IBM Software Group

IBM® WebSphere® Application Server V6

High Availability Overview

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This presentation will cover the High Availability services in WebSphere Application Server V6 at a basic level.

Goals

- Describe the benefits of High Availability services

- Compare capabilities between V6 and V5

The goals of this presentation are to describe WebSphere Application Server's new High Availability services and to compare these new capabilities to the capabilities of WebSphere Application Server V5 in this area. More details on this topic, including how to configure High Availability services, can be found in the presentation titled "High Availability Details including Core Groups and Policies".
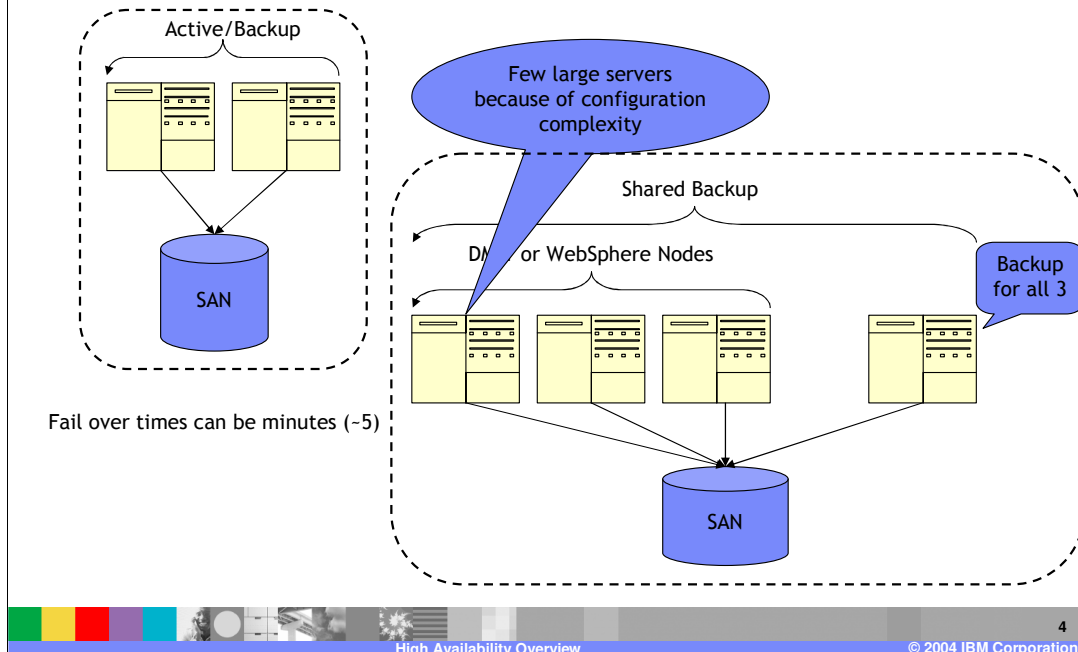
WebSphere Application Server V5: HA Status

- Work Load Management (WLM) service runs in the Deployment Manager
  - ▶ This makes the Deployment Manager a single point of failure (SPOF)
  - ▶ Must be made highly available to ensure WLM works correctly

- External clustering solution is required on WebSphere Application Server machines if you:
  - ▶ Use two-phase commit (2PC) transactions
    - Clustering solution is required to recover in-flight transactions
  - ▶ Use Service Integration Technologies (messaging)

- Cold failover only
  - ▶ Potentially 5-6 minutes downtime, if there is a failure

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With WebSphere Application Server V5, there are some obstacles to achieving true high availability. The Workload Management service runs in the Deployment Manager, which means that the Deployment Manager must be running to ensure proper WLM routing. Additionally, the only way to enable recovery of in-flight two-phase commit transactions is to use an external clustering solution, such as HACMP®. This is also required when using Embedded Messaging. Failover with this type of solution can lead to several minutes of downtime, which is not ideal.

v5 HA Configuration

Active/Backup

SAN

Few large servers because of configuration complexity

Shared Backup

DM__ or WebSphere Nodes

Backup for all 3

SAN

Fail over times can be minutes (~5)

V5 configurations that required high availability tend to be configured in either Active/Backup pairs, or with a few active nodes and a single machine acting as backup for all of them. Because of the complexity of this configuration, it was easier for most people to use only a few machines, which meant they had to be quite large if they were handling a heavy workload.
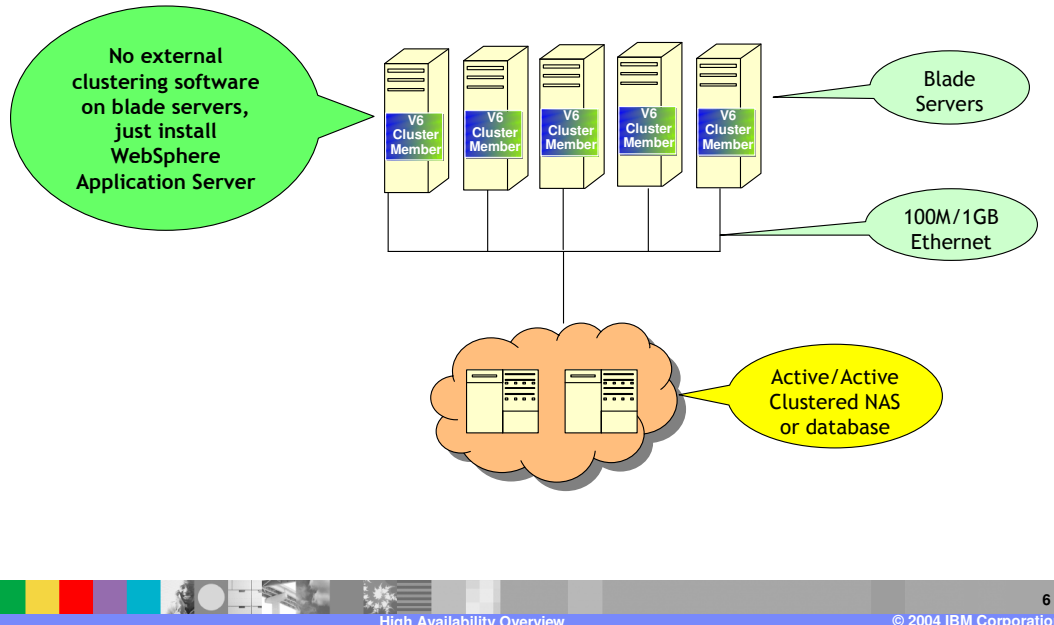
HA Overview

- Significant improvements in high availability
  - ▶ The rest of your environment (such as databases) <u>must</u> be made highly available as well to achieve true high availability

- High Availability Manager is responsible for running key services on available servers rather than on a dedicated one (such as WLM on the Deployment Manager)

- Can take advantage of fault-tolerant storage technologies such as Network Attached Storage (NAS)
  - ▶ Significantly lowers the cost and complexity of HA configurations

- Hot standby and peer failover for critical singleton services
  - ▶ WLM routing, Java™ Message Service (JMS) messaging, Transaction Manager, and others
  - ▶ Failed singleton starts up on an already running Java Virtual Machine (JVM)
  - ▶ Planned failover takes very little time

- The configuration of highly available systems is simplified
  - ▶ Works out of the box in most cases

Version 6 improves the high availability story significantly. WebSphere Application Server V6 can be used as part of a highly availability environment as a result of a new service known as the High Availability Manager. The High Availability Manager runs important services on any server that is available. This means that instead of running the WLM service inside the Deployment Manager, as in V5, WLM can run on any available server in the environment. The same is true for other key services. The High Availability Manager keeps track of the status of all of your servers and there services that they are running, ensuring that all services remain continuously available. When a failure is detected, the failed service can be started in another already-running JVM, potentially on another physical machine, in very little time. Planned failover takes less than a second.

This new capability is far easier to configure than the V5 environment previously discussed. In most cases, this capability will work out of the box, with no configuration required.

v6: HA Configuration

No external clustering software on blade servers, just install WebSphere Application Server

V6 Cluster Member
V6 Cluster Member
V6 Cluster Member
V6 Cluster Member
V6 Cluster Member

Blade Servers

100M/1GB Ethernet

Active/Active Clustered NAS or database

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It is far easier to build a highly available environment with WebSphere Application Server V6. You need only to install WebSphere Application Server on your servers. Because no external clustering software is required, it is more practical to deploy a large network of blade servers. However, you will need to ensure that any resources on which WebSphere Application Server depends are made highly available. This means storing transaction logs on a highly available Network Attached Storage system, and making sure that your database servers are clustered, among other things.

Failover for Different Service Types

- Singleton services that require failover fall into two categories:
  - ▶ User resources: application related resources
    - Example: Transaction log for 2PC transaction, Messaging Engine
    - Failover occurs only within the cluster boundary
  - ▶ System resources: used internally by WebSphere Application Server
    - Example: WLM routing
    - Failover can occur to any process within the Core Group

- A Core Group defines a set of processes that can cooperate to provide each other with high availability

Singleton services that require failover can be divided into two categories, user resources and system resources. User resources are artifacts related to a user application, such as a transaction log or a messaging engine. These resources can fail over only to another member of the same cluster, because only members of the same cluster are guaranteed to be running the same applications. System resources, such as WLM routing, can be run on any process within the same Core Group. A Core Group is a boundary that defines the set of processes that can provide each other with high availability. In the default and most common configuration, all processes are members of a single Core Group.

Deployment Manager and Node Agent HA

- Deployment Manager
  - ▸ No longer a SPOF for WLM routing
  - ▸ Only needed for configuration changes and Java Management Extensions (JMX) routing
  - ▸ Still requires a shared file system or shared drives with external cluster software to be highly available

- Node Agent
  - ▸ The need to failover a Node Agent is significantly less with V6
  - ▸ Location Service Daemon still only runs inside the Node Agent
    - The Node Agent should be kept running using a process nanny

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If you want to make a Deployment Manager or Node Agent highly available, you will still need to use an external clustering solution such as HACMP. However, the need to make either of these processes highly available is very low. The deployment manager no longer runs the WLM routing service, so it is no longer a single point of failure for Workload Management. It is only needed for configuration changes and JMX routing. Version 5 required the Node Agent to be failed over to support the recovery of transaction logs or JMS messaging engines. In V6 this is no longer necessary because the High Availability manager can recover the transaction logs or the messaging engine on another server, provided that the transaction logs or the message store are accessible to all servers. You should still use the "rc" or a similar service to restart your Node Agent in the case of a failure, since the Location Service Daemon still only runs inside the Node Agent.

Summary

- New V6 functions provide high availability that traditionally could only be achieved using high-cost external clustering products

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In summary, this presentation has focused on the new high availability related functionality in WebSphere Application Server V6. This functionality provides far better availability than WebSphere Application Server V5 and does not require the assistance of external clustering products. WebSphere Application Server V6 is capable of being part of a carefully designed environment that provides high availability. More details on this topic, including how to configure High Availability services, can be found in the presentation titled "High Availability Details including Core Groups and Policies".

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