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IBM® WebSphere® Application Server V6

Migrating the Runtime

(Cells, Nodes, Servers, Resources)

@business on demand.

This presentation will focus on Migrating to WebSphere Application Server version 6.

Agenda

- **Migrating V5 Cells**
  - ▶ Recommendations
  - ▶ Stand-alone Application Server
  - ▶ ND Cell
  - ▶ V5.0 & V5.1 Migration & Coexistence Scenarios

- **Goals:**
  - ▶ Minimize disruption & down-time
  - ▶ Automate with tools & minimal manual tasks
  - ▶ Allow for easy fall-back to V5

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The agenda for this presentation is to discuss migrating to WebSphere Application Server version 6 and related topics. The goal of migration is to minimize customer impact while moving forward to the next release.

Migration & Coexistence – Software Levels

- **WebSphere Application Server V4**
  - ▸ No Migration Path – same coexistence rules as with V5

- **WebSphere Application Server V5.0 & V6**
  - ▸ Minimum Level: W502025

- **WebSphere Application Server V5.1 & V6**
  - ▸ Minimum Level: W510207

- **WebSphere Application Server V6**
  - ▸ z/OS™ 1.4 required

- **Load Modules**
  - ▸ If V5 modules are in LPA/LNKLST, V6 modules must be in STEPLIB

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There are some coexistence and prerequisite conditions that must be met prior to attempting a migration.

There is currently no migration path from WebSphere Application Server version 4 directly to WebSphere Application Server version 6. WebSphere Application Server version 4 is subject to the same coexistence rules as version 5. WebSphere Application Server version 5.0 must be at minimum service level W502025 before attempting a migration. Similarly, WebSphere Application Server V5.1 must be at W510207. These service levels will enable both version 5 products to coexist with version 6 of WebSphere Application Server. WebSphere Application Server version 6 requires zOS 1.4. If your version 5 modules are in LPA/Linklist, then the version 6 modules must be in STEPLIB.

Application Migration & Interoperability

- Java™ 2 Enterprise Edition (J2EE) 1.3 Applications - Generally upward-compatible with J2EE 1.4
  - ▸ Deprecated features
- Programming Model Enhancements
  - ▸ Application Profiling – some changes required
  - ▸ Asynchronous Beans – use the V6 "Profile creation wizard"
  - ▸ Dynamic Cache – migration tasks described for data replication settings
  - ▸ Internationalization – no changes in V6
  - ▸ Schedulers – forward migration supported
- WBISF – Process Choreographer not available in V6.0.1
  - ▸ In general, not supported to migrate a WBISF Cell to V6.0.1 (BPE & PC)
- Interoperating with non-z/OS servers:
  - ▸ Some properties setting are required (ASCII,

See " Migrating, Coexisting, & Interoperating" book (PDF)

Certain changes could be required when migrating your applications. In general, J2EE 1.3 applications are upward compatible with J2EE 1.4 applications, although there are some deprecated features. Programming model enhancement applications using Application Profiling will require some changes. The version 6 profile creation wizard should be used for Asynchronous Beans. Process Choreographer is not available in version 6.0.1, therefore migration of a WebSphere Business Integration Server Foundation (WBISF) cell to version 6.0.1 is not supported. It is possible to interoperate with non-zOS servers by setting various properties. See the **Migrating, Coexisting and Interoperating** book for more details.
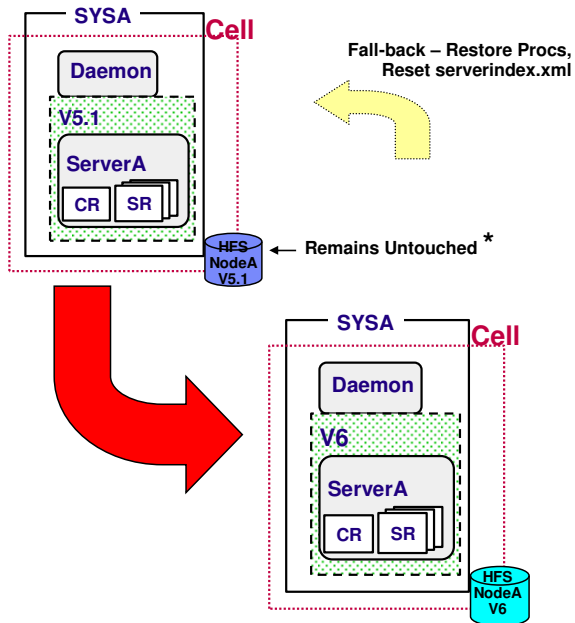
Overview of Migration to Version 6

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- **Migration is node-by-node**
  - From WebSphere Application Server V5.0 or V5.1
    - **Not from V4 (You must first Migrate to V5.)**
  - V5 configuration HFS remains intact for fall-back
- **Order of migration for ND cell:**
  - Migrate the Dep. Manager first
  - Migrate Application Server nodes
- **Migration from V5.1**
  - V5.1 node can coexist with V6 nodes
- **Migration from V5.0**
  - V5.0 node cannot coexist w/V6 on the same LPAR
  - Must migrate all nodes on the LPAR at once
- **Migration Tools:**
  - WebSphere Application Server V6 for other platforms uses 'Profiles', Pre/PostUpgrade scripts to transform Node
  - WebSphere Application Server V6 for z/OS uses the ISPF dialog to create batch jobs which run these utilities.

Migrating the Runtime

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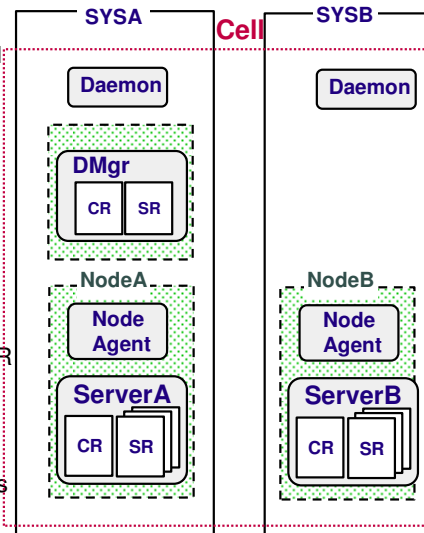
Migration to version 6 is done on a node by node basis, from either a version 5.0 or version 5.1 system. You cannot migrate from version 4 directly to version 6. You will have to first migrate to version 5. The version 5 HFS remains intact to allow for fall-back if necessary. On an ND cell, the Deployment Manager will be migrated first followed by the application server nodes. There is a concept of coexistence, which means a version 5.1 node can coexist with a version 6 node on the same LPAR, but a version 5.0 node cannot coexist on the same LPAR in the same cell with version 6. In this case, once the Deployment Manager is migrated to version 6, all 5.0 nodes on that LPAR and in that cell must migrate to version 6 at the same time. There are some migration tools available. zOS uses the ISPF dialog panels to create batch jobs which run the migration utilities.

Migrating a Node – Overview of the Flow

- Use the ISPF dialog to generate Migration Utility jobs
- Stop the V5 application server
- Create new V6 configuration HFS
- Save V5 Procs
- Copy New/Updated Procs to PROCLIB
- Reset any XA connector PRR processing
- Migrate the configuration HFS to V6
- Start the WebSphere Application Server V6 server
- Test your apps

SYSA
Cell
Daemon
V5.1
ServerA
CR   SR
HFS NodeA V5.1

Fall-back – Restore Procs, Reset serverindex.xml

← Remains Untouched *

SYSA
Cell
Daemon
V6
ServerA
CR   SR
HFS NodeA V6

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Migrating the Runtime

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To migrate a node you will need to generate the migration utility jobs using the ISPF dialog panels. Prior to running the jobs, stop the application server, create the version 6 HFS, and copy new or updated procs into a PROCLIB. If you have XA connectors , Peer restart and recovery processing will need to be reset. After these steps are completed, the configuration HFS is now migrated, allowing a WebSphere Application Server version 6 application server to be started. The final step is to test your applications in the new version 6 environment.

Many Scenarios . . .

- Base Application Server (not interesting – usually test cells)

- Network Deployment Cells
  - Single or Multi-System Cells
  - Single Shared HFS vs. Separate HFS for each Node
  - Common Procs for all servers vs. Unique Procs
  - Common set of UserIDs for all servers vs. Unique
  - Global Security options (OS, CUR, LDAP)
  - IJP, WBISF, PMEs, etc.

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There are many possible migration scenarios. The possibilities range from a simple base application server migration, to a mulit-system network deployment cell. A configuration could be a single shared HFS or a separate HFS for each node. There could be common procs for all servers or unique procs. Other considerations for your migration process are global security and application specific issues.

General Recommendations

- Keep the Same Procedure Names (Recommended)
  - ▸ Backup (save) your V5 Procs
  - ▸ If you use different Proc names, RACF profile updates required:
    - STARTED class profiles
    - SERVER class profiles
    - Automation Changes required

- Use separate HFS for each V6 node (even if you didn't in V5)
  - ▸ This may require new Procnames if you had a shared HFS in V5

- Backup your Configuration HFS(s) (DFDSS or PAX)
  - ▸ V5 Configuration HFS is left Untouched *
  - ▸ serverindex.xml_disabled is renamed (in the node's directory)

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In order to simplify things, you should use the same procedure names. If you choose to use different proc names, you will need to update the RACF STARTED and SERVER class profiles. Automation changes will also be required. The version 5 procs should be backed up to allow for easy recovery.   Use a separate HFS for each version 6 node. This might require new procnames if you used a shared HFS in version 5.   The only change to the version 5 configuration HFS is that the serverindex_xml file is renamed to serverindex.xml_disabled in the node directory. Back up your configuration HFS to allow for easy recovery.

Other Recommendations

- Use STEPLIBs for all your V6 load module libraries

- Don't turn off Global Security

- Keep the same UserIDs, UIDs, Groups, GIDs, etc.

- Keep the same Port numbers
  - DRS_CLIENT_ADDRESS port is reused for the HAM port.
  - More Port numbers required

- Don't migrate a WBISF cell

- After Migration, Application updates will not roll back

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Again for simplicity, use the same userids, groupids, and port numbers. The DRS_Client_ADDRESS port is reused for the HAM port. Additional port numbers are required. Do not turn off global security. Version 6 load libraries should be steplib'd. Version 6 does not support WBISF, therefore you cannot migrate a WBISF cell. After the migration process is complete and updates made to your applications, they will not roll back to your backed up version 5 configuration HFS.

Backing up your Configuration HFSes – using PAX

Your best insurance against a corrupted runtime configuration HFS:

(Even though the Migration utilities create backup files in the HFS)

- **Backup to an HFS file** (in /tmp/)
  - ▸ pax -wzf /tmp/paxed.z9.HFS /z9/config/*
- **Restore** from /tmp:
  - ▸ cd /z9/config
  - ▸ pax -pe -rvf /tmp/paxed.z9.HFS

/tmp/paxed.z9.HFS

- **Backup to an MVS dataset:**
  - ▸ (pre-allocate to ensure enough space - PS, FB-80, 150 cyl)
  - ▸ pax -wzvf "//'Z9CELL.ARCHIVE'" /t9/config/*
- **Restore** from an MVS dataset:
  - ▸ cd /z9/config
  - ▸ pax -pe -rvf "//'Z9CELL.ARCHIVE'"

Z9CELL.ARCHIVE

- Don't forget RACF changes, Procs, DB2™ Tables for PC, & other MVS settings....

The best insurance against a corrupted runtime configuration HFS is a backup. You can backup the HFS to either an HFS file or an MVS dataset. Shown here are the pax commands to create a backup or restore from backup.

Backing up Configuration HFSes – using DFDSS

- Backup -
```
//STEP1    EXEC PGM=ADRDSSU,REGION=4M
//SYSPRINT  DD  SYSOUT=*
//OUTDD1   DD  DSN=Z9CELL.BKUP.CONFIG,DISP=(NEW,CATLG),
//             SPACE=(CYL,(180,50)),UNIT=(3390)
//SYSIN DD *
   DUMP DATASET (INCLUDE ( OMVS.Z9CELL.CONFIG.HFS )) -
       OUTDDNAME(OUTDD1) -
       CANCELERROR TOL(ENQF) OPTIMIZE(1) WAIT(2,2)
/*
```

- Restore -
```
//STEP1    EXEC PGM=ADRDSSU,REGION=4M
//SYSPRINT  DD  SYSOUT=*
//INDD1    DD  DSN=Z9CELL.BKUP.CONFIG,DISP=SHR
//SYSIN DD *
   RESTORE DATASET(INCLUDE( OMVS.Z9CELL.CONFIG.HFS )) -
       INDD(INDD1) -
       TGTALLOC(SOURCE) TOL(ENQF)
/*
```

Z9CELL.BKUP.CONFIG

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Here is sample jcl that can be used to backup and restore the configuration HFS.
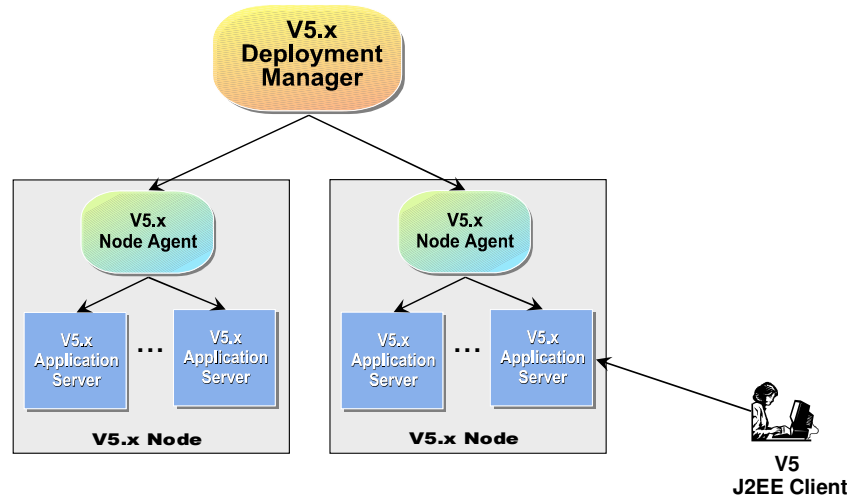
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Section

Migration Overview
From V5.1 Network Deployment Cells

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This section will provide an overview of migration of Network Deployment Cells.

Starting with a Full V5.1 ND Cell

V5.x Deployment Manager

V5.x Node Agent

V5.x Node Agent

V5.x Application Server ... **V5.x Application Server**

V5.x Node

V5.x Application Server ... **V5.x Application Server**

V5.x Node

V5 J2EE Client

Migrating the Runtime

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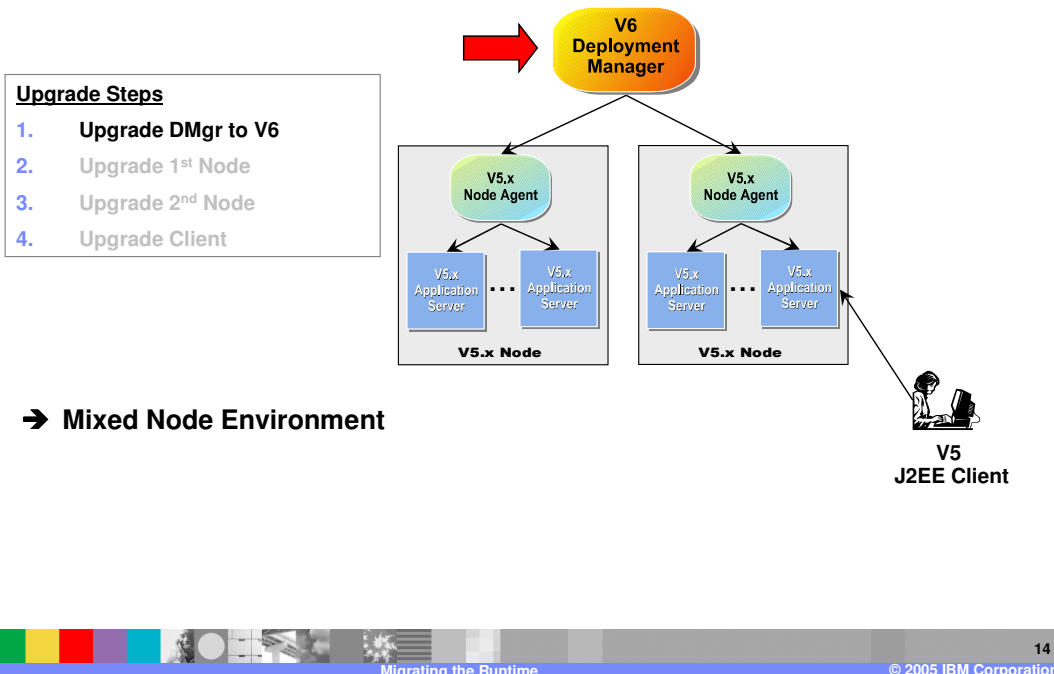
The next several slides will show you the step-by-step process for migrating an entire WebSphere Application Server V5.1 cell to WebSphere Application Server V6, with intermediate Mixed V5.1 and V6 Nodes.

The starting point is a V5 cell with a V5 J2EE client.

Upgrading V5.1 to V6 Cell Environment - Steps

Upgrade Steps

1. **Upgrade DMgr to V6**
2. Upgrade 1st Node
3. Upgrade 2nd Node
4. Upgrade Client

➔ **Mixed Node Environment**

V6 Deployment Manager

V5.x Node Agent

V5.x Node Agent

V5.x Application Server · · · V5.x Application Server

V5.x Node

V5.x Application Server · · · V5.x Application Server

V5.x Node

V5 J2EE Client

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Migrating the Runtime
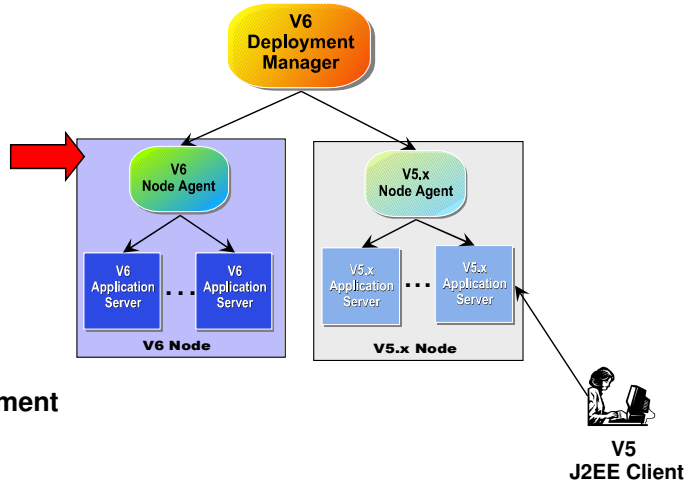
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The first step is to migrate the V5.1 Deployment Manager to V6 with the same Cell name. You now have a Mixed Node environment. The result is that the V5 Deployment Manager is disabled. The V6 Deployment Manager now manages two fully operational V5.1 nodes. This is the concept of coexistence. V6 can coexist with V5.1, V6 cannot coexist with V5.02 in the same lpar and cell.

Upgrading V5 to V6 Cell Environment - Steps

V6 Deployment Manager

Upgrade Steps

1. Upgrade DMgr to V6
2. **Upgrade 1st Node**
3. Upgrade 2nd Node
4. Upgrade Client

V6 Node Agent

V5.x Node Agent

| V6 Application Server | ... | V6 Application Server |

V6 Node

| V5.x Application Server | ... | V5.x Application Server |

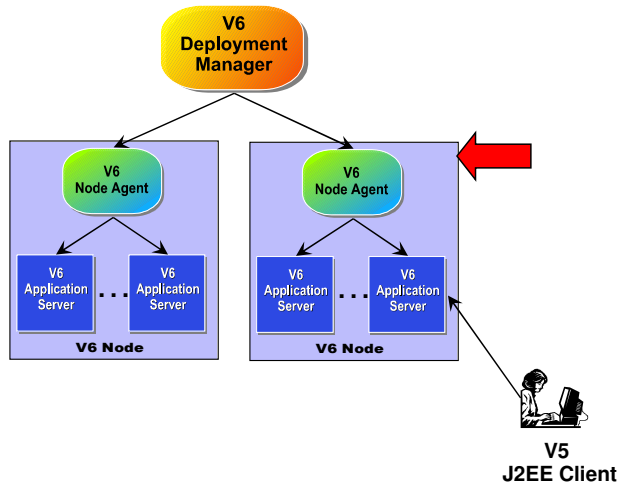**V5.x Node**

V5 J2EE Client

➔ **Mixed Node Environment**

The next step is to migrate the first node using the migration utilities. Now the cell consists of a V5.1 node, and a V6 node, which are fully operational.

Upgrading V5 Cell to V6 Cell – Sequence

V6 Deployment Manager

Upgrade Steps

1. Upgrade DMgr to V6
2. Upgrade 1st Node
3. **Upgrade 2nd Node**
4. Upgrade Client

V6 Node Agent

V6 Node Agent

V6 Application Server ... V6 Application Server

V6 Node

V6 Application Server ... V6 Application Server

V6 Node

➔ **Full V6 Cell Environment and V5 client**

V5 J2EE Client

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The next step is to migrate the second node. Both nodes are at V6 and are fully operational. Now the cell is a full V6 Cell. You still could have V5 Application Clients in the environment that are calling V6 Application Servers.

Upgrading V5 Cell to V6 Cell – Sequence

Upgrade Steps

1. Upgrade DMgr to V6
2. Upgrade 1st Node
3. Upgrade 2nd Node
4. **Upgrade Client**
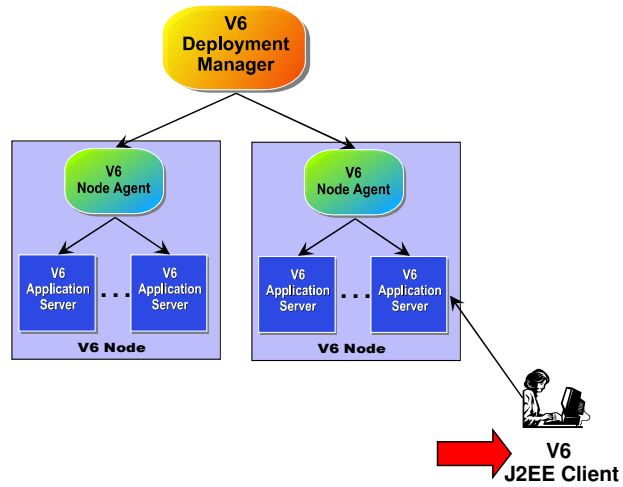
➔ **Full V6 Cell Environment and V6 client**

V6 Deployment Manager

V6 Node Agent

V6 Node Agent

V6 Application Server . . . V6 Application Server

V6 Node

V6 Application Server . . . V6 Application Server

V6 Node

V6 J2EE Client

The last step is to migrate the J2EE client using the upgradeClient command.

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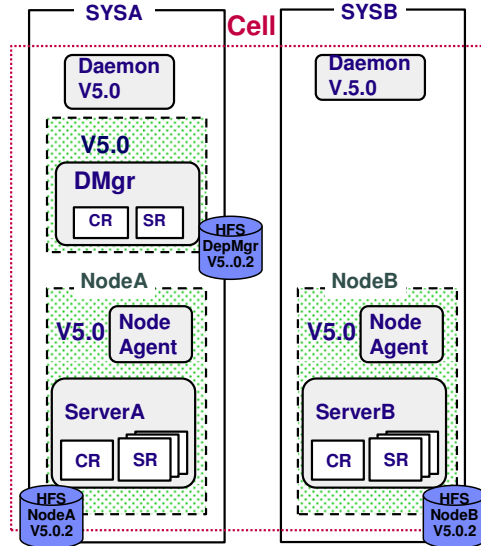## Section

Migration Overview
From V5.1 Network Deployment Cells

**(Migrating a Base Application Server is
like a trivial example of migrating the
Deployment Manager or a managed node.)**

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This section will cover migrating a network deployment cell.

WebSphere Application Server V.5.0.2 ND:

- Migrate node-by-node

- Order of migration for ND:
  1. Migrate DMGR + NodeA
     - All Nodes on the LPAR must Migrate at once
     - V6 Nodes (including DMGR) Can't coexist with V5.0 Nodes on the same LPAR
     - V5 Nodes on other LPARS can coexist
  2. Migrate Application Server NodeB

SYSA **Cell** **SYSB**

Daemon V5.0   Daemon V.5.0

V5.0
DMgr
CR   SR   HFS DepMgr V5..0.2

NodeA   NodeB
V5.0 Node Agent   V5.0 Node Agent

ServerA   ServerB
CR   SR   CR   SR
HFS NodeA V5.0.2   HFS NodeB V5.0.2

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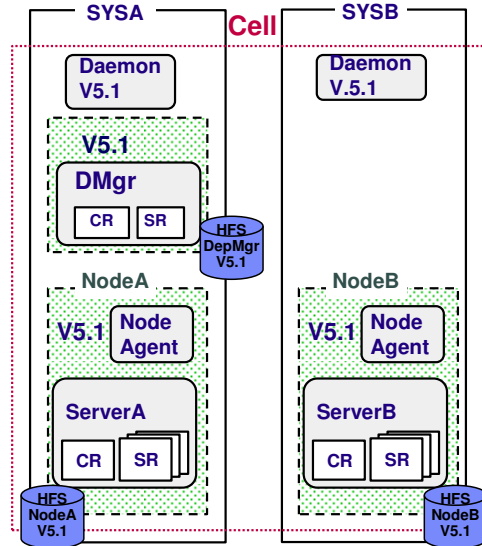**Migrating the Runtime**   **© 2005 IBM Corporation**

Migration from a version 5.02 environment to a version 6 environment is done on a node by node basis. Once the Deployment Manager is migrated, all nodes on that LPAR and in that cell must migrate due to the fact that Version 5.02 cannot coexist with V6.

WebSphere Application Server V.5.1 ND:

- Migrate node-by-node
- Order of migration for ND
  1. Migrate the Dep. Manager
     ▸ It can coexist with V5.1 Nodes
  2. Migrate Application Server NodeA
     ▸ Do it while NodeB is serving Apps
  3. Migrate Application Server NodeB

Note: Migration jobs **must** be run on the home system of the node being migrated.

SYSA   Cell   **SYSB**

Daemon V5.1   Daemon V.5.1

V5.1   **DMgr**   CR   SR   HFS DepMgr V5.1

NodeA   V5.1   Node Agent   ServerA   CR   SR   HFS NodeA V5.1

NodeB   V5.1   Node Agent   ServerB   CR   SR   HFS NodeB V5.1

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Migration from a version 5.1 environment to a version 6 environment is performed one node at a time.

Since it is possible for version 6 and version 5.1 to coexist, it is not necessary to migrate all V5.1 nodes when the Deployment Manager is migrated. In this example NODE A can be migrated while NODE B is serving applications. Once NODE A is functional, NODE B can be migrated ensuring no loss of productivity during the migration process. Migration jobs must be run on the home system of the node being migrated.

Deployment Manager Migration

<u>Use the ISPF dialog:</u>

#4 Migrate V5.x Nodes to V6.

#2 Migrate V5.x DMGR to V6.

"L" Load customization variables
Use variables from original Dep. Mgr

#1 Allocate target data sets.
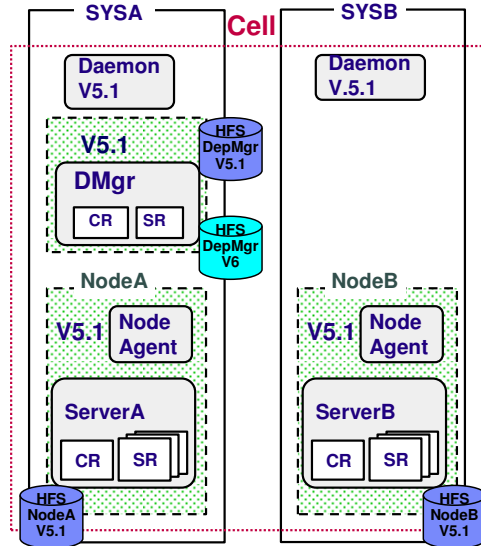
#2 Define variables.

#3 Generate customization jobs.

#4 View instructions.

Stop the Deployment Manager

Backup the V5 Configuration HFS

Backup the V5 Procedures

Submit Jobs . . .

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This slide is a summary of the options you would select using the ISPF dialog panels to generate the migration customization jobs. Once the jobs are created, stop the Deployment Manager, create the necessary backups, and submit the jobs.

Generate Migration Utility Jobs – Go to 'Migrate'

- **Launch the WebSphere Application Server V6 ISPF dialogs:**
  - ▸ **exec 'WebSphere Application Server600.WebSphere Application Server.SBBOCLIB(BBOWSTRT)' 'appl(mig6)'**
  - ▸ **> Enter > Enter . . .**

```
------------  WebSphere Application Server for z/OS Customization  ------

   Use this dialog to create WebSphere Application Server for z/OS  cells
and nodes....

   1   Configure a security domain.

   2   Create stand-alone Application Server nodes.  You must complete
       Option 1 before starting this option.

   3   Create Network Deployment cells and nodes.  You must complete      --
       Option 1 before starting this option.

   4   Migrate V5.x Nodes to V6 Nodes.   <==========
```

```
     You will be presented with a series of dialogs that will ... generate
     the appropriate job streams to perform the migration.

        1   Migrate a V5.x stand-alone application server node to V6.

        2   Migrate a V5.x Deployment Manager to V6.

        3   Migrate a V5.x managed node to V6.  You must migrate the cell's
            Deployment Manager before migrating any of the cell's managed nodes
```

From the ISPF main panel, select option 6 and execute the command shown here. From the primary panel displayed select option 4, Migrate V5.x Nodes to V6 Nodes. A second panel will be displayed listing the various migration paths available.

Generate the Migration Jobs – Define variables

- **Continuing on . . .**

```
-----------   WebSphere Application Server for z/OS Customization      --------

. . . .


  1   Allocate target data sets. The data sets will contain the
      customization jobs and data generated by the Dialog.
  2   Define variables. Define your installation-specific information for
      customization.
  3   Generate customization jobs. Validate your customization variables
      and generate jobs and instructions.
  4   View ins
                 -----------   WebSphere Application Server for z/OS Customization    ----
Options for
                 Define Variables to migrate a V5.x stand-alone Application Server Node
S   Save cus
    in a dat       Specify a number and press Enter to define the WebSphere Application
                   Server for z/OS variables. You should review all of the variables in
L   Load cus       each of the sections, even if you are using all of the IBM-supplied
    from a d       defaults.
                   After you complete all sections, press PF3 to return to the main menu.


                                                              Completed?
                 1 - System Locations (directories, HLQs, etc.)       Y
                 2 - System Environment Customization                 Y
                 3 - Server Customization                             Y
```

The migration utility panels are very similar to dialog panels from past releases. The primary panel allows you to allocate datasets, define system variables, generate customization jobs, and load or save configuration files. Option 2, define variables, will display a second panel that enables system customization parameters to be specified.

Define variables – System Locations

- **Define the System Locations – Recommend STEPLIBs for V6**

```
------------  WebSphere Application Server for z/OS Customization    -------

System Locations (1 of 2)

   Specify the following V6 information, then press ENTER to continue.

   For some data sets, specify "Y" if they are in STEPLIB.

 Full Names of Data Sets

   PROCLIB.:  SYS1.PROCLIB

   Run WebSphere Application Server from STEPLIB (Y/N)?  Y
   SBBOLPA.:  WebSphere Application Server600.WebSphere Application
Server.SBBOLPA
   SBBOLOAD:  WebSphere Application Server600.WebSphere Application
Server.SBBOLOAD
   SBBOLD2.:  WebSphere Application Server600.WebSphere Application
Server.SBBOLD2
```

```
   SCEERUN.:  SYS        ------------  WebSphere Application Server for z/OS Customization  ---
   SCEERUN2:  SYS
   SGSKLOAD:  SYS       System Locations (2 of 2)
              (lea
                          Specify the following, then press Enter to continue.

                       V6 WebSphere Application Server product directory:
                            /shared/zWebSphere/V6R0
```

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Option 1, System Locations, defines system datasets to be used during the migration, as well as the location of the version 6 product directory.

Define variables – Server Customization

▸ **New mount point
& HFS**

```
------------  WebSphere Application Server for z/OS Customization     -----

System Environment Customization

   Specify the following to customize your system environment, then
   press Enter to continue.

 WebSphere Application Server for z/OS HFS Information

   Mount point....:  /h5cell/migv6/SYSD
   Name...........:  OMVS.H5CELL.MIGV6.CONFIG.HFS
   Volume, or '*' for SMS.:  *
   Primary allocation in cylinders...:  250
   Secondary allocation in cylinders.:  100
```

The server environment customization panel allows you to specify the new mount point, HFS name and HFS size.

Define variables – Server Customization

```
------------  WebSphere Application Server for z/OS Customization    ---

Server Customization (1 of 2)

    Specify the following to customize your migration, then press Enter…

    V5.x WebSphere Application Server home directory:
       /WebSphere Application Serverv51config/h5cell
           / Application Server

    V6 WebSphere Application Server home directory:
       /h5cell/migv6/SYSD
           / Application Server

    Migration Options
      Enable z/OS Migration Tracing:  N
      Enable WASProfile Tracing....:  N
      Enable WASPreUpgrade Tracing.:  N
      Enable WASPostUpgrade Tracing:  N

      Default Backup Directory:  /tmp/migrate/66795/base_backup
      User Specified Backup Directory:
         ==>  /h5cell/migv6/SYSD/backup_baseV5
```

‣ **Don't use /tmp/ or V5 configuration for back-up**

‣ **Use V6 configuration (delete it with the target.)**

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The server customization panel specifies the home directory for both version 5 and version 6. From this panel you can enable tracing and specify a backup directory if you wish to use something other than the default.

Define variables – DMGR Server Customization

▸ **High Availability manger for V6 cannot handle multi-homed hosts. . .**

- Temporary solution is to code dotted IP host address
  - Should be fixed in a subsequent release.
  - This prevents you from easily moving the Deployment Manager to another host
- The WG31 systems do not have this problem
- Most customer environments do… (as does the WSCPLEX)

```
Server Customization (2 of 2)

  Specify the following to customize your migration, then press Enter

  High Availability Manager Host: 9.82.24.72
    HA Manager Host MUST resolve to a single
    IP address.  It can not be a multihomed host.

  Daemon Procedure name....:  H5DMN
  Controller Procedure name:  H5ACR
  Servant Procedure name...:  H5ASR
```

Note that Proc names are the same . . .

Part 2 of the server customization panel specifies the High Availability Manager Host address.   There is a limitation in version 6 that prevents the high availability manager from handling multi-homed hosts. This will be fixed in subsequent releases. In the meantime, a temporary solution is to code the dotted IP host address.   Doing this prevents you from easily moving the Deployment Manager to another host.

The Instructions

▶ **Manual Tasks:**

- **APF-authorized datasets**
- **BPXPRMxx for configuration HFS**
- **Issue RACF commands**
- **Stop V5 application server**
- **Create configuration HFS for V6**
  - Do it by hand or use **BBOWMDMT** job and fix it:
  - chown adminUsr:Grp <configuration_root>
  - chmod 775 <configuration_root>

There are still a few manual tasks you must complete prior to the migration. Datasets must be APF authorized. The bpxprm member must be updated.   RACF commands should be issued at this time.   The version 5 application server must be stopped.   Finally, you can create the version 6 HFS by hand or using the BBOWMDMT job. If you use the BBOWMDMT job, you must fix the permission by submitting the commands listed here.

Sample Instructions

```
11. Make sure the following System SSL data set is in the system link
    pack area or the system link list on all MVS systems at or below
    z/OS Version 1.5:

    SYS1.CRYPTO.SGSKLOAD

    This STEPLIB statement must be left in place on all MVS systems at
    z/OS Release 1.5 and below, and may be removed manually on all MVS
    systems at z/OS Version 1.6 and above.

Running the migration jobs
--------------------------

The customization dialog built a number of batch jobs with the
variables you supplied. You must run the jobs in the order listed
below using user IDs with the appropriate authority.

BEFORE YOU BEGIN: Complete the section above entitled "Doing manual
configuration updates."

Follow the table below, which lists in order the jobs you must submit
and the commands you must enter. Special handling notes are included
in the table. All jobs are members of

'HUTCH.H5CELL.MIGV6.XXXX.CNTL'

Attention: After submitting each job, carefully check the output.
Errors may exist even when all return codes are zero.

These jobs must be submitted by a user-id that has authority to alter
file permissions, change file ownership and group membership of all
files

+-----------+-------------------------------------------------------+
| BBOWMBMT  |                                                       |
+-----------+                                                       |
| Done:     | OMVS.H5CELL.MIGV6.CONFIG.HFS                          |
|           |                                                       |
|           | This job is not required if you already have a suitable |
| By:       | mount point. In this case you are required to manually  |
|           | create the following directory structure.            |
|           |                                                       |
|           | This job:                                             |
|           |                                                       |
|           | o   Creates a mount point directory                   |
|           |                                                       |
|           |     /h5cell/migv6/SYSD                                 |
|           |                                                       |
|           | o   Allocates the configuration HFS                   |
|           |                                                       |
|           |     OMVS.H5CELL.MIGV6.CONFIG.HFS                       |
|           |                                                       |
|           |     and mounts it at the above mount point.           |
```

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Here is an example of the directions generated when you complete the generate customization jobs step from the ispf dialog migration panels.

Deployment Manager Migration

Submitting the jobs:

- Create new configuration HFS
  - Use BBOWMDMT as a model
  - Verify Ownership (Admin:Grp) & Permission (775)
- Copy Procs to PROCLIB (BBOMDCP)
  - Save old Procs first!
- Migrate the configuration HFS (BBOWMG3D)
  - This job takes 20-30 minutes
  - Specify TIME=NOLIMIT on JOB card
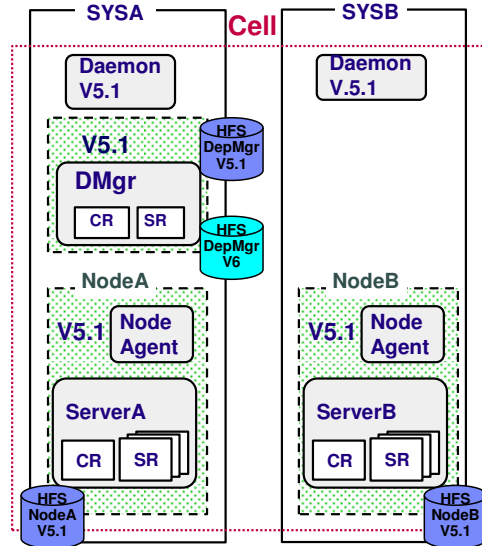
Once the version 6 HFS is created, and your version 5 HFS and procs are backed up, you can begin submitting the migration jobs. The main migration job is called BBOWMG3D and takes approximately 20 to 30 minutes to complete. To avoid time out issues, you should specify TIME=NOLIMIT on the job card.

13 steps of the BBOWMG3x Jobs (for each node)

Steps . . . involved with this utility:

SETUP	Creates working directory
WRCONFIG	Copies Generated Variables to a shell script
WRRESP	Copies Variables over to create a Profile
MKCONFIG	Gathers Info. from existing configuration
VERIFY	Verifies the Environment File
CRHOME	Creates a V6 WAS_HOME Structure
CRPROF	Creates a Profile for the Node
PREUPGRD	Saves existing WebSphere Application Server environment
UPGRADE	Backs up V5 Configuration files and Migrates to new HFS
UPPROCS	Updates Proc names, etc. in xml & setupCmdLine files
FINISHUP	Does End of Migration Processing
WROUT & **WRERR**	Write log files from /tmp/migrate/nnnnn to SYSPRINT

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These are the various steps involved with the BBOWMG3D job. If the migration fails in the middle of this job, the version 6 HFS will need to be cleaned out and this job will need to be rerun as there is no way to resume from the point of failure.

Migration Jobs - what could go wrong?

- **Bad input parms in the ISPF Dialog**
  - STEPLIBs omitted, misspelled, or not APF-authorized
  - V5 & V6 SMP/E Home dirs. (Should be mounted Read Only)
  - V5 Configuration Home dir. (VERIFY step)
- **Insufficient Space**
  - /tmp or backup location
  - V6 Configuration HFS
- **Job Submission**
  - Skip jobs, or Instructions
  - Wrong Userid
  - Restart/Rerun jobs after target configuration populated (CRHOME step)
- **Other**
  - HFS Ownership & Authorization (/tmp/migrate/ or Configuration HFS)
  - Time-outs (specify TIME=1440 on JOB card for certain jobs) to prevent S522 ABENDs
  - Clean out Application Server or DMgr directory before re-running Migrate job

Many problems could be encountered during the migration process. Bad input parameters in the ISPF dialog panels might have been specified. The SMP/E installed products should be mounted read only. Insufficient space in /tmp is a common problem, so now you can specify that the backup files be placed in a location where the necessary space is available. It is important to run the jobs in the correct order, waiting for each one to complete prior to submitting the next. A userid with correct authority must be used for submitting the jobs. To prevent S522 time-out abends, specify TIME=1440 on the job card. If you do experience problems during the migration process, you must clean out the Application Server or Deployment Manager directory prior to rerunning the migrate job.

Recovery from Migration Problems

- During Verify Step:
  - ▸ Usually an error in ISPF dialogs
  - ▸ Clean-up files in /tmp/, regenerate & re-submit jobs

- After Verify Step:
  - ▸ Clean out V6 configuration home directory
  - ▸ Clean-up files in /tmp/, regenerate & re-submit jobs

- During managed (federated) node migration
  - ▸ Check for Security errors, Space problems, DMGR up
  - ▸ See log in {root}/DeploymentManager/profiles/default/temp/

To recover from migration problems, first determine the step where the error was encountered. If it was during the verify step, you must clean up the files in the temporary directory, fix the problem, regenerate and re-submit the jobs. Errors during the verify step are usually caused from ISPF dialog problems. If the error occurs after the verify step, you must clean out the version 6 configuration home directory, clean up temporary files, regenerate and resubmit the jobs. Finally, if the error occurs during the managed node migration, check for security errors, insufficient space problems or if the Deployment Manager is running. The migration log is written in the /temp directory under the default profile path.

Migration Jobs – Logs & Tracing

- **Standard .out and .err files**
  - ▶ /tmp/migrate/12345/ directory
    - '12345' is a generated number (time-stamp)
  - ▶ Copied to SYSPRINT in final step(s)

- **Log files** in target Configuration HFS:
  - ▶ /{WASv6root}/DeploymentManager/profiles/default/logs/
  - ▶ /{WASv6root}/DeploymentManager/profiles/default/temp/z9node_migration_temp/
    - WASPostUpgrade_z9node_phase2.Tue-Apr-05-17.18.13-GMT+002005.log
    - temp_new_config_files
    - WASPostUpgrade_z9node_phase2.log.codes
    - WASPostupgrade_z9node_phase2.trc
    - com.ibm.websphere.migration.postupgrade.R50Federated.NodeInfo
    - migration_failed_phase2
    - websphere_backup_cmd_line_args.ser

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The migration jobs will create logs in either a default temp directory, or the one specified on the ISPF dialog panels. If the migration completes successfully the output is written to SYSPRINT.   Listed here are the log files located in the target configuration HFS.

RACF stuff

- The DMGR servant <u>must</u> have a Keyring with the WebSphere CA certificate.
  - ▶ If your DMGR uses a different userid for the servant than it does for the controller you must …
  - ▶ Add a WASKeyring to the DMgr's servant userid and connect the WebSphere CA certificate.
    - (Configuration group already has READ access to IRR.DIGTCERT.LIST & IRR.DIGTCERT.LISTRING)

```
RACDCERT ADDRING(WASKeyring) ID(<DMgr servant userid>)

RACDCERT ID(<DMgr servant userid>)
  CONNECT(RING(WASKeyring) LABEL('WebSphereCA.sdm') CERTAUTH)
```
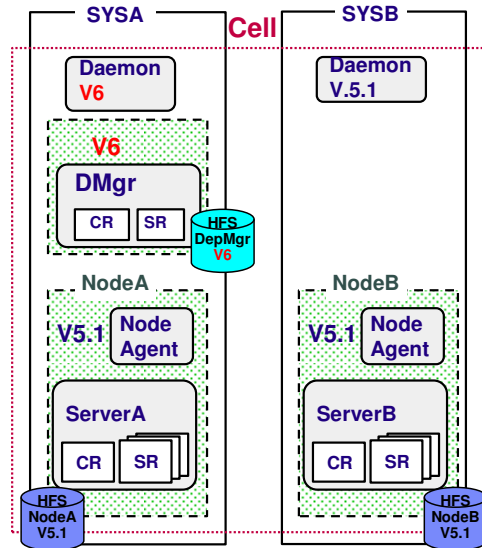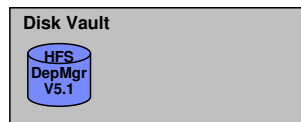
The Deployment Manager servant must have a keyring with the WebSphere CA certificate. If your Deployment Manager uses a different userid for the servant than it does for the controller, you must add a WASKeyRing to the Deployment Manager servant userid and connect the WebSphere CA certificate. Listed here are the RACF commands to add the keyring and do the connect.

Deployment Manager is now on V6

▶ Stop Servers, NA & Daemon on SYSA

▶ Start the Deployment Manager
  ▶ V6 DMgr can manage V5.1 Nodes, or V.5.0 Nodes on other LPARs
  ▶ Daemon on SYSA must be started by the V6 DMGR
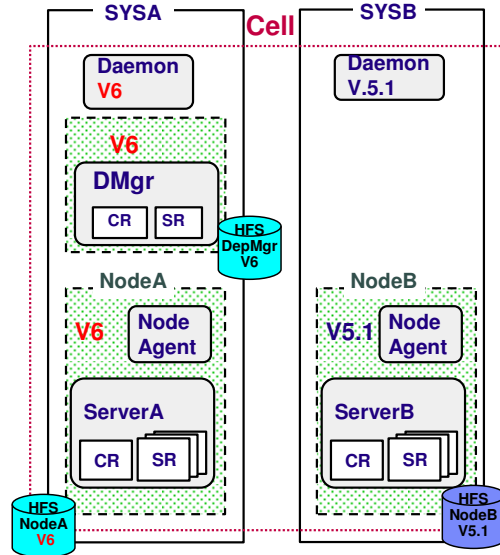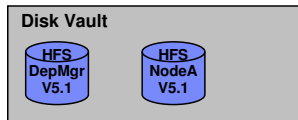 ▶ DMgr must be started before NA or Application Server on that LPAR

▶ V5 HFS saved:

Disk Vault

HFS
DepMgr
V5.1

SYSA — **Cell** — **SYSB**

Daemon V6

Daemon V.5.1

V6

DMgr

| CR | SR |

HFS DepMgr V6

NodeA

V5.1 | Node Agent

NodeB

V5.1 | Node Agent

ServerA

| CR | SR |

ServerB

| CR | SR |

HFS NodeA V5.1

HFS NodeB V5.1

Once the Deployment Manager has been migrated to version 6, you will need to restart the region, which will bring up a version 6 daemon as well as a version 6 Deployment Manager. The version 6 Deployment Manager can manage version 5.1 nodes, or version 5.0 nodes on a different LPAR. The Deployment Manager must be started prior to starting the node agent or application server on that LPAR.
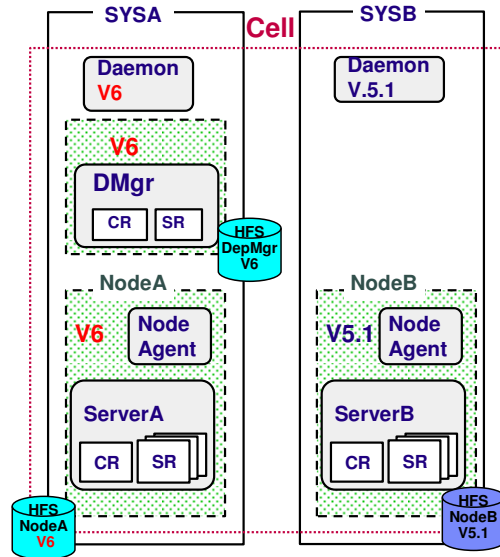
NodeA Migration:

1. Stop NodeA
   - Leave the DMGR running
2. Migrate NodeA
   - Run the dialog
   - Submit the migration jobs
3. Start NodeA
   - V6 Daemon can now be started by DMGR or by the Node Agent
4. V5 HFSes saved:

Disk Vault

- HFS DepMgr V5.1
- HFS NodeA V5.1

Cell

SYSA
- Daemon V6
- **V6** DMgr — CR | SR — HFS DepMgr V6
- NodeA — **V6** Node Agent — ServerA — CR | SR — HFS NodeA V6

SYSB
- Daemon V.5.1
- NodeB — **V5.1** Node Agent — ServerB — CR | SR — HFS NodeB V5.1

To migrate the first node, stop the node but leave the Deployment Manager running, submit the migration jobs, and restart the node. Once the node is migrated, the daemon can be started by either starting the Deployment Manager or the node agent.

Coexistence: V6 & V5

- **Load Libraries**
  - Only one version can be in LPA/LNKLST – other versions use STEPLIB
  - (V6) Daemon loads modules from V6 Libraries

- **Global Security**
  - Mechanisms supported across versions (LTPA, OS, Custom, LDAP)

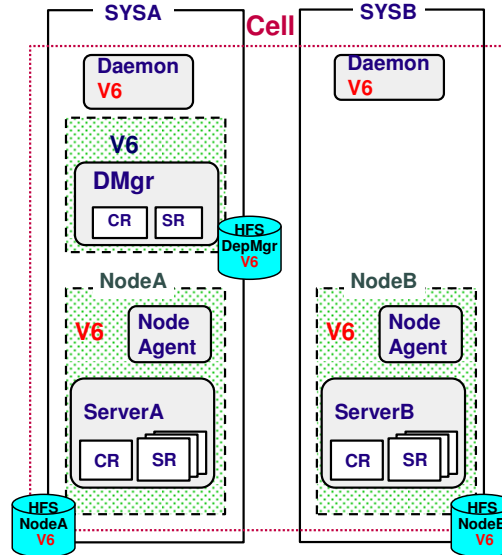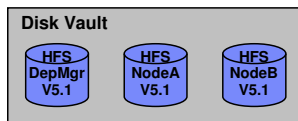- **Application Interop.**
  - J2EE 1.3 – 1.4
  - PMEs ***

SYSA

Cell

SYSB

Daemon V6

Daemon V.5.1

V6

DMgr

CR | SR

HFS DepMgr V6

NodeA

V6 | Node Agent

NodeB

V5.1 | Node Agent

ServerA

CR | SR

ServerB

CR | SR

HFS NodeA V6

HFS NodeB V5.1

There are several coexistence rules that must be followed during the migration process. Only one version of the product can be in LPA/Linklist. The other versions must use STEPLIB. The version 6 daemon will load modules from the version 6 libraries. Global security mechanisms such as LTPA, OS, Custom and LDAP are supported across versions. There are several application interoperability issues that will need to be addressed, such as deprecated J2EE features, and PME specific application migration requirements.

Migrate remaining Application Server Nodes

1. Stop NodeB NA, Servers & Daemon
2. Migrate NodeB
   ‣ Daemon is also migrated to V6
   ‣ DMGR must be up
3. Start NodeB

4. V5 HFSes saved:

Disk Vault

HFS DepMgr V5.1 HFS NodeA V5.1 HFS NodeB V5.1

SYSA **Cell** **SYSB**

Daemon V6   Daemon V6

V6
DMgr
CR SR
HFS DepMgr V6

NodeA
V6 Node Agent
ServerA
CR SR
HFS NodeA V6

NodeB
V6 Node Agent
ServerB
CR SR
HFS NodeB V6

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To migrate additional nodes, stop the node, node agent, servers and daemon associated with that system (SYSB in the example shown here). Next, migrate that node. The daemon is also migrated at this time. The cell Deployment Manager must be running. Once the migration jobs are completed, start the node, which will now be at version 6.

Falling Back to Version 5:

- Stop the V6 Node

- Restore the Procs

- Rename serverindex.xml_disabled
  - Use migrationDisablementReversal.jacl script **

- Restart the Node

- Observe Coexistence rules
  - Deployment Manager must be at V6 if any managed nodes are at V6
  - No coexistence between V6 & V5.0 on the same LPAR
  - DRS doesn't work cross-versions
  - Upgraded/Added Applications not carried back.

- To re-migrate to V6, Target Configuration HFS must be cleaned out
  - Delete /tmp/migrate directory

If it is necessary to restore back to version 5, stop the version 6 node, restore the version 5 procs, rename the serverindex.xml_disabled file, then restart the node. Remember you need to observe the coexistence rules listed here. To re-migrate to version 6 the target configuration HFS must be cleaned out.

Summary and Recommendations

- Back up your WebSphere Application Server V5 Configuration HFSes before you migrate.
- Use the same Procedure names.
  - ▸ Avoids adding/changing RACF profiles.
  - ▸ Save your V5 Procs for fall-back.
- Practice migration on a test cell to learn the ropes.
- Minimize the amount of "coexistence time" (mixed levels.)
- Keep current on WebSphere Application Server and z/OS Maintenance
- Review your RACF definitions with your security administrator.
- Coordinate your TCP/IP usage with servers and other subsystems.
- Involve your DBA with any/all DB2 definitions.
- Keep your ISPF dialog Target and SAVECFG datasets around for documentation.
- WebServer Plug-in & Scheduler database not migrated.

In summary, you might want to consider a practice migration on a test cell to familiarize yourself with the migration process. Prior to starting a real migration, back up your WebSphere Application Server version 5 configuration files, and your version 5 procs. After the migration is complete, keep your ISPF dialog target and savecfg datasets around for documentation purposes. It is important to remain current on your WebSphere Application Server and zOS maintenance. Review your RACF definitions with your security administrator, and coordinate your TCP/IP usage with your servers and other subsystems. Involve your DBA with your DB2 definitions. Remember WebServer Plug-ins and the scheduler database are not migrated.

Misc. Notes (FAQs)

- FAQs:
  1. Can I federate a V5 Base Application Server into a V6 Cell?
     - No; you must first migrate it to a V6 stand-alone node, then federate it.
  2. Can I have more than 1 server in a base appserver node?
     - No; You could get away with that in V5, but it WebSphere Application Server V6, it is not really supported.
  3. How can I move the DMGR to another system if the HA Mgr has dotted IP host?
     - You can't (easily) unless you go modify the IP address (messy).
  4. Can I now have multiple servant regions in a base appserver node?
     - Yes (I have not tried it, but understand that this restriction is lifted.)

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Here are several frequently asked questions related to migration for you to review.

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