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Dynamic Clusters in WebLogic Server

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Cloud Application Foundation

- Complete
- Open
- Integrated
- Best in Class
- On Premise Private Cloud
- Public Cloud



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Need for Zero-Downtime Architecture

Address unplanned downtime

- Hardware Failures
- Software Failures
- Site Disaster

Address planned downtime

- Application Upgrades
- Server Upgrades
- Configuration Changes



Administrative Concepts including Clustering

WebLogic Server

- Domain
- Admin Server
- Cluster
- Managed Server
- Node Manager



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What is a WebLogic Cluster

- Multiple WebLogic managed servers running simultaneously and working together
- Cluster members can run in same machine or be located on different machines
- Clients view a cluster as a single WLS unit
- Support for mulitcast or unicast communication among cluster members
- Support for state replication among cluster members for various artifacts (Session, EJB/RMI Objects)



Benefits of Clustering

- Load Balancing
- Failover & High Availability
- Highly Available Database Connectivity using Active GridLink for RAC
- Whole Server Migration & Service Migration
- Address Site Disaster with MAN & WAN Replication
- Application Upgrades using Side-By-Side Deployment
- Rolling Server Upgrades
- Configuration Changes without Server Restarts
- Monitor and restart instances automatically with Node Manager

Traditional (Static) Clustering

Scaling Managed Servers

- 1. Configure a Cluster
- 2. Configure a Managed Server
- 3. Assign the Managed Server to the Cluster
- 4. Start Managed Server
- 5. To scale, for each new Managed Server
 - A. Repeat Step 2
 - B. Repeat Step 3
 - C. Repeat Step 4

Downside

- Members of the Cluster are Static
- Manual intervention is necessary to change the Cluster contents
- Manual effort involved in configuring Managed Servers

Dynamic Clusters

- "Elastic scaling" for cloud environments
 - New option to simplify scaling of WebLogic clusters
 - Eliminates reconfiguration required to scale clusters
- How it works
 - User creates a cluster with dynamic servers and a server template
 - Defines server-specific attributes calculated when scaling
 - Server name, listen ports, machines.....
 - Standard mechanisms used to start /stop servers to scale cluster





Key Concepts

- Server Templates
 - Define common, non-default attributes that can be applied to different server instances
 - Change in one place, percolated to all server instances
- Dynamic Servers
 - Instances which are not individually configured
 - Get their configuration from a Server Template
- Dynamic Clusters
 - Clusters that include Dynamic Servers



Server Templates

- Configuration can be done via
 - Admin Console
 - WLST
- Defining Server Template
 - Specify common attributes for a group of server instances
 - Each server instance can be linked to a Server Template
 - If needed, attributes can be overridden
 - Macros can be used for any string attribute (and not for integers or references to other configuration elements)



Configuring Server Templates



WLST

Admin Console





Using Server Templates

- Primary use is with Dynamic Clusters
 - Also usable with configured managed servers
- Servers inherit changes dynamically
- Tokens for server-specific configuration:
 - \${id} instance id
 - \${serverName}
 - \${clusterName}
 - \${domainName}
 - \${system-property-name}





Dynamic Clusters

- Configuration can be done via

 WLST
 - Admin Console
- Contains one or more Dynamic Servers
- Based on a single, shared Server Template
- Helps in easily scaling up the number of Dynamic Servers in a domain
- Specify the number of server instances anticipated at peak load
- If additional servers needed, then create new servers based on the Server Template
- Following attributes are key for the configuration
 - Server Name, Listen Ports, Machines, Network Access Point

Configuring Dynamic Clusters

WLST

# create the server template for the dynamic servers and				
# set the attributes for the dynamic servers. Setting				
# the cluster is not required.				
ŧ				
dynamicServerTemplate=cmo.createServerTemplate("dc-server-template")				
dynamicServerTemplate.setAcceptBacklog(2000)				
dynamicServerTemplate.setAutoRestart(true)				
dynamicServerTemplate.setRestartMax(10)				
dynamicServerTemplate.setStartupTimeout(600)				
create the dynamic cluster and set the dynamic servers				
+				
dynCluster=cmo.createCluster("dynamic-cluster")				
dynServers=dynCluster.getDynamicServers()				
dynServers.setMaximumDynamicServerCount(10)				
dynServers.setServerTemplate(dynamicServerTemplate)				
# dynamic server names will be dynamic-server-1,				
<pre># dynamic-server-2,, dynamic-server-10</pre>				
ŧ				
dynServers.setServerNamePrefix("dynamic-server-")				
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Admin Console





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Dynamic Clusters Wizard

- Interactive step-by-step process
- Simplifies Dynamic Cluster creation
- · Guides you through the complete process
- Results in:
 - Cluster with Dynamic Servers

- Server Template
- Machine mappings
- Listen address and port mappings

Create a New Dynamic Cluster					
Back Next Finish	Cancel				
Specify Dynamic Server Pro	perties				
The following properties will be used to specify the size and characteristics of your new Cluster					
How many dynamic servers will y	mic servers will : Create a New Dynamic Cluster				
Number of Dynamic Server:	Back Next Finish Cancel				
What naming convention would	Specify Machine Bindings				
Server Name Prefix:	Associating Dynamic Servers to	Machines is essential if you inten	t to use the Node Manager and the		
	How do you want to distribute Dy	namic Servers across machines?			
Server Templates are used to co shared across clusters, so we'll (💿 Use any machine configu	Create a New Dynamic Clus	ster		
Back Next Finish	Use a single machine for Back Next Finish Cancel				
	Selected machine:	Specify Listen Port Bindi	ings		
	Select how these Dynamic Servers should be bound to listen ports.			ts.	
	Use a subset of machine	Use a subset of machine Listen Ports for Dynamic Servers can be staticly specified in a server template or can be dyna 1achine Name Match Expre Assign each Dynamic Server unique listen ports 			
	Machine Name Match Expre				
	Back Next Finish	Listen Port for first serve	r:	7100	
		SSL Listen Port for first se	erver:	8100	
Assigned each Dynamic Server fixed listen ports					
		Listen Port:		7100	
		SSL Listen Port:		8100	
		Back Next Finish	Cancel		

Dynamic Clustering

Scaling Dynamic Servers

- 1. Create a Server Template
- 2. Create a Dynamic Cluster
- 3. Set the Dynamic Servers based on the Server Template
- 4. Start a Dynamic Server
- 5. To scale, for each dynamically configured managed (Dynamic Server), repeat Step 4

All Dynamic Servers are by default part of the Dynamic Cluster

Benefits

- Members of the Cluster are Dynamic
- Starting Dynamic Clusters can be carried out using WLST / Node Manager
- Oracle recommends stopping Dynamic Clusters through Admin Console
- Programmatically starting / stopping of Dynamic Servers can be done, to change the Cluster contents
- Configuring Dynamic Servers is easy, they pick up their configuration from associated Server Template
- Supports the need of a Cloud Environment



Dynamic Clusters MBean Hierarchy

- Cluster has a new child: Dynamic Server
- Server Template used for Dynamic Servers
- Server Template can be used outside of a cluster
- Runtime: Server Lifecycle Runtime MBeans
 - Define server names and ports
 - Late bindings for machine mappings





Typical Use Cases

- Quick cluster for development
- Cluster that needs to be scaled out at will
- Cluster spread across specific machines in a data center





Current limitations

- Cannot target JMS servers or JMS stores at Dynamic Servers
- No support for Coherence Containers
- No ability to define and execute policies to start/stop/move dynamically configured Managed Servers at runtime
- No EMCLI (part of EM 12CC) support for Dynamic Clusters
- Only Read/Update possible through EM 12CC, Create/Delete happens through WLS Console for both Server Templates and Dynamic Clusters



Questions?



