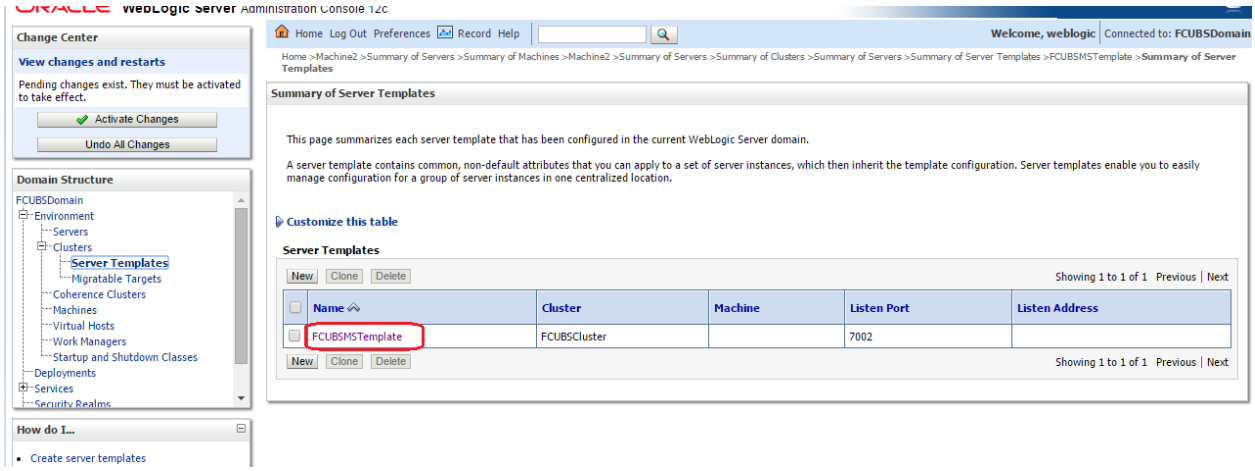
3.3.1 Logging

The process of log file writing in a Weblogic server can impact the performance. Hence, you need to keep the logging to minimum in a production environment.

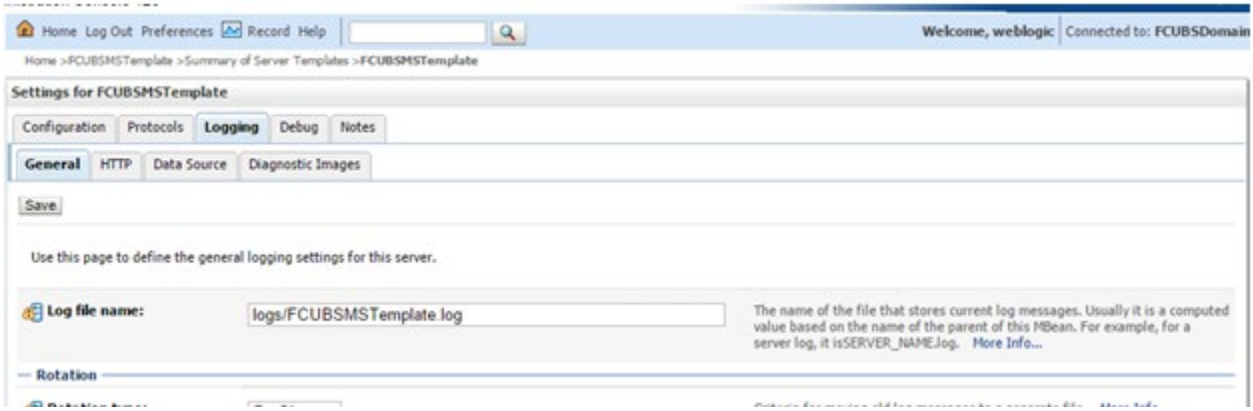
Update below parameters by in Logging Screen

Minimum Severity to log	Warning
Log file Severity level	Warning
Standard Out Severity level	Critical
Domain broadcaster Severity level	Critical

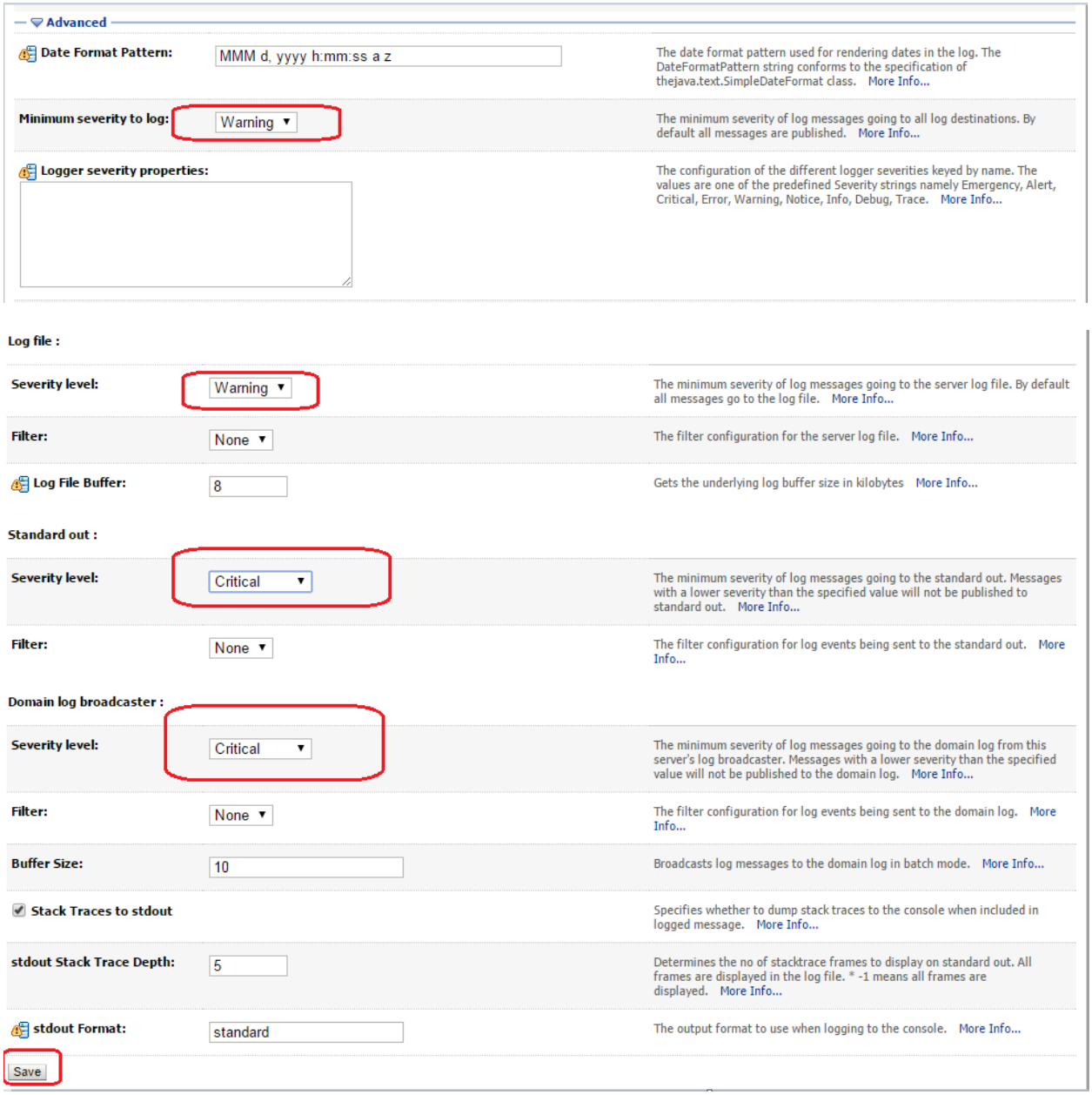
1) Navigate to FCUBSDomain → Environment → Clusters



2) Select FCUBSTemplate and naviage to Logging → General

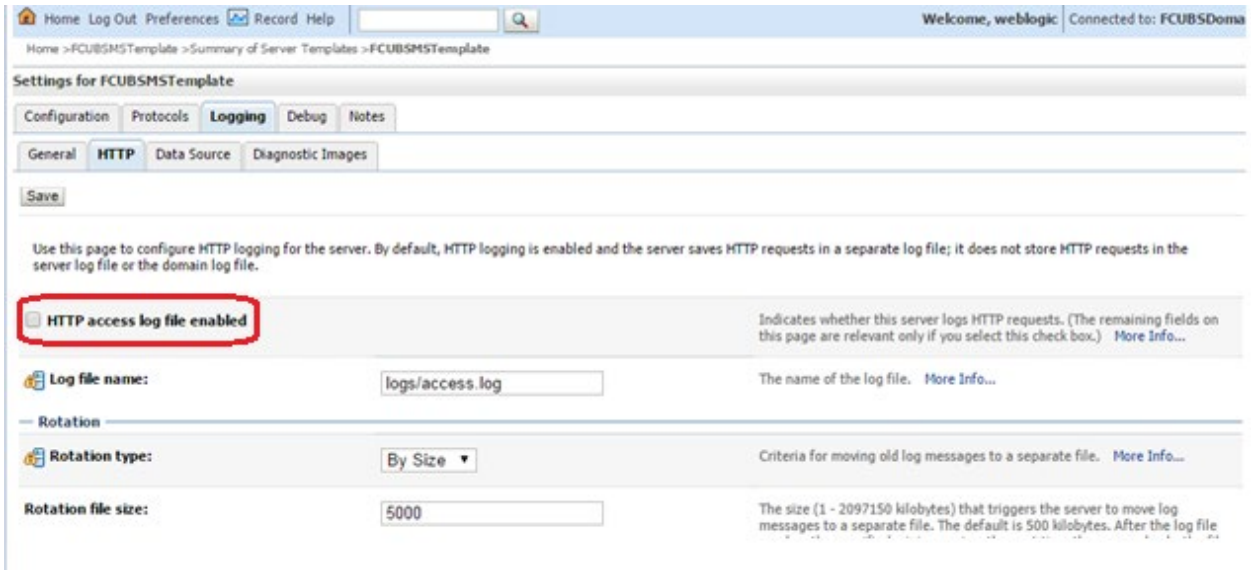


3) Under Advanced Tab, update the below parameters and Click on **Save**



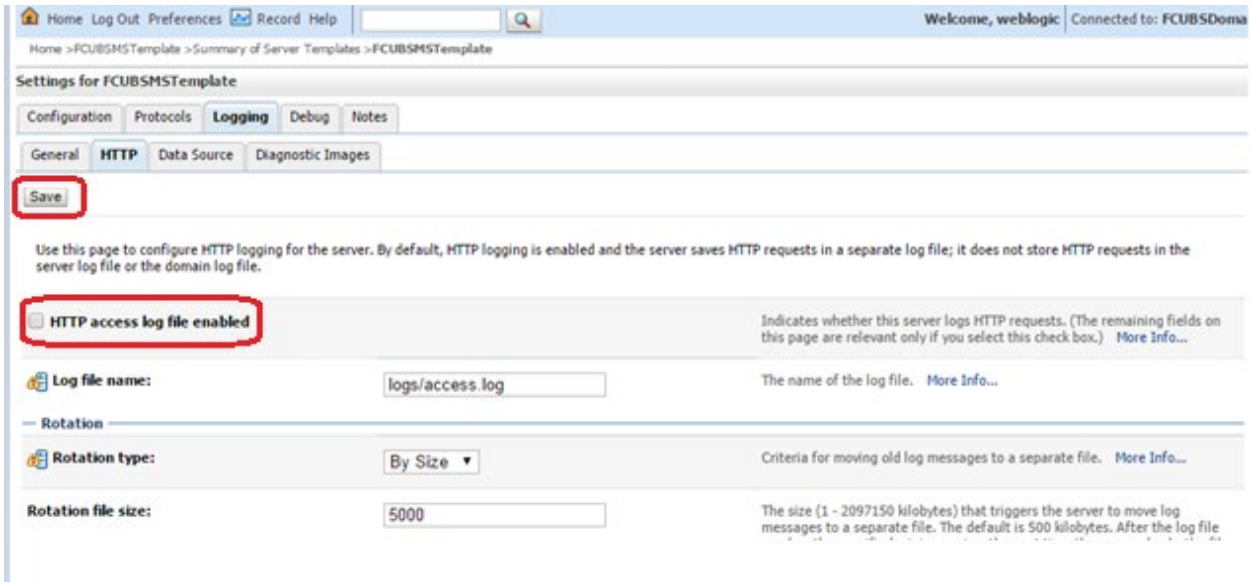
3.3.2 HTTP Logging

1) FCUBSDomain → Environment → Clusters → FCUBSTemplate → Logging → HTTP → Uncheck the **Access Logs** Flag



3.3.3 Stuck Tread Max Time

1) FCUBSDomain → Environment → Clusters → FCUBSTemplate → Tuning, update the stuck thread max time to **18000** and Click on **Save**



4. Tuning

4.1 General Parameters

PARAMETER	VALUE	Navigate To
JTA Time out seconds	18000	Login to Weblogic Server console. Click on the domain name (ex: FCUBSDomain) which is under 'Domain Structure'. Go to Configuration > JTA, parameter and values is found on the right side panel of console.
Session Timeout	900	Login to Weblogic Server console Click on Deployments which is under 'Domain Structure'. Click on the deployed FCJ application from right side panel. Click on FCJNeoWeb from ‘Modules and components’ Go to Configuration General, the parameter values can be found here.

4.2 JVM Tuning

This section of the document provides JVM optimization for Oracle FLEXCUBE Universal Banking Solution.

Basically the JAVA minimum and maximum heap size needs to be reset for 32 and 64 bit environments. Both the minimum and maximum heap size is set to 1.5GB and 4GB in case of 32 bit and 64 bit environments respectively.

How to find whether the JVM is 32bit or 64bit?

Go to $JAVA_HOME/bin directory. Check java version using command ./java –d64 –version
64 bit JVM shows the version details where as 32bit throws an error.

How to modify the JVM heap parameters?

To change the JVM heap parameters modify setDomainEnv.sh under domain FCUBSCL in both servers. This file is located at **“$WL_HOME/user_projects/domains/$WLS_DOMAIN/bin”** in both the servers.

Use below USER_MEM_ARGS variable to override the standard memory arguments passed to java for **SUN JDK.**

32 bit JDK

```
USER_MEM_ARGS="-
Dorg.apache.xml.dtm.DTMManager=org.apache.xml.dtm.ref.DTMManagerDefault
-
Dorg.apache.xerces.xni.parser.XMLParserConfiguration=org.apache.xerces.
parsers.XML11Configuration -Dweblogic.threadpool.MinPoolSize=100 -
Dweblogic.threadpool.MaxPoolSize=100 -Xms1536M -Xmx1536M -
XX:MaxPermSize=256m -server -XX:+UseParallelOldGC -
XX:ParallelGCThreads=4"
export USER_MEM_ARGS
```

64 bit JDK

```
USER_MEM_ARGS="-
Dorg.apache.xml.dtm.DTMManager=org.apache.xml.dtm.ref.DTMManagerDefault
-Dorg.a
pache.xerces.xni.parser.XMLParserConfiguration=org.apache.xerces.parser
s.XML11Configuration -Dweblogic.threadpool.MinPoolSize=100 -
Dweblogic.threadpool.MaxPoolSize=100 -Xms8g -Xmx8g -Xmn4g   -server
-XX:+UseParallelOldGC -XX:ParallelGCThreads=4"
export USER_MEM_ARGS
```

Note: Take a backup of the files before modifying the same.

5. Start Managed Servers

Starting using scripts

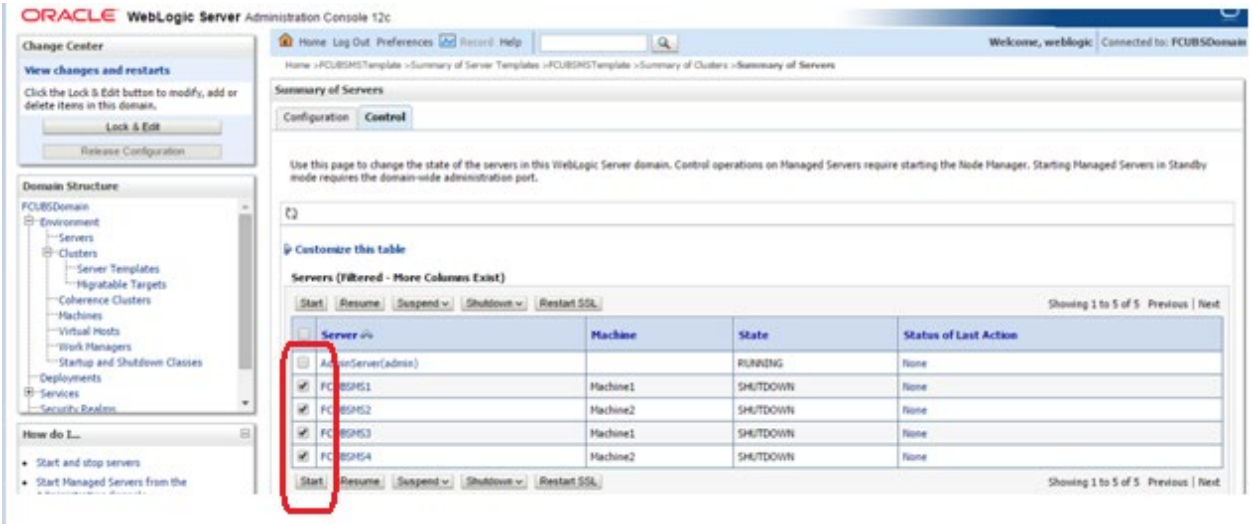
Managed Servers can be started by executing startManagedWebLogic.sh script present in folder ***$DOMAIN_HOME/bin***

Usage: ./startManagedWebLogic.sh SERVER_NAME {ADMIN_URL}

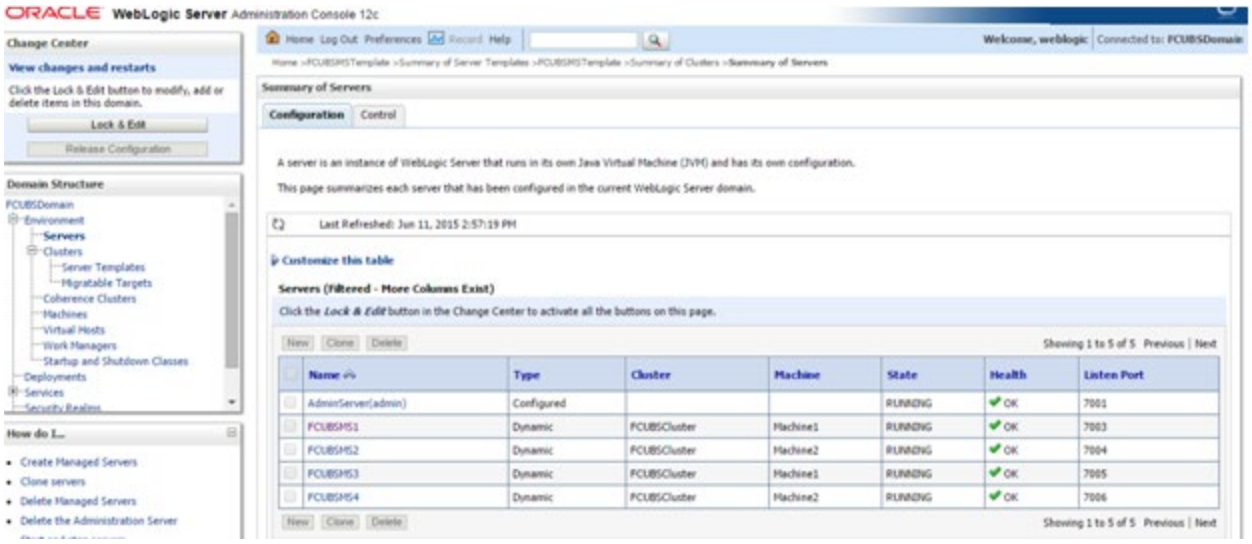
Eg: ./startManagedWeblogic.sh FCUBSMS1 https://<hostname1>/console

Starting using console

Alternatively, login to admin console, navigate to FCUBSDoamin → Environment → Servers → Control, select the managed servers to be started and click on **Start**



Upon successful startup, the status of Managed servers is changed to "**RUNNING**".


ORACLE WebLogic Server Administration Console 12c
Change Center
View changes and restarts
Click the Lock & Edit button to modify, add or delete items in this domain.
Lock & Edit
Release Configuration
Domain Structure
FCUBSDomain
Environment
Servers
Clusters
Server Templates
Migratable Targets
Coherence Clusters
Machines
Virtual Hosts
Work Managers
Startup and Shutdown Classes
Deployments
Services
Security Realms
How do I...
Create Managed Servers
Clone servers
Delete Managed Servers
Delete the Administration Server
Home Log Out Preferences Record Help
Welcome, weblogic | Connected to: FCUBSDomain
Summary of Servers
Configuration Control
A server is an instance of WebLogic Server that runs in its own Java Virtual Machine (JVM) and has its own configuration.
This page summarizes each server that has been configured in the current WebLogic Server domain.
Last Refreshed: Jun 11, 2015 2:57:19 PM
Customize this table
Servers (Filtered - More Columns Exist)
Click the Lock & Edit button in the Change Center to activate all the buttons on this page.
New Clone Delete
Showing 1 to 5 of 5 Previous | Next
Name Type Cluster Machine State Health Listen Port
AdminServer(admin) Configured RUNNING OK 7001
FCUBSMS1 Dynamic FCUBSCluster Machine1 RUNNING OK 7003
FCUBSMS2 Dynamic FCUBSCluster Machine2 RUNNING OK 7004
FCUBSMS3 Dynamic FCUBSCluster Machine1 RUNNING OK 7005
FCUBSMS4 Dynamic FCUBSCluster Machine2 RUNNING OK 7006
New Clone Delete
Showing 1 to 5 of 5 Previous | Next

6. Data Source creation and JDBC Configuration

Following are the JNDI names of those data sources used by FLEXCUBE application.

- jdbc/fcjdevDS - This datasource is used by FLEXCUBE online screen excluding branch screens.
- jdbc/fcjdevDSBranch - This datasource is used by Branch screens.
- jdbc/fcjSchedulerDS - This datasource is used by Quartz scheduler.

Note:

- jdbc/fcjdevDS should be **NonXA** and make use of **OCI** driver.
- jdbc/fcjdevDSBranch and jdbc/fcjSchedulerDS should be **XA**

6.1 Setup Required for OCI Driver

Data sources are created with OCI enabled. For this, Oracle Instant Client is required, below steps needs to be followed

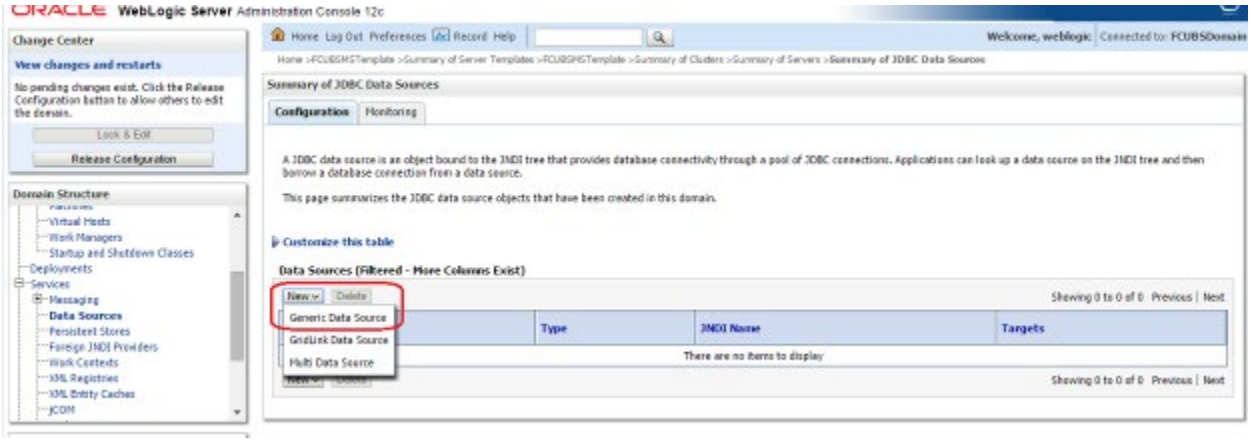
- Download Oracle Instant Client corresponding to the used Oracle DB and java (x64 or x32):

http://www.oracle.com/technetwork/database/features/instant-client/index-097480.html

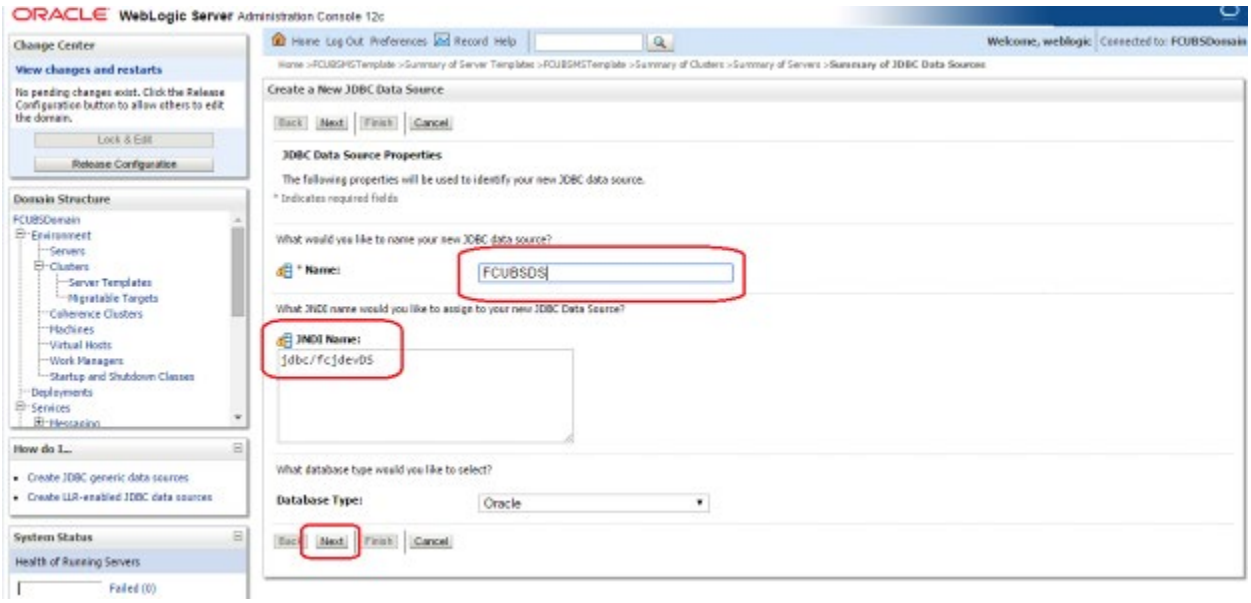
- Set {ORACLE_HOME} in the environment variable.
- Update the environment variable LD_LIBRARY_PATH as {ORACLE_HOME}/lib. This is to load all the .so files.
- Ensure that the ojdbc*.jar file in {WL_HOME}/server/lib/ojdbc*.jar is the same as the file {ORACLE_HOME}/jdbc/lib/ojdbc*.jar. This is to ensure compatibility.
- Update LD_LIBRARY_PATH in StartWebLogic.sh or in setDomainEnv.sh. This must be the path of directory where Oracle Instant Client is installed.
- If you are still not able to load the .so files, then you need to update the EXTRA_JAVA_PROPERTIES by setting Djava.library.path as {ORACLE_HOME}/lib in StartWebLogic.sh or in setDomainEnv.sh.

6.2 Data source creation: non XA

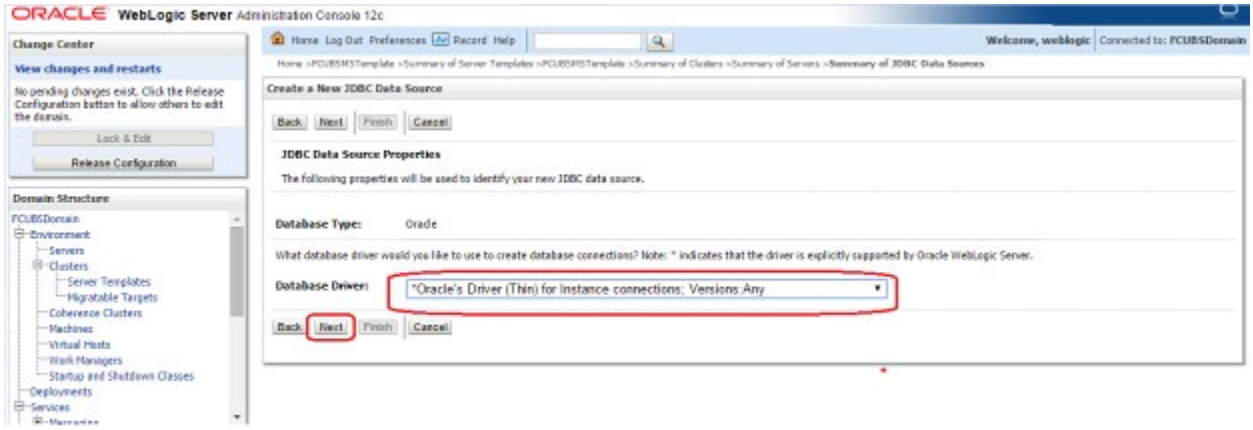
1) Navigate to FCUBSDomain → Services → Data Sources → select New **> Generic data source**



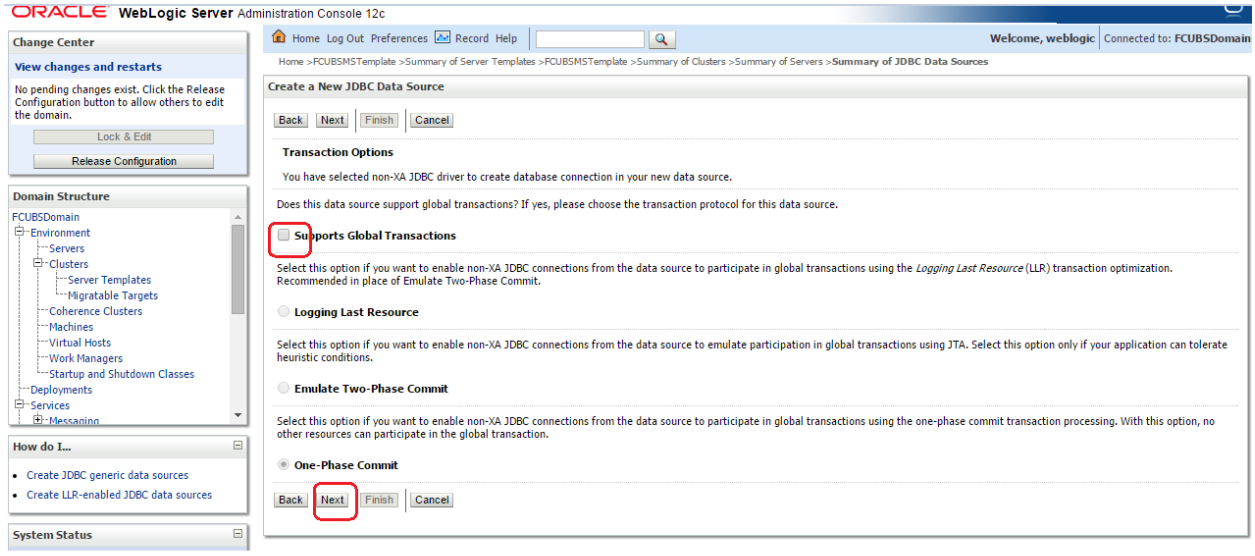
2) Enter the **Name** and **JNDI Name** and Click on **Next**



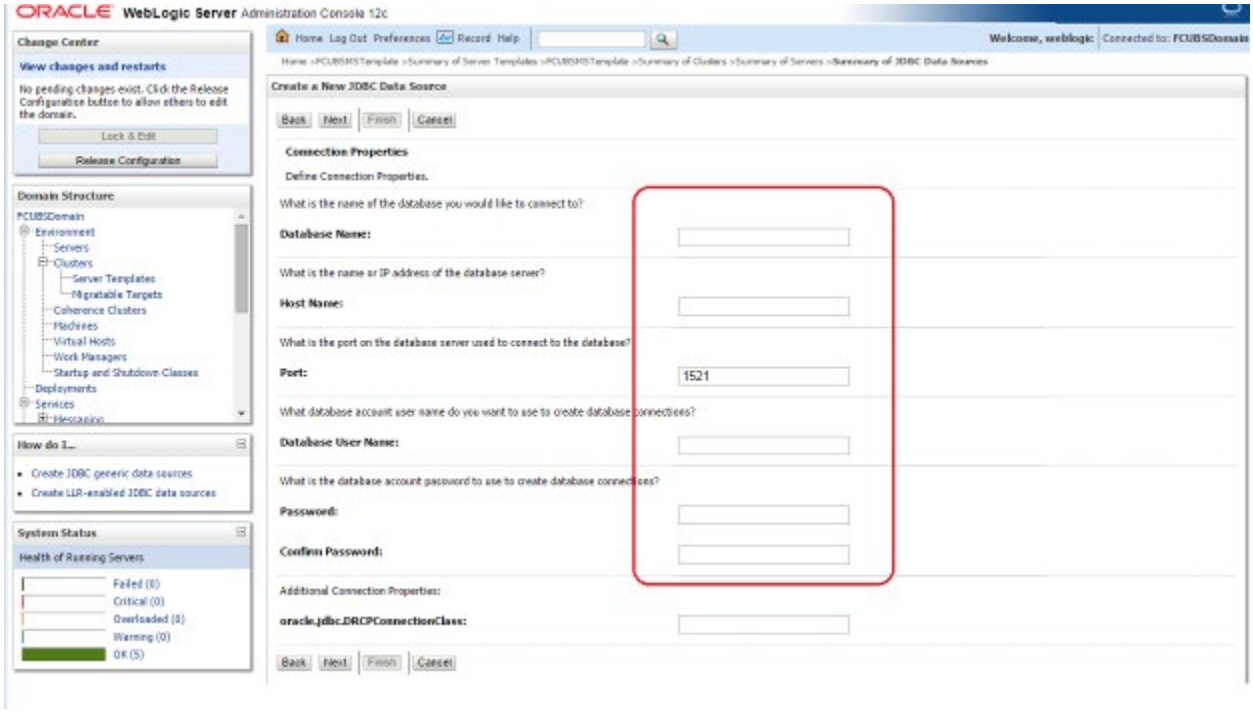
3) Select the Driver as "**Oracle's Driver(thin) for Instance connection: Versions: Any**" and Click on **Next**



4) Uncheck the "**Supports Global Transactions**" and click on **Next**



5) Enter the Database Name, Host Name, Port, User Name, Password, Confirm Password and Click on **Next**



6) Replace the **JDBC URL** in the below format and click on **Next**

Default URL: jdbc:oracle:thin:@<IP_Adress>:<Port>:<INSTANCE_NAME>.

Change the default URL to:

jdbc:oracle:oci:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=xxxxxx.com)(PORT=1521)))(CONNECT_DATA=(SERVICE_NAME=fcubs)))

Where,

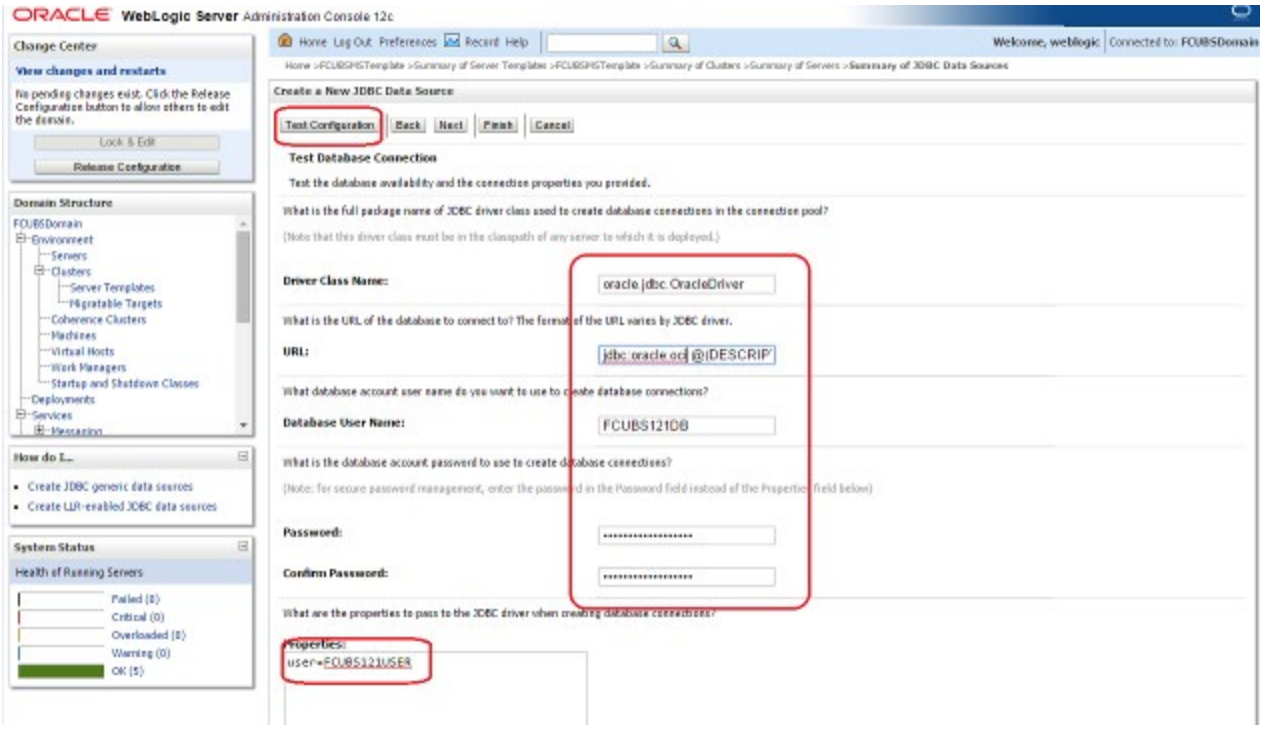
Scan IP = xxxxxx.com

Service Name = fcubs

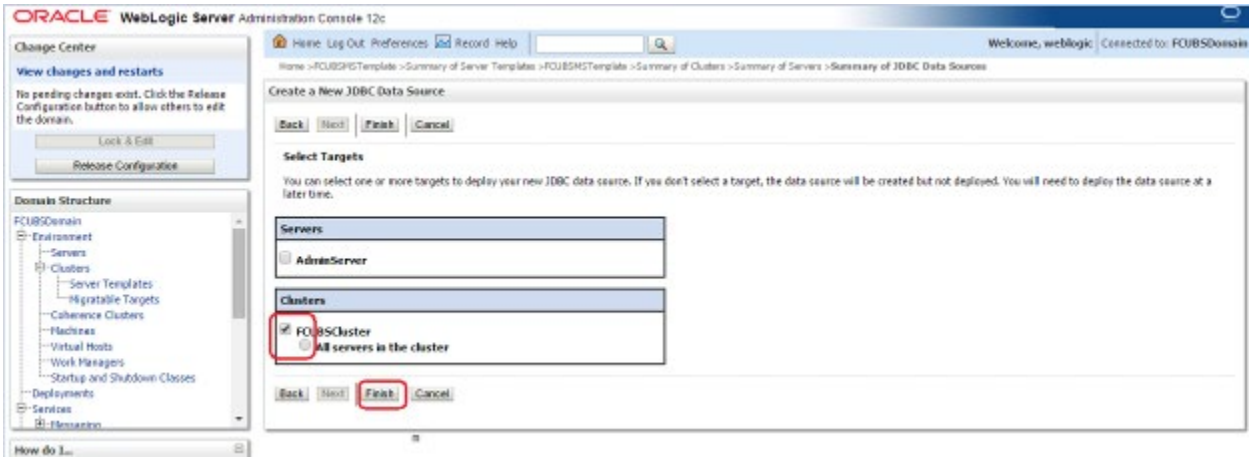
Port = 1521

Make sure that in URL, we make the changes to reflect oci.

Then Click on Test Configuration. The connection test should be successful.

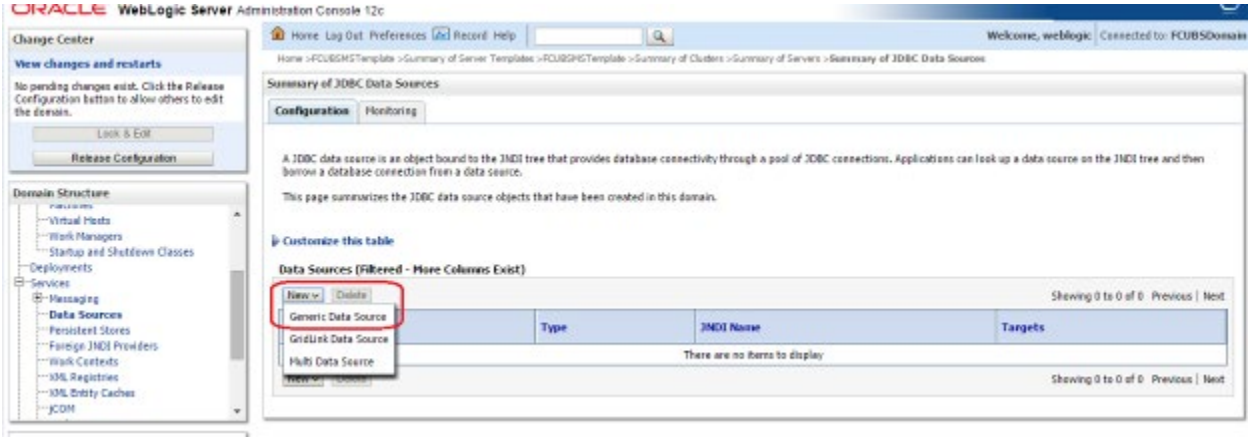


7) Select Target as **FCUBSCluster** and click on **Finish**

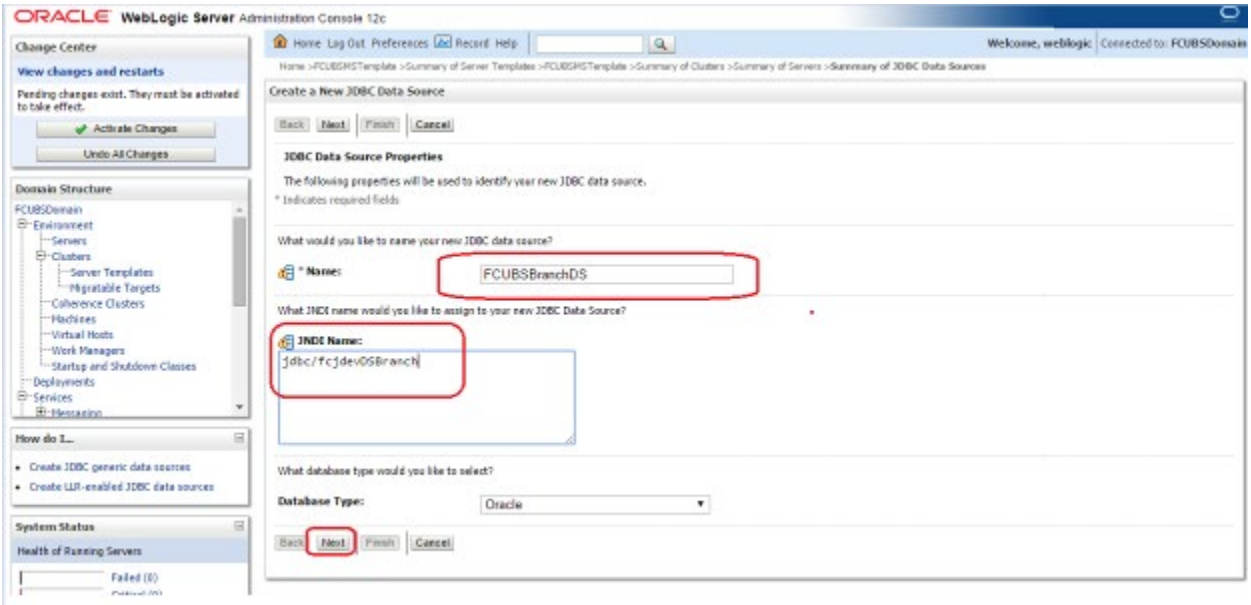


6.3 XA Datasource

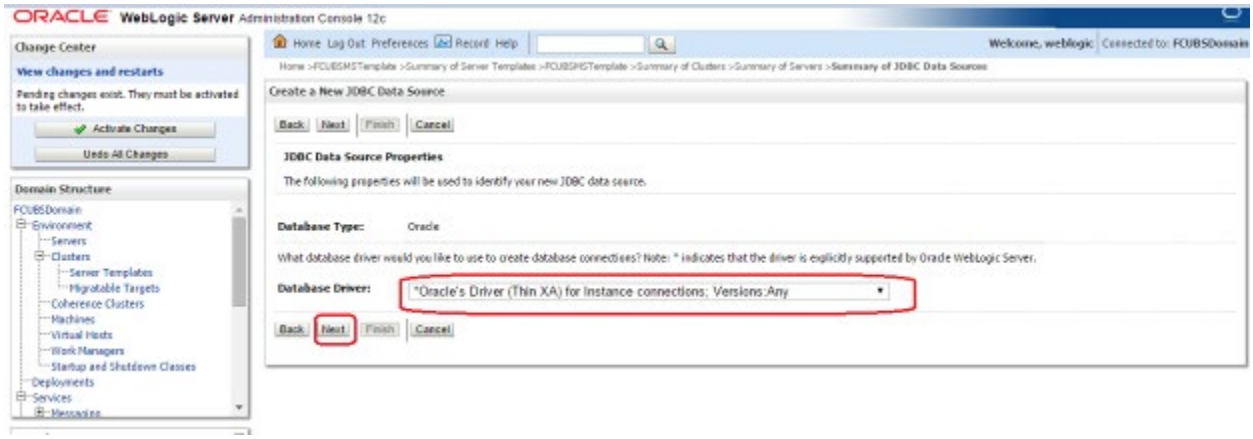
1) Navigate to FCUBSDomain → Services → Data Sources → select New **> Generic data source**



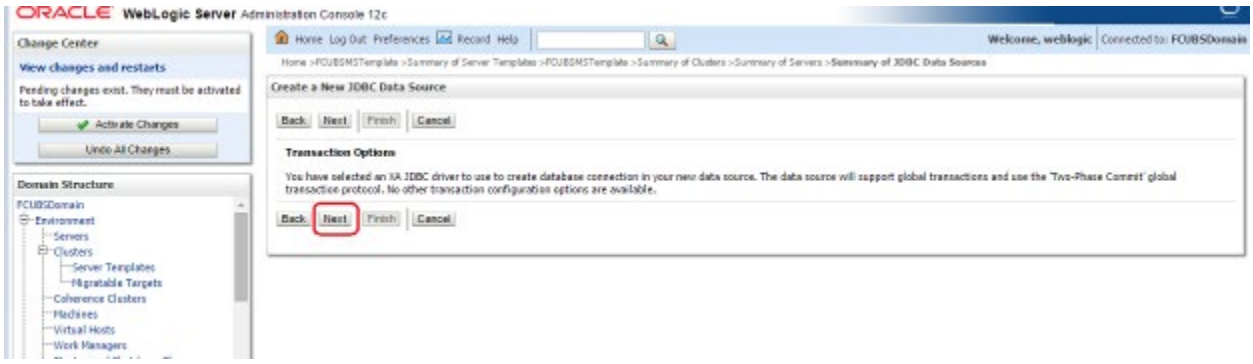
2) Enter the **Name** and **JNDI Name** and Click on **Next**



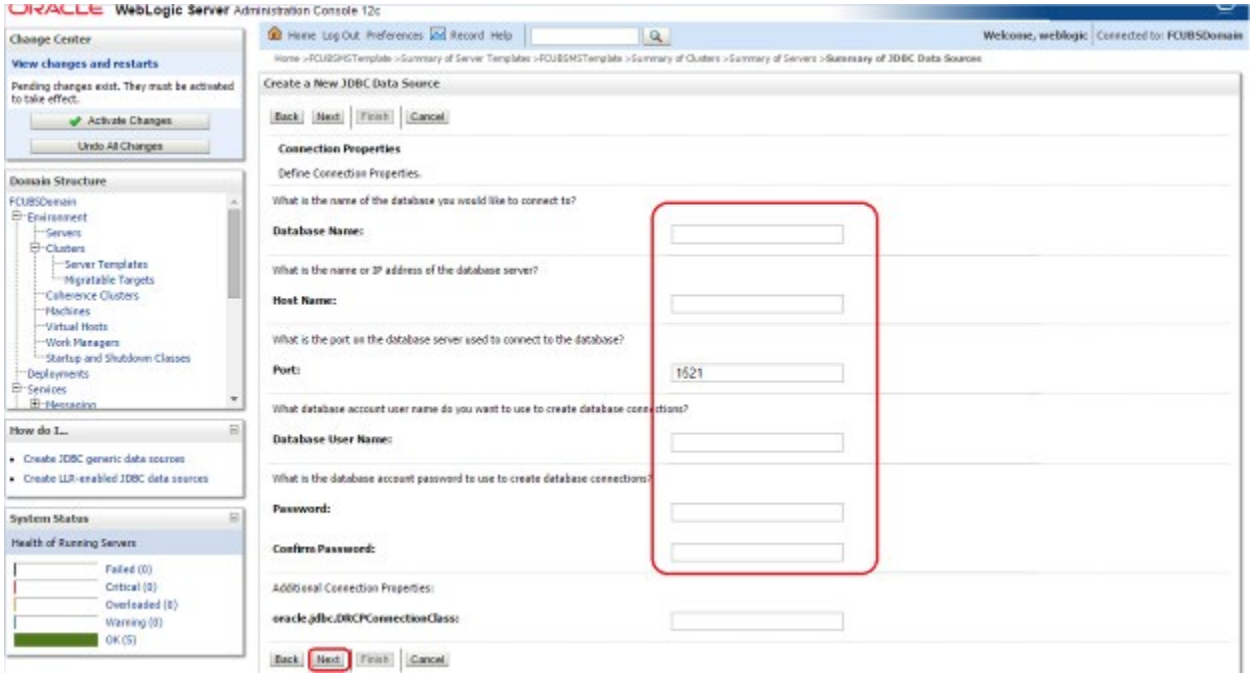
3) Select the Driver as “**Oracle’s Driver(thin XA) for Instance connection: Versions: Any**” and Click on **Next**

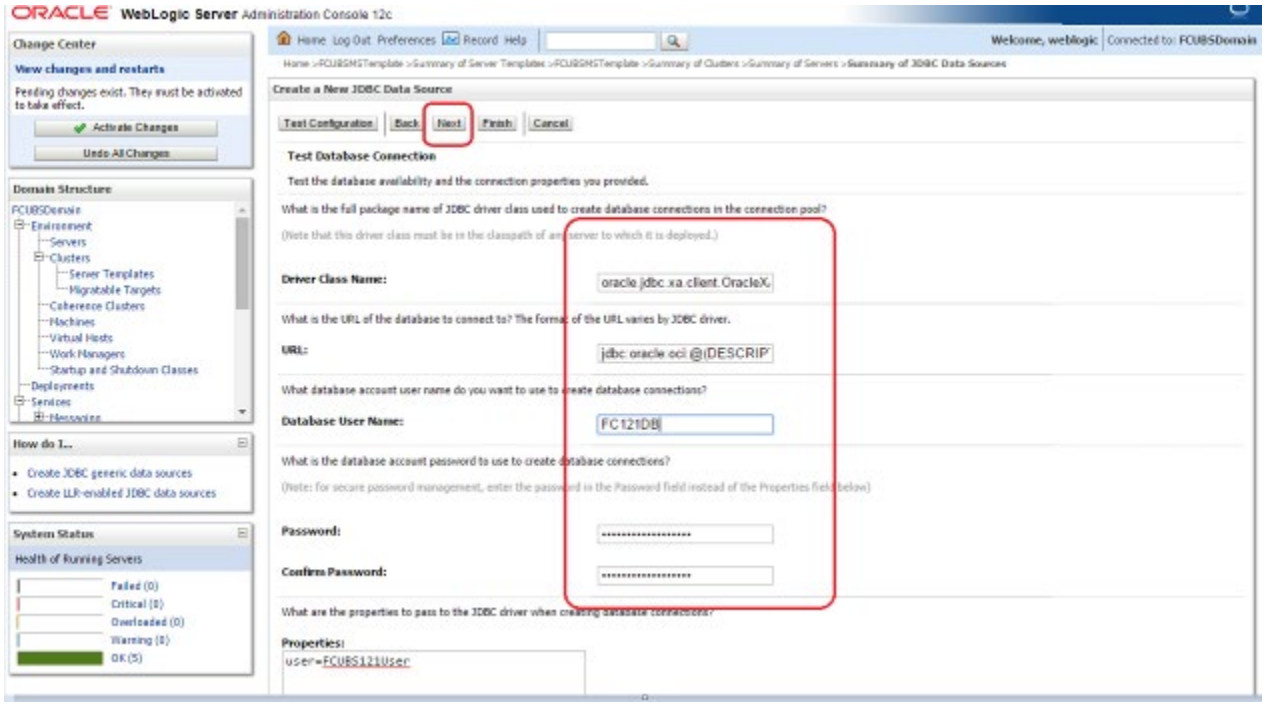


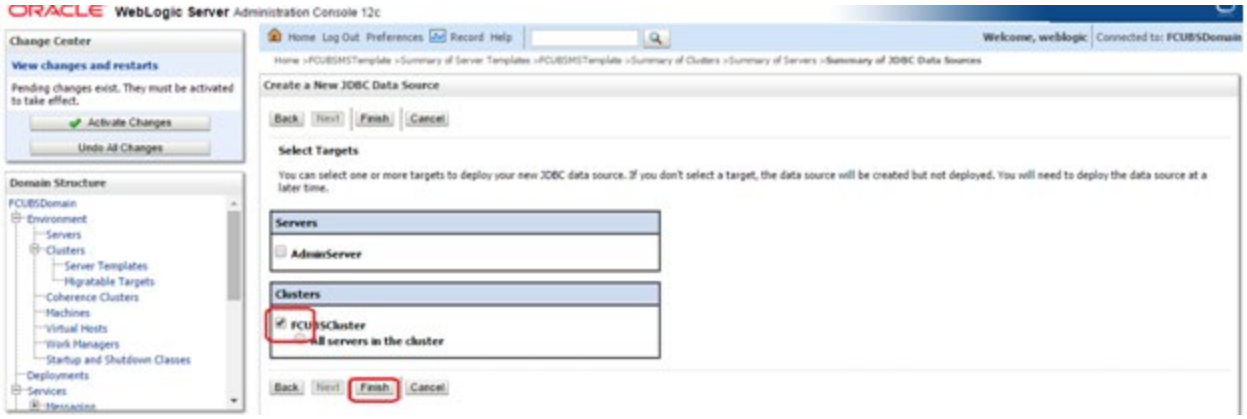
4) Click on Next



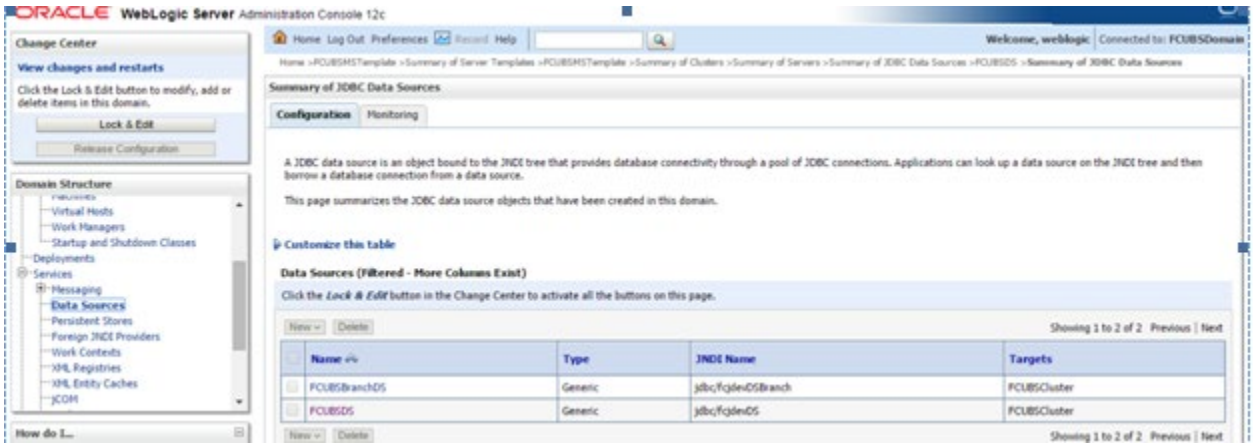
5) From this step to target setting step follow as mentioned in non-xa



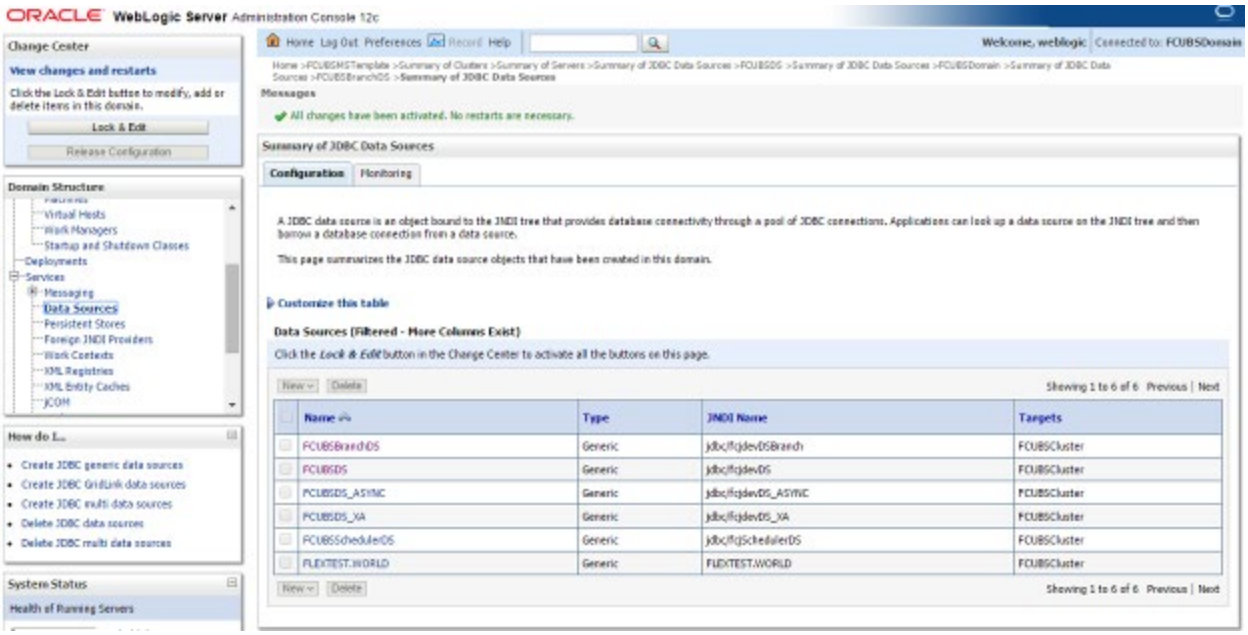




6) Upon Activate Changes would create the XA Datasource



7) Similarly create all the other Datasource required for the FCUBS Application and Gateway Deployments



6.4 JDBC Parameters Tuning

Below JDBC parameters needs to updated for all the Datasources

PARAMETER	VALUE	Navigate To
Connection Reserve time out	30	Connection Pool->Advance
Test Frequency	60	Connection Pool->Advance
Inactive connection time out	30	Connection Pool->Advance
Initial Capacity	1	Connection Pool
Max capacity	Based on Site Requirement	Connection Pool
Capacity Increment	5	Connection Pool
Shrink Frequency	900	Connection Pool->Advance
Test Connection on Reserve	Checked	Connection Pool->Advance

7. JMS Resource Creation

JMS Resource Creation involves various steps

- Persistence Store Creation
- JMS Server Creation
- JMS Module Creation
- Resource Creation: Connection Factory and Queue’s

Refer to the Configuring JMS on Weblogic Server for further details on JMS setup.

8. Oracle WebLogic Load Balancing

For Weblogic Load balancing, use

1) Oracle HTTP Server: Refer to Configuration for Oracle HTTP Server for setup.

2) Apache: Refer to Configuration for Apache for setup.

9. Frequently Asked Questions

9.1 Machine status is Unreachable.

If the machine status is unreachable, means that machine is not reachable and from console you cannot start/stop the managed servers.

In the console, navigate through Domain structure → Machines → machine1 →Monitoring → Node Manager Status will be **Unreachable**

To change the status, you need to start the nodemanager on that server. Refer to start nodemanager section on steps to start the nodemanager.

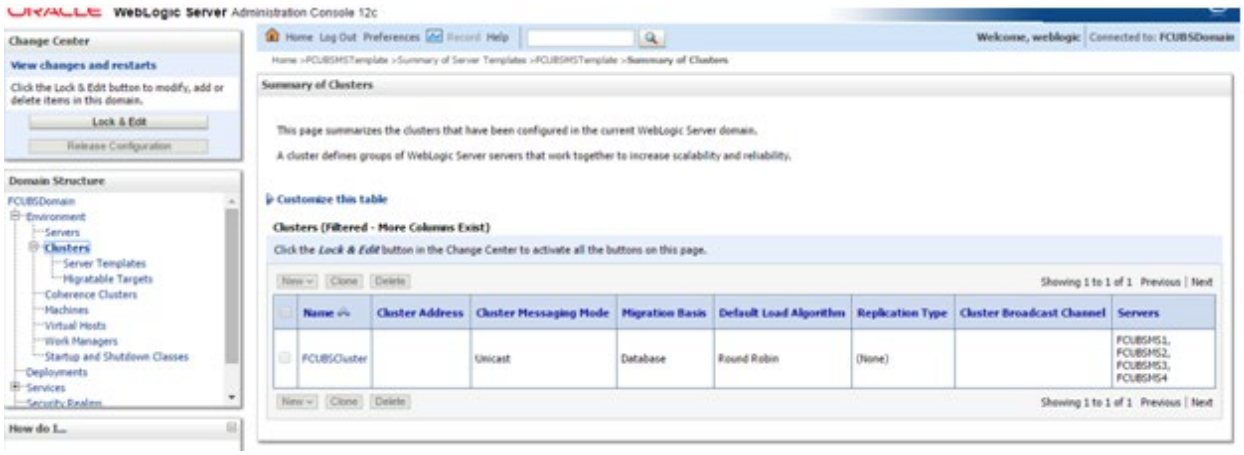
9.2 How to restart node manager?

1) Locate node manager pid using *ps -ef|grep weblogic.nodemanager.javaHome*
2) Change directory to $DOMAIN_HOME/bin
3) Kill the unix process using *kill -9 <pid>*
4) Verify that the node manager is killed by *tail –f nohup.out*
5) Start node manager using *nohup ./startNodeManager.sh &*
6) Verify nodemanager is started using *tail –f nohup.out*

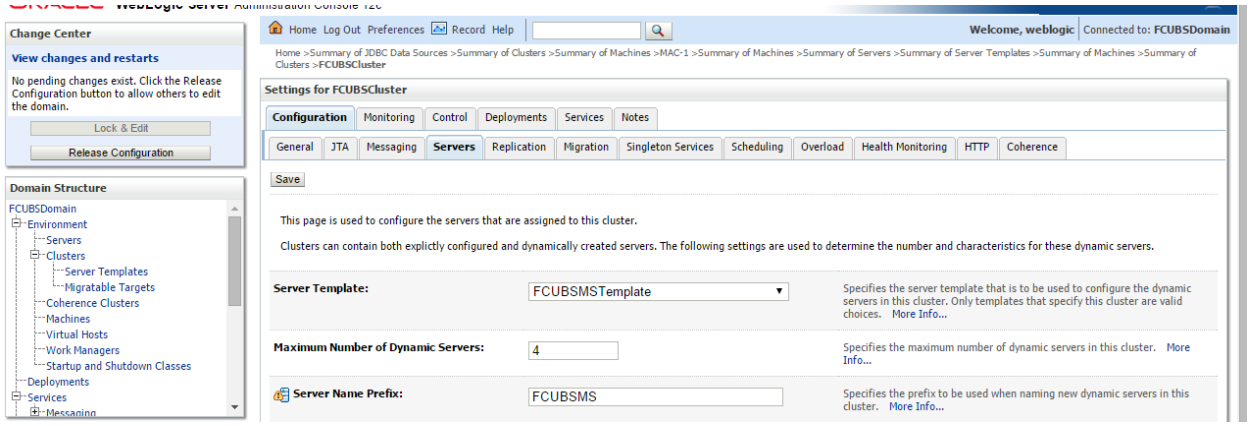
9.3 Scaling Up Dynamic Cluster

When the capacity is insufficient and you need to scale-up, you can add dynamic servers on demand. It requires only a few clicks.

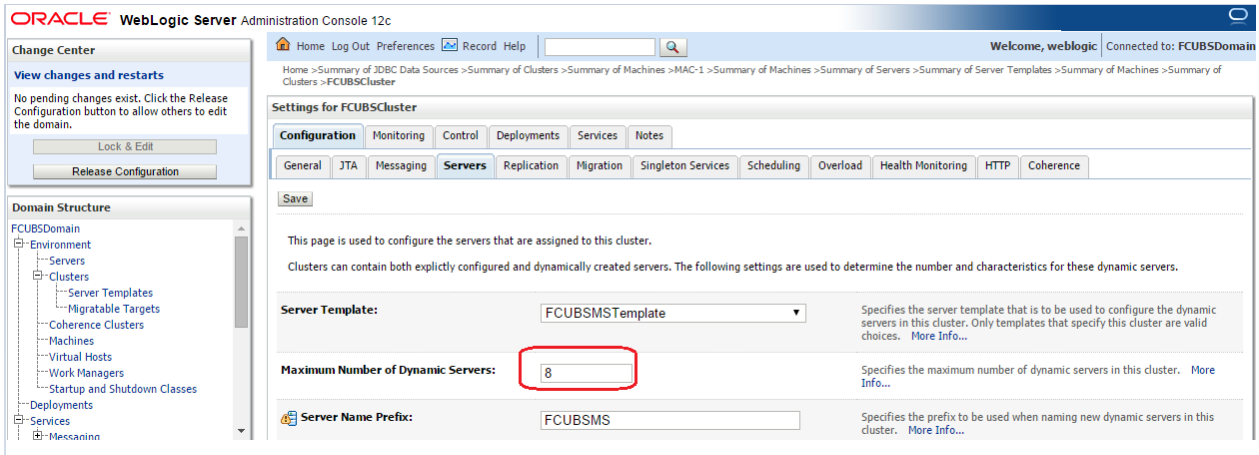
1) Navigate to FCUBSDomain → Environment → Clusters



2) Click FCUBSCluster → Configuration→ Servers tab



3) Change the Maximum Number of Dynamic Servers to: 8 and Click Save



4) Activate changes in the Change Center of the Weblogic Console. After activation 4 new Dynamic Servers are added to the Dynamic Cluster

Name	Type	Machine	Listen Port
FCUBSMS1	Dynamic	MAC-1	7101
FCUBSMS2	Dynamic	MAC-2	7102
FCUBSMS3	Dynamic	MAC-1	7103
FCUBSMS4	Dynamic	MAC-2	7104
FCUBSMS5	Dynamic	MAC-1	7105
FCUBSMS6	Dynamic	MAC-2	7106
FCUBSMS7	Dynamic	MAC-1	7107
FCUBSMS8	Dynamic	MAC-2	7108

5) Start the 4 new Dynamic Servers and you have doubled you capacity.

9.4 Session Timeout

Session timeouts occur intermittently during load condition. Verify the following

1. Clock Synchronization: Time across the nodes/machines is same.
2. Session Stickiness in load balancer: Persistence Type in load balancer should be set to SOURCE IP and should not be cookie.

FCUBS Weblogic 12c Middleware Practices
[May] [2021]
Version 12.87.7.0.0

Oracle Financial Services Software Limited
Oracle Park
Off Western Express Highway
Goregaon (East)
Mumbai, Maharashtra 400 063
India

Worldwide Inquiries:
Phone: +91 22 6718 3000
Fax: +91 22 6718 3001
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