# Best Practices For Upgrading to TSM 6

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# Overview

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9. Looking Forward – the new TSM V6 DB and Log
10. Backup and Restore of the TSM V6 DB

# *The Basics*

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# The Basics

- Major restructuring of the TSM database – DB2
- Why do this ?
  - Current DB is reaching its limits in terms of size, performance, and function
  - Position for long term growth
  - Position for future additional function
  - Online reorgs – no need for auditdb
  - Free TSM development resources DB maintenance
- Performance goal is to provide “equivalent performance”
  - Compared to Version 5.5
- No DB2 skills required to run TSM 6
- Yes, there will be new function
  - Not part of this discussion
- !! Not the solution to every problem !!

# The Basics

- Increase in real memory recommendations
  - Min now 4 GB but more recommended to accommodate DB2/TSM
- Increase in TSM DB size possible / probable
  - DB2 space will expand and contract based on workload
- Increase in overall recovery log size (up to 128 GB)
  - **Only support for roll-forward mode**
- DB Upgrade process includes:
  - Prepare current TSM server Database
  - Extract all DB entries from current TSM DB
  - Insert all DB entries into DB2 via TSM
  - Time consuming upgrade when compared to previous TSM software upgrades
- Fall back is re-install of previous code and DB
  - Potentially more complex than previously experienced
  - No exposure to data loss if you plan ahead

# What you get and what you do not get

- New database
  - DB2 is external to TSM, installed with TSM package
  - Must use the DB2 image that is installed with TSM
  - Don’t install on a system with DB2 already installed
- One-to-One relationship between TSM instance and database instance
  - No merge of multiple TSM instances into one database
  - Can run multiple TSM / database instances on same OS image
- No Cross platform upgrade
  - For instance, you cannot upgrade from TSM on Windows to TSM on AIX

# What you get and what you do not get

- Theoretical DB size will increase, BUT ...
  - Recommended maximum DB size will be limited initially – 1 TB
  - Plan for equivalent number of objects
  - New function will add to DB growth
- New Recovery Log mechanism
  - DB2 logs will require more disk space
  - Active and Archive logs
  - Comprises of 512MB files
  - Size depends on activity and DB Backup frequency
- Can **NOT** run different versions of TSM on same OS instance
  - Same restriction as prior releases

# Upgrade Utility

- Upgrade utility is a separate install package
  - Can coexist with existing TSM versions
  - Download DB Server-Upgrade Utility Package (from the ftp site)
    ftp://service.boulder.ibm.com/storage/tivoli-storage-management/maintenance/server-upgrade
  - Use an upgrade utility version that is greater than, or equal to, the level of the TSM server you are upgrading, is required; eg: a TSM 5.5.2 Server requires TSM 5.5.2 Upgrade Utility or higher
  - Installed on V5 server only - may require a system reboot on Windows

  Upgrade process:
  1. Upgrades existing DB to V5.5.x
  2. Extracts from existing V5.5.x database
  3. Inserts into DB2 using TSM server (not the utility itself)

- Source server is down during extract process
  - If TSM V5.5.x, existing TSM server can restart afterwards
  - If prior to V5.5.x, the DB needs to be restored first

# *Planning and Preparing for TSM v6*

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# Preparation

- READ documentation
  - TSM Server Upgrade Guide (SC23-9554-02 for V6.2)
  - TSM InfoCenter
  - READMEs for the DB Upgrade (latest updates)
- OS Levels
  - Be current – check web and documentation
  - Check SP and Maintenance Levels different for V6.1 and V6.2
- TSM Levels
  - Recommended starting point is TSM V5.5.2
  - May need to upgrade TSM clients
  - Automatic Deployment for Windows Clients with TSM V6.2
- Preparation could include:
  - DB unload/load might help extract process
  - DB audit
- Consider 24X7 requirements for TSM availability
  - Applications such as CDP, Content Manager, and Space Manager *assume* TSM server is always available
  - Customer DBs may need to backup logs hourly

# Preparation

- Disk space planning
  - Upgrade process creates new database
  - Determine and configure DB2 space before starting the upgrade
  - DB2 active and archive logs will need space
  - Raw logical volumes are no longer supported for the db and logs
- Time
  - How long can your TSM server be down ?
  - Estimate the extract and insert processes
  - Plan for 5GB/hr to 10GB/hr for an upgrade process
    - But that assumes a “normal” TSM workload
    - Content Manager DBs have more objects per GB, so they may be considerably slower when using GB/hr estimate
- Verify your monitoring applications support TSM V6
  - TSM Operational Reporting is not supported with V6
- TSM Health Check
  - Consider a TSM Health Check prior to upgrade.

# Preparation - Estimating Disk Requirements

| Item | Type | Same system Media | Same system Network | New system Media | New system Network |
|---|---|---|---|---|---|
| Active Log (1) | Disk | 16GB (Min) | 16GB (Min) | 16GB (Min) | 16GB (Min) |
| Log Mirror | Disk | Log Size | Log Size | Log Size | Log Size |
| Archive Log | Disk | Log Size + | Log Size + | Log Size + | Log Size + |
| V5 DB | Disk | Current DB | Current DB | 0 | 0 |
| V5 Rcvylog | Disk | Current Log | Current Log | 0 | 0 |
| DB2 DB (2) | Disk | DB Util% + 50% | DB Util% + 50% | DB Util% + 50% | DB Util% + 50% |
| DB Backup (2) | Seq Media | DB Util% | DB Util% | DB Util% | DB Util% |
| Extract(2) | Seq Media | DB Util% | 0 | DB Util% | 0 |
| | | | | | |
| Total Disk | Disk | | | | |
| Total Seq | Seq Media | | | | |

Note 1: Active log is a function of daily activity – increase to 48 GB for Dedup

Note 2: V6 DB, DBB, and Extract are a function of current DB utilization

# Preparation – Recommended for 100GB utilized db

| Item | Disk Size (allowing for growth) |
|---|---|
| Instance Directory (dsmserv.opt etc) | <1 GB |
| TSM Database | 200 GB |
| Active Log | 128 GB |
| Archive Log | 300 GB |
| Optional: Log mirror for the active log | |
| Optional: Secondary archive log (failover location for archive log) | |

# Preparation

- Picking the first TSM to upgrade
  - Ideal first candidate is small, stand-alone TSM
  - Do you use Library Sharing ?
    - Library Manager must be at a higher level that Library Clients
    - Library Clients must be at a supported level (V5.5 for TSM 6.2)
  - Do you use LANFree ?
    - Storage Agents must be at a supported level
- Multiple TSM instances
  - How many upgrades can you do in a weekend ?
  - IP Address and Interconnectivity considerations
  - If upgrade in place, must upgrade all TSM instances
- Test, test, test
  - Have a real test system
  - Test the upgrade process
    - Test upgrade with a large DB to make your own estimate of time
  - Test the back-out procedure
  - Test the upgraded database

# TSM Storage Agent and Library Client Compatibility

| If you have a TSM Server at this level: | It is compatible and is supported with these TSM Storage Agent and Library Client Levels |
|---|---|
| Tivoli Storage Manager Version 6.2 | Versions 6.2, 6.1, and 5.5 |
| Tivoli Storage Manager Version 6.1 | Versions 6.1, 5.5, and 5.4 |
| Tivoli Storage Manager Version 5.5 | Versions 5.5, 5.4, and 5.3 |
| Tivoli Storage Manager Version 5.4<br>▪ **an extended-support contract is required for 5.3 storage agents, except for the 5.3.6.3 storage agents for Sun Solaris 8, Linux x86 RHEL3, and Windows 2000. | Versions 5.4, and 5.3 ** |

# TSM Client/Server Compatibility

| If you have a TSM client at this Level: | It is compatible and is supported with these TSM Servers/Storage Agents Levels |
|---|---|
| Tivoli Storage Manager Version 6.2 | Versions 6.2, 6.1 and 5.5 |
| Tivoli Storage Manager Version 6.1 | Versions 6.2, 6.1 and 5.5 |
| Tivoli Storage Manager Version 5.5 | Versions 6.2, 6.1, 5.5 and 5.4 |
| Tivoli Storage Manager Version 5.4** | Versions 6.1, 5.5 and 5.4 |

- **5.4 clients do include the special 5.3.6-level clients (Window 2000, Solaris 8, and Linux x86 RHEL 3) until 90 days after the vendor of those special client OS levels ends regular support

# Recommended Memory Requirements

- TSM 6.2 requires significantly more memory per instance than TSM 5.

| Server | Non Dedup | Dedup |
|---|---|---|
| * Windows 32 bit | 8 GB | n/a |
| Windows 64 bit | 12 GB | 16 GB |
| AIX 64 bit | 12 GB | 16 GB |
| Linux 64 bit | 12 GB | 16 GB |
| Solaris 64 bit | 12 GB | 16 GB |

* only 1 instance allowed

# Preparing for the Upgrade

1. Check upgrade documentation for changes.
2. Check prerequisites (prc/mem/disk and OS).
3. Download and install the TSM Upgrade Utilities  (V5 server only).
4. Prepare space for upgrade – V6 will require more space than V5.
5. Modify server before upgrade.
   - reusedelay settings on storage pools – may need to go back to V5
   - delete volhist type=dbb todate=-(number of days to go back to)
6. Disable sessions.
7. Backup storage pools.
8. Backup TSM database.
9. Backup volhist and devconfig.
10. Make copies of dsmserv.opt, dsmserv.dsk, devconig and volhist.
11. Run sample commands across TSM V5 DB to text file..
12. Stop TSM server – Halt.

# Preparing for the Upgrade

- Run the sample scripts against TSM V5 database just before upgrade. Example in chapter 11 of the TSM Upgrade Guide.

```
select node_name, count(*) as "Number of Filespaces" from filespaces group by node_name order by
select platform_name, count(*) as "Number of Nodes" from nodes group by platform_name
select count(*) as "Number of Administrators" from admins
select node_name,sum(num_files) as "Number of Backup Files" from occupancy where type='Bkup'
group by node_name
select node_name,sum(num_files) as "Number of Archive Files" from occupancy where type='Arch'
group by node_name
select count(*) as "Number of Schedule Associations" from associations
select count(*) as "Number of Backupsets" from backupsets
select count(*) as "Number of Client Option Sets" from cloptsets
select count(*) as "Number of Collocation Groups" from collocgroup
select count(*) as "Number of Archive CopyGroups" from ar_copygroups
select count(*) as "Number of Backup CopyGroups" from bu_copygroups
select count(*) as "Number of Data Movers" from datamovers
select count(*) as "Number of Device Classes" from devclasses
select count(*) as "Number of Domains" from domains
select count(*) as "Number of Drives" from drives
select count(*) as "Number of Libraries" from libraries
select count(*) as "Number of Library Volumes" from libvolumes
select count(*) as "Number of Volumes" from volumes
select count(*) as "Number of Management Classes" from mgmtclasses
select count(*) as "Number of Node Groups" from nodegroup
select count(*) as "Number of Device Paths" from paths
select count(*) as "Number of Policy Sets" from policysets
select count(*) as "Number of Client Schedules" from client_schedules
select count(*) as "Number of Admin Schedules" from admin_schedules
select count(*) as "Number of Server Scripts" from scripts
select count(*) as "Number of Servers Defined" from servers
select count(*) as "Number of Servers Groups Defined" from server_group
```

# *Upgrade Methods to TSM V6*

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# Upgrade Methods

The following methods can be used to upgrade a TSM 5.x DB to TSM V6:

1. Upgrade to new system, using external media  (disk or tape)
2. Upgrade to new system, using network
3. Upgrade in place (on same system), using external media  (disk or tape)
4. Upgrade in place (on same system) using network
5. TSM Export/Import from 5.x -> 6
   - TSM Export/Import supported from 5.x -> V6 (server-to-server or external media to new system only)
   - Not backward compatible. (V6 -> 5.x export/import is **not** supported)

# Upgrade Methods

- Upgrading the DB and not doing TSM Export/Import, you have 2 choices:
  - Upgrade using command line utilities – manual process
    - DB2 utilities
    - Dsmupgrd preparedb, dsmupgrd extractdb, dsmserv insertdb
  - Upgrade using TSM Upgrade Wizards
    - **Highly** recommended to use these
    - Less complex than command line utilities
    - Not only is the DB upgrade done, but the ability to do DB Backups is also mostly configured.
    - Wizard will also create & configure your server/database instance for you prior to doing the upgrade
    - Wizards are supported on all TSM Server platforms

# Phases of the Database (DB) Upgrade Process

| Phase | Notes |
|---|---|
| DB Backup<br>(Occurs on Source Server) | |
| DSMUPGRD PREPAREDB<br>(Occurs on Source Server) | Prepares 5.x DB for upgrade, Does the following:<br>1. Does an upgrade of DB to 5.5.<br>2. Checks for known Database problems.<br>3. Backs up devconfig file to configured devconfig files.<br><br>Should finish in around 10 minutes |

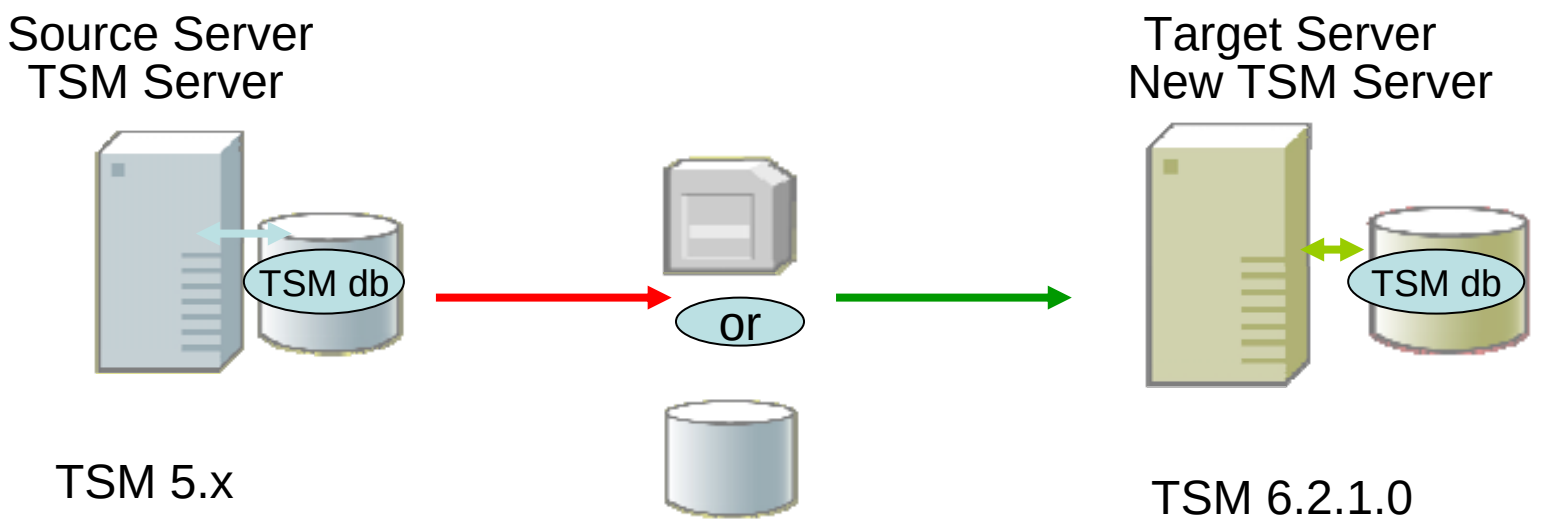
# Phases of the DB Upgrade Process

| Phase | Notes |
|---|---|
| DSMUPGRD EXTRACTDB<br>(Occurs on Source Server) | Extracts DB to either media or sends it over the network.<br><br>If writing to media, this step takes about as long as a DB Backup.<br><br>If writing to network, it depends on network speed or speed of insertdb process. |
| DSMSERV LOADFORMAT<br>(Occurs on Target Server) | Creates the instance, Initializes the new DB, and does an initial backup of the new DB.<br>This step takes around 10 minutes. |

# Phases of the DB Upgrade Process

| Phase | Notes |
|---|---|
| DSMSERV INSERTDB<br>Insert records<br>(Occurs on Target Server) | Inserts information into DB using the DB2 load utility. Speed is hardware dependent. See performance section. Expect 5 -10 GB/hr for this part |
| DSMSERV INSERTDB<br>Integrity Check<br>(Occurs on Target Server) | Builds the table Indices and verifies the integrity of the tables. This phase may take as long as the previous phase. |
| DSMSERV INSERTDB<br>Update phase<br>(Occurs on Target Server) | The update phase updates selected records in the TSM 6 database to conform to the requirements of TSM 6. Mostly used to merge information from multiple TSM 5.5 tables into a single TSM 6 table. Again, this phase takes about as long as the previous insertdb phases. |

# Upgrade to New System External Media



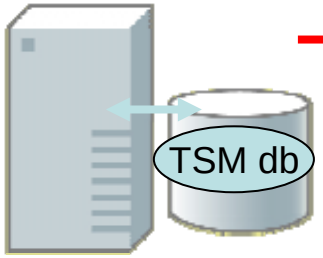

1. Dsmupgrd preparedb
2. dsmupgrd extractdb

3. Install TSM 6.2.1
4. dsmserv loadformat
5. dsmserv insertdb manifest

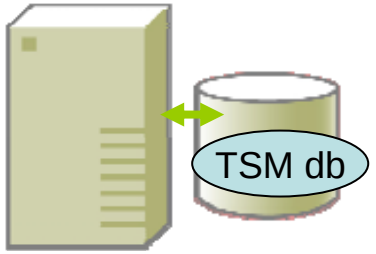
Extractdb/dsmserv insertdb

# Upgrade to New System Network

Source Server
TSM Server




Target Server
New TSM Server




TSM 5.x

TSM 6.2.1.0
DB2 V9.7

1. Dsmupgrd preparedb

4b. dsmupgrd extractdb

2. Install TSM 6.2.1

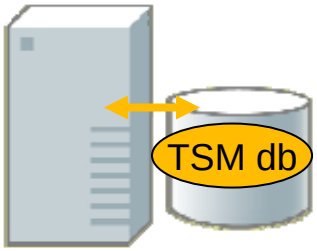
3. dsmserv loadformat

4a. dsmserv insertdb

Extractdb/dsmserv insertdb

# Upgrade In-Place Process External Media

TSM Server




TSM 5.x

1. dsmupgrd preparedb
2. dsmupgrd extractdb

or

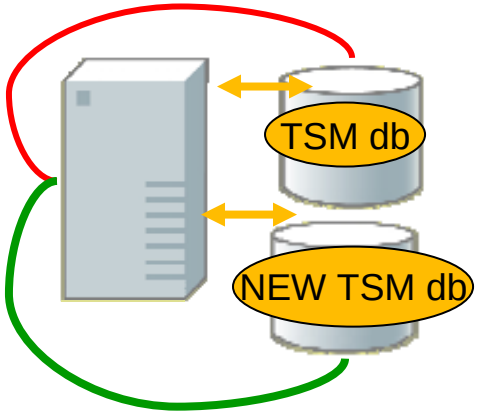
Extractdb dsmserv insertdb

TSM 6.2.1.0
DB2 V9.7

3. Remove TSM 5.x code
4. Install TSM 6.2.1
5. dsmserv loadformat
6. dsmserv insertdb manifest

# Upgrade In-Place Process Network

TSM Server




TSM 5.x

1. Dsmupgrd preparedb

5b. dsmupgrd extractdb

TSM 6.2.1.0

2. Remove TSM 5.x code

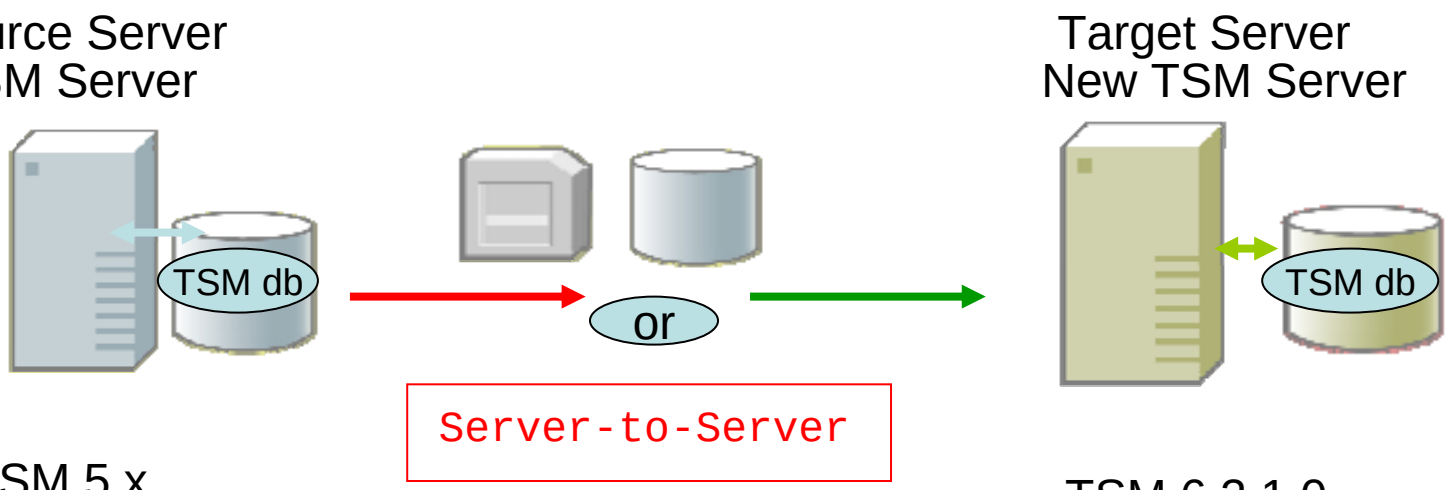
3. Install TSM 6.2.1

4. dsmserv loadformat

5a. dsmserv insertdb

Extractdb dsmserv insertdb

# TSM Export/Import to New System Process



# Why Use the DB Upgrade Wizards?

- They ***greatly*** simplify the upgrade process. Here is a **portion** of the process flow for one of the upgrade methods (upgrade to new system using network) after V6 install completed for Windows:
  1. Run the dsmupgrd preparedb command on source TSM 5.x system, check for errors.
  2. Create the userid,  instance directories, DB/LOG for the instance.
  3. Login with instance user.
  4. For all the directories that were created, Ensure the access permissions are set correctly.
  5. Change the access permissions for the storage disk pools so that the instance ID can write to them.
  6. Create the DB2 instance using the db2icrt command

# Why use the DB Upgrade Wizards?

7. Copy the original V5 dsmserv.opt, devconfig and volhist file to new TSM server. Remove any obsolete options from dsmserv.opt
8. Set the DB2 default path variable using the following db2 command:

   db2 update dbm cfg using dftdbpath
9. Format the new database using dsmserv loadformat, check for errors
10. Start the insert process on target server (dsmserv insertdb), wait for message ANR1336I indicating source server can be started.
11. When ANR1336I issued, now start source server (dsmupgrd extractdb)
12. Monitor for completion, and then check for errors.
13. Configure DB backup for TSM V6.
14. Create a Windows service for the TSM instance.

OR …Just use the DB Upgrade Wizard.

# *Example – Windows in place network upgrade using wizard*

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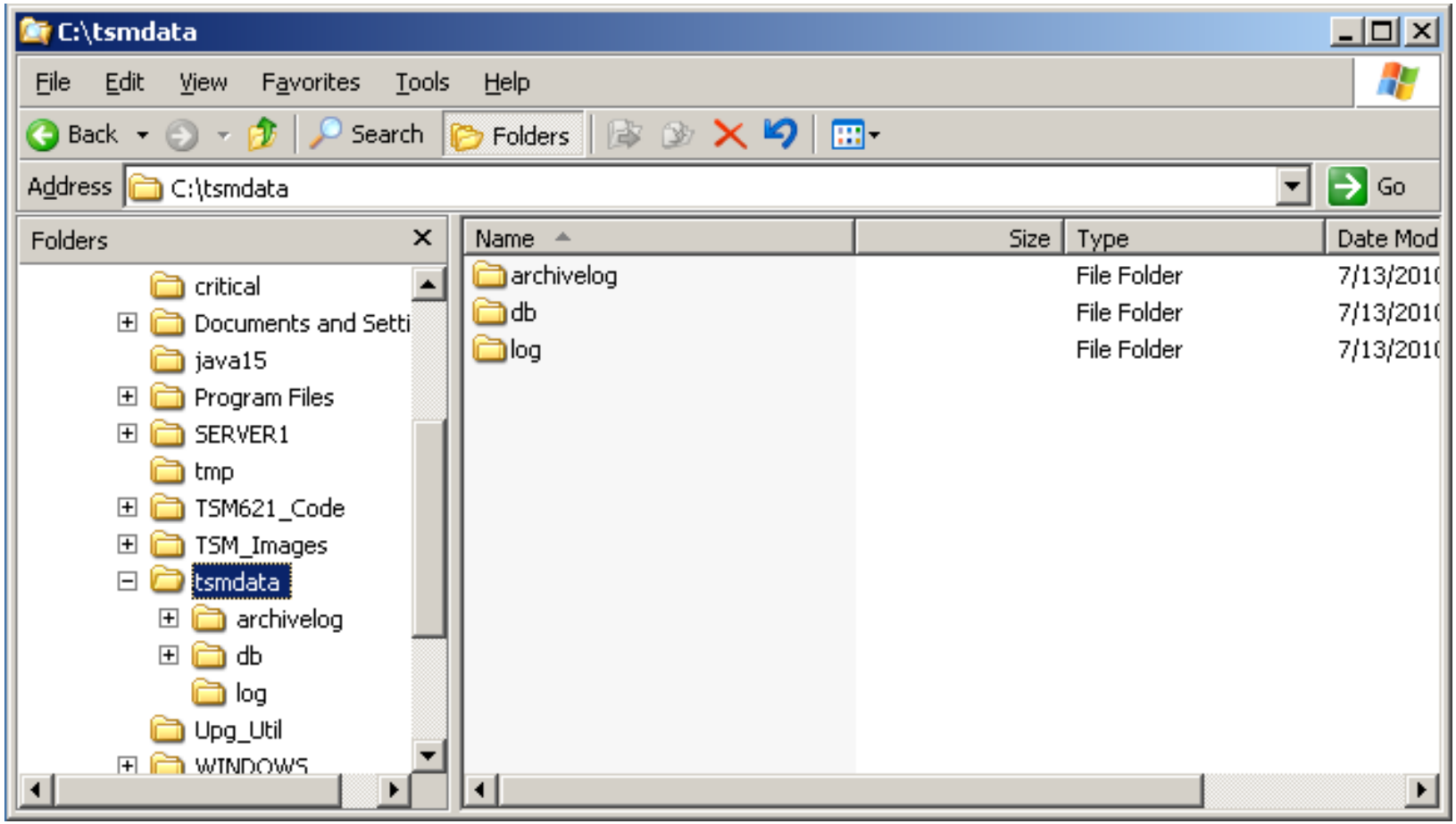
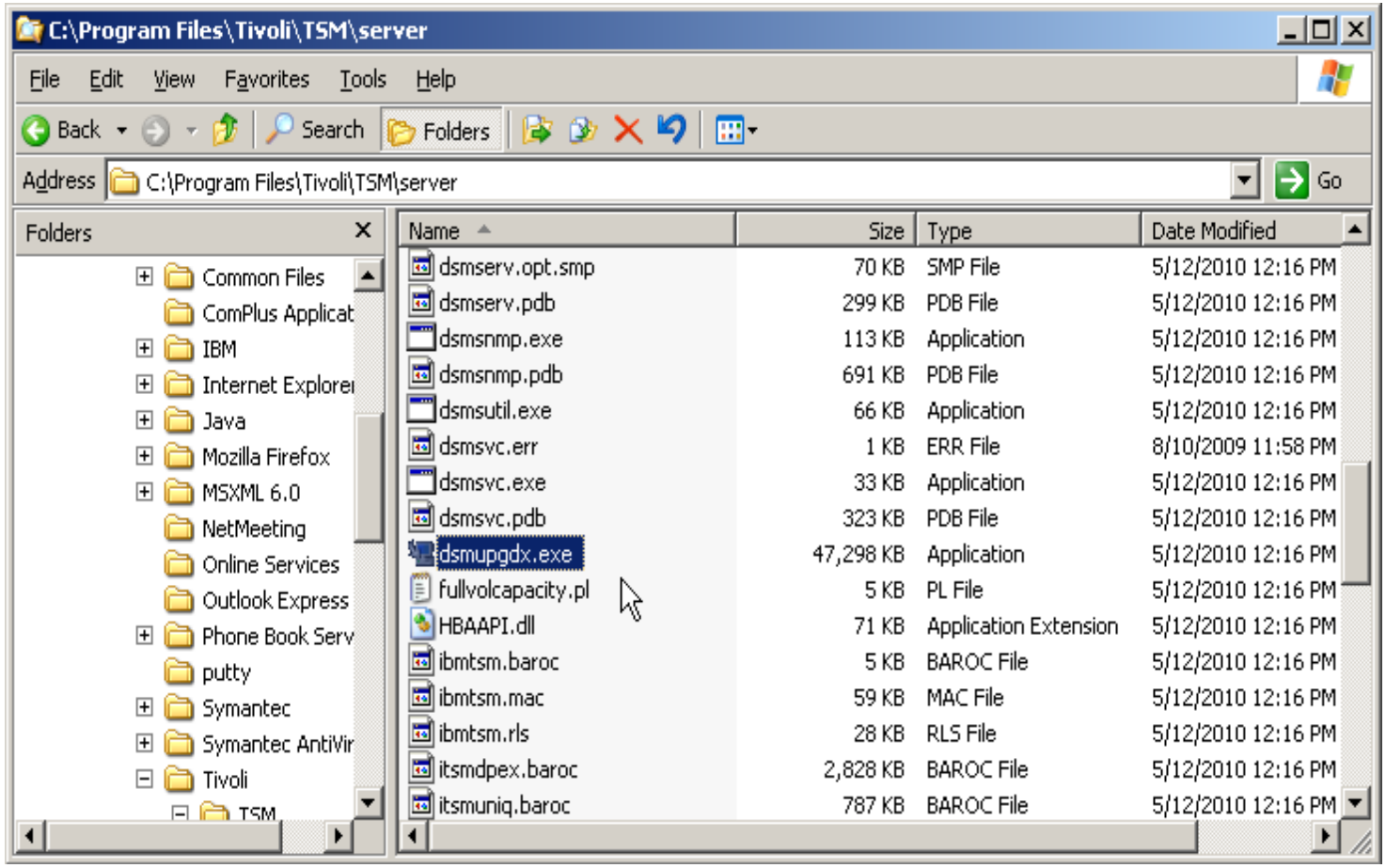
# This example assumes that the following steps have already been completed

- TSM Upgrade Utility has been installed (5 mins)
- TSM V5 software has been removed (5 mins)
- TSM V6 software had been installed (20 mins)

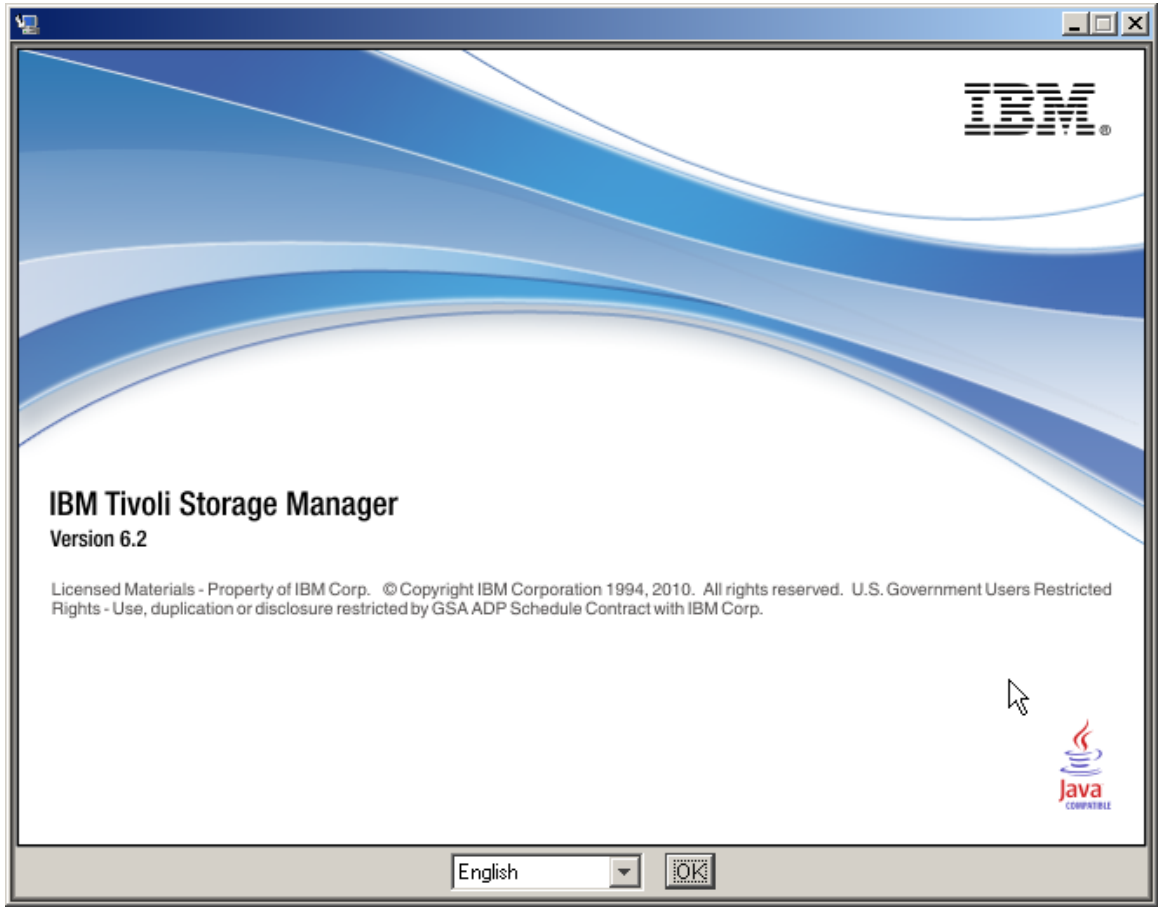
# Create new TSM directory structure



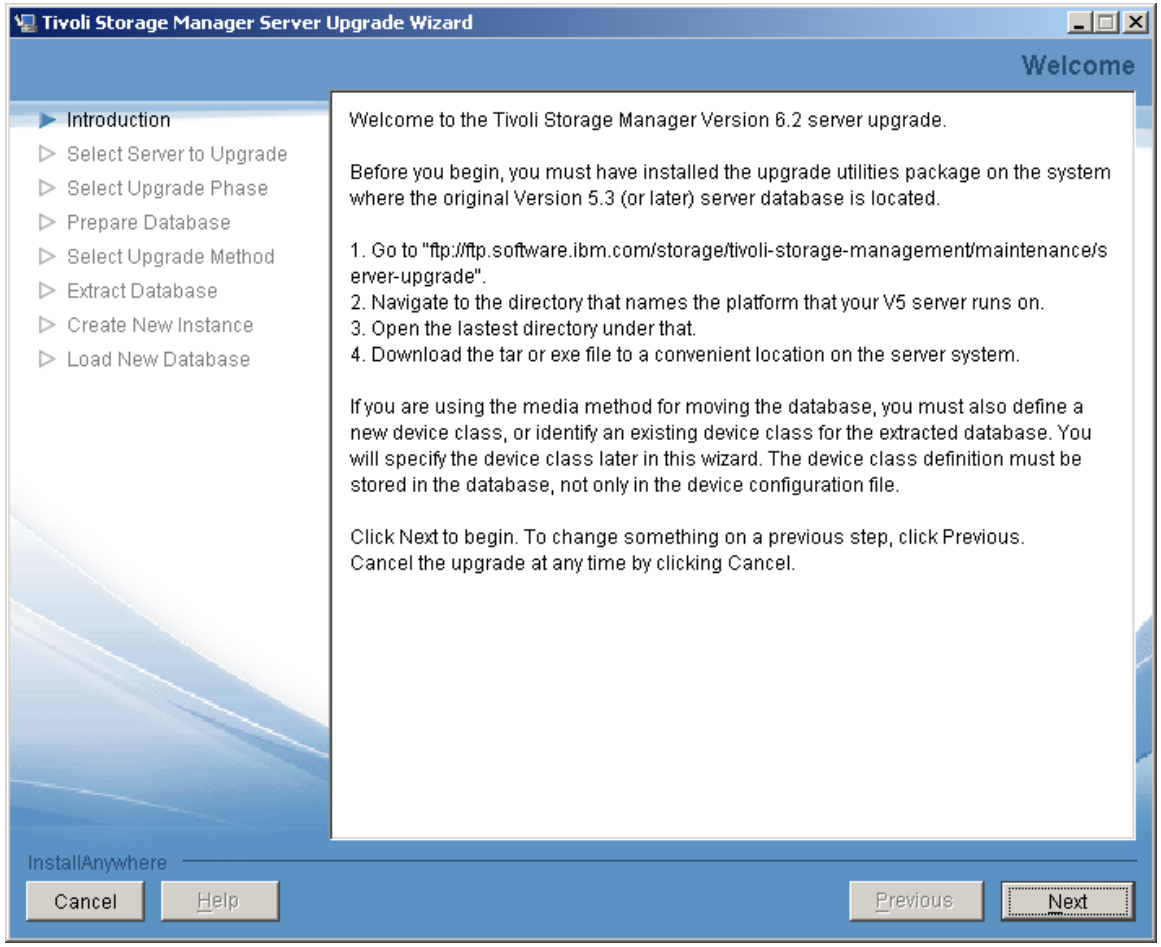
# Run the TSM upgrade wizard – dsmupgdx.exe



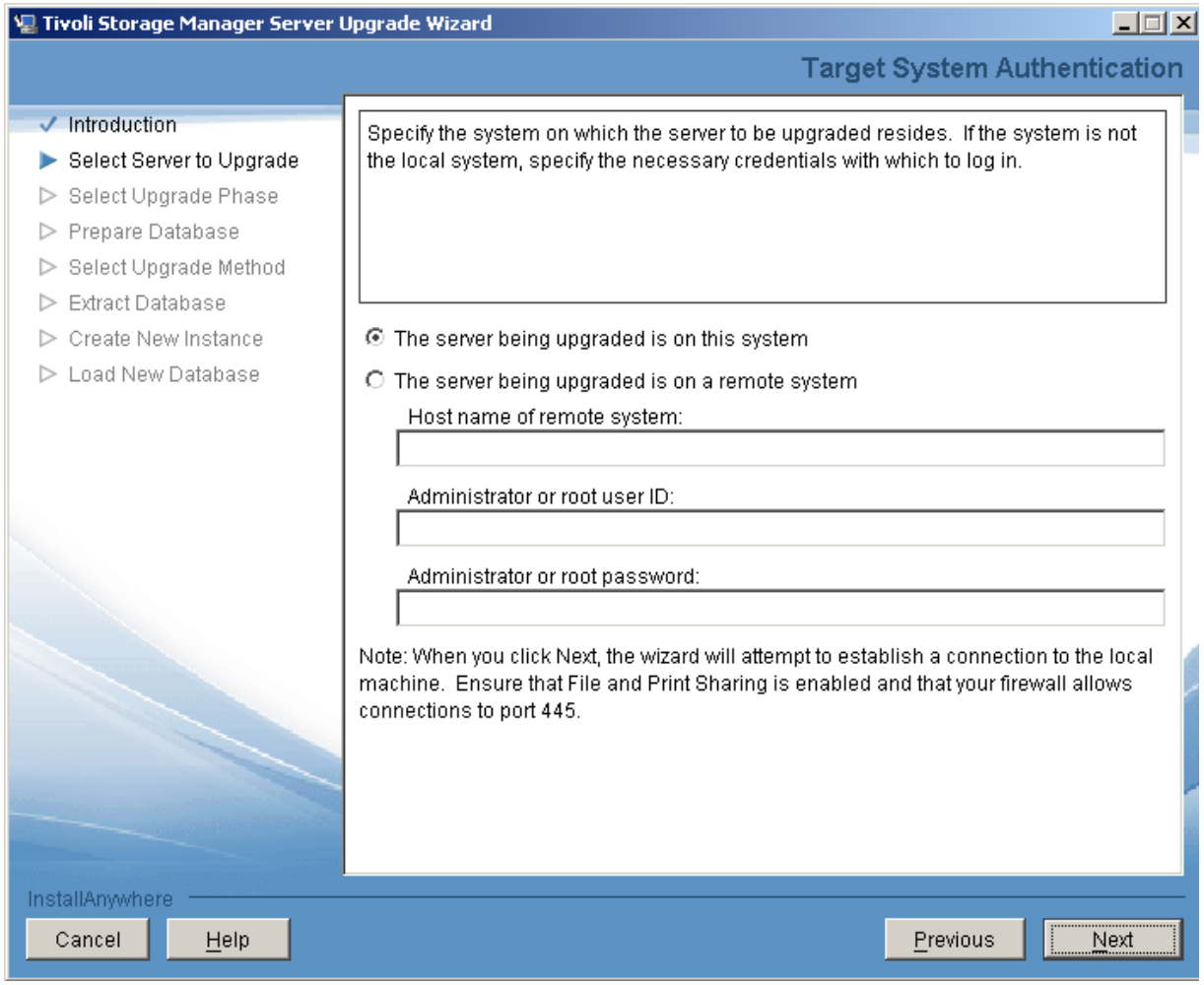
# TSM upgrade wizard – language screen



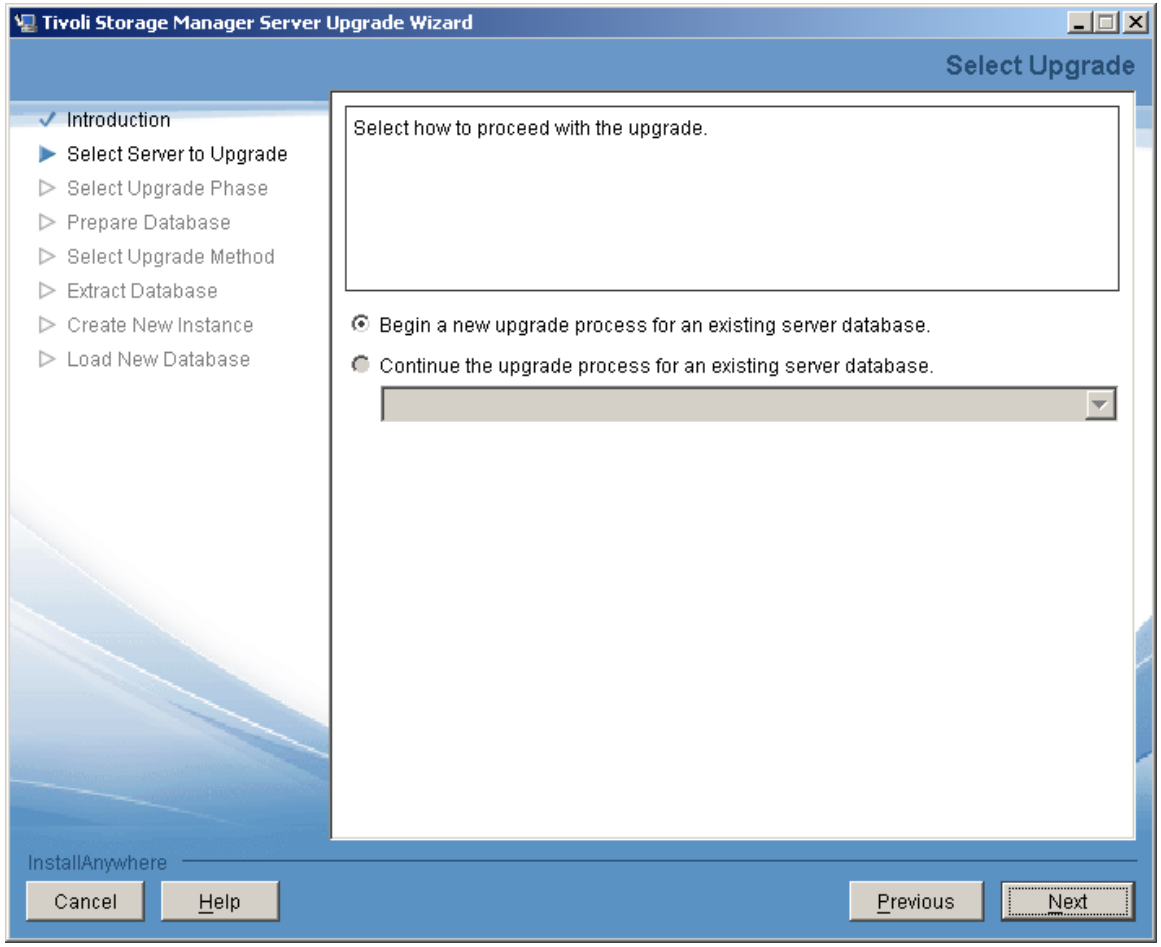
# TSM upgrade wizard – intro screen



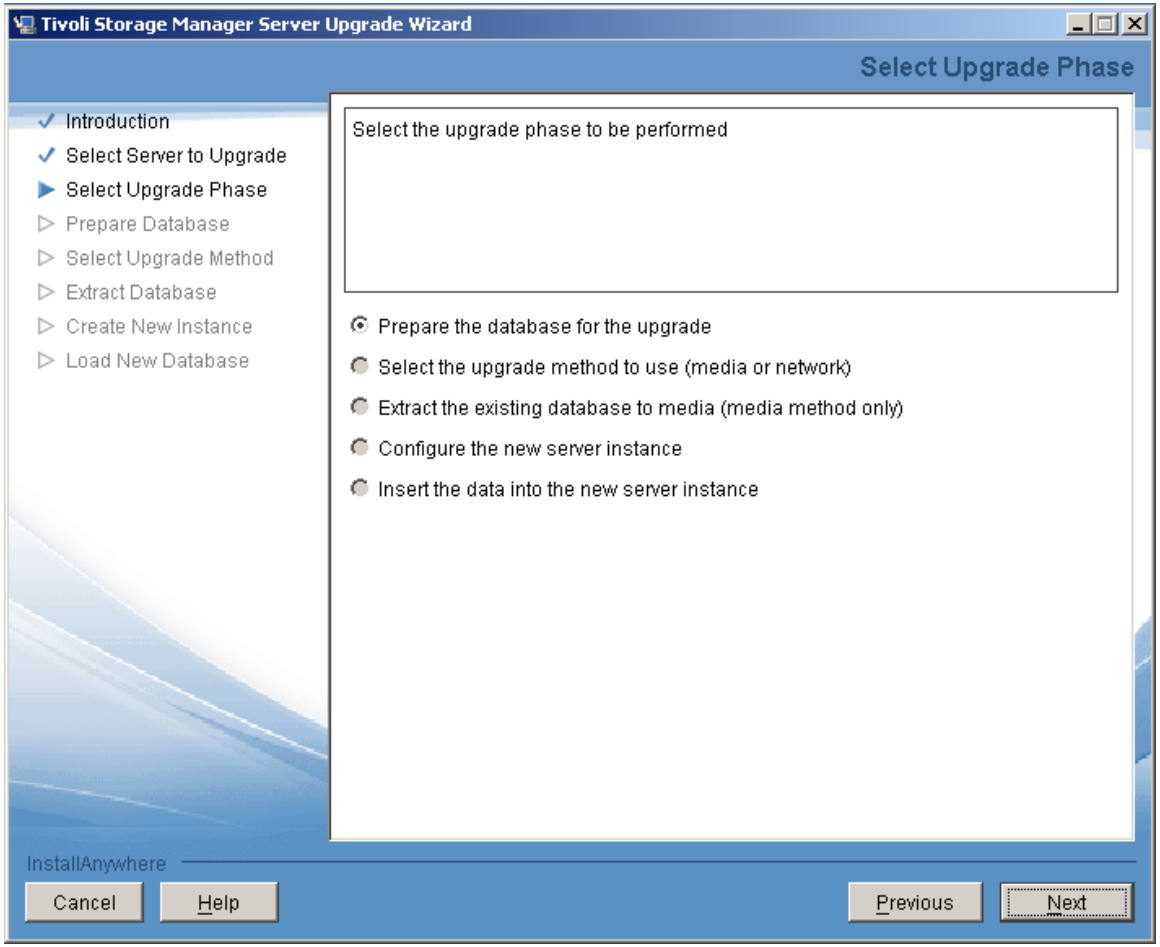
# TSM upgrade wizard – select upgrade type



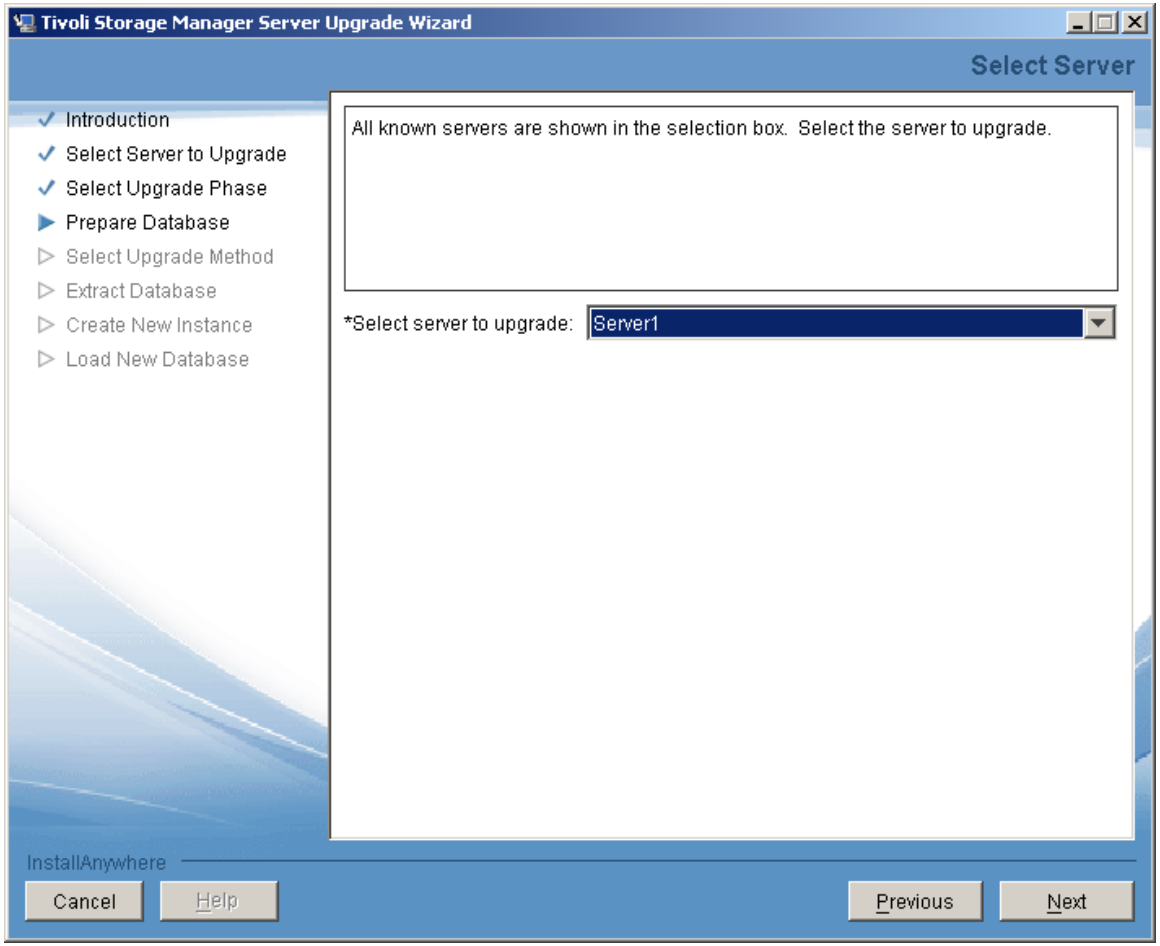
# TSM upgrade wizard – select new upgrade



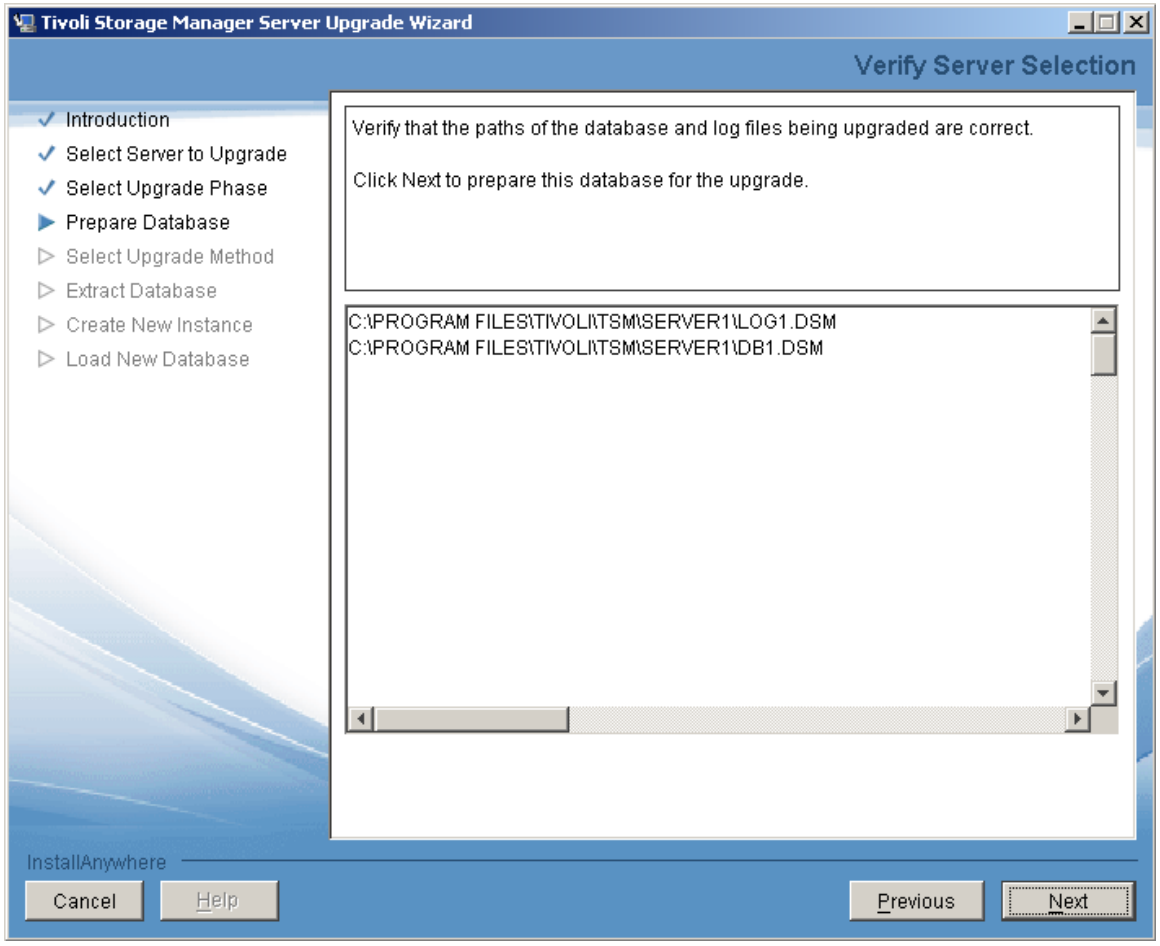
# TSM upgrade wizard – select prepare db



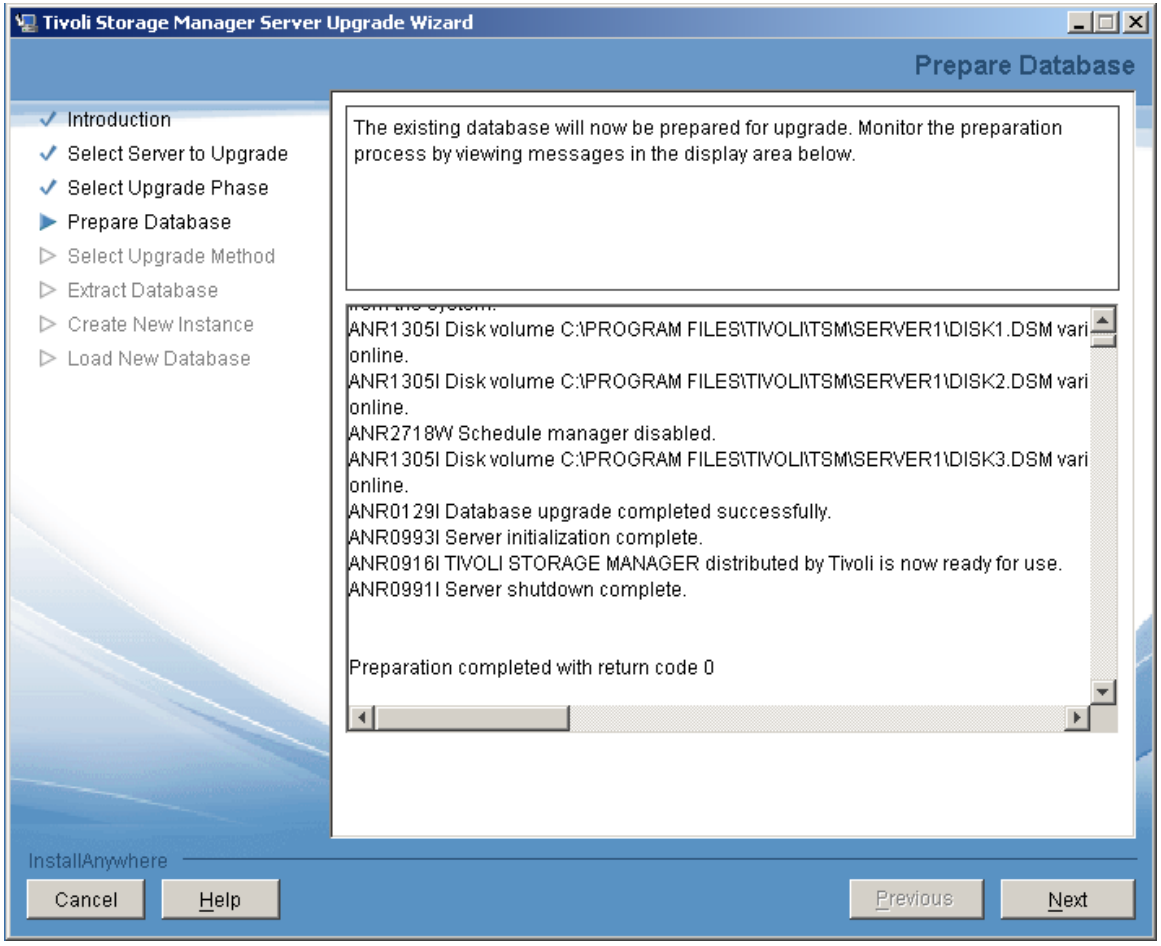
# TSM upgrade wizard – select server to prepare



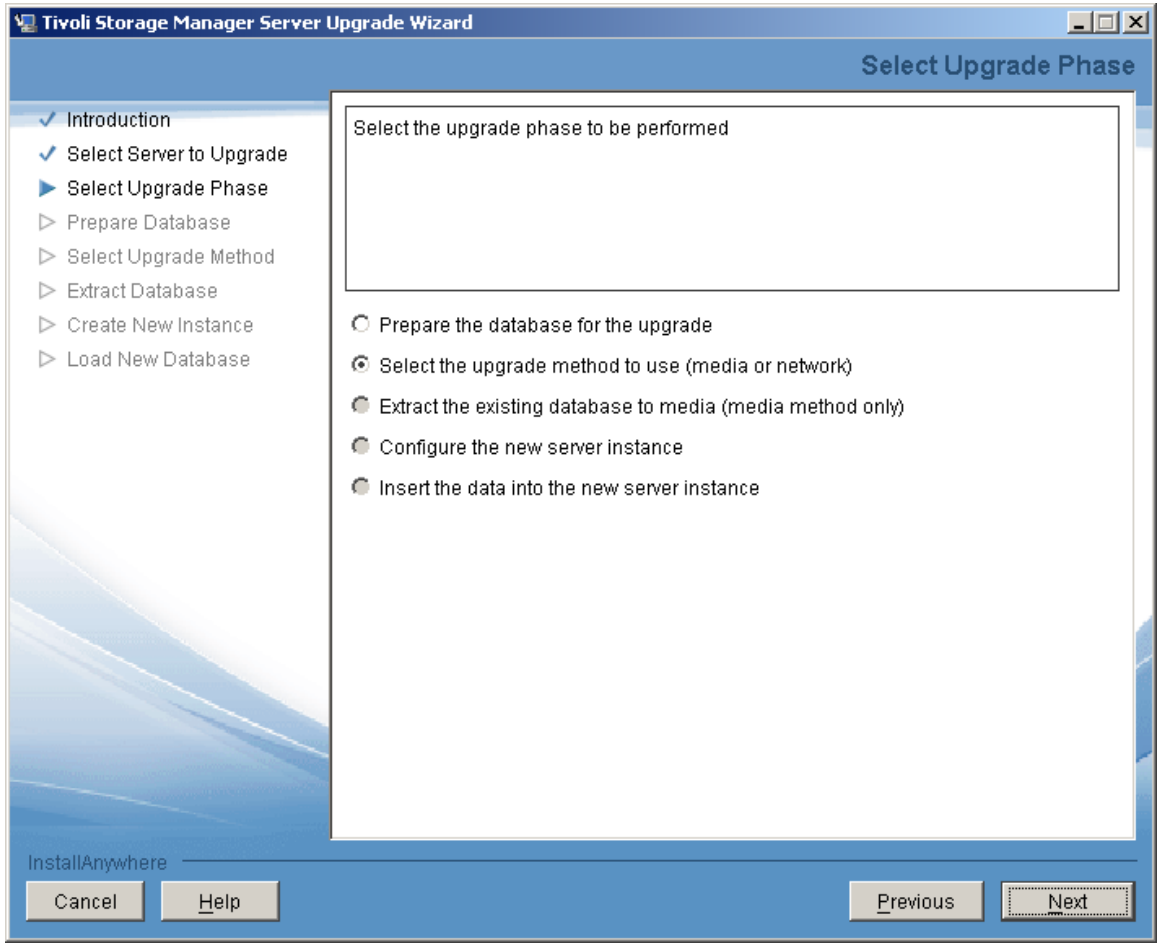
# TSM upgrade wizard – verify V5 db and log files



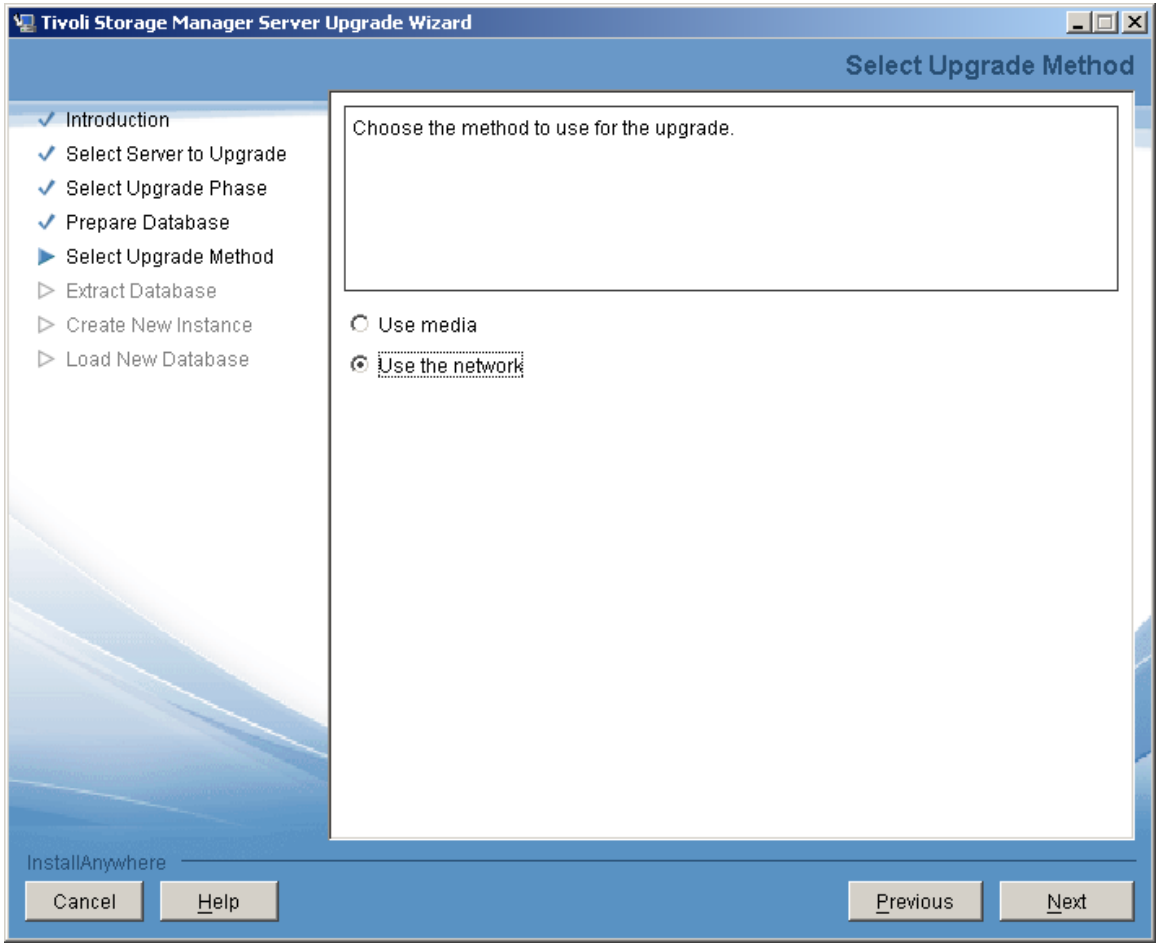
# TSM upgrade wizard – prepare db completes



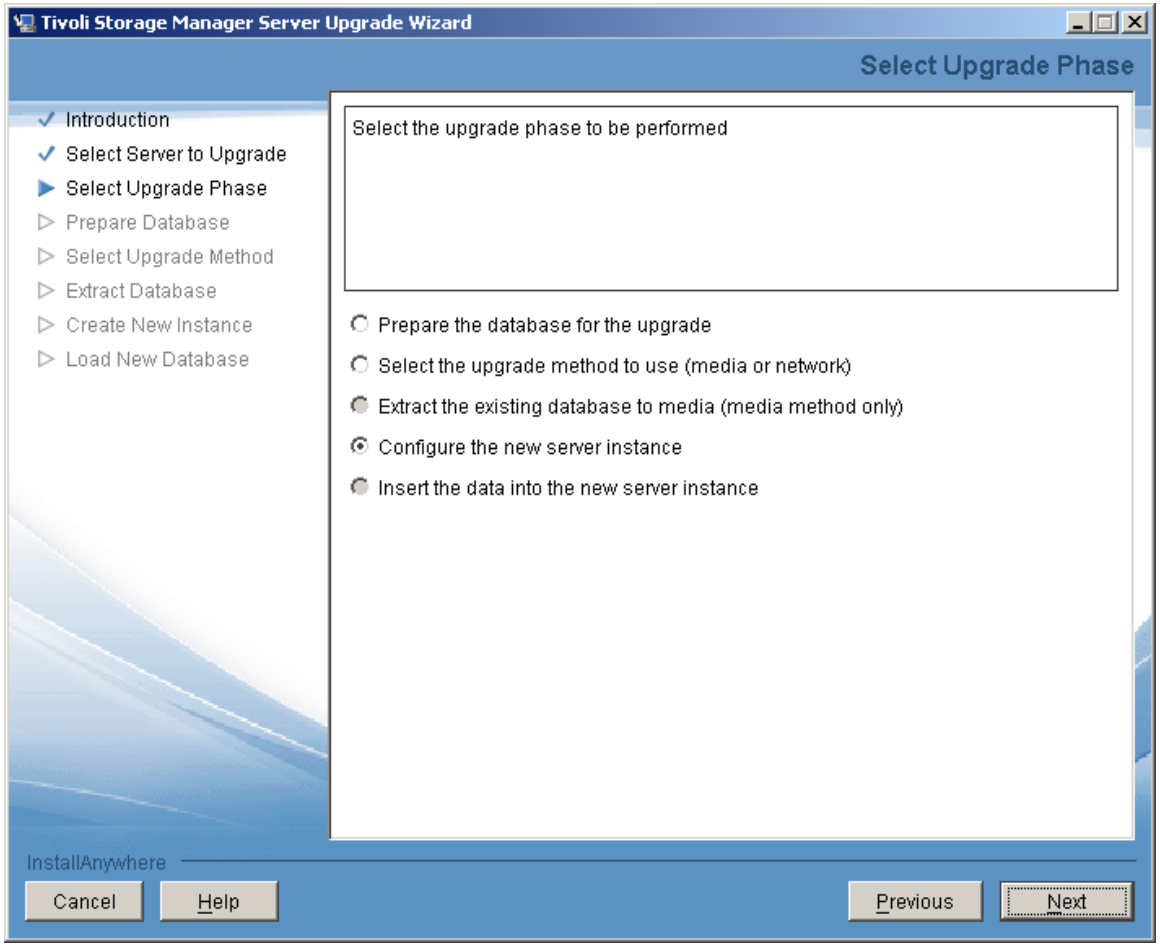
# TSM upgrade wizard – select upgrade method



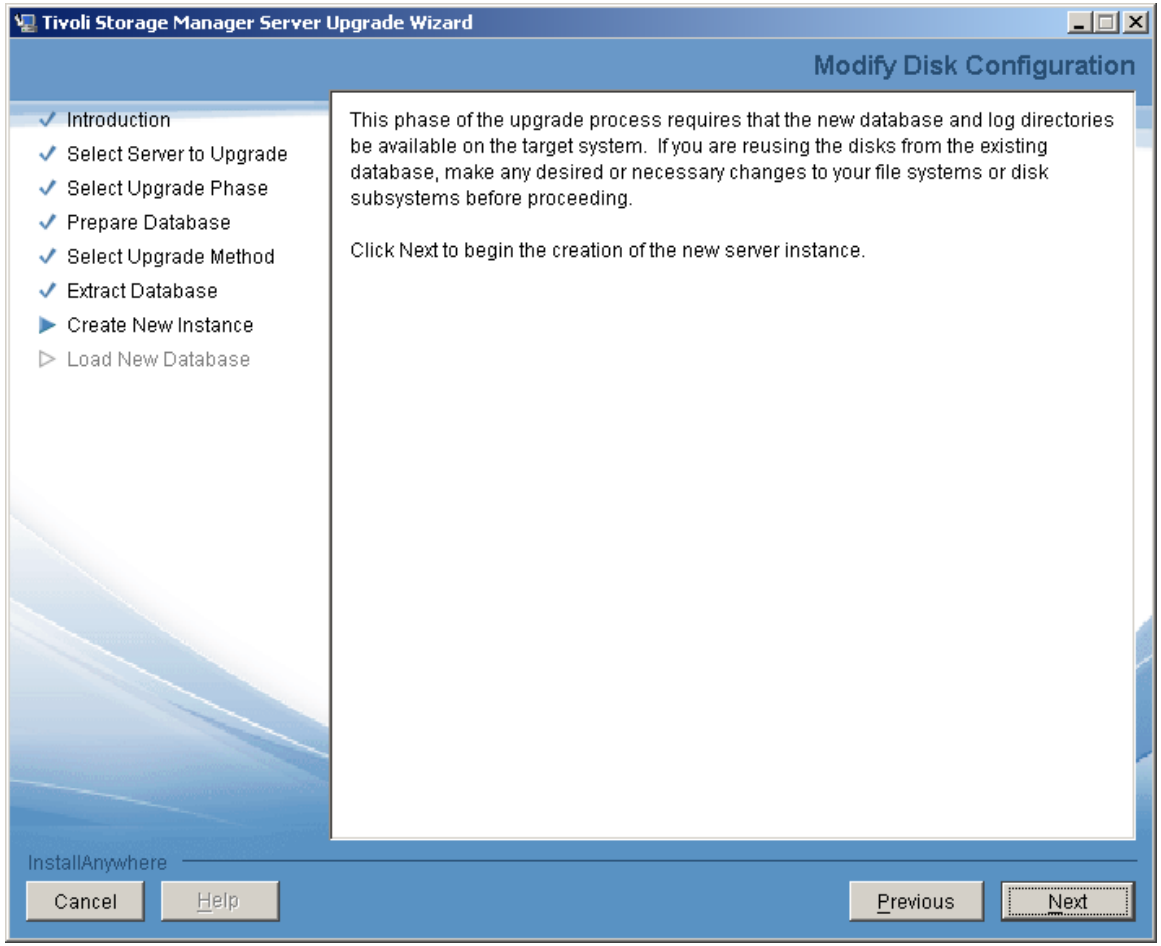
# TSM upgrade wizard – select ‘Use the network’



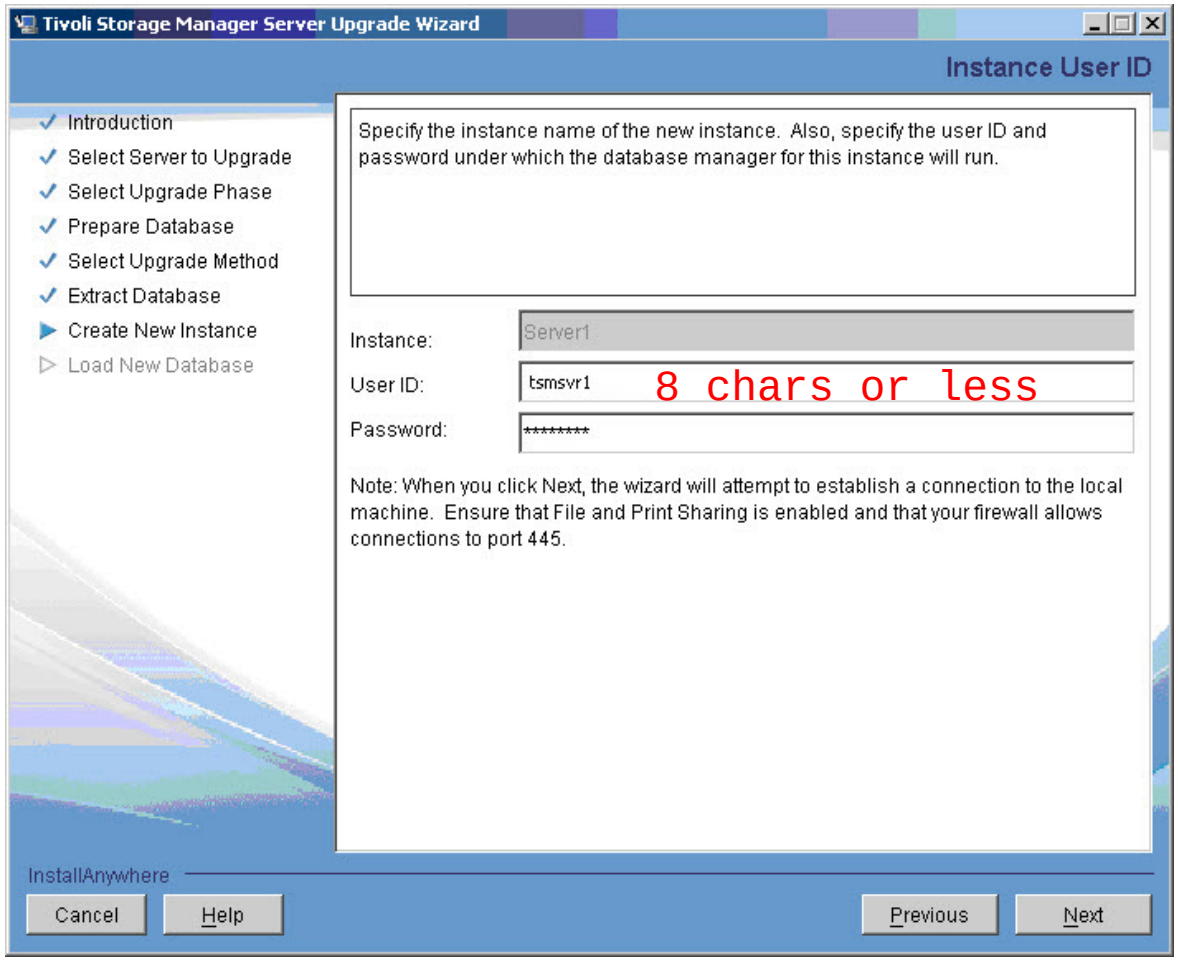
# TSM upgrade wizard – configure new instance



# TSM upgrade  wizard – new disk structure must be in place before continuing



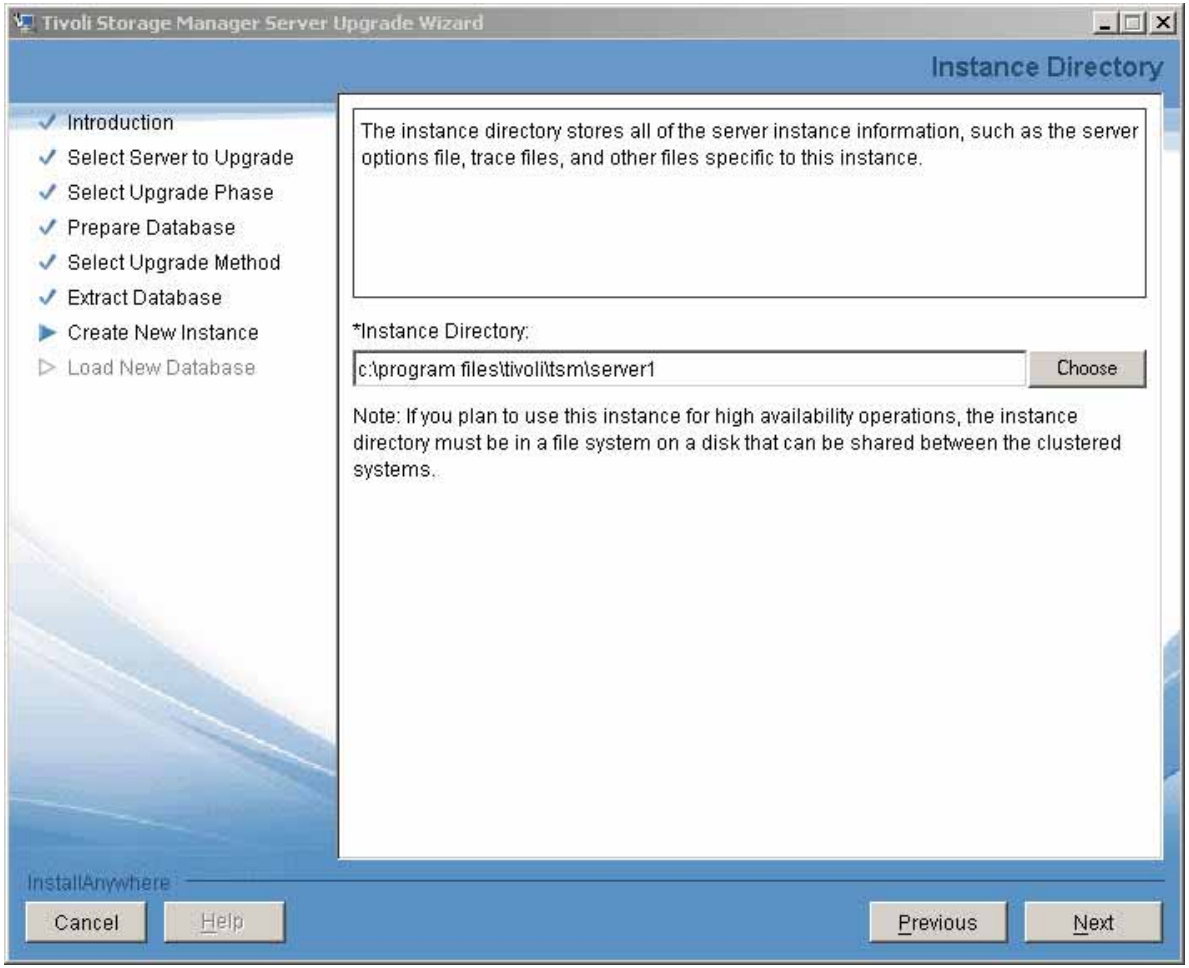
# TSM upgrade wizard – enter instance userid



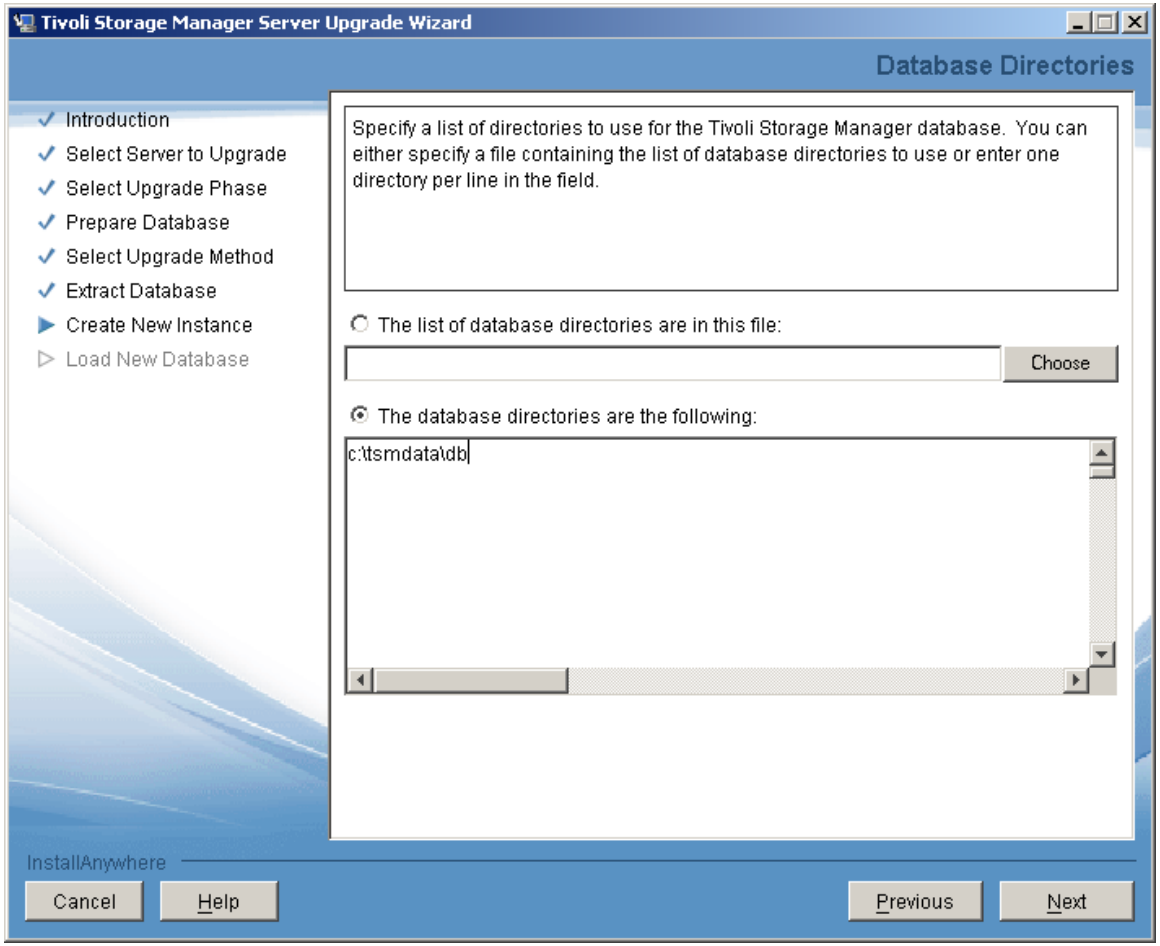

**Unix**
unique user id per instance

**Windows**
can use same user id for all instances

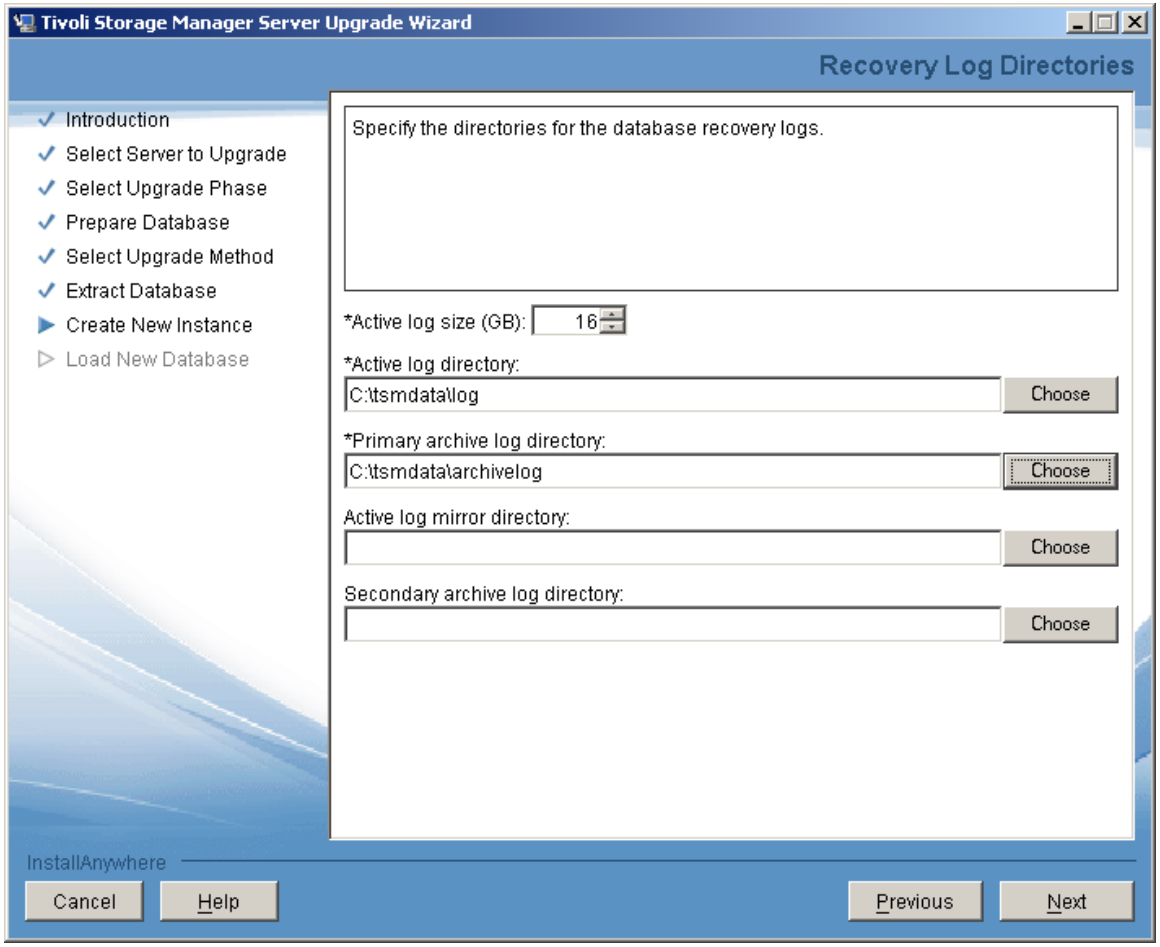
# TSM upgrade  wizard – select server instance dir



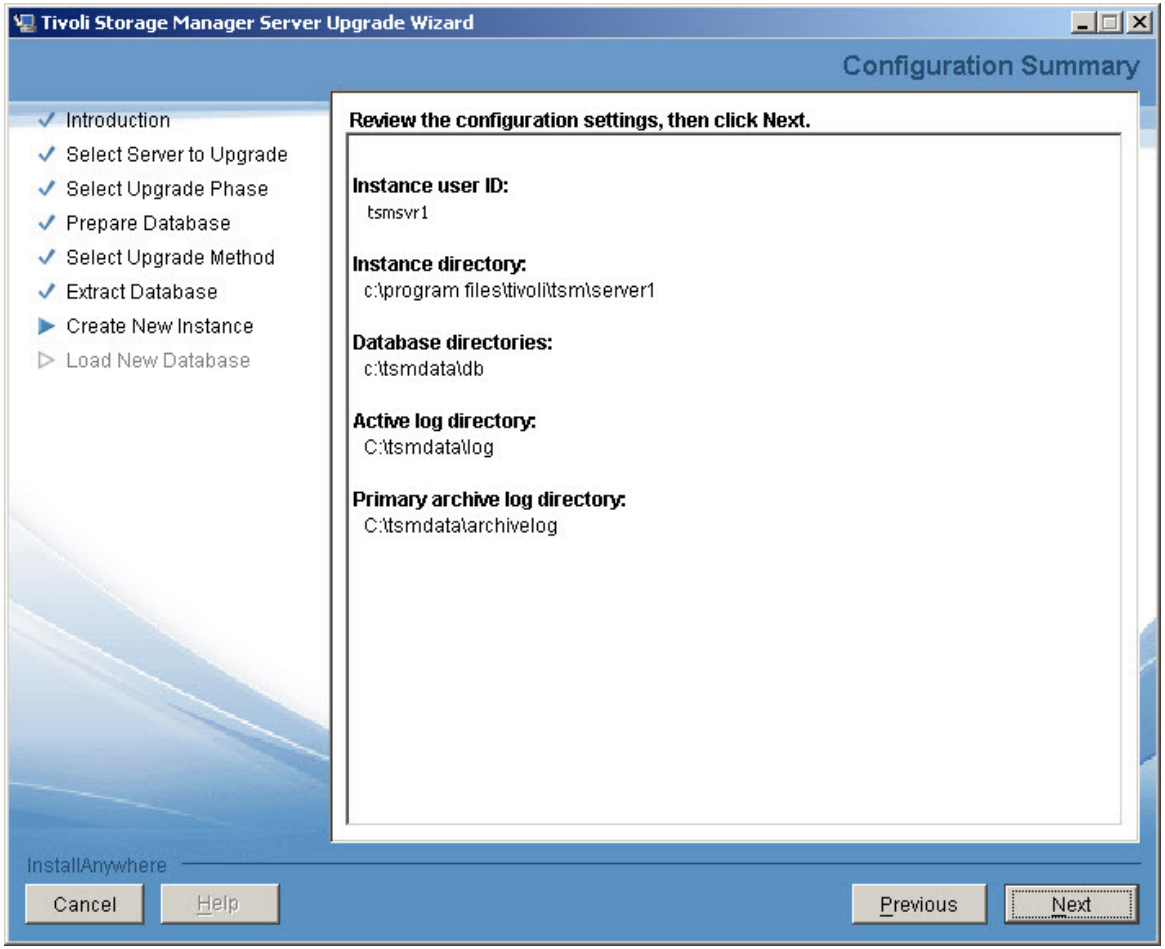
# TSM upgrade  wizard – enter tsm db directories



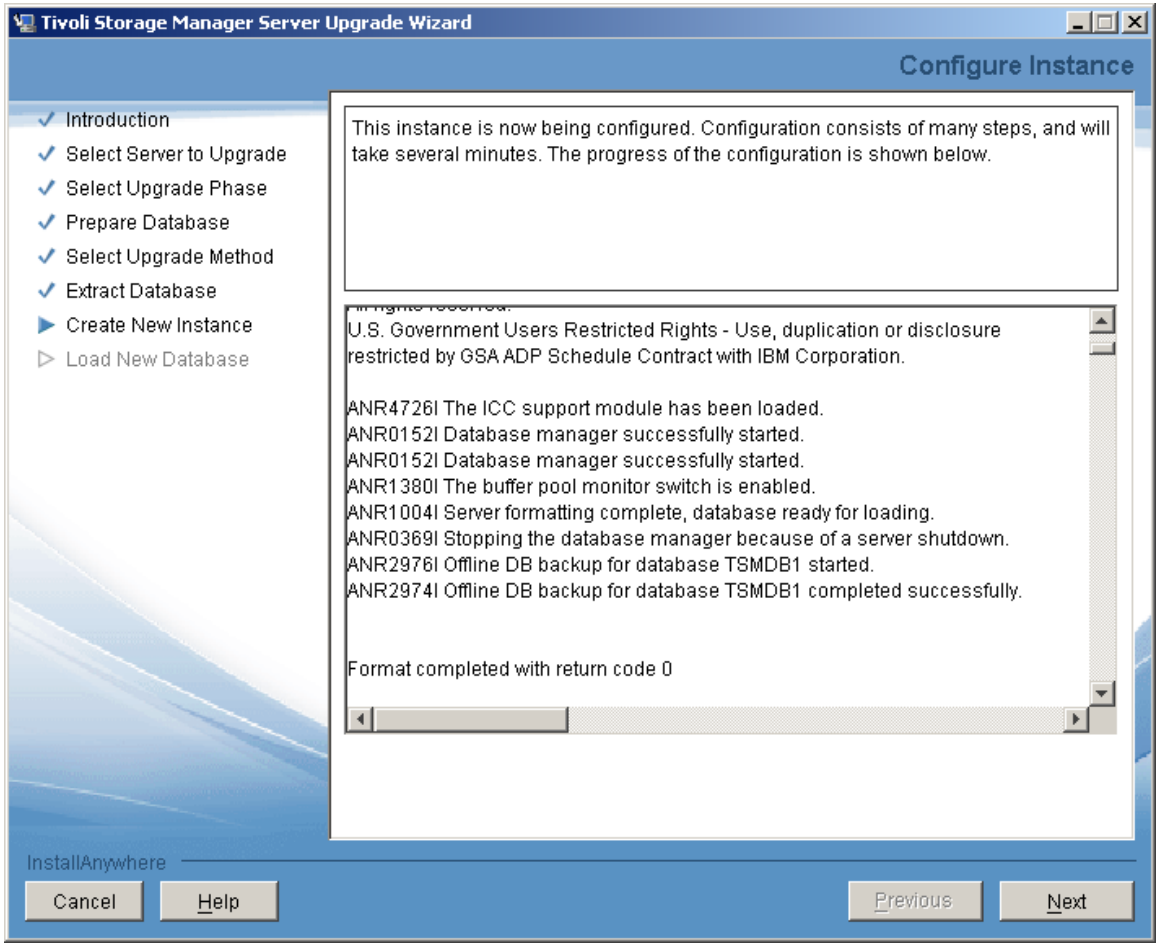
# TSM upgrade wizard – enter log size and dirs



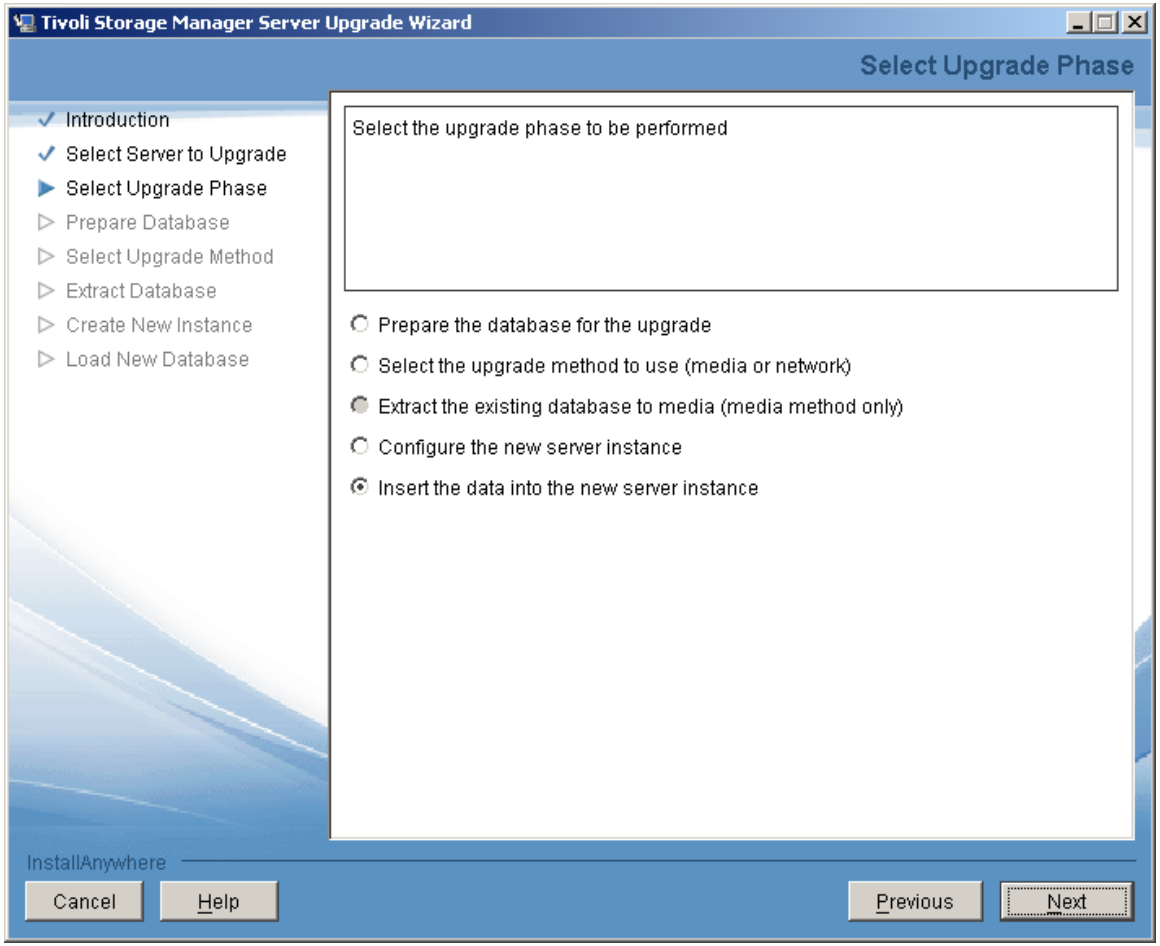
# TSM upgrade wizard – review configuration



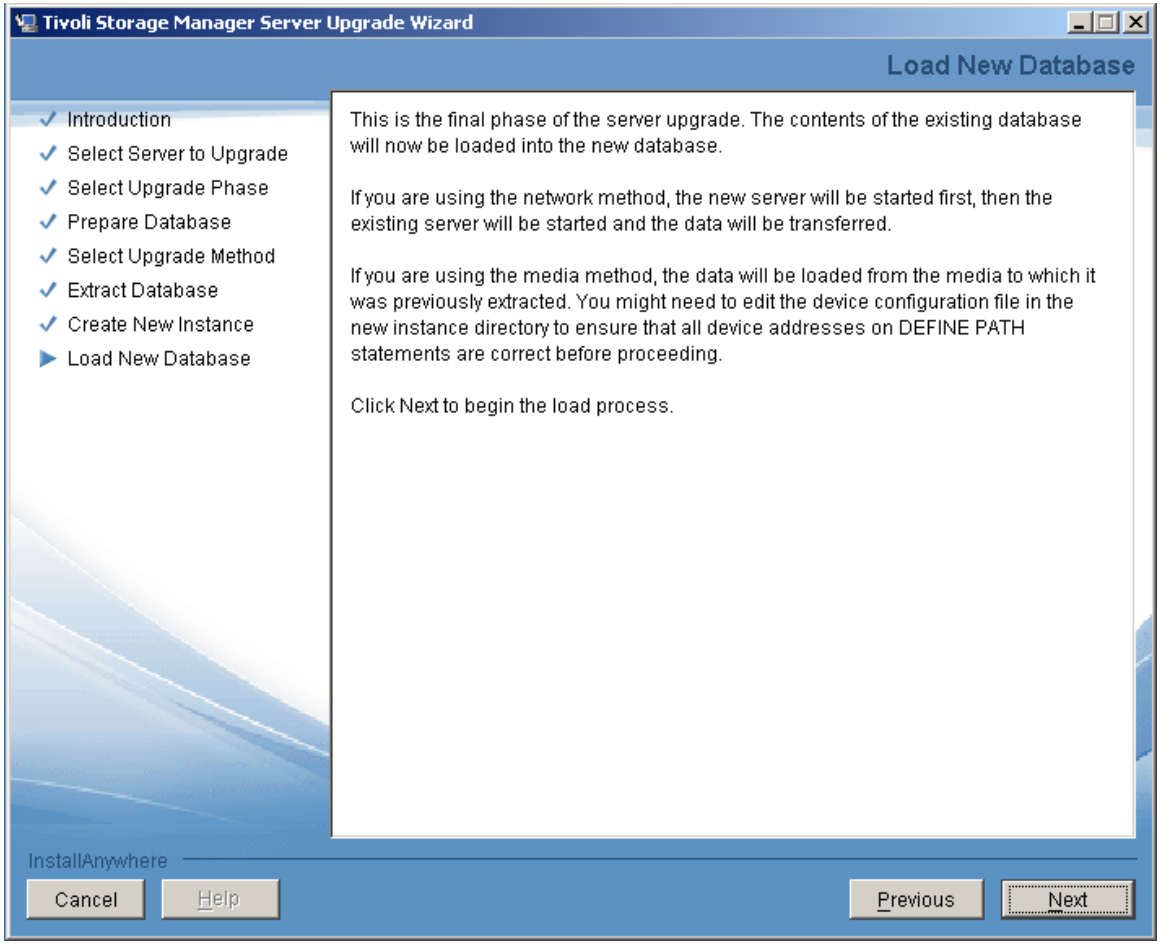
# TSM upgrade wizard – create new instance



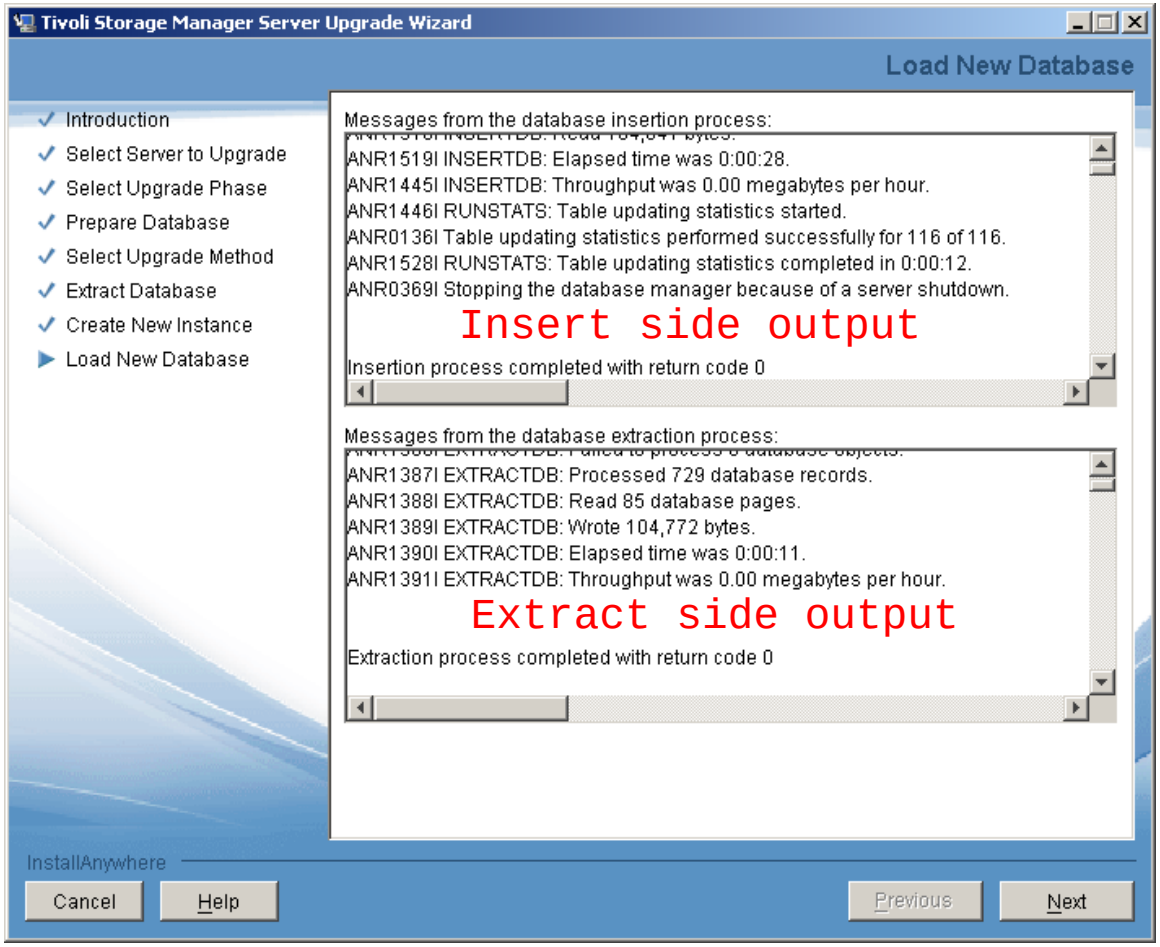
# TSM upgrade wizard – select insert data



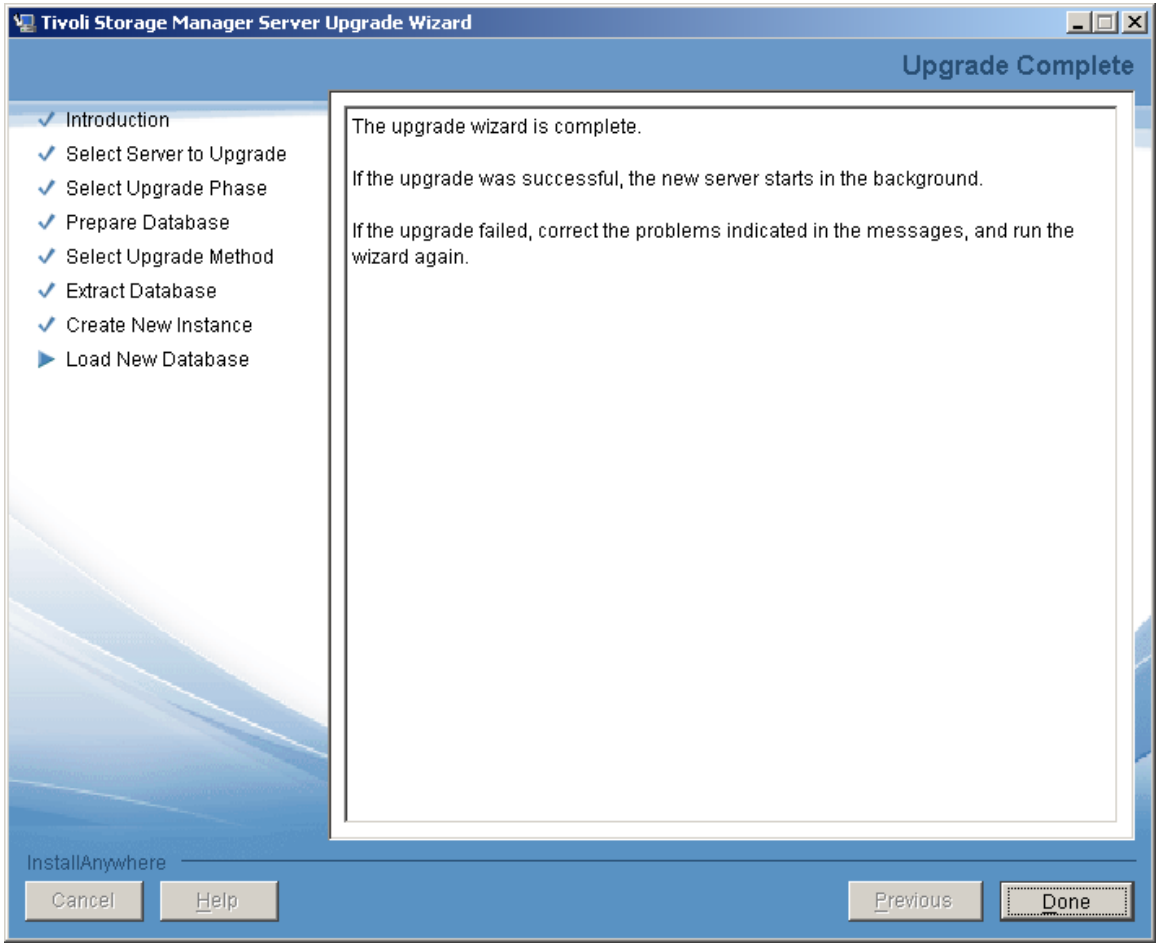
# TSM upgrade wizard – load new db screen

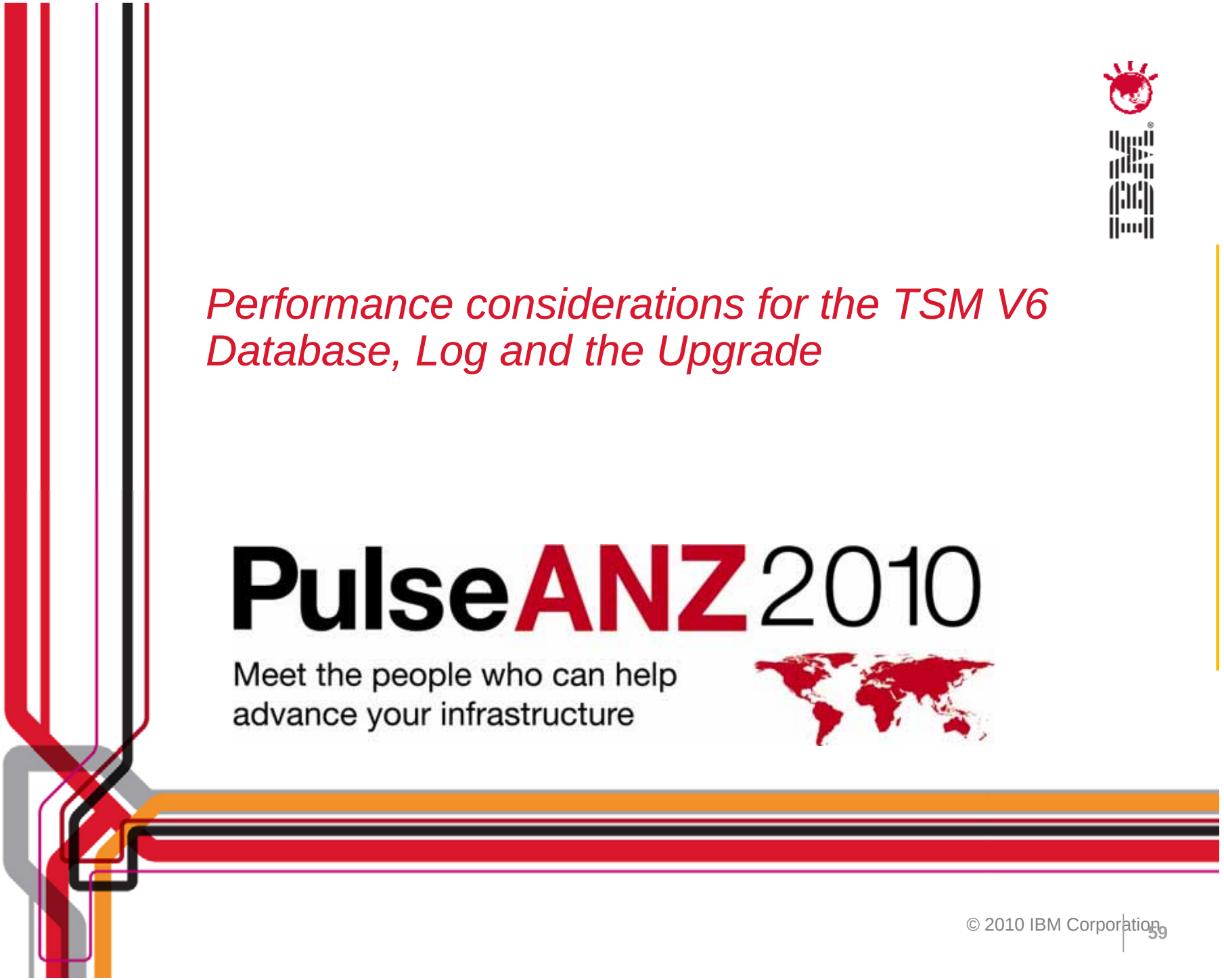


# TSM upgrade wizard – load new db status



# TSM upgrade  wizard – completion screen





# *Performance considerations for the TSM V6 Database, Log and the Upgrade*

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# Estimating time for the Upgrade of the DB

- Dependent on many factors
  - Size of DB being upgraded
  - Number and speed of processors
  - Storage device configuration
  - Upgrade method chosen
- Plan for 5-10 GB/hr for DB upgrade.

# Items to consider for your DB Configuration

- Use fast disk. Using the slow internal disk included by default in most AIX servers, or using consumer grade Parallel Advanced Technology Attachment (PATA) / Serial Advanced Technology Attachment (SATA) disk in a Linux or Windows system will slow everything down.

- Use multiple database containers. (This is DB2 terminology for what TSM calls database directories.) Make sure each database directory is in a different filesystem / LUN. This improves performance because DB2 will stripe the database data across the various directories. TSM supports up to 128 directories for the DB.

  **Recommend using 4-8 directories for large TSM DB.**

- Separate your TSM Components (DB LUNs, Log LUNs, Storage Pool LUNs)

- Enable read cache for the database file systems, and enable write cache if the disk subsystem supports it.

# Items to consider for the V6 Logs

- The Logs have sequential IO access.
- Use dedicated disks for the active/archive logs. If these are shared with other applications you will experience slowdowns when logs are being copied for archiving purposes.
- If possible, disable read cache for the active logs (they are only read at initialization), but enable write cache for them.

# Example of Upgrade Timings

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# Example of customers upgrade timings

| Type | V5 DB size (actual used) | Extract Size | Extract Time | Insert Time |
|---|---|---|---|---|
| AIX | 225 GB | 130 GB | 2hr 49min | 26hr 12min |
| Windows | 62 GB | 30 GB | 42 min | 27hr 54min |
| Windows | 64 GB | 33 GB | 37 min | 3hr 9min |
| Windows | 94 GB | 52 GB | 1hr 19min | 7hr 44 min |
| Windows | 183 GB | 94 GB | 1hr 55 min | 12hr 33min |

**Every customer is different ! So test if possible**

# TSM V6 Install / Upgrade FAQs

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# TSM V6 Install / Upgrade FAQs

***Q***:I am currently running my TSM Server on a 32-bit Windows® platform. Can I move to a 64-bit platform as part of the V6 upgrade?

***A:***Yes

***Q:*** When upgrading a TSM server V5.5.x to TSM V6, is it possible to omit the dsmupgrd preparedb and sufficient to issue a dsmupgrd extractdb?

***A:*** No,DSMUPGRD PREPAREDB is required first. It's especially important if you're upgrading from a version earlier than 5.5, as it will upgrade the database version to 5.5. But even if you are already at 5.5, we require that it be run.... it just doesn't have quite as much to do in that case.

# TSM V6 Install / Upgrade FAQs

***Q:*** How large will the TSM V6 DB be after the upgrade ?

***A*:** During the beta, over 200 customers participated and approximately 80 databases were tested with the upgrade process across multiple platforms. In general, the DB size after the upgrade was completed was roughly the same size. In some cases a 2X increase in size was seen. For planning purposes, customers should use a value of 50% larger than the original utilized space value of their V5 database.

***Q:*** Can I get the 6.2 version of the Administration Center for use with my 5.5 or 5.4 server without installing a 6 server?

***A:***Yes The 6.2 Tivoli Storage Manager Administration Center will work with server versions 6.2.x, 6.1.x, 5.5.x and 5.4.x.

***Q:*** Can I get the 6.2 version of the TSM Reporting and Monitoring for use with my 5.5 or 5.4 server without installing a 6 server?

***A:***Yes The 6.2 TSM Reporting and Monitoring will work with server versions 6.2.x, 6.1.x, 5.5.x and 5.4.x.

# TSM V6 Install / Upgrade FAQs

***Q.*** How does the database upgrade utility react if the existing database has corruption? Will the update utility detect the corruption? Is it necessary to audit the db first then do the upgrade?

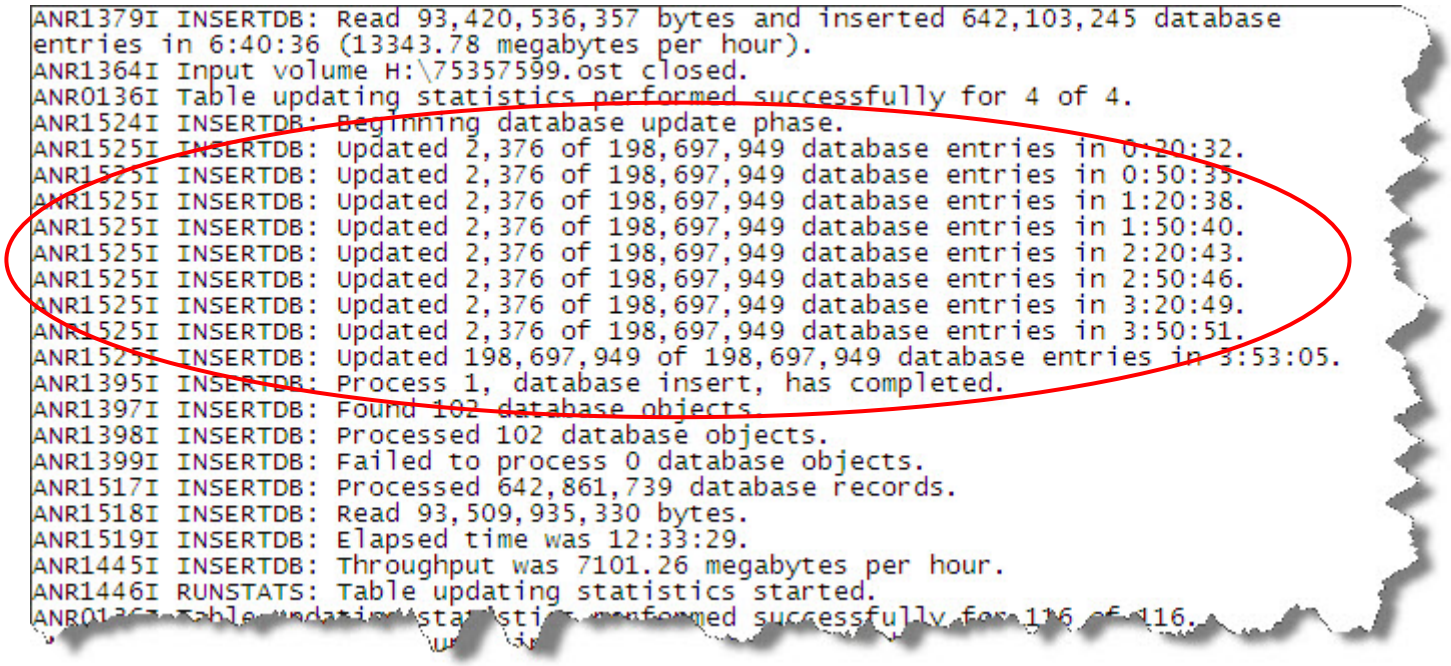
***A.*** The TSM V6 Database Upgrade Utility will detect database corruption and attempt to repair the faulty items. The upgrade utility will generate messages when corruption is detected.

```
ANR1525I INSERTDB: Updated 3,340,601 of 369,553,981 database entries in 9:10:58.
ANR1525I INSERTDB: Updated 3,340,601 of 369,553,981 database entries in 9:40:58.
ANR1525I INSERTDB: Updated 3,340,601 of 369,553,981 database entries in 10:10:58.
ANR1525I INSERTDB: Updated 369,553,981 of 369,553,981 database entries in 10:22:57.
ANR1338E One or more constraint violations were detected. Examine log file constrnt.log for details.
ANR1396E INSERTDB: Process 1, database insert, has completed with errors.
ANR1397I INSERTDB: Found 189 database objects.
ANR1398I INSERTDB: Processed 189 database objects.
ANR1399I INSERTDB: Failed to process 0 database objects.
ANR1517I INSERTDB: Processed 1,152,166,382 database records.
ANR1518I INSERTDB: Read 134,963,543,883 bytes.
ANR1519I INSERTDB: Elapsed time was 26:12:05.
ANR1445I INSERTDB: Throughput was 4912.37 megabytes per hour.
ANR1446I RUNSTATS: Table updating statistics started.
ANR0136I Table updating statistics performed successfully for 116 of 116.
ANR1528I RUNSTATS: Table updating statistics completed in
```

# TSM V6 Install / Upgrade FAQs

***Q:*** DSMSERV INSERTDB repeatedly issues status message ANR1525I with no sign that any progress is being made?

***A:*** This lack of change in status is not the sign of a problem. The repeated issuance of the ANR1525I is an indication that INSERTDB is still running, even if the statistics that the messages report do not change.



# TSM V6 Install / Upgrade FAQs

***Q:*** What do I need to do if I need to restart the upgrade process?

***A:*** The upgrade process is **not** checkpoint restartable. If for any reason the process fails or is cancelled, it needs to be restarted from the beginning.

If you are using the extract to media method for upgrade and have completed the extract, you can restart the upgrade from the insertdb step after cleaning up directories and reformatting the DB:

db2 start database manager

db2 drop db TSMDB1

Clean up directories, logs, database backups

# TSM V6 Install / Upgrade FAQs

***Q:*** What if I need to go back to my previous V5 TSM?

***A:*** If source server is TSM 5.3 when dsmupgrd preparedb is done:

You need to restore your DB from backups prior to restarting your server

You need to re-install TSM 5.3 from installation media if using in-place upgrade methods

***A:*** If source server is TSM 5.4 when dsmupgrd preparedb is done:

You need to restore your DB from backups prior to restarting your server

You need to re-install TSM 5.4 from installation media if using in-place upgrade methods

***A:*** If source server is TSM 5.5.x when dsmupgrd preparedb is done:

You will **NOT** need to restore your DB from backups prior to restarting

You will need to re-install TSM 5.5 from installation media if using in-place upgrade methods

# *TSM Admin Center*

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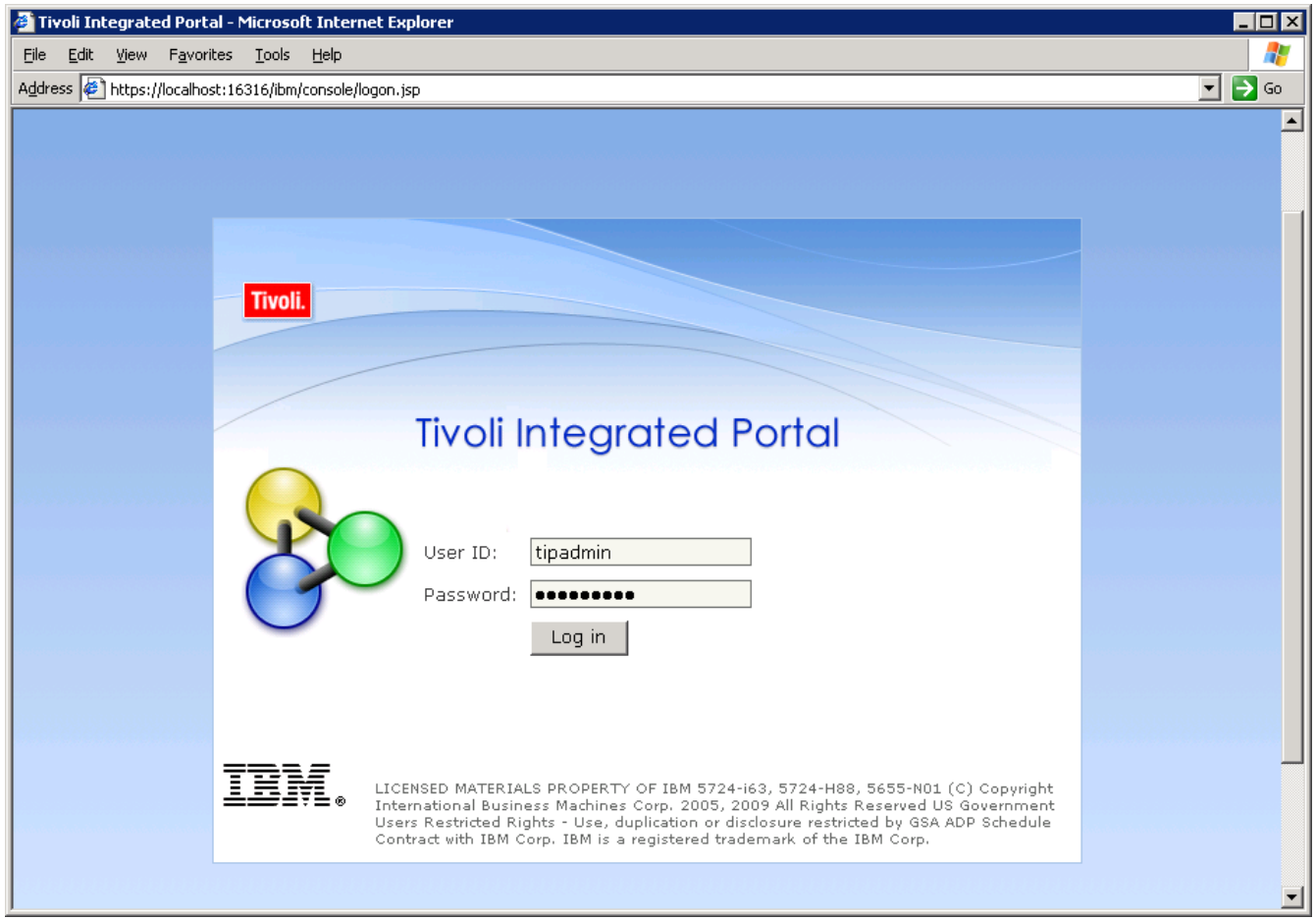
# TSM Admin Center 6.2

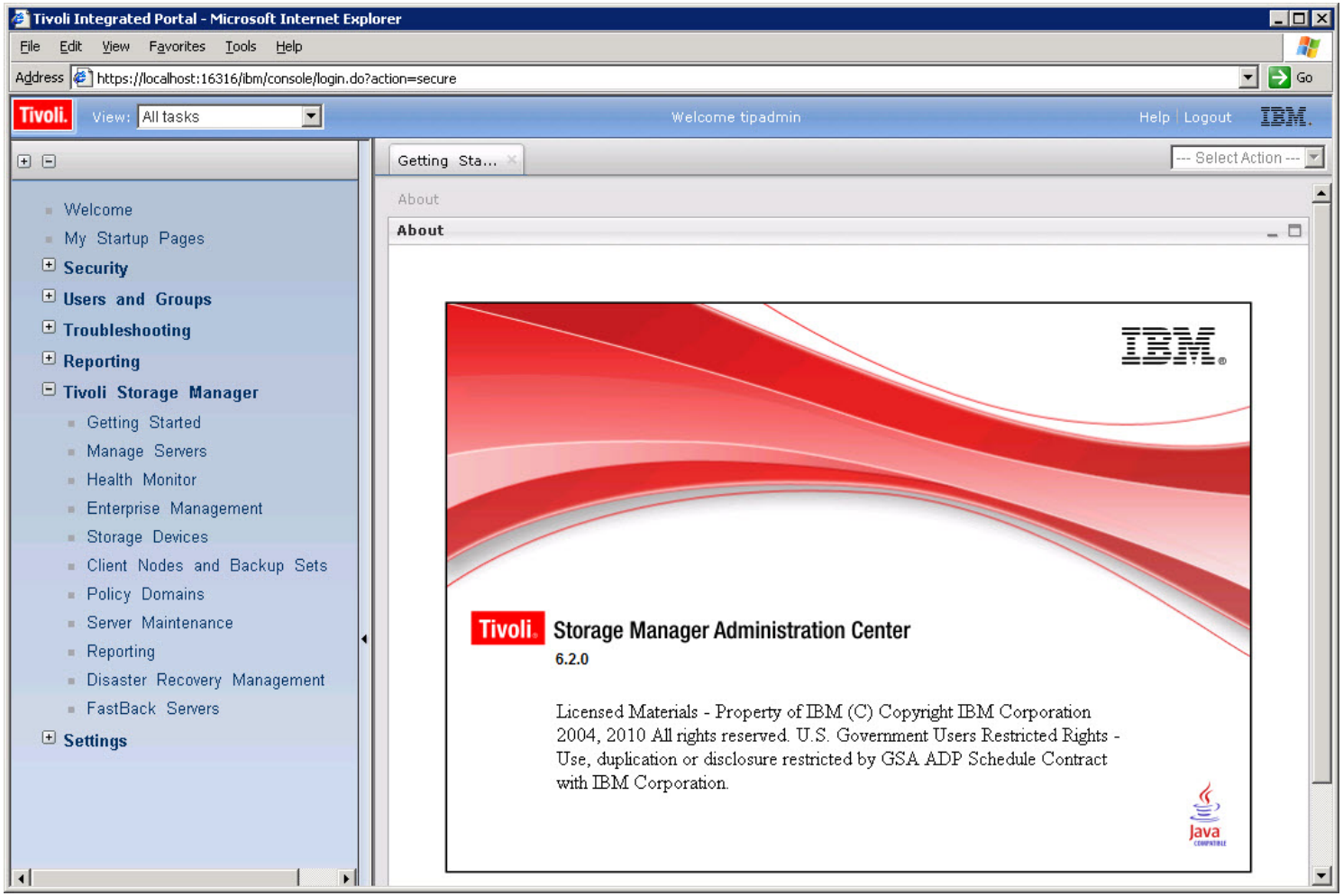
- Tivoli Integrated Portal (TIP) Version 1.1.1.2
- Client Deployment for Windows
- Improved Manage Servers section
- Client Nodes and Backup Sets section
- Improved Health Monitor
- FastBack Integration
- Tivoli Common Reporting included for the display of TSM reports

# TSM Admin Center 6.2 – using TIP

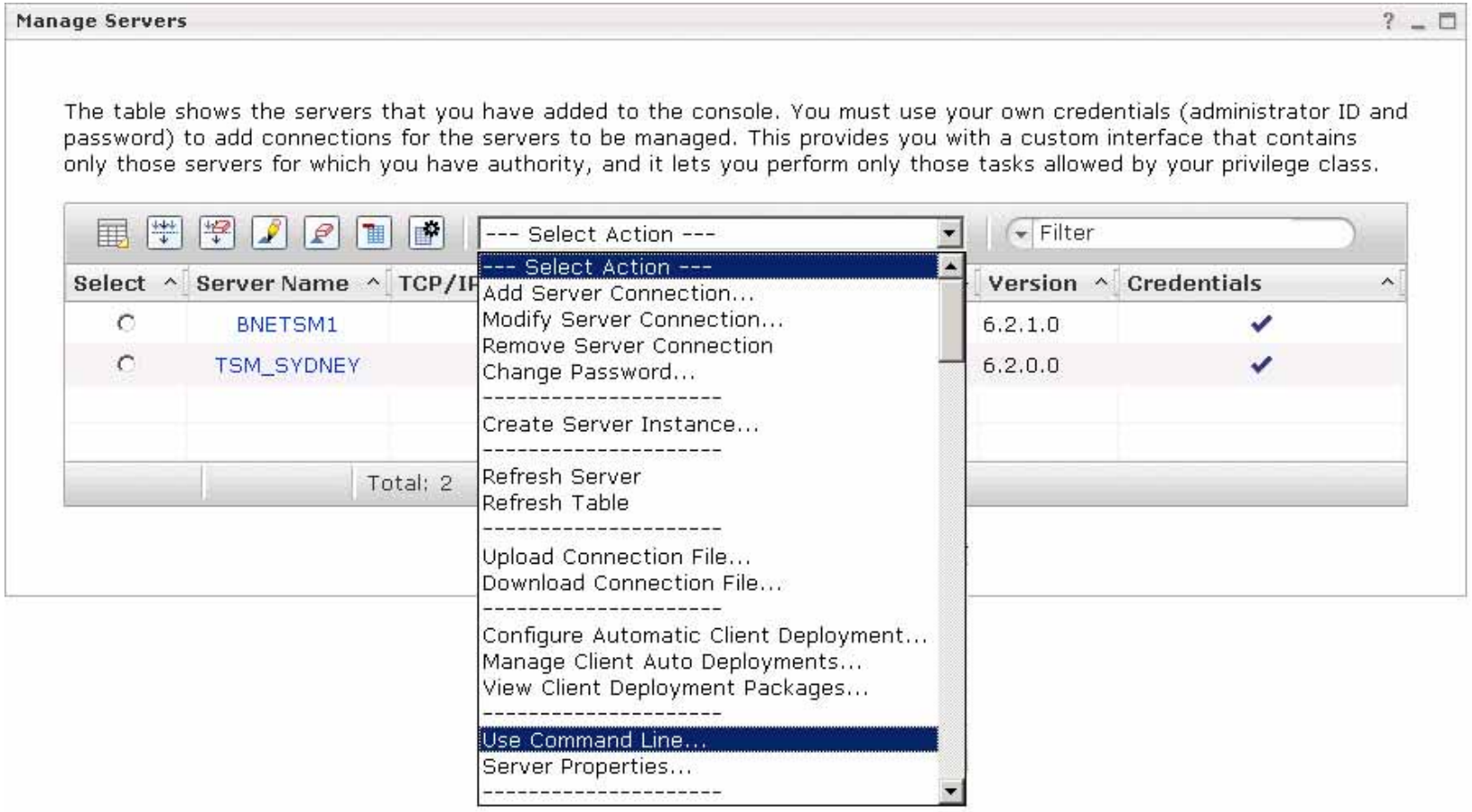
- New URL for TSM 6.2 - http://host_name:16310/



# Initial Administration Center Screen ...



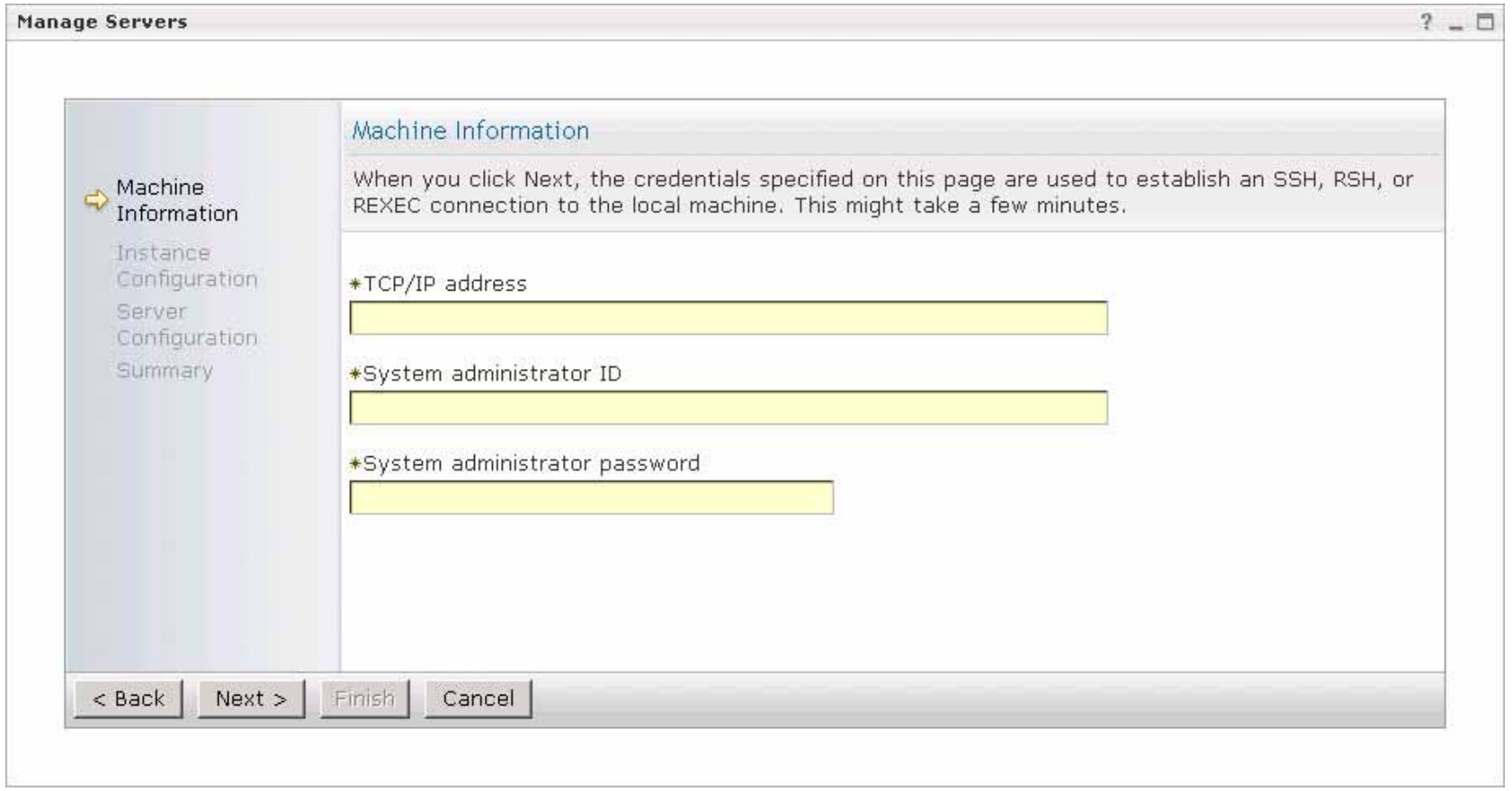
# Updated Manage Servers Section …



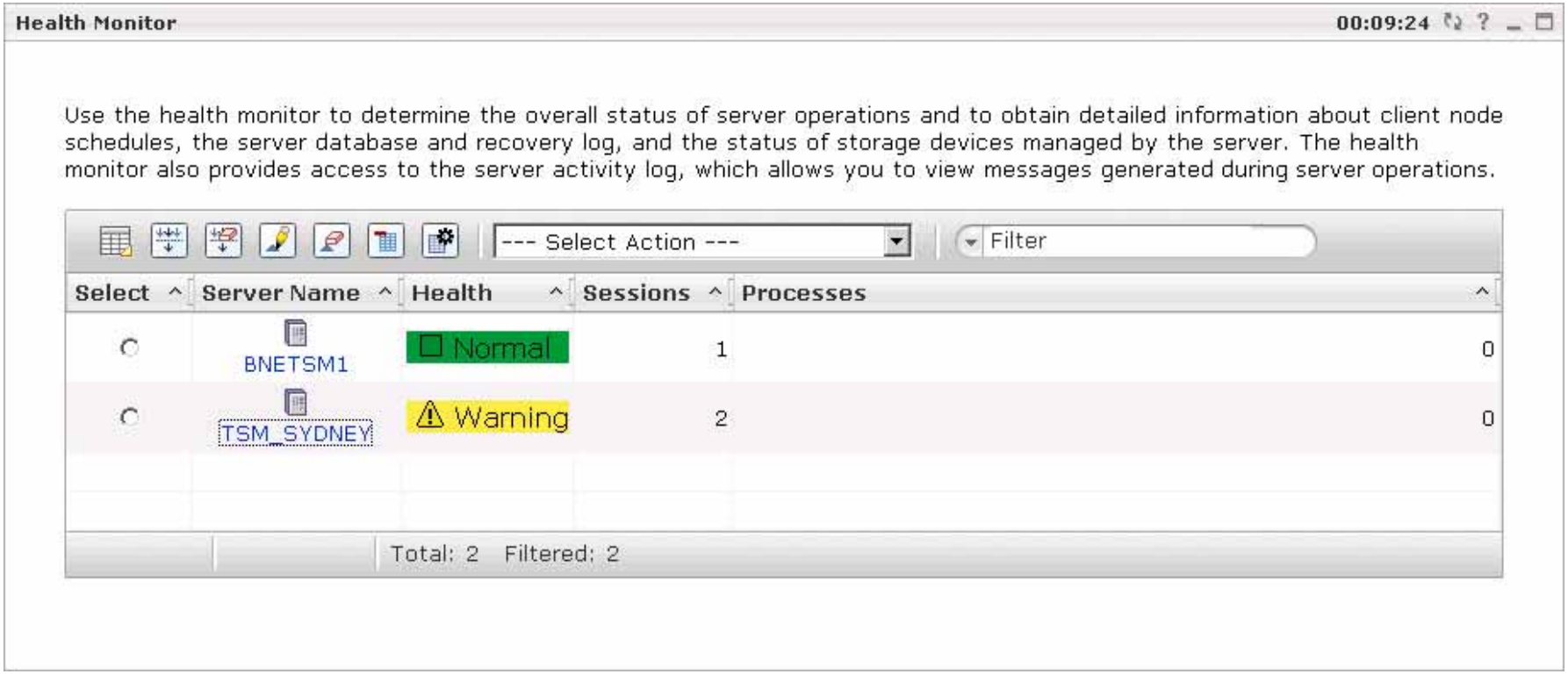
# Create Server Instance Wizard

- **Remotely configures the server and DB2 database**
  - Product must first be installed on the remote system
  - Unix only
  - Does not perform an upgrade
  - Makes use of  Remote Execution and Access (RXA) component
    - Common component for distributing files to, and processing programs on, different computers with different operating systems
- **Creates a new server instance (including the underlying DB2 instance)**
- **Formats the database**
- **Sets up a basic options file based on user input**
- **Customer is permitted to create multiple server instances**

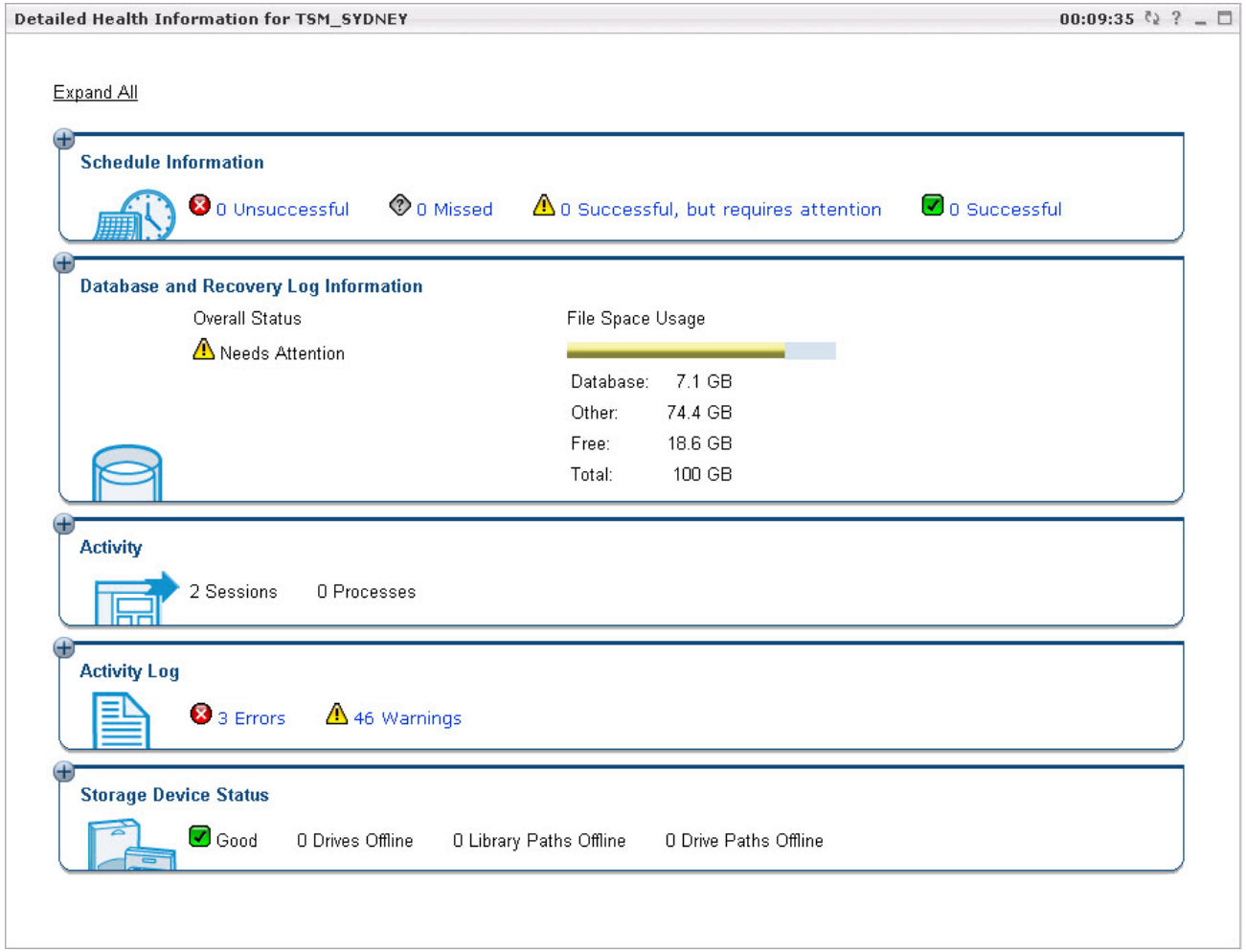
# New Server Instance …



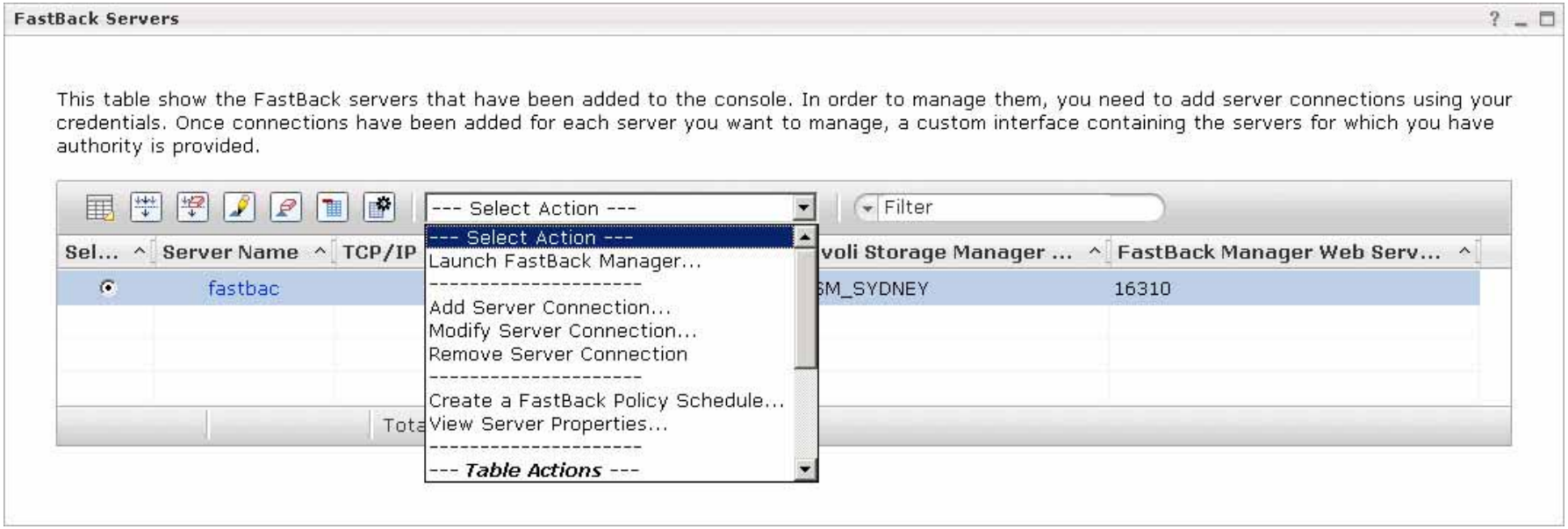
# Health Monitor



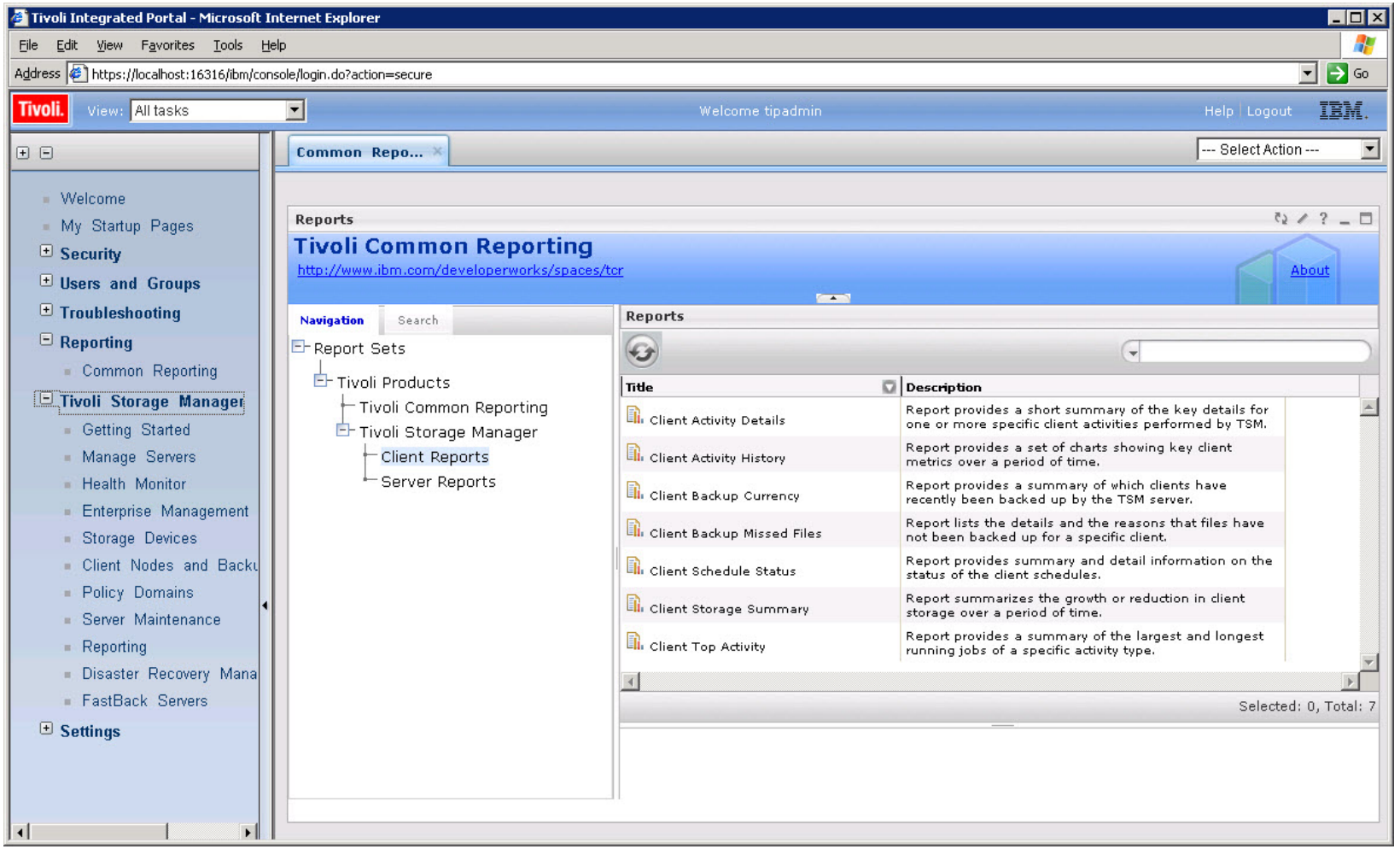
# Health Monitor



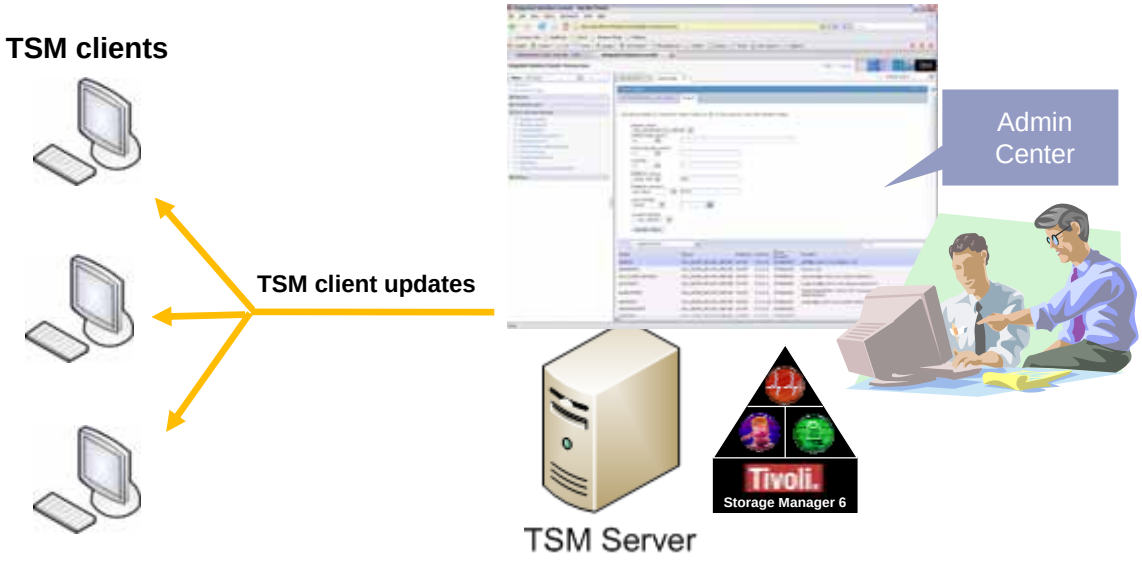
# Fastback Integration



# Tivoli Common Reporting



# Client Deployment for Windows BA clients



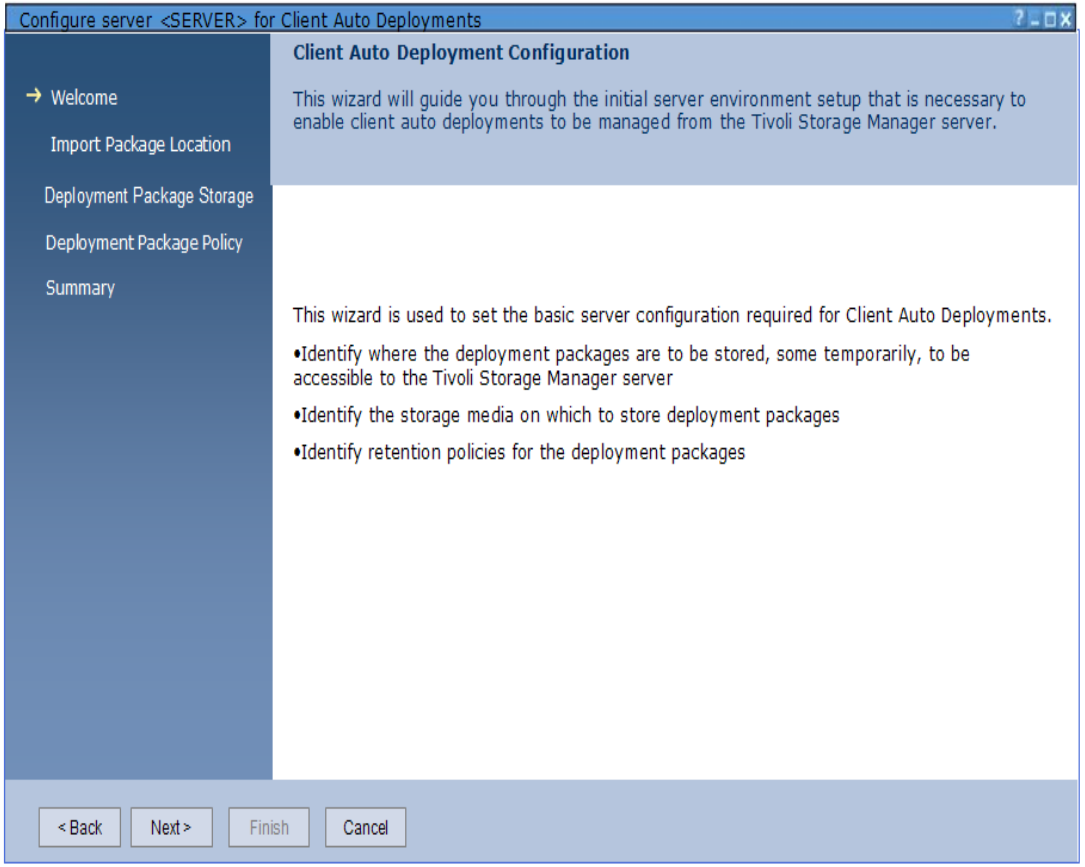

**Benefits**:

- Updating Windows BA clients is:
  - Less time consuming
  - More reliable
  - Less labor intensive

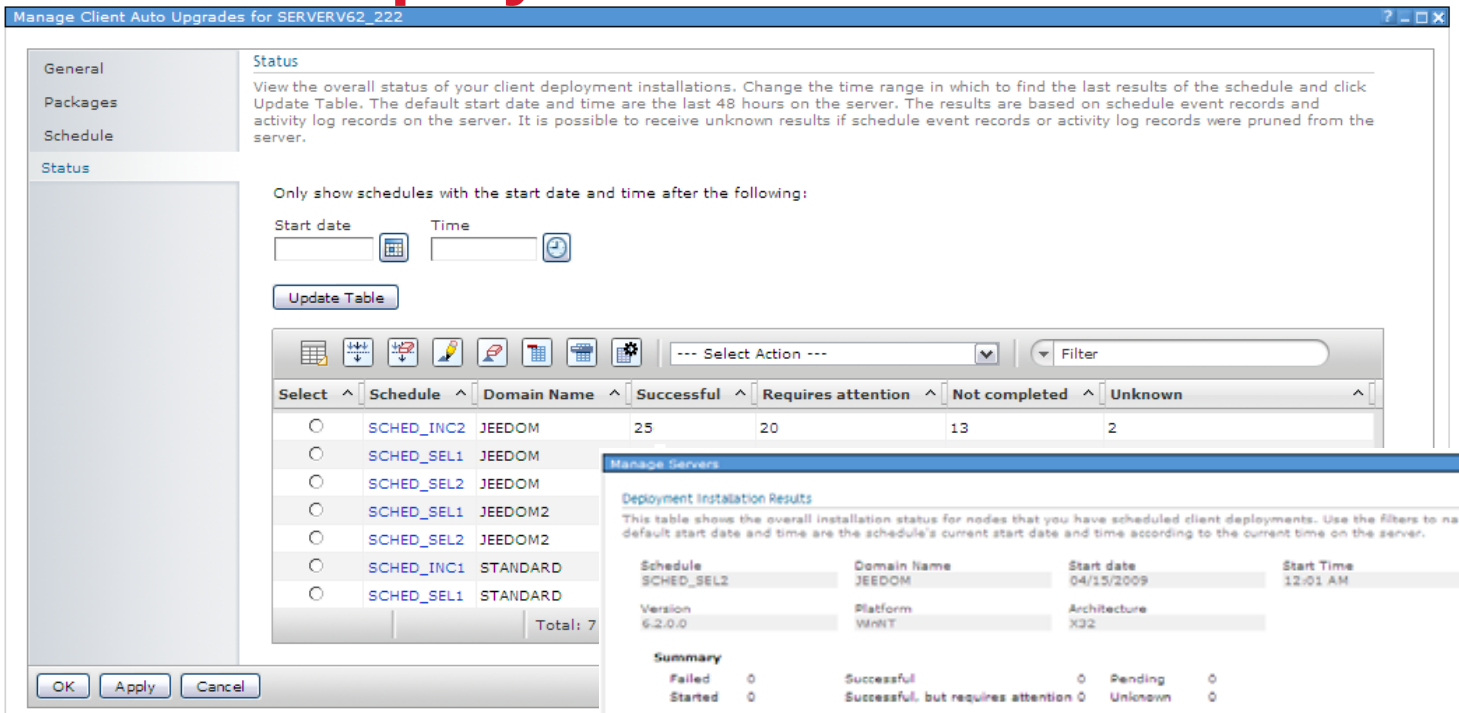
- ✓ **TSM administrator obtains Windows BA client maintenance release from the FTP site.**
- ✓ **From the Admin Center, the TSM administrator selects a maintenance level to be distributed to a list of existing clients. Define a policy and schedule.**
- ✓ **The distribution and code updates will run automatically on the clients, based on the predefined policy/schedule.**
- ✓ **From the Admin Center, the TSM administrator can review the client distribution status.**
- ✓ **Windows B/A client maintenance distribution for upgrade from 5.4 or higher to 6.2**

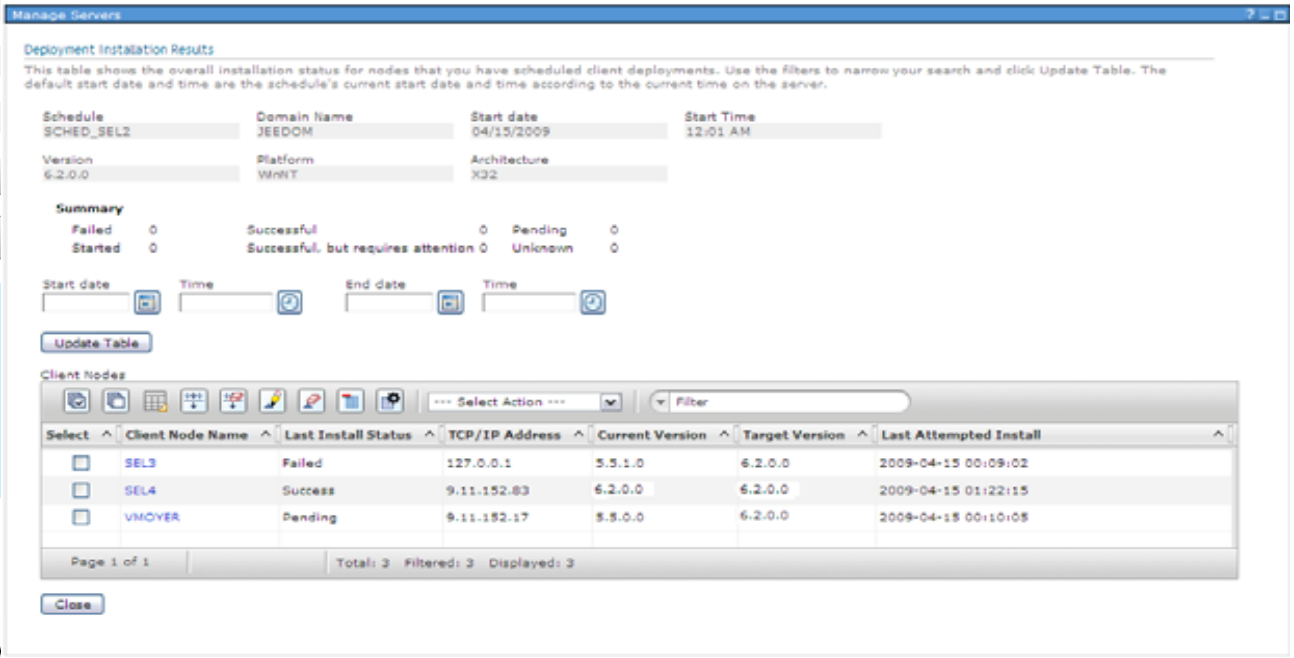
# Client Deployment for Windows BA clients

- Wizard sets the basic server configuration required for Client Auto Deployments.
  - Identify where the deployment packages are to be stored
  - Identify the storage media on which to store deployment packages
  - Identify retention policies for the deployment packages



# Client Deployment for Windows BA clients



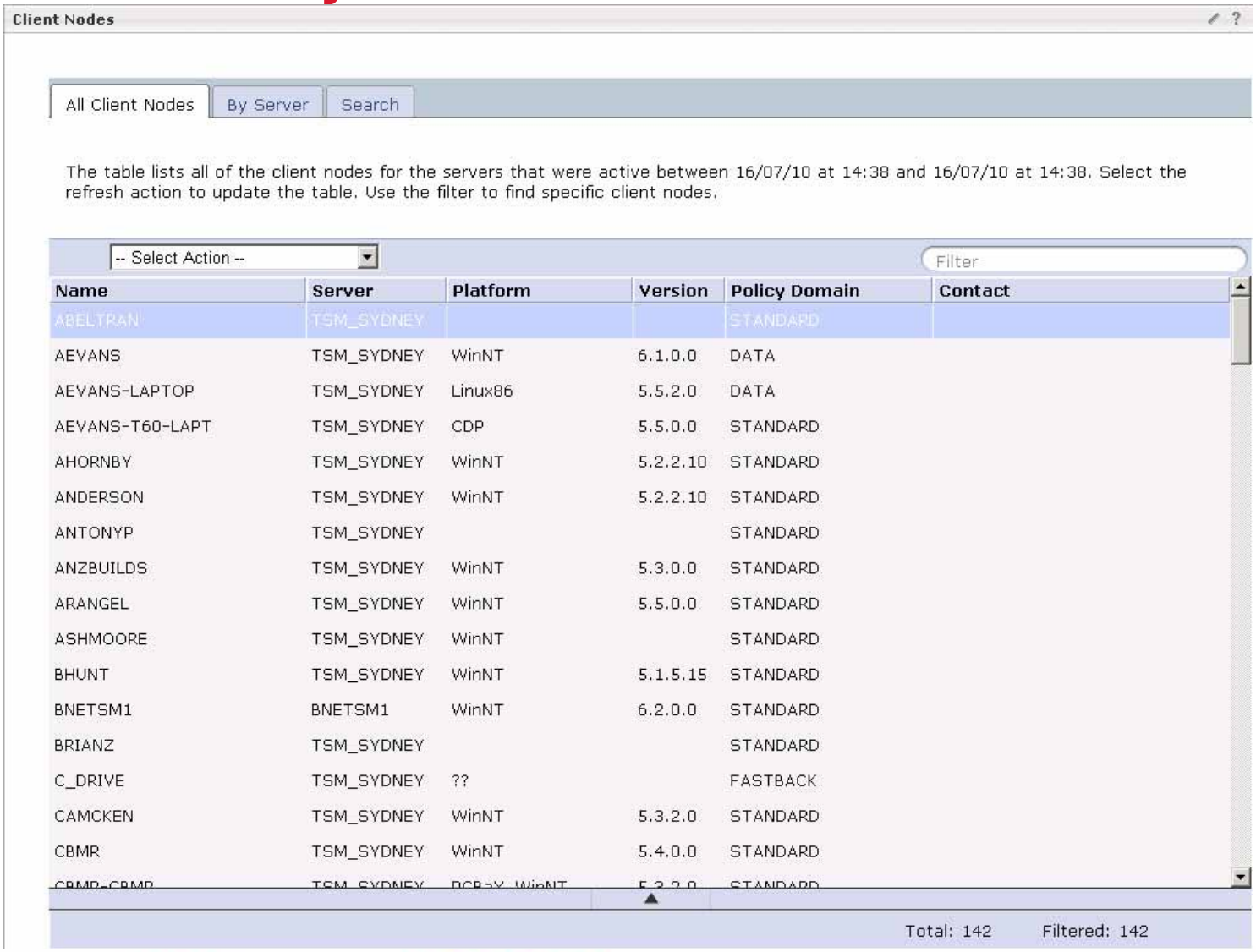




View status of client deployment

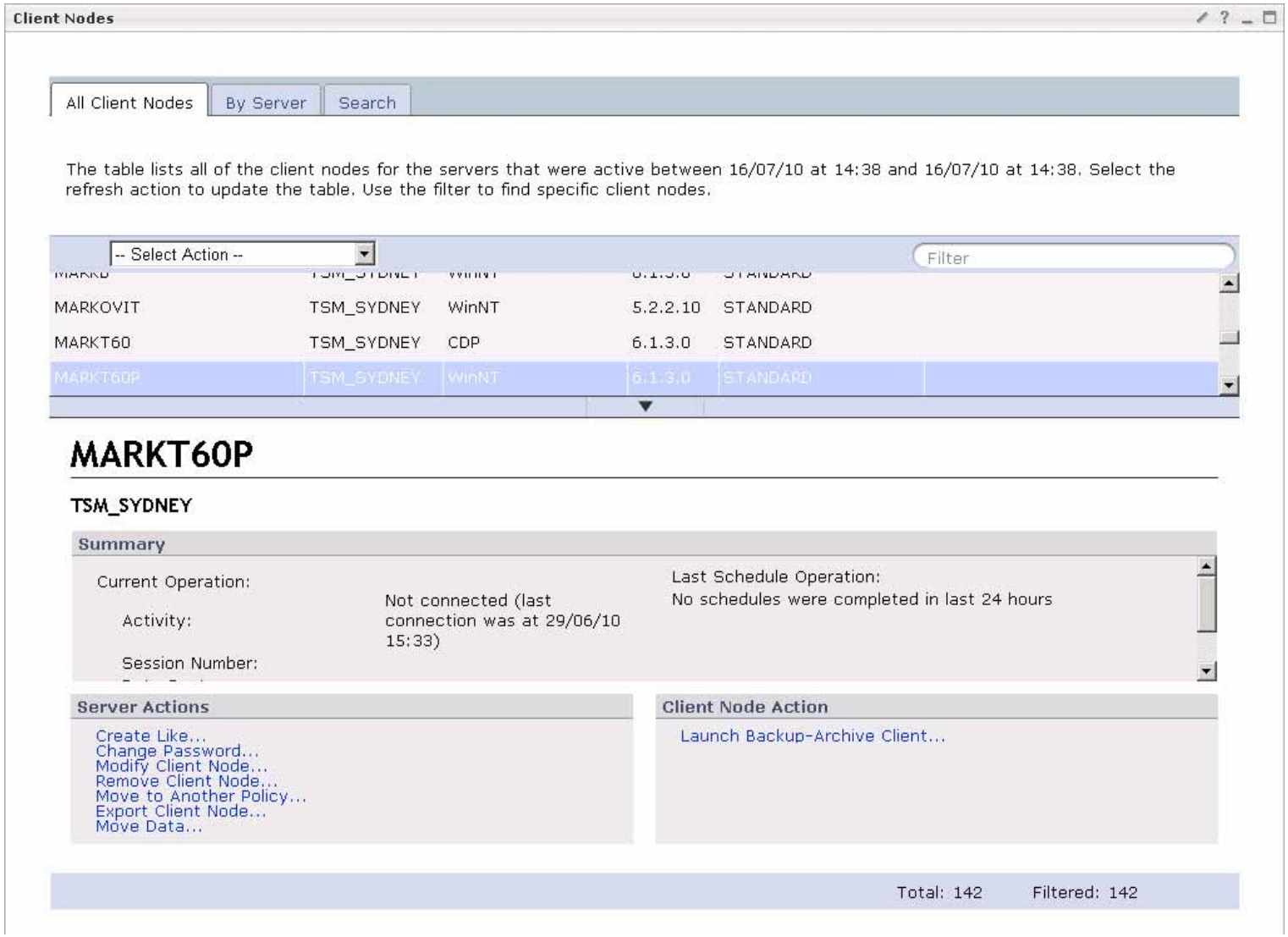
# New *Client Node* Section

- New high level task
- Find any client node regardless of server
- New global client node view
  - All nodes on all servers
  - All nodes on a specific server
  - Search for node based on selection criteria
- A quick summary for a given node (via AJAX)
- New right click menu for quick access to action for a node
- Fast path client node creation
  - Change the existing wizard to a form
  - Allow default settings
    - User can set defaults on a per server or all servers basis
    - Each time user enters the create node form, it will be pre-populated with those defaults and he won't have to re-enter them.

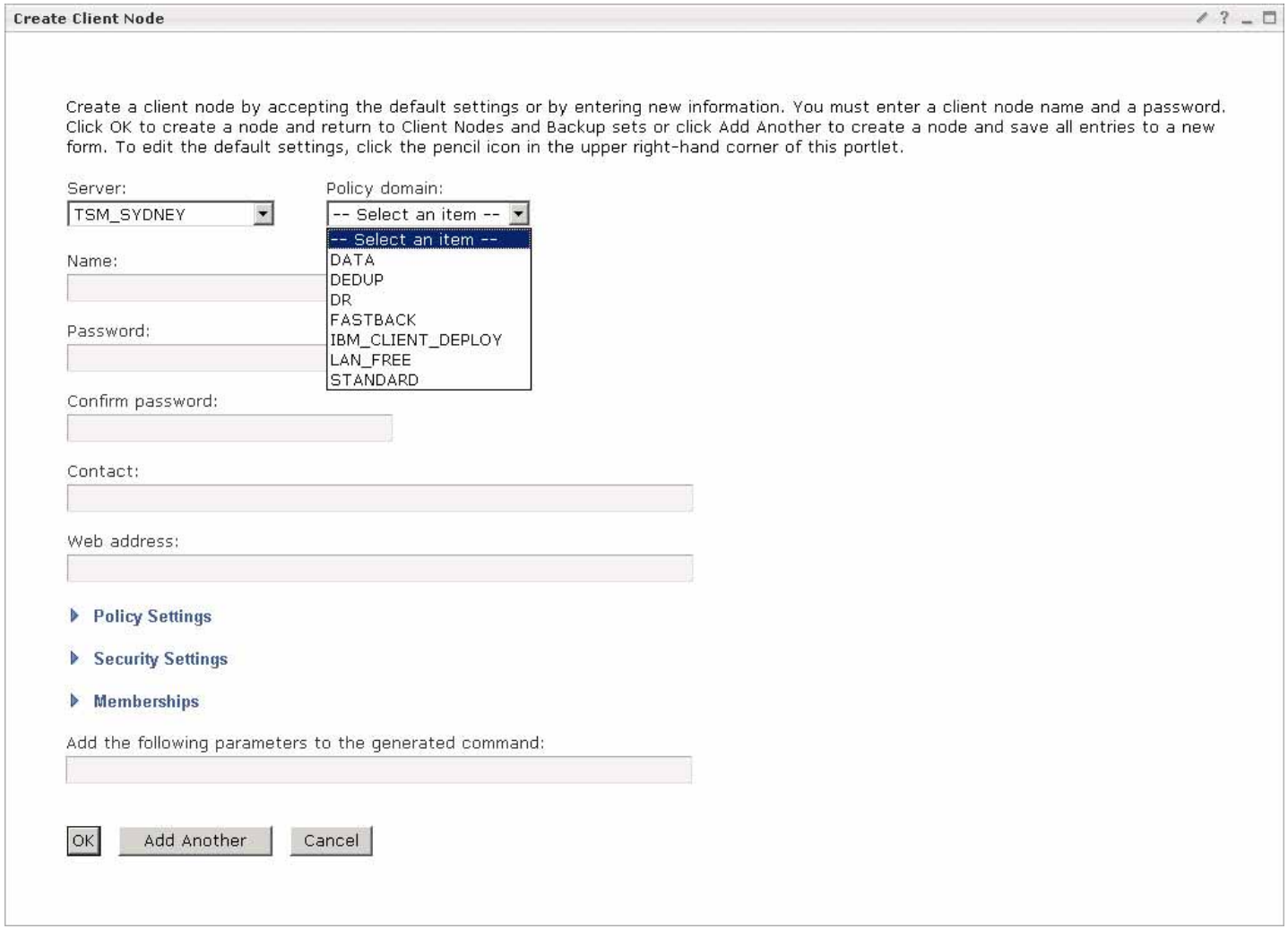
# Client Node Entry Point – All Nodes on All Servers



# Client Node Entry Point – Quick Summary for a Node

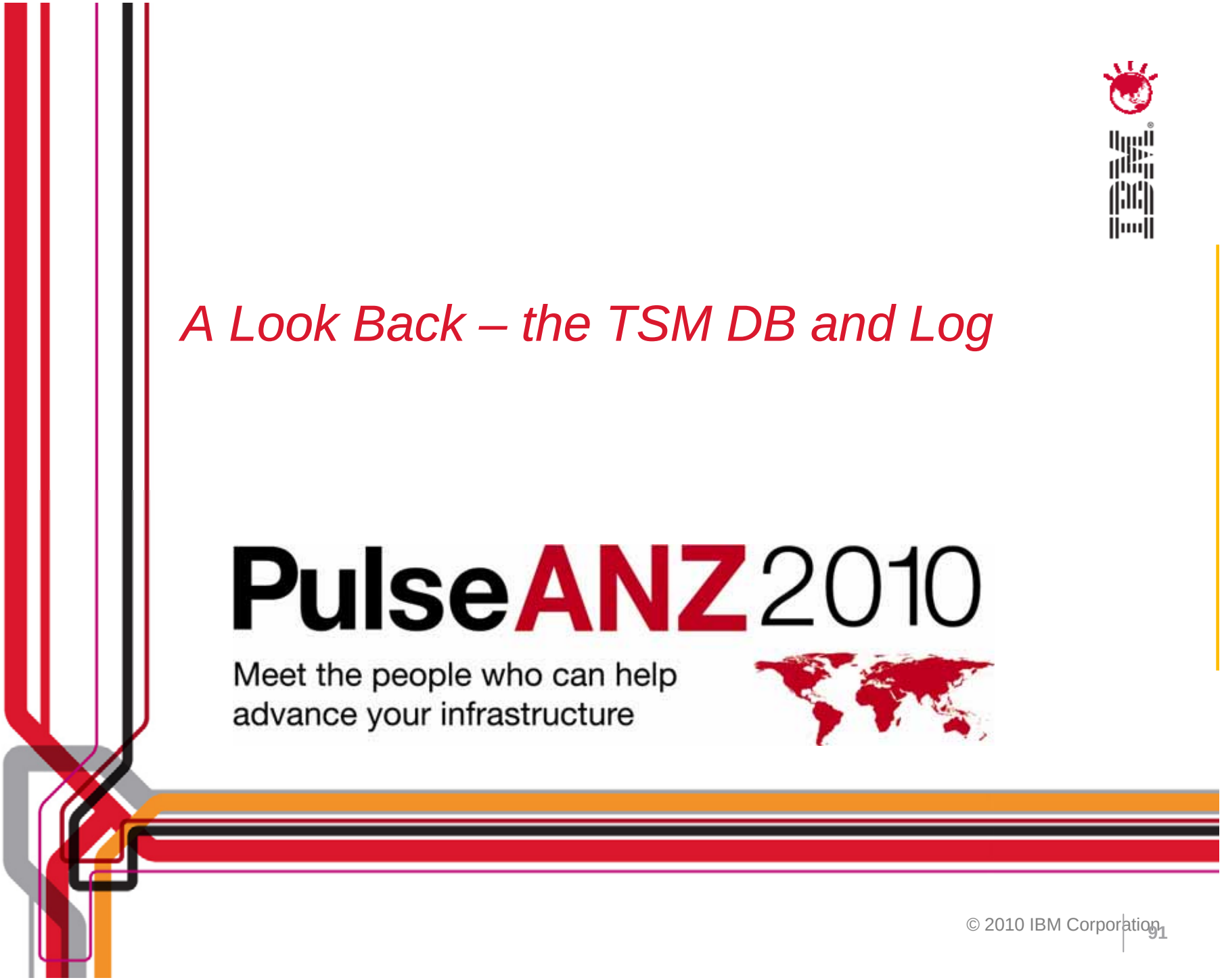


# New Create Client Node Form




User begins by selection a server

# Thank You



# *A Look Back – the TSM DB and Log*

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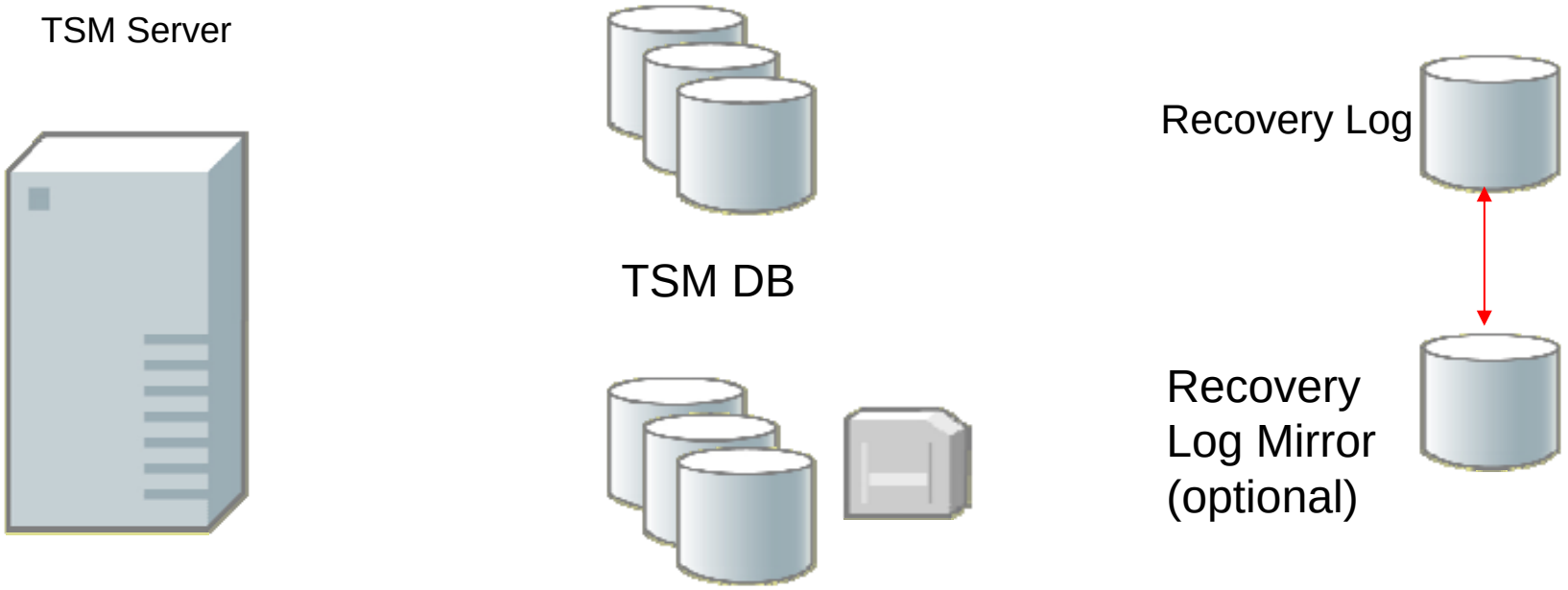
# ADSTAR Distributed Storage Manager (ADSM)/TSM Components (Before V6)



# ADSM/TSM Database

- Used to contain committed transactions
- Comprised of 1 or more database volumes
- Size Limit of 536GB
- Could be on RLVs or filesystems.
- DB could be mirrored (up to 2 times if user wished)
- If filesystems were used, users were required to format volumes before they could be used.
- Random IO access
- Audit of DB required TSM Server to be brought down. Audit could take a long time to complete.
- Database reorg required TSM server to be brought down, UNLOAD/LOAD could take a long time to complete.

# ADSM / TSM Recovery Log

- Contains current transaction data.
- Could be run in “normal mode” or “roll-forward mode”.
- Could be on RLVs or filesystems.
- If filesystems were used, users were required to format volumes before they could be used.
- Sequential IO access
- Comprised of 1 or more recovery log volumes
- Maximum size of 13.5 GB.
- Recovery log could be mirrored (up to 2 times if user wished)
- If recovery log became full, TSM halted

# ADSM / TSM DB Backup / Restore

- Could be full, incremental, or snapshot.
- Each run of a backup required a new volume
- If incremental backups were used, a restore required the full and each of the incremental backups to be restored to bring to current point in time.
- Could recover an individual DB volume if needed.
- Could restore to current time or point-in-time.
- Restore could be done with or without the use of volumehistory file
- A restore of the DB required existing volumes to be deleted and reformatted first.

# *Looking Forward – the New TSM V6 DB and Log*

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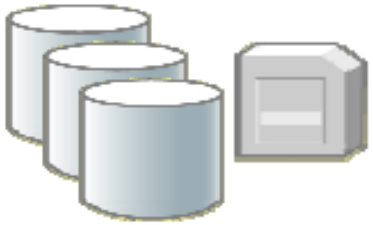
# TSM V6 Components

TSM Server

TSM DB



TSM STGPools (disk, tape)

ActiveLogDir

MirrorLogDir

ArchiveLogDir

ArchFailoverLogDir

# TSM V6 Database

- Contains committed transactions
- Can be spread over many (up to 128) directories
- DB Volumes are now managed by DB2. No need to format them.
- Individual DB volumes can no longer be restored.
  - Function was used infrequently.
- **Cannot** be placed on raw logical volumes
- **Cannot** be mirrored. (Mirroring is a future requirement)
  - Still can use HW mirroring if you want. (RAID1, RAID10)

# TSM V6 Database

- Random IO access.
- Location(s) specified on DBDir/DBFile parameter of dsmserv format/loadformat commands.
  - DBDir – list of Dirs, separated by comma (up to 128 dirs)
  - DBFile – Text File containing list of Dirs (1 per line, up to 128 dirs)
- Add a new directory with the new Extend DBSpace command. Change is dynamic – does not require a restart of TSM.
- Currently there is no way to dynamically “reduce” the DB.
- New maximum supported size of 1TB.

# TSM V6 Database

- Don’t need to format volumes before using.
- On-line re-org done automatically.
- No longer need to do off-line audits.
- DB Backup / Restore is different (this will be covered later in presentation.) Can restore to either current time or point-in-time.

# DSMSERV Format / Loadformat

dsmserv FORMAT / LOADFORMAT

[ DBDirectory=<dbdir1[,dbdir2[,dbdir3...]]> | DBFile=<file> ]

ACTIVELOGDirectory=<active log dir>

[MIRRORLOGDirectory=<mirror log dir>]

ARCHLogdirectory=<archive log dir>

[ARCHFailoverlogdirectory=<failover archive log dir>]

ACTIVELOGSize=<size of log in MB>

# TSM Active Log

- “Active” Log is a TSM term. DB2 uses logs and archive logs.
- Contains current in-flight transaction data.
- Roll-forward mode only.
- Use is required.
- Sequential IO access
- Initial directory of active logs determined by ActiveLogDir parameter (on dsmserv format / loadformat); can be changed later in dsmserv.opt
- Active log files created in 512 MB sized files.
- Number of logs created is determined by ActiveLogSize / 512.
- If a transaction is not committed and all active log files are filled, then TSM halts.
- Default ActiveLogSize is 16GB, Maximum value is 128GB

# TSM Active Log (Mirror)

- Used to contain mirrored copies of active transaction data
- Sequential IO access
- Use is optional but recommended.
- Initial directory of active log mirrors determined by MirrorLogDir parameter (on dsmserv format / loadformat); can be changed later in dsmserv.opt
- Change of MirrorLogDir requires TSM restart.
- If mirror log directory becomes full, message issued, TSM continues

# TSM V6 Log Mirroring

- If error writing to either primary or log mirror
  - Failing path to log is marked as bad.
  - Message written to log
  - Writes continue to remaining good log volume until current log volume is filled. When DB2 needs to open the next log file, then the path is retested and reused if it is OK.
- If error occurs in the remaining good path, TSM shuts down.

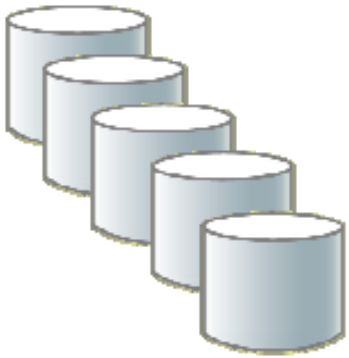
# TSM Archive Log

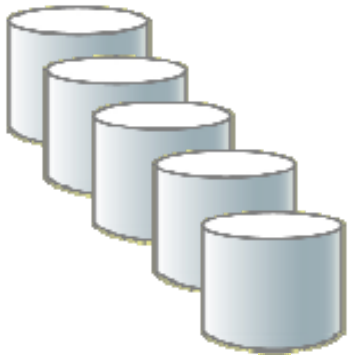
- Contains committed transaction data.
- Should plan on having up to 3 full backups worth of space for archive logs. (more on this later)
- Sequential IO access
- Use is required
- Initial directory of archive logs determined by ArchiveLogDir parameter (on dsmserv format / loadformat); can be changed later in dsmserv.opt
- Changing ArchiveLogDir directory requires TSM to be restarted
- Log files older than 2 full backups ago are removed after DB backup. (more on this later)
- If archive log directory becomes full, and no fail over archive log location has been specified, then TSM just keeps logs in the ActiveLogDir location and creates new ones. If THIS fills, then TSM halts.

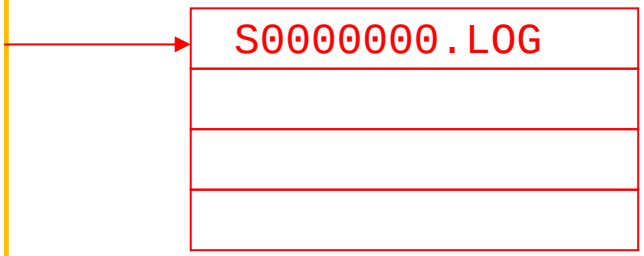
# TSM Failover Archive Log

- Use is optional but highly recommended. Consider use of large Network File System (NFS) mountpoint or large “cheap” disk for this. (more on this later)
- Sequential IO access
- Set with ArchFailOverLogDir parameter (on dsmserv format / loadformat), or added later in dsmserv.opt
- Log files are removed after DB backup. (more on this later)
- Changing ArchFailOverLogDir directory requires TSM to be restarted.

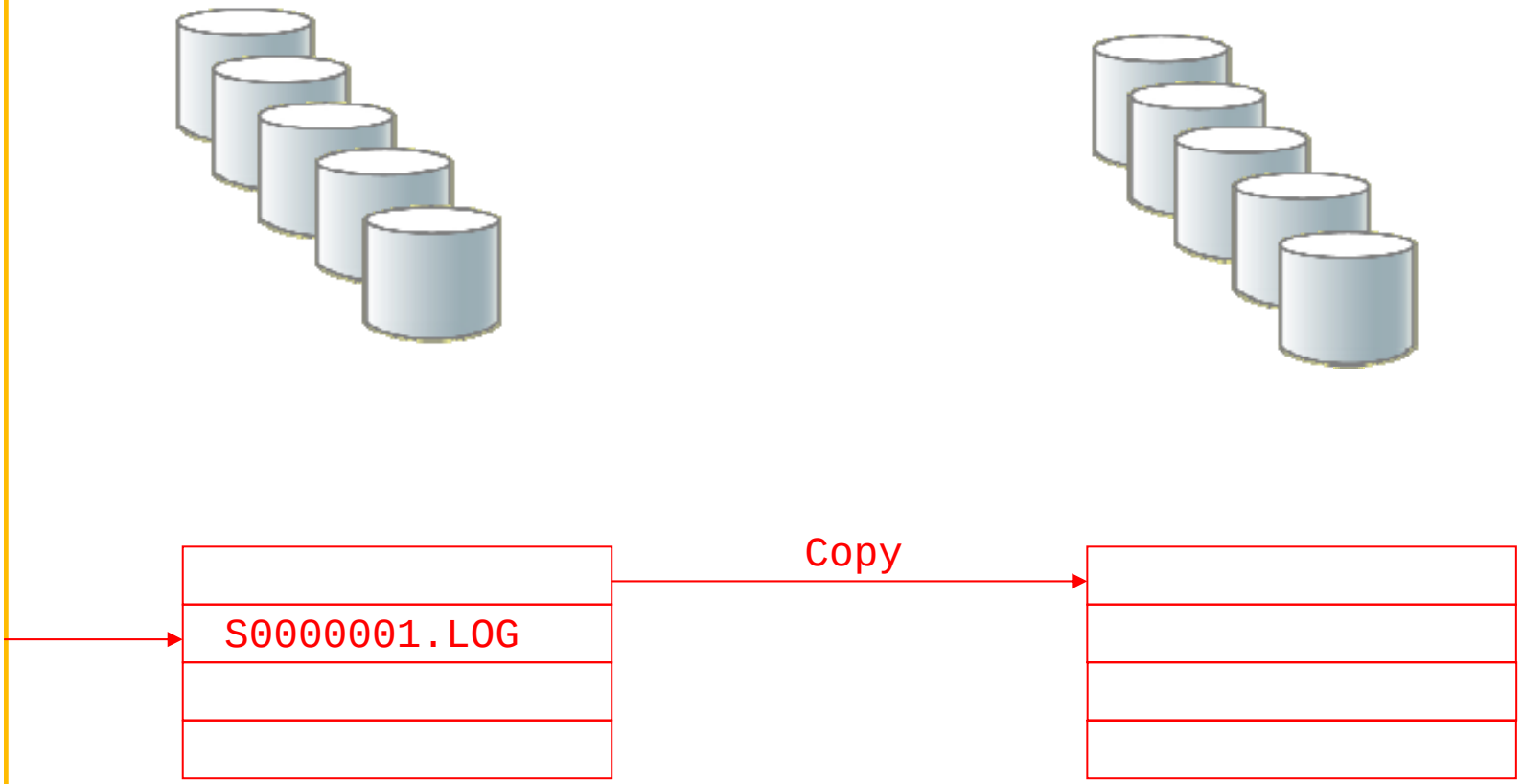
# Active Log / Archive Log (Initial startup)



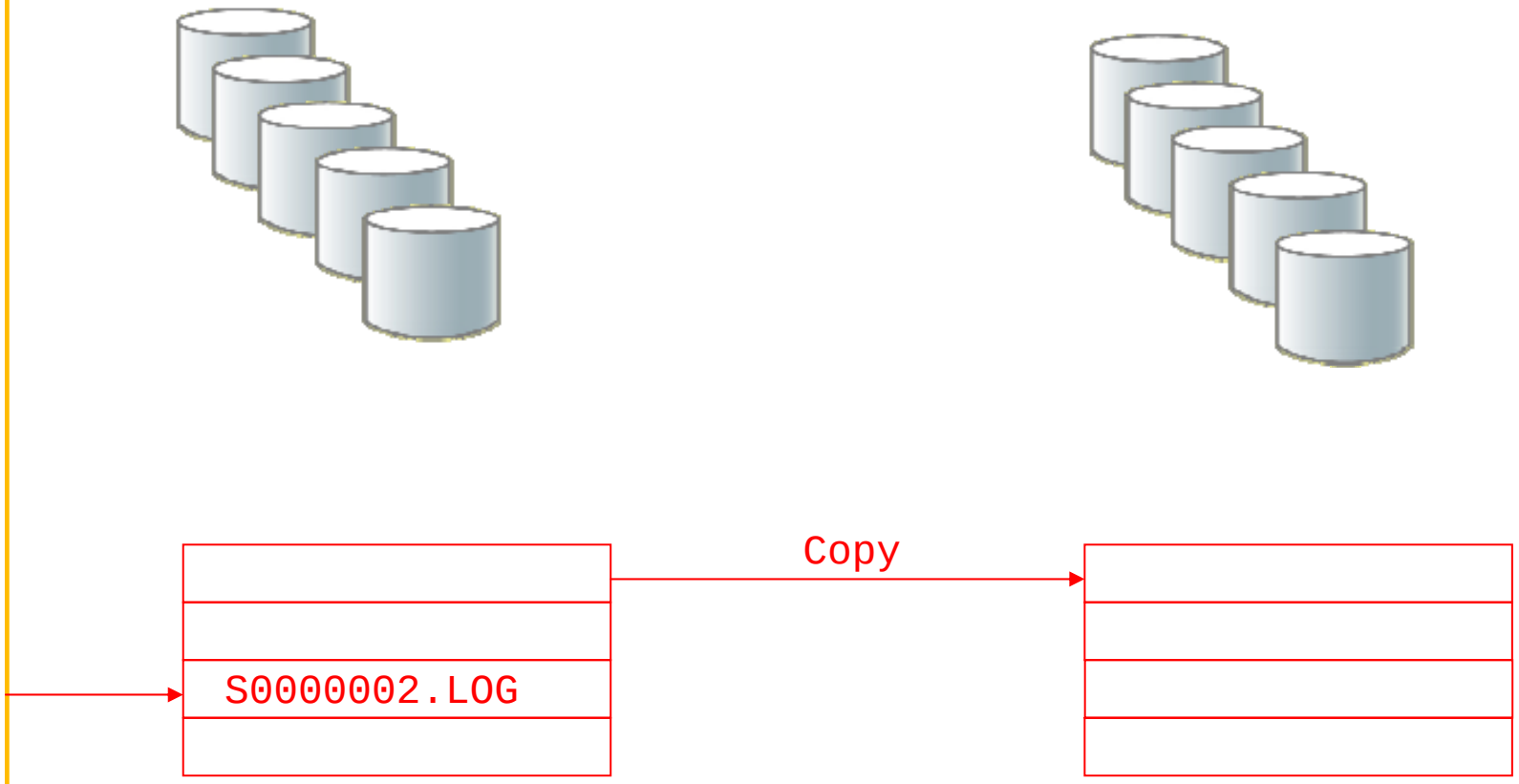




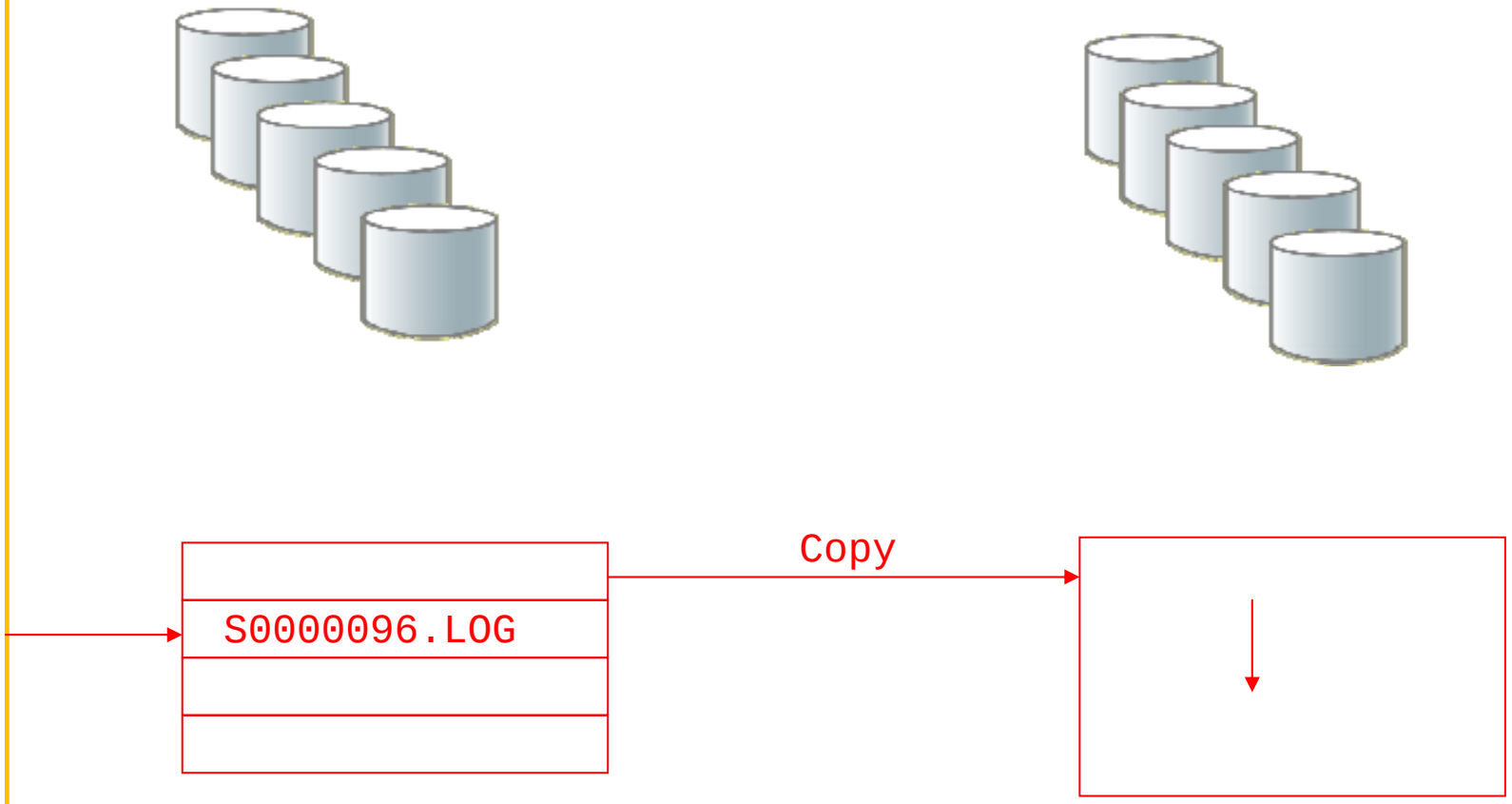
# Active Log / Archive Log (First Log File Fills Up)



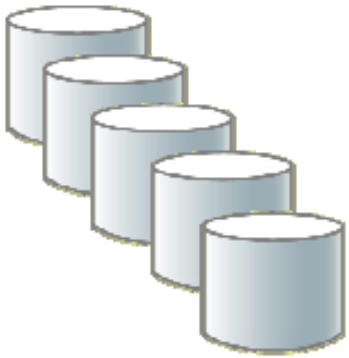
# Active Log / Archive Log (Second Log File Fills Up)

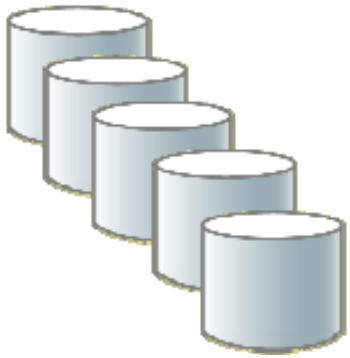


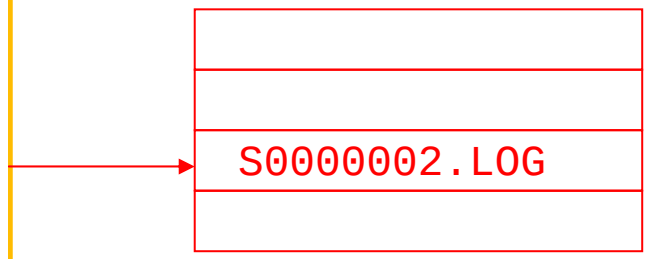
# Active Log / Archive Log (Many Logs Later)



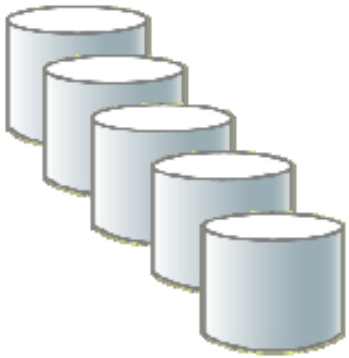
# Transaction Spanning across Active Logs

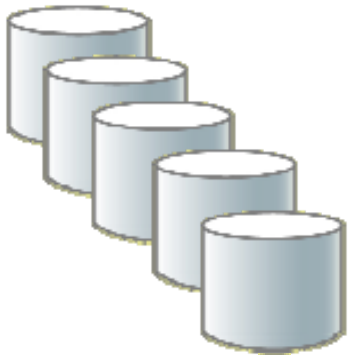


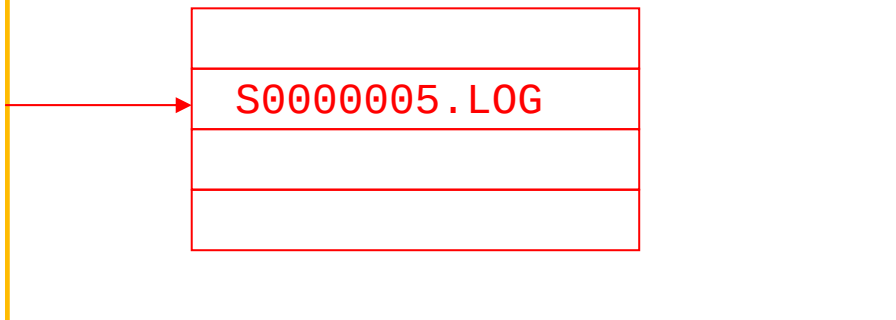




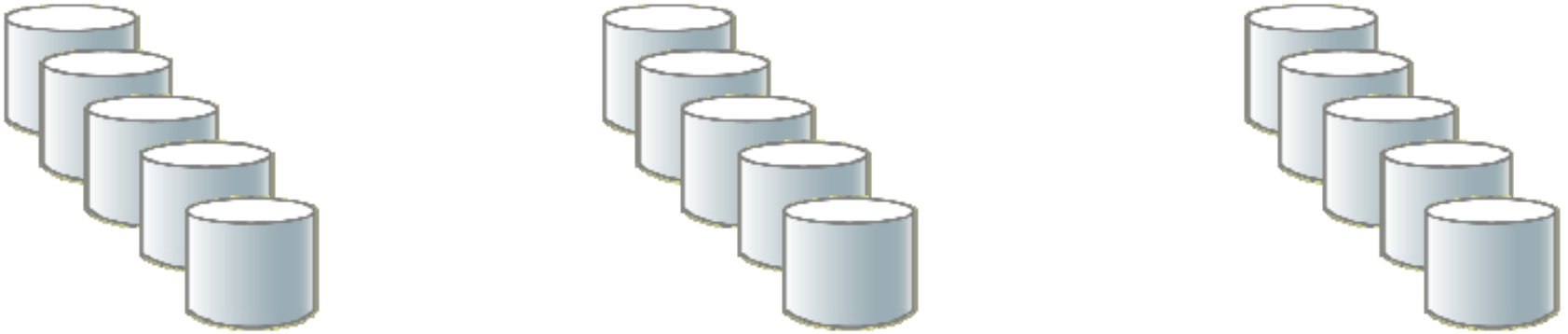
# Transaction Spanning across Active Logs





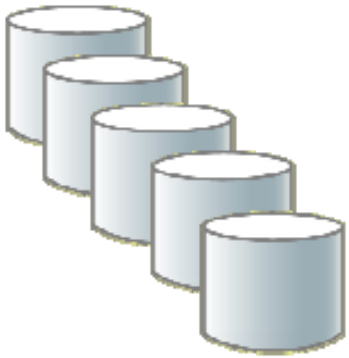


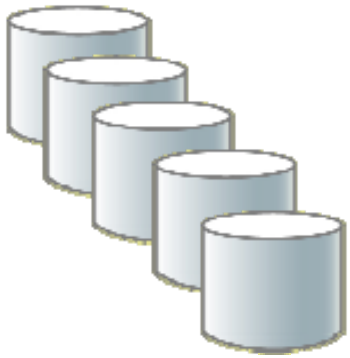
# Active Log / Archive Log /Failover Archive Log

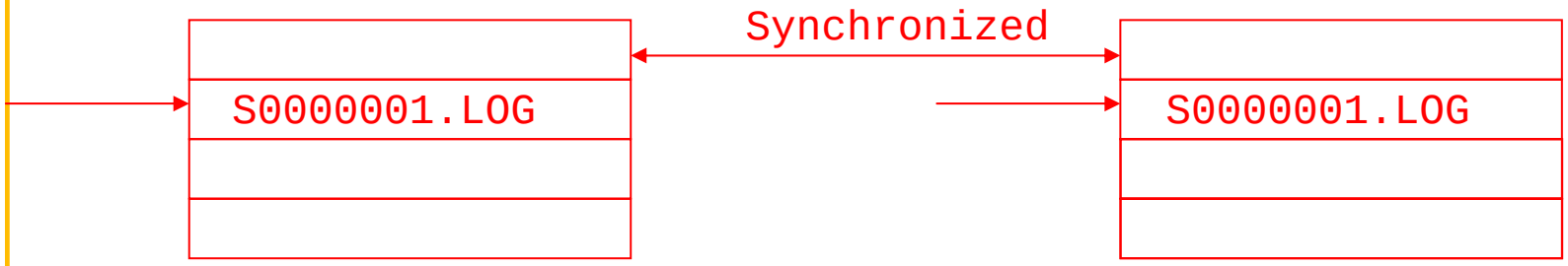


Copy

# Active Log / Mirror Log







# Tips for Setup and Size of the V6 Logs

- DB2 does more logging than TSM / ADSM. Don't be "skimpy" on setting the value of ActiveLogSize. The default size for a TSM 6.2 server is now16 GB.
- Tip: One benchmark calculated that during backup, each object updated in the DB required 3500 bytes of active log space. If you calculate how many objects are added each day with incremental backups, this is the amount of log space you will need for just backups. Other processes take additional log space (migration, identify, reclamation, etc).
- The speed of the archive log disks isn't as critical as the active log disks. Transactions continue to be written to the active logs while the active log files are copied to the archive logs.
- Consider having a large NFS filesystem or a large "cheap" disk as the ArchFailOverLogDir location just to be sure you don't run out of archive log space.

# *Backup and Restore of the TSM V6 DB*

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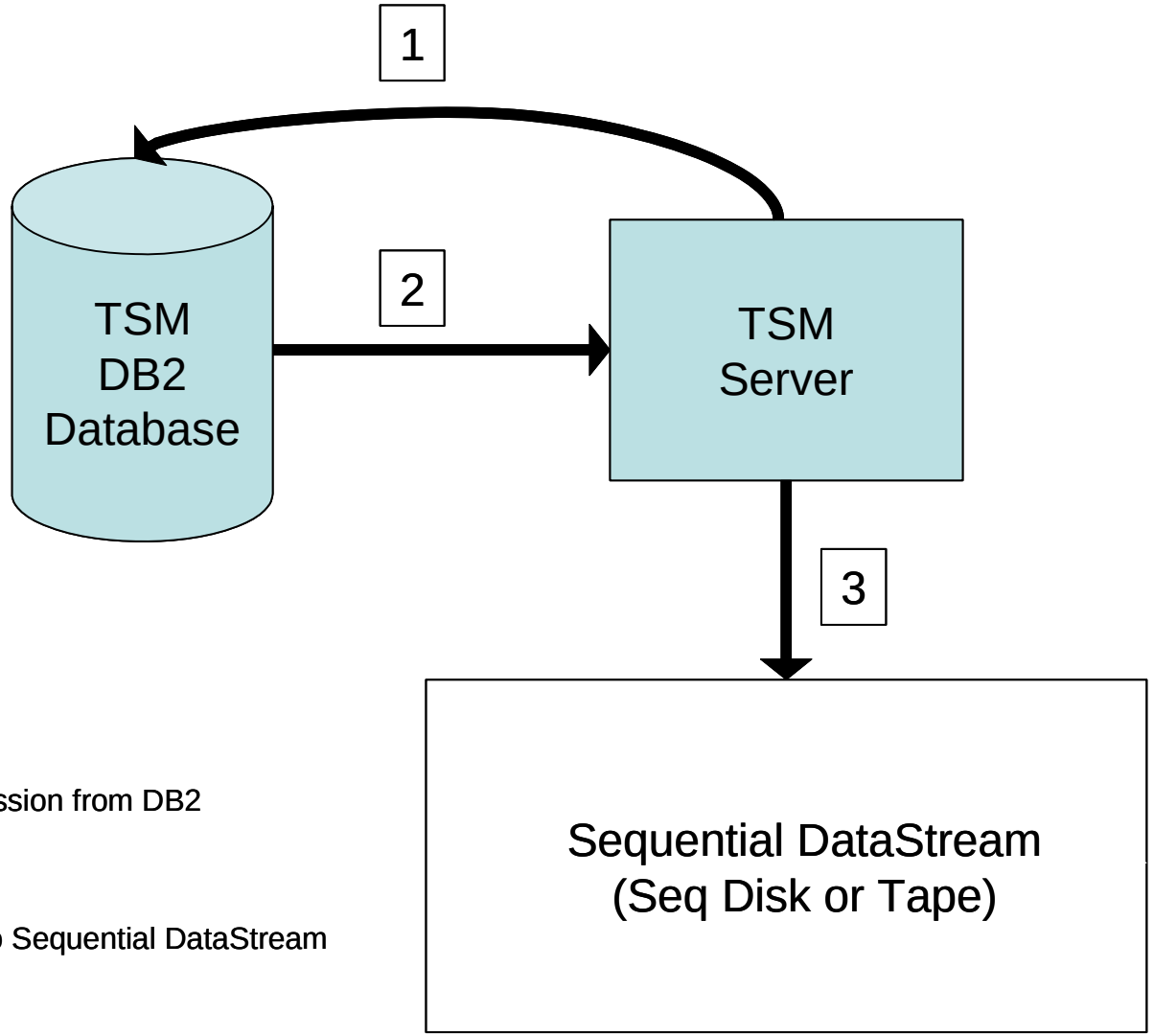
# Configuring the V6 DB Backup

- Again, use the upgrade wizards if possible. Most of backup configuration done with the wizards.
- V6 DB Backup uses the TSM client API for backup. API is installed automatically with TSM installation.
- Uses a special nodename of $$_TSMDBMGR_$$ for backup. This node can only perform backups and restores of the DB. Password **must** be TSMDBMGR.
- You can't see this nodename with a query command. It is hidden.
- TSM volumehistory file and devconfig files are now **required** for the backup and restore of the TSM DB.
- **Note**: Be careful when canceling sessions. It is possible to cancel the API session doing the DB Backup. (Look for the nodename above on a 'q session' command.)

# Processing Flow of the V6 DB Backup




1 Initiate DB Backup

2 Intercept Inbound Session from DB2

3 Stream DB Backup to Sequential DataStream

# Methods of Backup for the TSM V6 DB

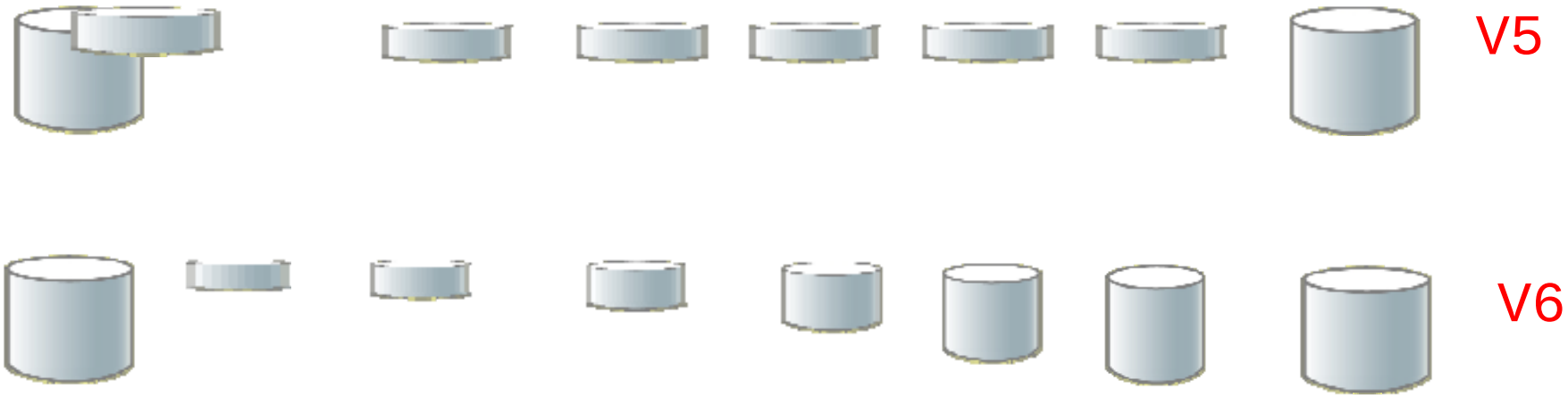
- Full Backup
  - Typically done through TSM Admin Schedule
  - Can also use server-to-server for device class of backup
- Incremental Backup
  - Not quite the same as TSM 5.x incremental backup (more on this later)
  - Can also use server-to-server for device class of backup
- TSM DB Snapshot
  - Typically done through TSM Admin Schedule
  - Does not clear out archive logs
  - Can also use server-to-server for device class of backup
- DB2 Snapshot is not supported in this release

# Number of Volumes Used for the V6 DB Backup

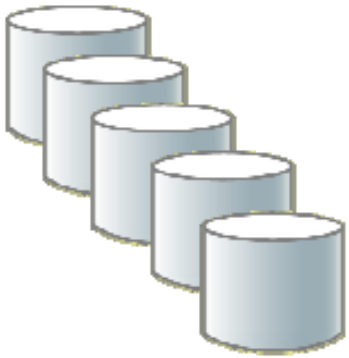
- Full Backup
  - For devclass tape, at least one tape volume used
    - Contains the DB backup and also active/archive logs since last full
  - For devclass file, at least 2 volumes used, name ends in '.dbv'
    - First contains the DB backup, 2nd contains active/archive logs since last full
- TSM DB Snapshot
  - For devclass tape, at least one tape volume used
    - Contains the DB backup and also active/archive logs since last full
  - For devclass file, at least 2 volumes used, name ends in '.dss'
    - First contains the DB backup, 2nd contains active/archive logs since last full
- Incremental backup
  - Contains all archive logs since last full db backup (see next slide)
  - For devclass tape, at least 1 volume used
    - Contains Changed pages, plus initial database metadata
  - For devclass file, at least 2 volumes used, name ends in '.dbv'
    - Contains Changed pages, plus initial database metadata

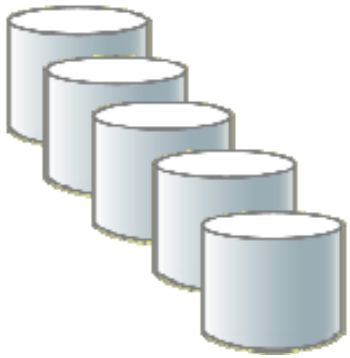
# Differences in the V6 Incremental Backup

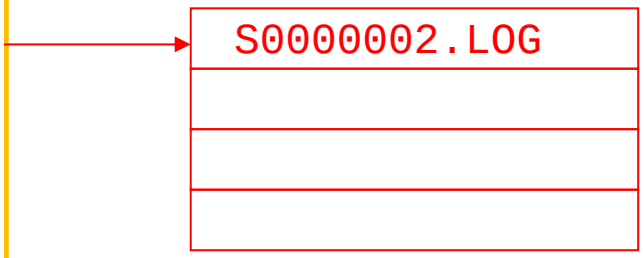
- Different than V5.x TSM DB incremental backup
- Also called (in DB2 speak) an “Incremental cumulative backup”
- For V6, need full backup, plus LAST incremental backup for DB restore

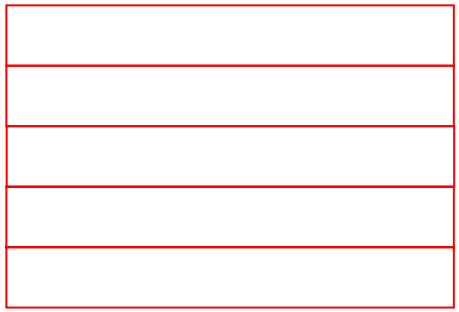


# Logs and DB Backup Example – Initial Install

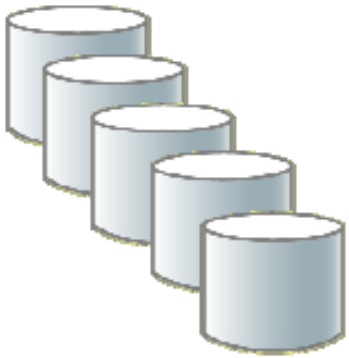


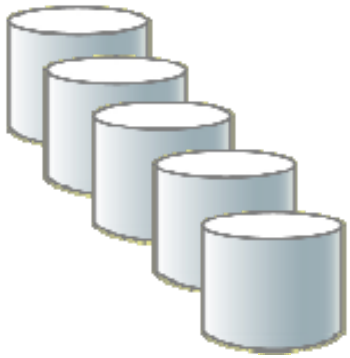


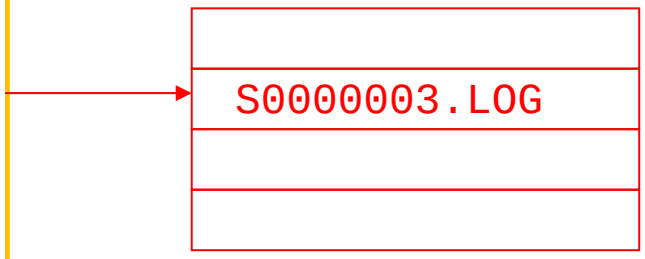


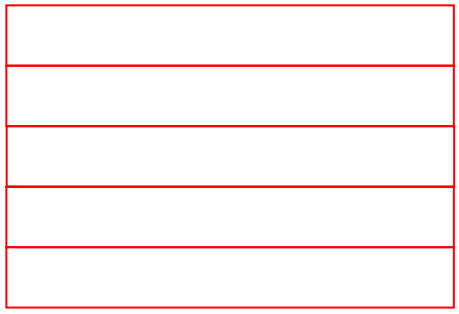



# Logs and DB Backup Example – First Full DB Backup

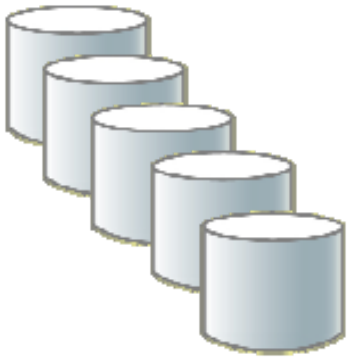


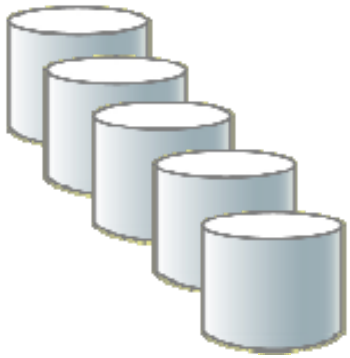


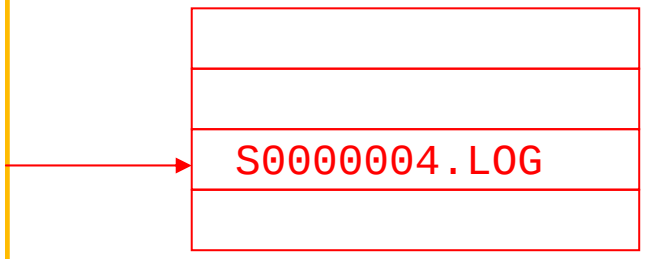


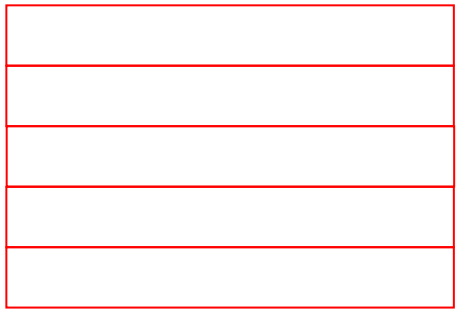



# Logs and DB Backup Example – First Incr DB Backup

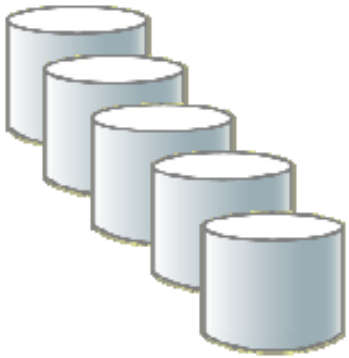


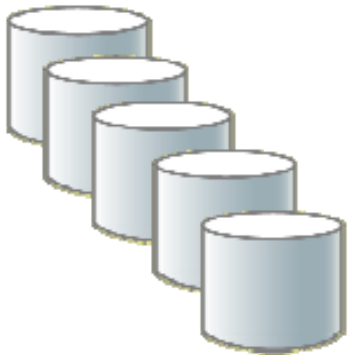


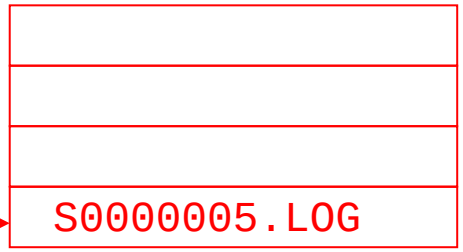


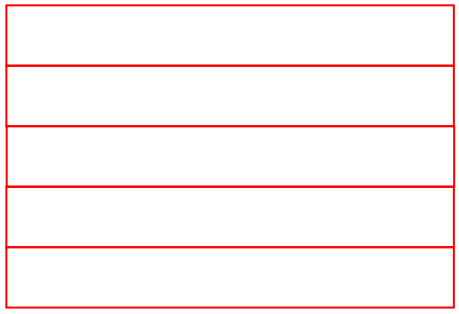



# Logs and DB Backup Example – Second Incr DB Backup

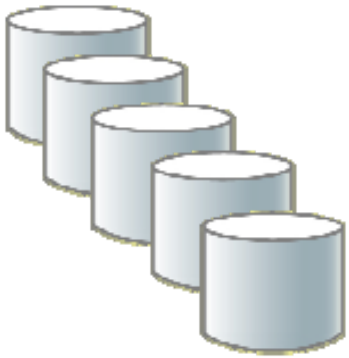


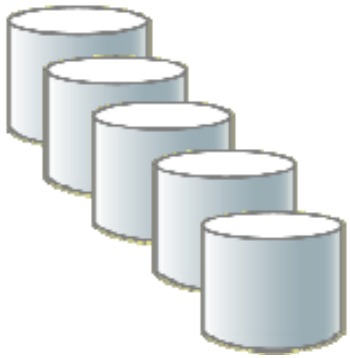


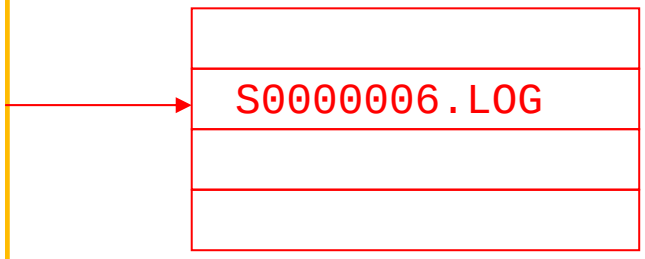


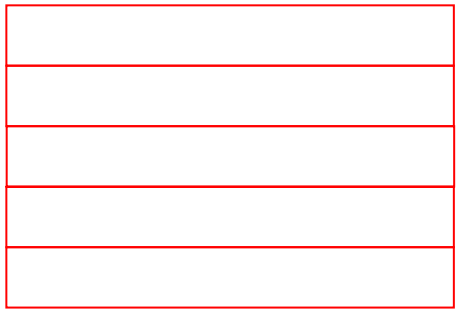



# Logs and DB Backup Example – Second Full DB Backup







# DB Backups: Should you do Full or Incremental DB Backups?

- Size your log space keeping in mind how you do DB Backups
  - Full backups clear out archive logs that are N-2 full backups ago . If you do incremental backups during the week, then archive log space requirements will increase.

# TSM V6 DB Backup FAQ

- Can multiple TSM DB Backups be placed on a tape?
  - Not in this release. This is a known requirement that will be implemented in a future release of TSM.
- Are space triggers supported with V6 and the DB?
  - Space triggers are no longer supported with the V6 DB.
- Can my TSM V6 DB backup be encrypted?
  - This is a known requirement, but is not implemented in this release. If you want, you can take a backup to a device that supports encryption such as the IBM System Storage™ TS1120 Tape Drive. This however requires an external key manager.

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