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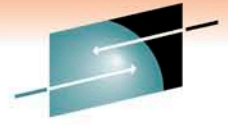
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# Tivoli Storage Manager Version 6 Implementation Planning, Upgrade and Strategies

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IBM

March 2<sup>nd</sup>, 2011  
Session:9091



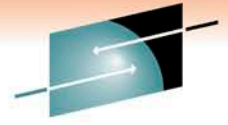


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# Agenda

- Preparing for the DB Upgrade to V6
- Overview of the Stages in the DB Upgrade Process
- Overview of the Upgrade Methods for the TSM DB to V6
- Sizing and Tuning Tips for the Logs and DB in TSM V6

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# Tivoli Storage Manager

## Preparing for the DB Upgrade to TSM V6



# Software / Hardware / Documentation Necessary for the Upgrade



1. READMEs for the DB Upgrade
2. DB Server Upgrade Guide (SC23-9554-02)
3. DB Upgrade Utilities (ftp downloads site)
  - Need upgrade version that is greater than or equal to the level of the TSM server you are upgrading
  - <ftp://service.boulder.ibm.com/storage/tivoli-storage-management/maintenance/server-upgrade/>
4. TSM V6 DVD's
5. Storage Technical Exchange Website:  
[http://www-01.ibm.com/software/sysmgmt/products/support/supp\\_tech\\_exch.html](http://www-01.ibm.com/software/sysmgmt/products/support/supp_tech_exch.html)
6. TSM Wiki  
<http://www.ibm.com/developerworks/wikis/display/tivolistorage/manager/Home>

# What You Can and Cannot Do with TSM V6



- You :
  - can run multiple TSM / database instances on same OS image
  - can forget about having to do DB audits.
- You :
  - CANNOT use an existing DB2 code install on the system (must use the DB2 that installs with the TSM server)
  - CANNOT use a DB2 from a remote system
  - CANNOT use Raw Logical Volumes for the database and Log volumes (you can still use RLV for storage pool volumes)
  - CANNOT run multiple software levels of TSM on the same OS instance.

# What You Can and Cannot Do with the TSM DB Upgrade



- You **CAN**:
  - run multiple TSM database upgrades at the same time, given you have enough resources
  - use TSM export/import to go from V5.x to V6 to do the upgrade instead of using TSM DB Upgrade utilities (See [here](#) for considerations)
- You **CANNOT**:
  - change OS platforms with the upgrade (with a few exceptions)
  - merge multiple TSM databases with the upgrade
  - change OS platforms after the upgrade using DB2 export/import. (TSM export/import must still be used for this)

# Why use TSM Export/Import instead of the DB Upgrade Utilities?

- You may have applications that require 100% uptime of TSM.
  - You may need to use TSM Export/Import if:
    - you are using a DP Agent that needs to backup transaction logs before DB insert process has finished.
    - You have a TSM Server that has 24x7 requirements for data restores and backups
    - You want to selectively move just certain nodes to a new V6 system and leave other nodes on a TSM V5 system
    - You are using Tivoli CDP to back up to a TSM Server.
    - You are using Content Manager
    - You are using Space Manager (HSM)

## Why use TSM Export/Import instead of the DB Upgrade Utilities?

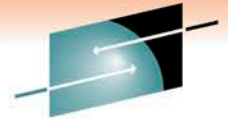
- TSM Export/Import can be used while TSM 5.x server is still running. (Nodes being moved to new server should be disabled while export/import is running.)
- See considerations for use [here](#)



# Considerations for use of Export/Import for Upgrade to V6



- Consider carefully the case of using Export/Import vs. DB Upgrade.
  - TSM Export/Import in benchmarks was slower in V6 than in previous releases.
  - May want to consider instead leaving TSM V5 server as is, and starting over with new V6 server if you have conditions noted [here](#).



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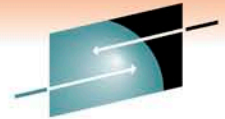
# Tivoli Storage Manager

## Overview of the Stages in the DB Upgrade Process



# Phases of the DB Upgrade Process

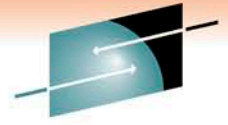
Phase	Notes
DB Backup (Occurs on Source Server)	
DSMUPGRD PREPAREDB (Occurs on Source Server)	<p>Prepares 5.x DB for upgrade, Does the following:</p> <ol style="list-style-type: none"> <li>1. Does an upgrade of DB to 5.5.</li> <li>2. Checks for known Database problems.</li> <li>3. USSFILESPACE conversion status</li> <li>4. Presence of NAS backups with TOCs, backupsets.</li> <li>5. Backs up devconfig file to configured devconfig files.</li> </ol> <p>Should finish in a few minutes</p>



# Phases of the DB Upgrade Process

Phase	Notes
DSMUPGRD EXTRACTDB (Occurs on Source Server)	Extracts DB to either media or sends it over the NW. If writing to media, this step takes about as long as a DB Backup. If writing to NW, it depends on NW speed or speed of insertdb process.
DSMSERV LOADFORMAT (Occurs on Target Server)	Creates the instance, Initializes the new DB, and does an initial backup of the new DB. This step takes ~ 5-10 minutes.
DSMSERV INSERTDB (Occurs on Target Server)	Inserts information into DB using the DB2 load utility. Speed is hardware dependent. See performance section. .Expect 5 GB/hr for this part

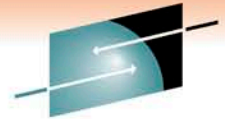
# Phases of the DB Upgrade Process



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Phase	Notes
DSMSERV INSERTDB Integrity Check (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 Update phase (Occurs on Target Server)	The update phase updates selected records in the TSM 6.1 database to conform to the requirements of TSM 6.1. Mostly used to merge information from multiple TSM 5.5 tables into a single TSM 6.1 table. Again, this phase takes about as long as the previous insertdb phases.

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## Overview of the Upgrade Methods for the TSM DB to V6



# 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
  2. Upgrade to new system, using network
  3. Upgrade in place (on same system), using external media
  4. Upgrade in place (on same system) using network
  5. TSM Export/Import from 5.x -> 6.X
    - 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)
    - See considerations for use of export/import on slide 26.

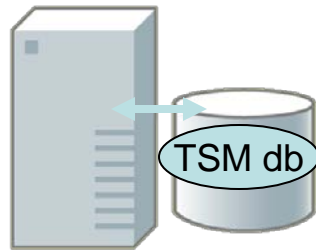
## Upgrade Methods (cont.)

- If you are upgrading the DB and not doing TSM Export/Import, you have 2 choices:
  - Upgrade using command line utilities
    - DB2 utilities
    - Dsmupgrd preparedb, dsmupgrd extractdb, dsmserv insertdb
  - Upgrade using DB 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



# Upgrade to New System External Media

Source Server  
TSM Server



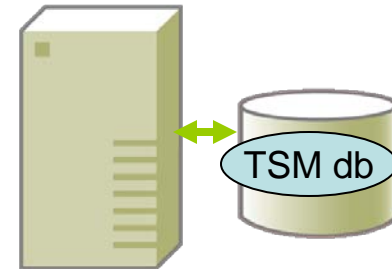
TSM 5.x



or



Target Server  
New TSM Server



TSM 6.X  
DB2 V9.5 / V9.7

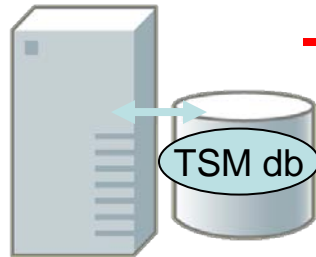
1. Dsmupgrd preparedb
2. dsmupgrd extractdb

3. Install TSM 6.X
4. dsmserv loadformat
5. dsmserv insertdb manifest

Extractdb/dsmserv insertdb

# Upgrade to New System Network

Source Server  
TSM Server

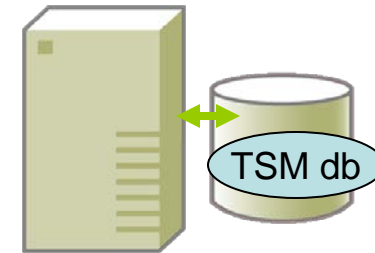


TSM 5.x

1. Dsmupgrd preparedb

4b. dsmupgrd extractdb

Target Server  
New TSM Server



TSM 6.X  
DB2 V9.5 / V9.7

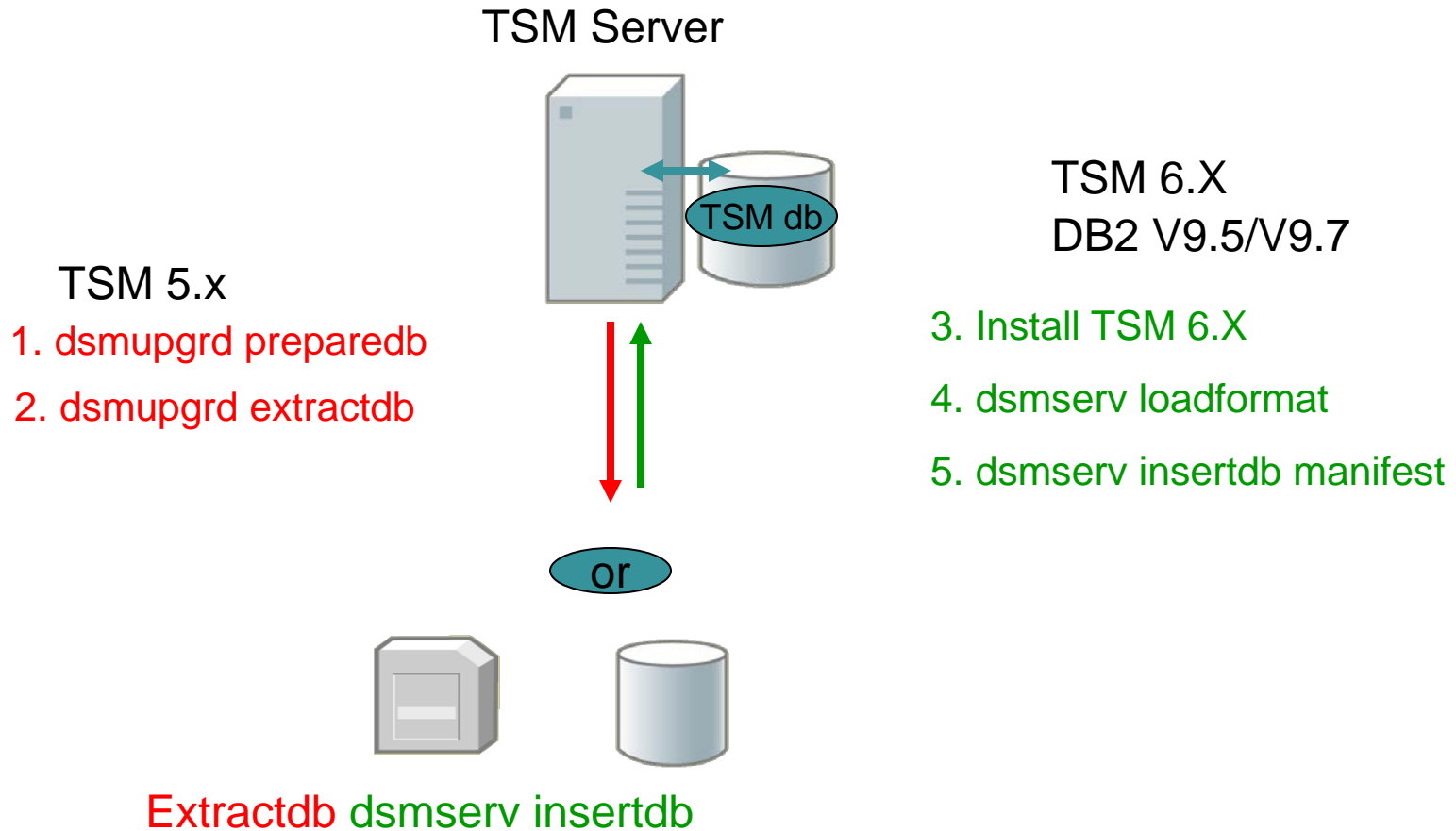
2. Install TSM 6.X

3. dmserv loadformat

4a. dmserv insertdb

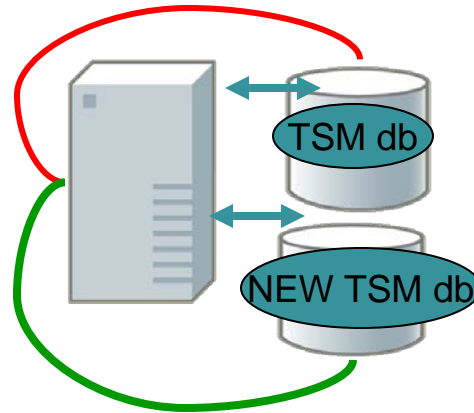
Extractdb/dmserv insertdb

# Upgrade In-Place Process External Media



# Upgrade In-Place Process Network

TSM Server



TSM 5.x

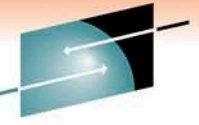
1. Dsmupgrd preparedb
- 4b. dsmupgrd extractdb

TSM 6.X

2. Install TSM 6.X
3. dsmserv loadformat
- 4a. dsmserv insertdb

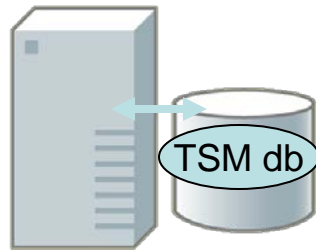
Extractdb dsmserv insertdb

# TSM Export/Import to New System Process (External Media)



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Source Server  
TSM Server



TSM 5.x

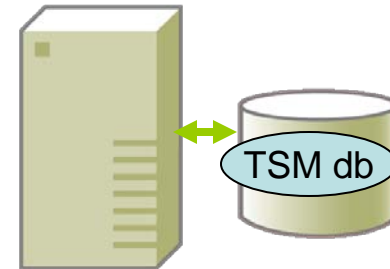
1. TSM Export



or



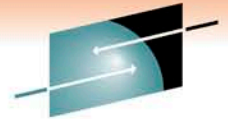
Target Server  
New TSM Server



TSM 6.X  
DB2 V9.5/V9.7

2. TSM Import

TSM Export/Import done in separate steps



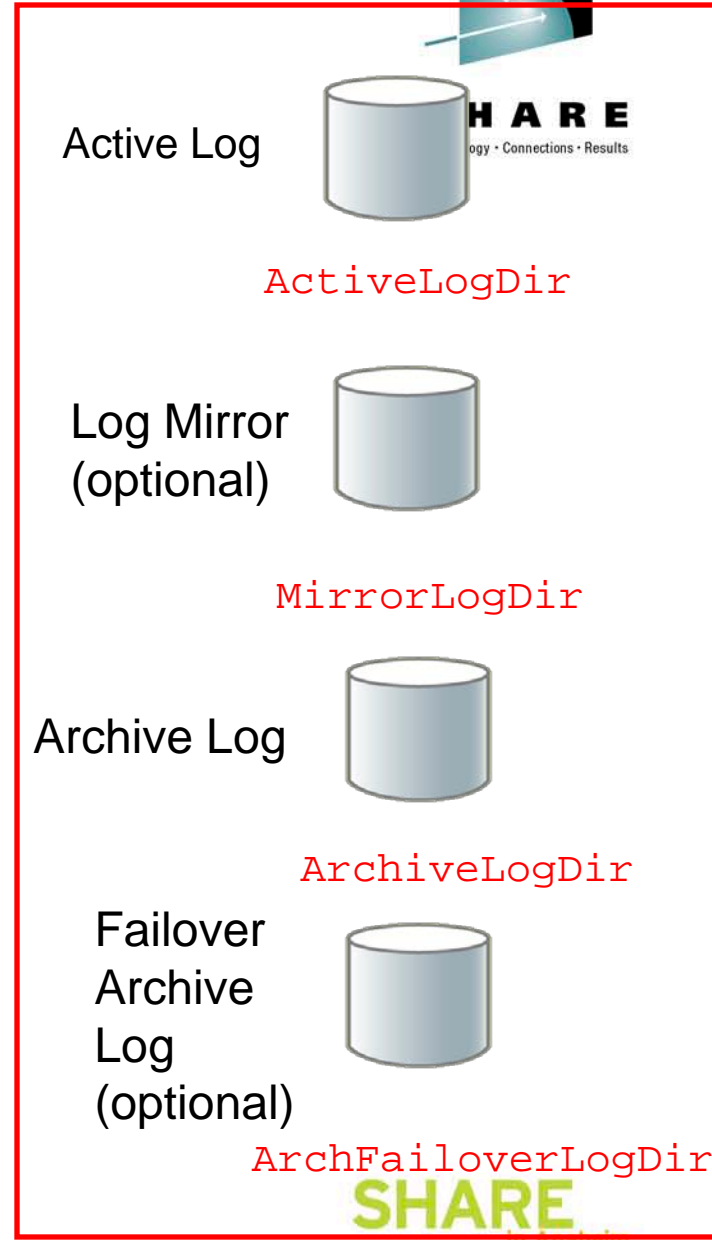
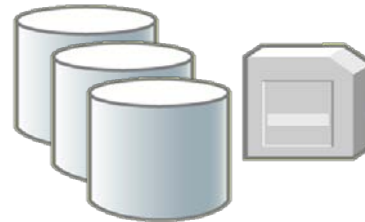
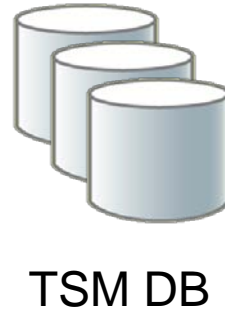
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# Tivoli Storage Manager

## Sizing and Tuning Tips for the Logs and DB in TSM V6



# TSM V6 Components



# TSM Active Log



- 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 (defined by the Log File Size of DB2). Number of logs created is determined by ActiveLogSize / 512.
- If the ActiveLogSize is increased, customers may see a delay on the restart of TSM while the new 512MB logs are being formatted.
- If a transaction is not committed and all active log files are filled, then TSM halts.
- Default ActiveLogSize is 16GB (changed in 6.2 from 2GB), maximum value is 128GB



# TSM Active Log



- As soon as an active log file gets full, it is copied to archive log space. It is not renamed, however, until all transactions in the active log are committed and a new active log file is needed.
- A transaction can span active log files.
- Customer Tip: recommend having several emergency 2GB dummy files in the location of ActiveLogDir space. If the location referenced by ActiveLogDir gets full, you can create an emergency amount of space by deleting these dummy files, changing ActiveLogSize, and restarting TSM.

# TSM Archive Log



- Contains committed transaction data.
- DB2 is configured to keep the logs around for 2 full DB backups. This was changed in service level 6.1.4.0/6.2.2 so that only enough log space will be required for 1 full DB backup. The appropriate DB2 parameters will be changed as part of the service pack install.
- Sequential IO access – slower disks can be used for archive logs.
- Use is required.
- 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 NFS mountpoint or large “cheap” disk for this. For Windows, a CIFS share could also be used for the failover archive log.
- Sequential IO access
- Set with ArchFailOverLogDir parameter (on dsmserv format / loadformat), or added later in dsmserv.opt
- Log files are removed after DB backup.
- To change the location where failover archive logs are placed, the ArchFailOverLogDir parameter in dsmserv.opt file should be updated. TSM will need to be restarted.
- DB2 parameters changed in 6.1.4.0 / 6.2.2.0 so that decision is made in less time as to whether or not to use the failoverarchive.log.

# Sizing the Logs for TSM V6



- Consider what your workload is and which functions you will use. TSM data deduplication, for example, uses considerably more log space, as do in-line table reorganizations.
- For new TSM customers, refer to following table.
- Keep current on TSM V6 maintenance. Many APARs have been addressed in current service levels
- Monitor log usage to see if it has been sized appropriately

# Initial Minimum Recommended Sizes for Active Log and Archive Log (For a New TSM Customer)

Storage Pool Deduplication Enabled?	Minimum recommended size for Active Log Directory	Minimum recommended size for Archive Log Directory
No	16GB	48GB
Yes	32GB	96GB

# Initial Minimum Recommended Sizes for Active Log and Archive Log (For an Existing TSM Customer)

- Use the following approach as an initial estimate for the ActiveLogSize value for the upgrade to TSM V6. This is assuming the customer is using **normal mode**.
  - After the daily full DB backup issue a “reset maxlogutilization” cmd. logv” command.
  - Right before the next daily full DB backup, note the max log utilization. (q log f=d command) This represents the largest amount of log space needed at any point for your transaction workload.
  - You need to multiply the previous largest value by 5. This is what you need at a minimum for the value of ActiveLogSize.
  - If you are implementing TSM at a level before 6.1.4.0 or TSM 6.2.2 (not yet released) multiply ActiveLogSize by 3. This is the minimum amount of space needed for ArchiveLog space in MB. If after these service levels use at least the value of 2 x ActiveLogSize for the amount of archive log space needed; this is in MB

# Initial Minimum Recommended Sizes for Active Log and Archive Log (For an Existing TSM Customer)

- Use the following approach as an initial estimate for the ActiveLogSize value for the upgrade to TSM V6: This is assuming log is in **roll-forward mode**.
  - After a daily full DB backup, issue a “show logv” command periodically (every 2-3 minutes) for the time period between 2 full backups. Note the headLSN value and truncLSN value for each execution of the command (they have a format of xxxxxx.yyy.zzzz in the output).
  - For each execution of the command from the output, calculate the value of (HeadLSN-TruncLSN), subtracting the xxxxxx portion of the LSN. Note the largest value xxxxxx. This represents the largest amount of log space needed at any point for your transaction workload. You may need to do this for several different days if your workload varies.

# Initial Minimum Recommended Sizes for Active Log and Archive Log (For an Existing TSM Customer)

## Cont.

- Use the following approach as an initial estimate for the ActiveLogSize value for the upgrade to TSM V6: This is assuming log is in **roll-forward mode**.
  - You need to multiply the previous largest value by 5. This is what you need at a minimum for the value of ActiveLogSize.
  - If you are implementing TSM at a level before 6.1.4.0 or TSM 6.2.2 (not yet released) multiply ActiveLogSize by 3. This is the minimum amount of space needed for ArchiveLog space. If after these levels use at least the value of 2 x ActiveLogSize for the amount of archive log space needed. This is in MB.



# Tuning Tips for the TSM V6 DB



- Use faster disks for the DB. Don't use the slower internal disk included by default in most AIX servers, or using consumer grade PATA/SATA disk in a Linux or Windows system. These will slow everything down.
- Use multiple database containers if you can. Recommended to use at least 4 containers initially for the DB (if it is less than 40GB), spread across 4 LUNs / physical disks. Larger TSM servers (> 100GB) should have up to 8 containers.
- Plan for growth with additional containers up front. Adding containers later can result in an imbalance of IO and create hot spots.
- If possible, place each database container in a different filesystem. This improves performance; DB2 will stripe the database data across the various containers. TSM supports up to 128 containers for the DB.
- You should have a 1-1 relationship between LUNs and containers. (1 container per LUN).

# Tuning Tips for the TSM V6 DB (cont.)



- For larger V6 DBs (> 40GB) ,separate your TSM Components (DB LUNs, Log LUNs, Storage Pool LUNs)
- The block size for the DB varies depending on the tablespace, most are 16K, but a few are 32K. Segment sizes on disk subsystems should be 64K or 128K.
- If using RAID, then define all your LUNs with the same size and type. (For example, don't mix 4+1 RAID5 and 7+1 RAID5)
- RAID10 outperforms RAID5 (when doing large numbers of writes) but comes at a cost of 50% more disk being needed.
- Smaller capacity disks are better than larger ones if they have the same rotational speed.
- Recommended best practice to have containers on disks that have the same capacity and IO characteristics.

# Tuning Tips for the TSM V6 Logs



- Use faster disks for active logs. Do not mix active logs with disks containing the DB, archive logs, or system files such as page or swap space.
- Can use slower disks for archive logs and failover archive logs.
- Subsystem readahead is good to use for the active logs; it helps in archiving them faster.
- RAID1 is good for active logs.
- Highly recommended that FailoverArchiveLog space be set aside for possible emergency use. Slower disks can also be used for FailoverArchiveLog space.