Pulse

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Upgrade TSM to V6

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Agenda

- Why upgrade to TSM v6?
- Basics
- Planning & Preparing for Upgrade
- Upgrade Methods
- Performance Considerations
- Example of Upgrade Timings
- FAQs
- Example - Windows In-place Network Upgrade Using Wizard (if time permits)

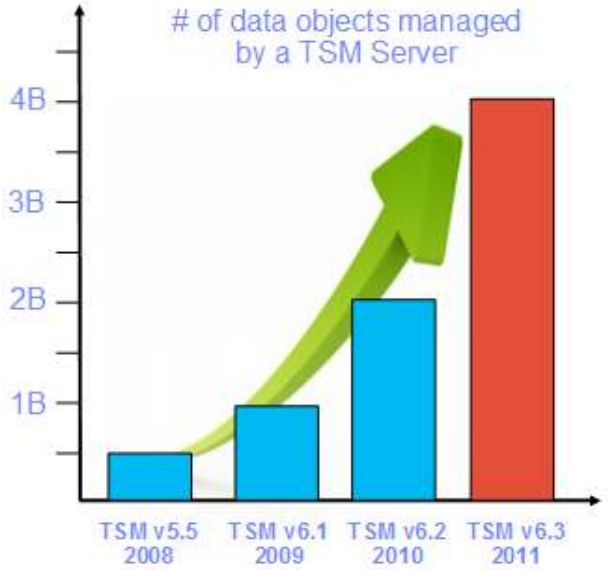
Benefits of Upgrading to TSM v6 (as compared to TSM v5.x)

Improved Return on Investment

- Scalability increased by 800%
  - Support up to 4 Billion data objects per TSM Server
- Built-in Data Deduplication – no extra charge
  - Source and target deduplication
  - Combines with progressive incremental backup to reduce data by up to 90% or more
- Simplify Administration
  - Automated client software updates across all platforms
  - New reporting and monitoring across the family with custom report creation
- Improve service levels and availability
  - New client data/metadata replication for warm standby disaster recovery
  - Faster backups and restores reduces downtime

Improved Performance and Reliability

- DB2 database 'under the covers'
- Eliminates most database administration



TSM Server capacity doubled 3 years in a row

Why should you upgrade to TSM v6?

Users of Tivoli Storage Manager v5.x are likely struggling with scalability, reliability, and performance problems; and having difficulty protecting virtual machines.

TSM v6.3 will help:

1. **Reduce Costs**
   - 87% fewer backup servers needed with improved scalability*
   - 40% less storage capacity needed with built-in data deduplication*
2. **Simplify Administration**
   - Dramatic reduction in all database management tasks – DB2 built-in
   - Reduced maintenance time with automatic agent updates
3. **Improve Application Availability**
   - Less downtime with faster, smarter backups
   - Quick problem resolution with built-in reporting and monitoring
   - Rock solid, enterprise-class internal database = fewer problems
     - Online reorgs
     - No DB2 skill required ******
4. **It's Easy !!!!!!**
   - Thousands have done it
   - Automated, wizard-based installation and migration

*** As compared to TSM v5.x; results will vary based on environmental variables**

Why should you upgrade to TSM v6?

IS THAT ENOUGH REASON?

1. **End of V5.5 and V6.1 Support Announced**
   - 30 April 2014

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The Basics

- Increase in real memory requirements
  - Min is 16 GB (for DB2/TSM)
  - 24GB or more is recommended
- Increase in TSM DB size and utilisation possible
  - DB2 space will expand and contract based on workload & reorg
  - Deduplication increases DB size and utilisation but saves storage pool space
- Increase in maximum recovery log size (from 13GB to up to 128GB)
  - **Roll-forward mode only**
- 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 & possible restore of 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 included in TSM package and is installed with TSM
  - 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 & DB2 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 is currently 4 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 of log depends on activity & 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
  - 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 & co-exist with current version - 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, existing TSM server instance can be restarted afterwards.

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Preparation

- READ documentation
  - TSM Information Center
  - READMEs for the DB Upgrade (latest updates)
- OS Levels
  - Be current – check web and documentation for supported OS levels
  - Check SP and maintenance levels and use TSM 6.3 Prereqchecker
- TSM Levels
  - Recommended starting point is TSM V5.5.2
  - May need to upgrade TSM clients
  - Automatic Deployment for Windows Clients from TSM V6.2 onwards
- Consider 24X7 requirements for TSM availability
  - Applications such as CDP, Content Manager, and Space Manager *assume* TSM server is always available
  - Customer DB Apps may need to backup or ship logs hourly

Preparation

- Disk Capacity Planning
  - Upgrade process creates new database
  - Determine & configure DB2 DB space before starting the upgrade
  - DB2 active & 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 5-10 GB/hr for an upgrade process
- Verify your monitoring applications support TSM V6
  - TSM Operational Reporting is not supported with V6

    Although this can still be used to some extend.
- TSM Monitoring for TSM V6.X
  - Consider installing Tivoli Monitoring for TSM which brings together multiple components, to provide near real-time monitoring and historical reporting.
  - Must be installed in different machine than TSM 6.3 server.
  - DB2 9.5

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 Deduplication
Note 2: V6 DB, DBB, & 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

- Pick the first TSM instance 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 6.3)

    TSM 5.5 Storage Agent and Library Client will be supported with TSM 6.3 Server (Library Manager) during the upgrade of TSM 5.5 servers to TSM 6.3, through 30 September 2013
  - Do you use LAN-Free ?
    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 if you can
  - 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 & 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 6.3	Versions 6.3, 6.2, 6.1, and 5.5 *
Tivoli Storage Manager Version 6.2	Versions 6.2, 6.1 and 5.5
Tivoli Storage Manager Version 6.1	Versions 6.1 and 5.5
Tivoli Storage Manager Version 5.5	Versions 5.5

*** TSM 5.5 Storage Agent and Library Client will be supported with TSM 6.3 Server (Library Manager) during the upgrade of TSM 5.5 servers to TSM 6.3, through 30 September 2013 – V5.5 & 6.1 EOL 30 April 2014**

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 6.4	Versions 6.3 6.2 and 6.1 (TSM Server level is 6.3.3 in TSM 6.4)
Tivoli Storage Manager Version 6.3	Versions 6.3, 6.2, and 6.1
Tivoli Storage Manager Version 6.2	Versions 6.3, 6.2, 6.1, and 5.5
Tivoli Storage Manager Version 6.1	Versions 6.3, 6.2, 6.1 and 5.5
Tivoli Storage Manager Version 5.5	Version 6.3*, 6.2, 6.1 and 5.5

*** TSM 5.5 clients will be supported with TSM 6.3 servers and storage agents during the upgrade of TSM 5.5 servers to TSM 6.3, through September 30, 2013 - V5.5 & 6.1 EOL 30 April 2014.**

Recommended Memory Requirements

- TSM 6.3 requires significantly more memory per instance than TSM 5

Server	Non Dedup	Dedup Minimum
* 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 (CPU/Memory/Disk & 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. Stop TSM server – Halt.

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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 (seq disk or tape)
2. Upgrade to new system, using network
3. Upgrade in place (on same system), using external media (seq disk or tape)
4. Upgrade in place (on same system) using network
5. TSM Export/Import from 5.x -> 6

 # hybrid upgrade-migration method

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

Phases of the DB Upgrade Process

PHASE	NOTES
DSMUPGRD EXTRACTDB (Occurs on Source Server)	Extracts DB to either media or sends it over the network. If writing to media, this step takes about as long as a DB Backup. If writing to network, it depends on network 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 around 10 minutes.

Phases of the DB Upgrade Process

PHASE	NOTES
DSMSERV INSERTDB Insert records (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 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 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.

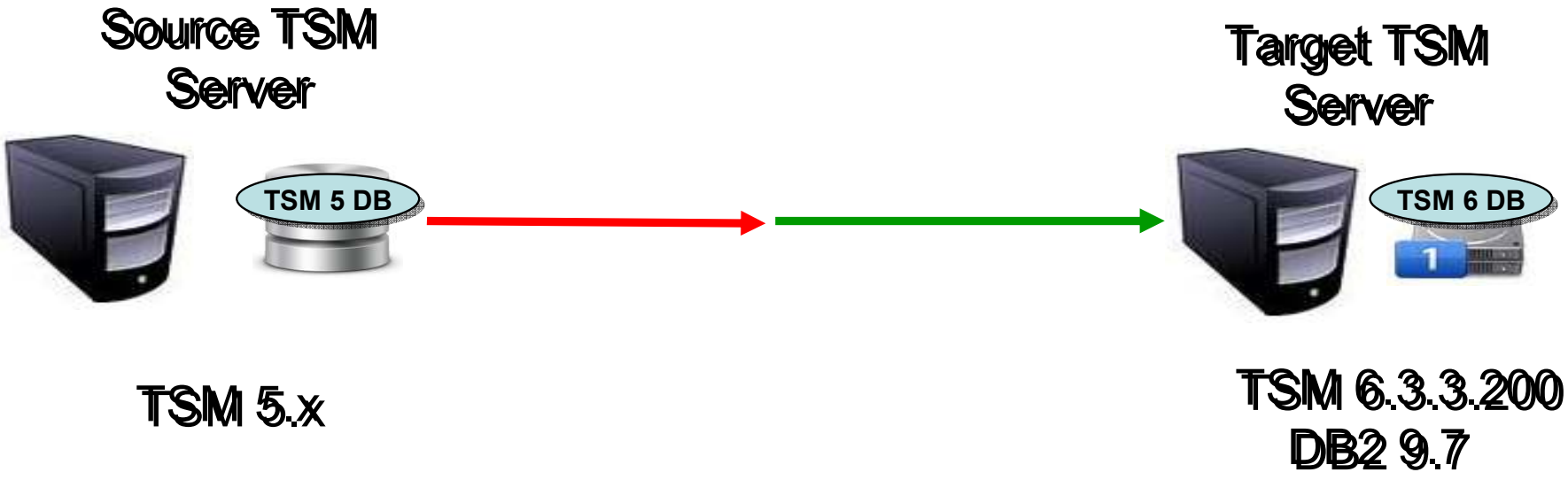
Upgrade to New System - External Media Method

1. dsmupgrd preparedb
2. dsmupgrd extractdb

3. Install TSM 6.3.3.200
4. dsmserv loadformat
5. dsmserv insertdb

Extractdb/dsmserv insertdb done in *separate steps*

Upgrade to New System - Network Method



1. Dsmupgrd preparedb

2. Install TSM 6.3.3.200

3. dsmserv loadformat

4a. dsmupgrd extractdb

4b. dsmserv insertdb

Extractdb/dsmserv insertdb *at same time*

Upgrade In-Place Process - External Media Method

TSM 5.x

1. dsmupgrd preparedb
2. dsmupgrd extractdb

TSM Server

TSM 6.3.3.200
DB2 9.7

3. Un-Install TSM 5.x code
4. Install TSM 6.3.3.200
5. dsmserv loadformat
6. dsmserv insertdb manifest

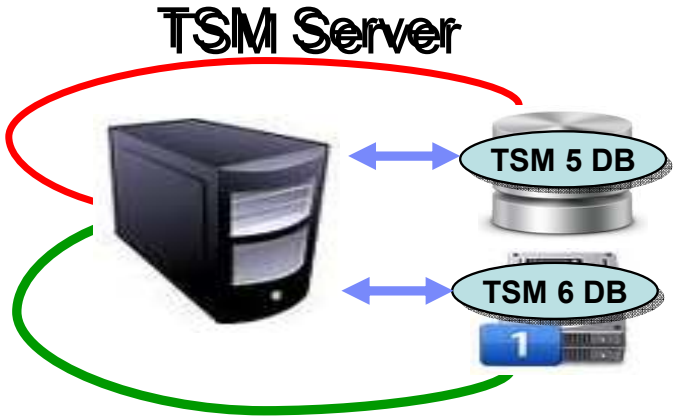
or

Tape Media

Sequential Disk Media

Extractdb dsmserv insertdb done in *separate steps*

Upgrade In-Place Process - Network Method



TSM 5.x

1. Dsmupgrd preparedb

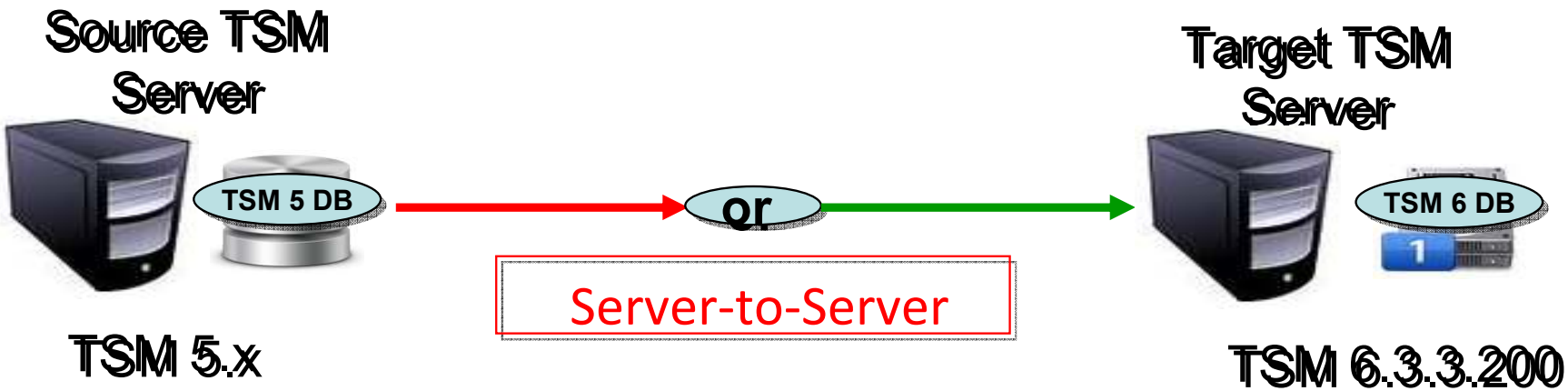
5a. dsmupgrd extractdb

TSM 6.3.3.200
DB2 9.7

2. Remove TSM 5.x code
3. Install TSM 6.3.3.200
4. dsmserv loadformat
5b. dsmserv insertdb

Extractdb dsmserv insertdb done *at same time*

TSM Export/Import to New System Method



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!

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Estimating time for the Upgrade of the DB

- Dependent on many factors
  - Size & utilization of DB being upgraded
  - Number of processors & cores
  - Storage device speed & configuration
  - Network speed
  - Upgrade method chosen (network)

- Plan for ***5-10 GB/hr*** for DB upgrade.

Items to consider for your DB Configuration

- **Use fast reliable disk - SSD where possible**

- **Use multiple database containers**. (This is DB2 terminology for what TSM calls database directories). Make sure each database directory is on 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)

Items to consider for the V6 Logs

- The Logs have sequential I/O 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.

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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

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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*. Is it 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 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 use the 6.3 version of the Administration Center with my 5.5 or 5.4 server without installing a 6 server?

A: Yes. The 6.3 Administration Center will work with server versions 6.3.x, 6.2.x, 6.1.x, 5.5.x and 5.4.x.

You CANNOT run the 5.5 Administration Center to administer a TSM Server V6.3.x

Q: Can I get the 6.3 version of the TSM Monitoring and use with my 5.5 or 5.4 server without installing a 6 server?

A: Yes. The 6.3 TSM Monitoring will work with server versions 6.3.x, 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?

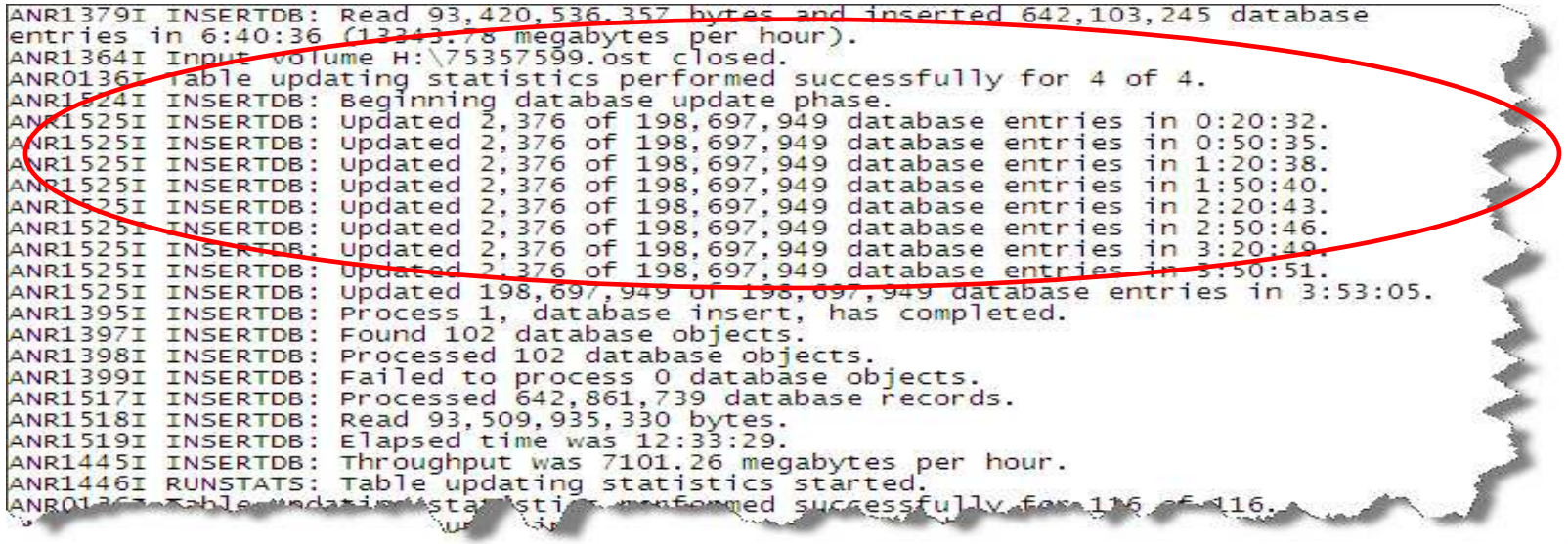
A. The TSM V6 Database Upgrade Utility will detect database corruption and attempt to repair the faulty items. The upgrade utility will generate messages when corruption is detected.

```
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** a checkpoint restartable process. 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 for some reason need to go back to my previous V5 TSM?

A: If source server is TSM 5.3 or 5.4 when *dsmupgrd preparedb* is done:

1. You need to re-install TSM 5.3 or 5.4 from installation media if using in-place upgrade methods
2. You need to restore your DB from backups prior to the prepare DB

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

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

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

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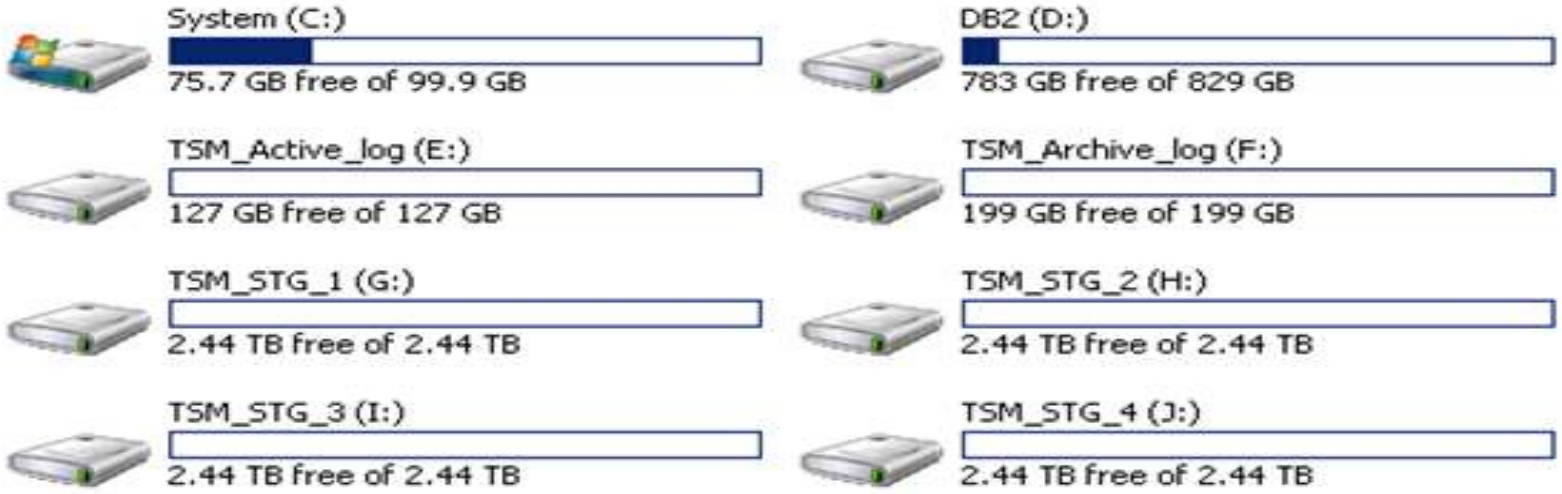
Example – Windows In-Place Network Upgrade

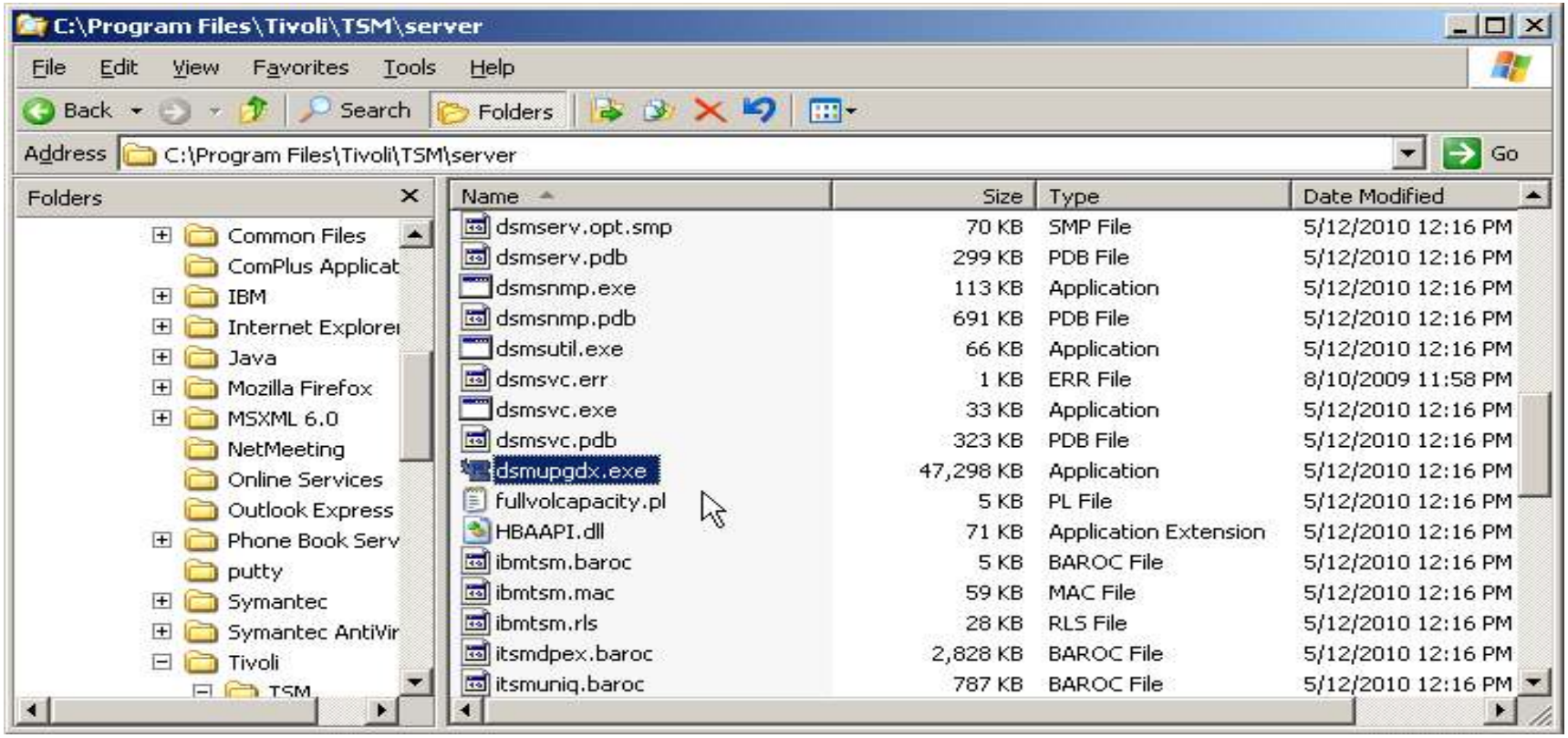
This example assumes that the following steps have already been completed;

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

Create New TSM Instance Directory Structure

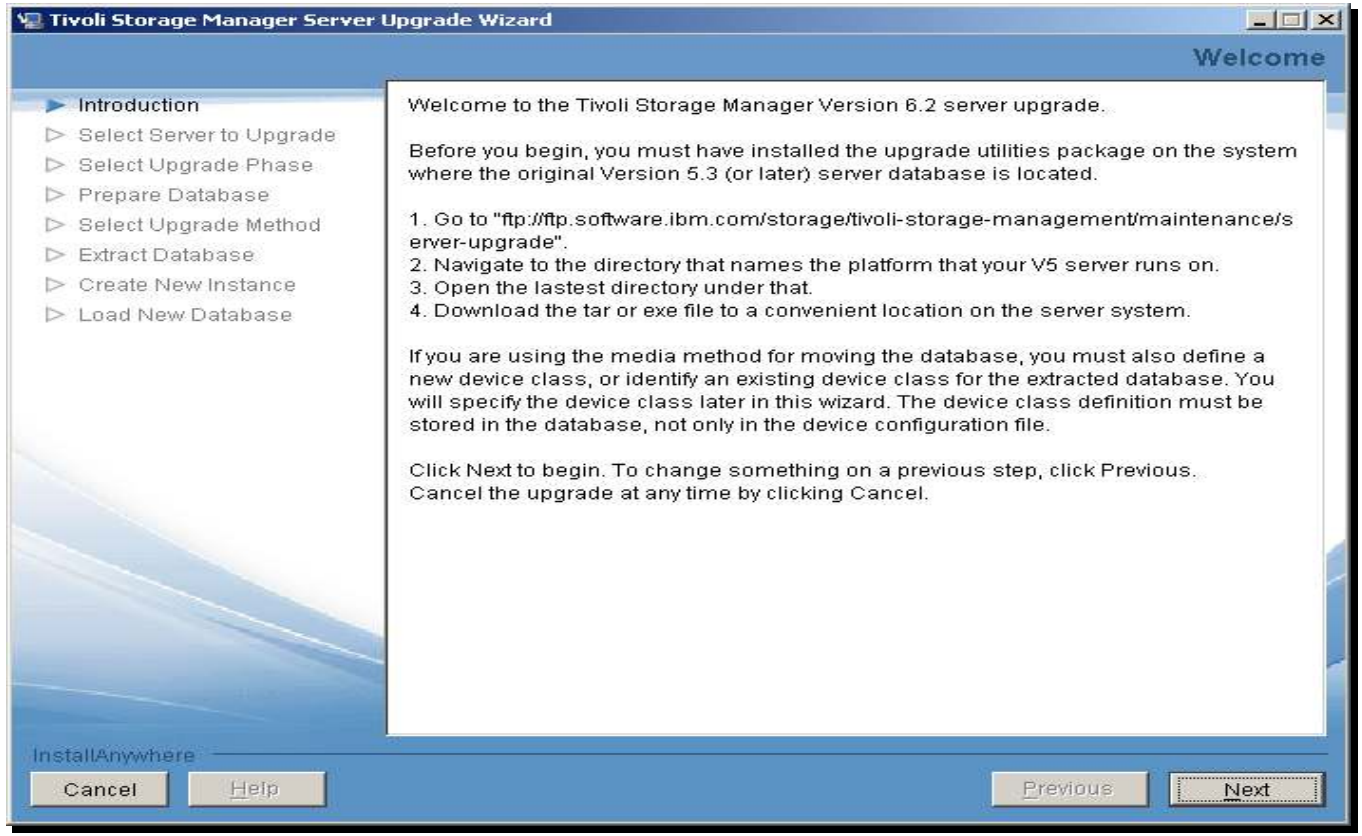


Run the TSM upgrade wizard – dsmupgdx.exe

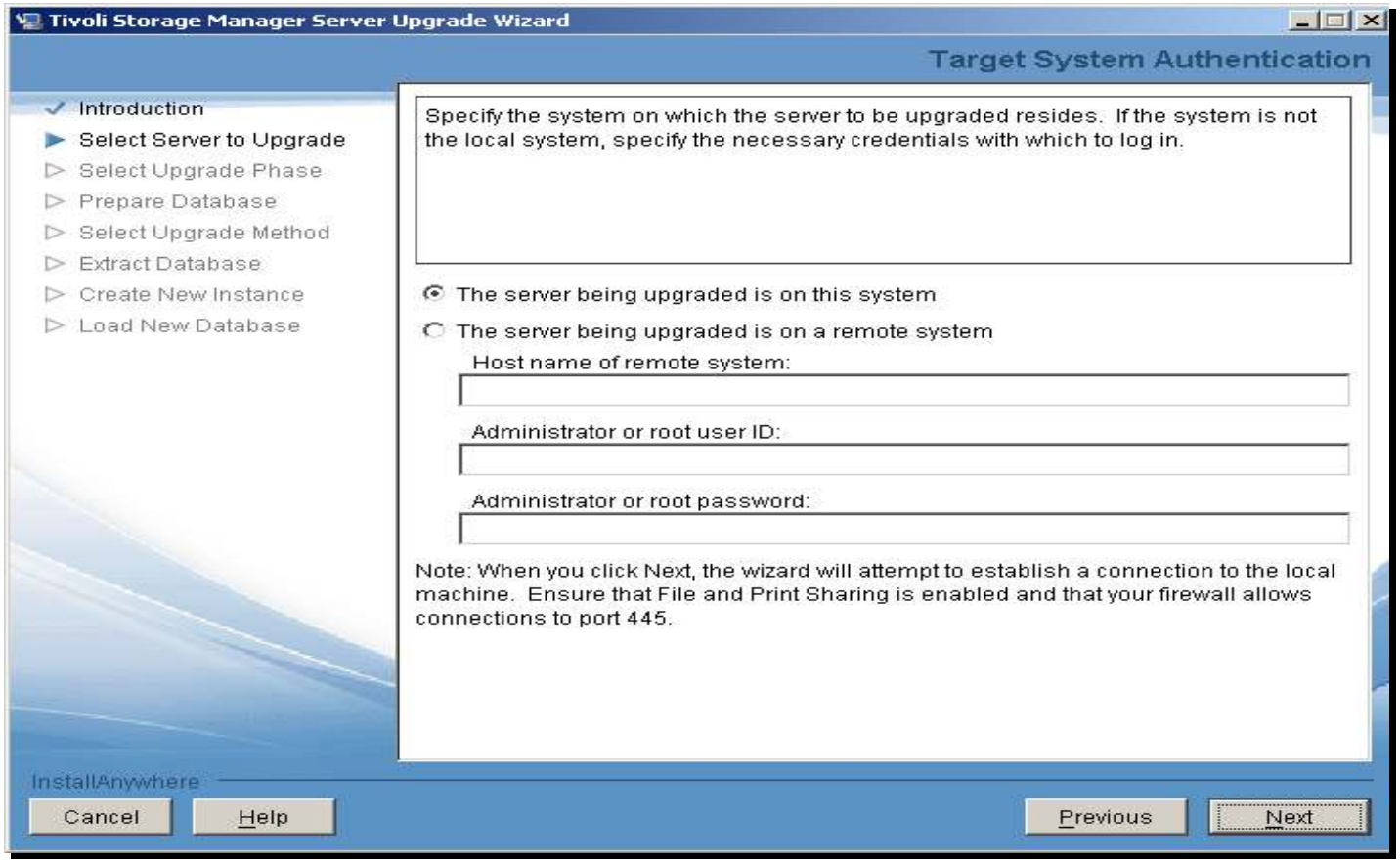


TSM Upgrade Wizard – Language Screen

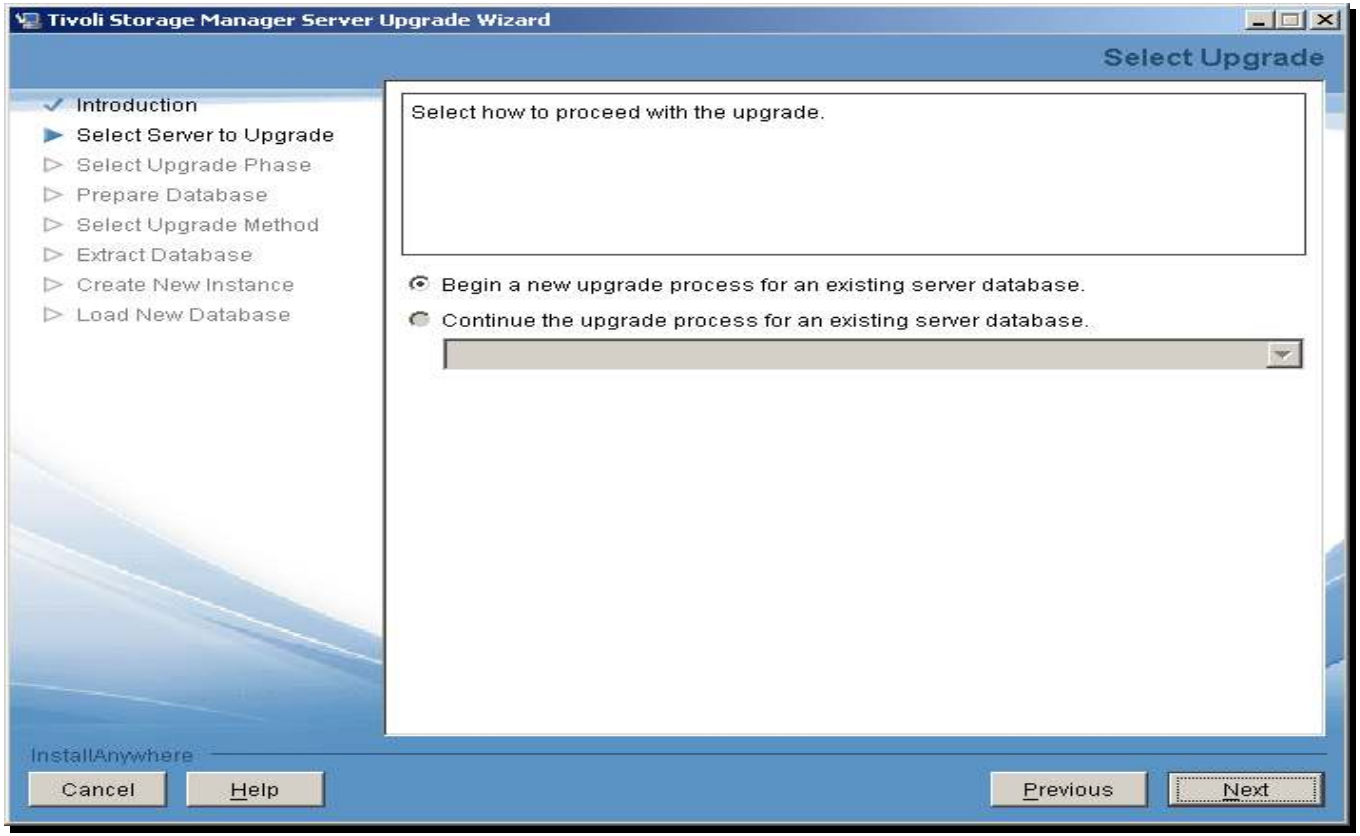
TSM upgrade wizard – intro screen



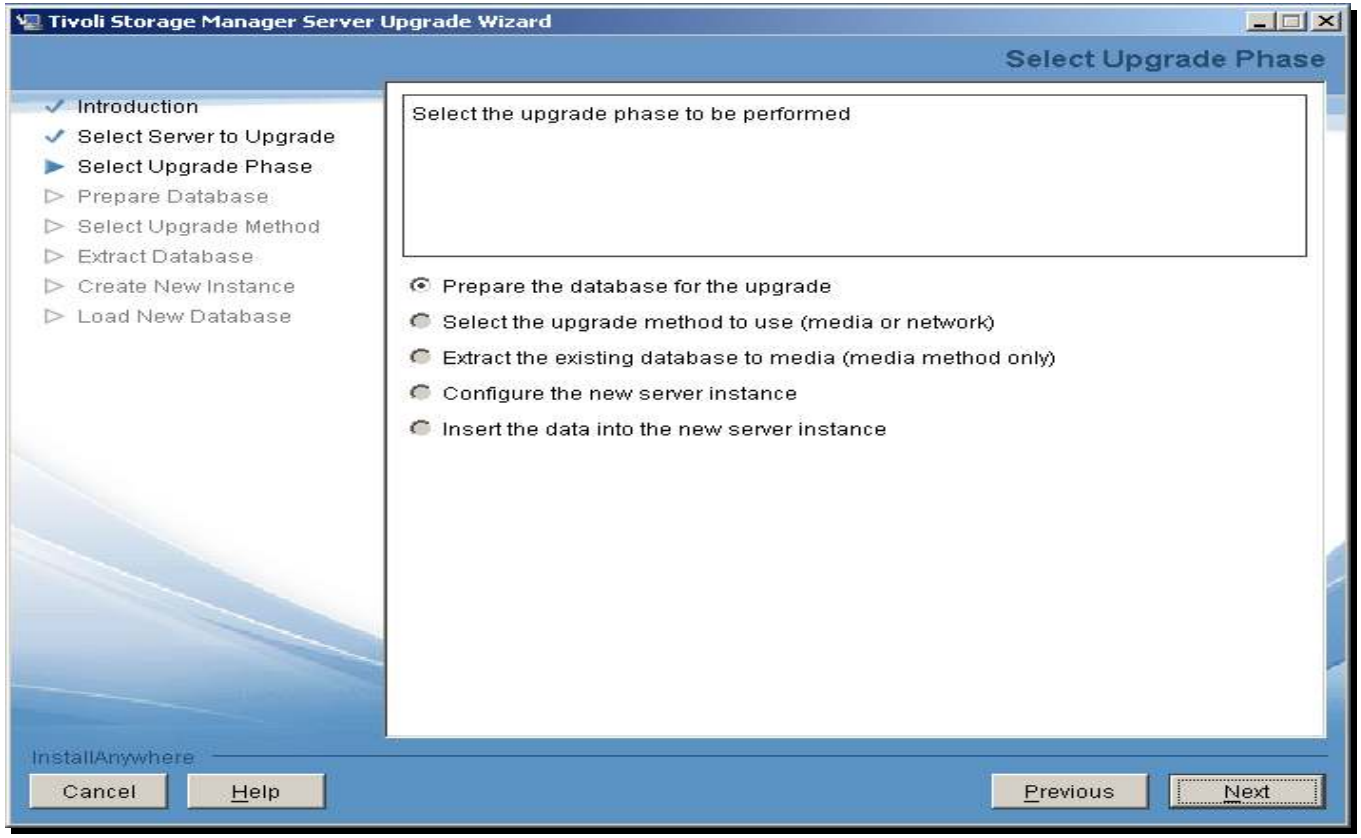
TSM upgrade wizard – select upgrade type



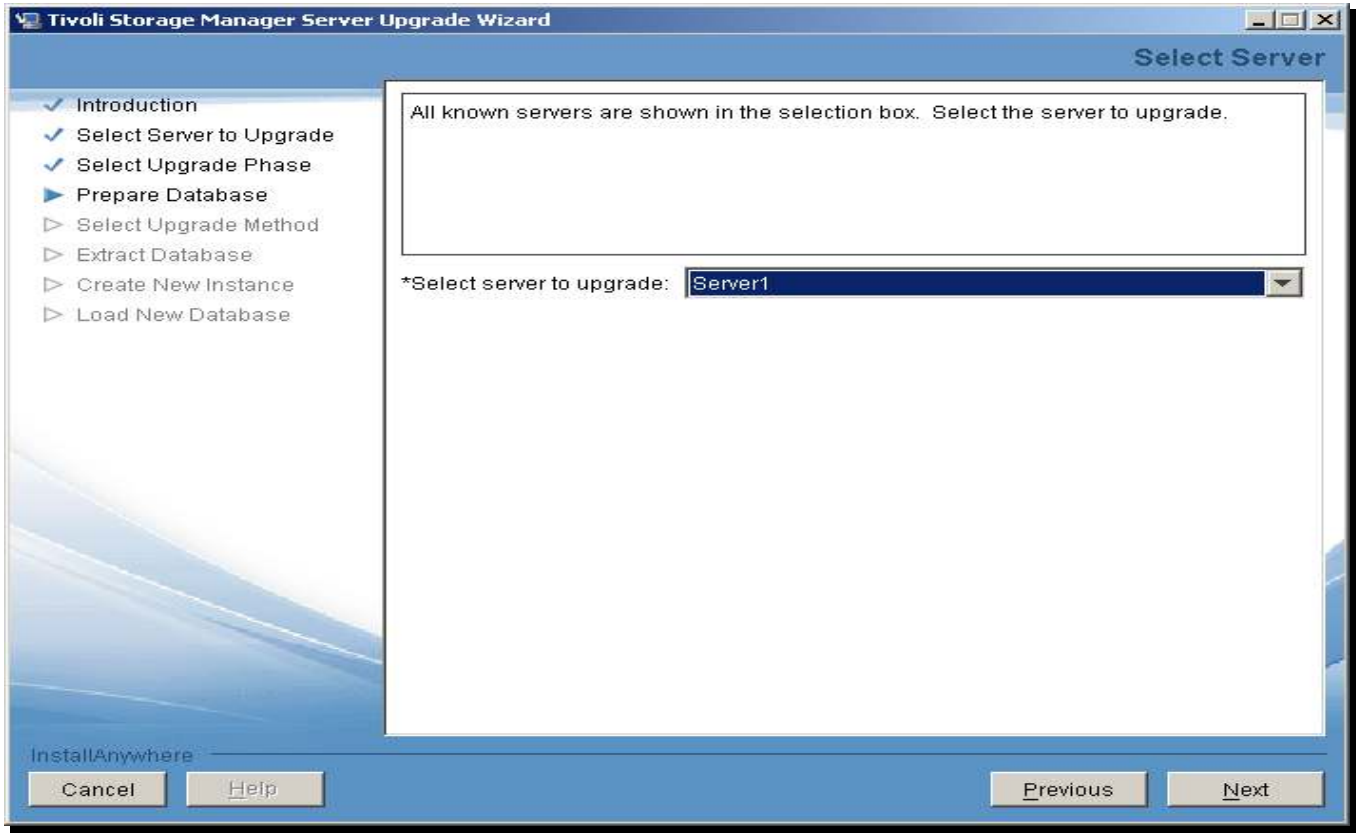
TSM upgrade wizard – select new upgrade



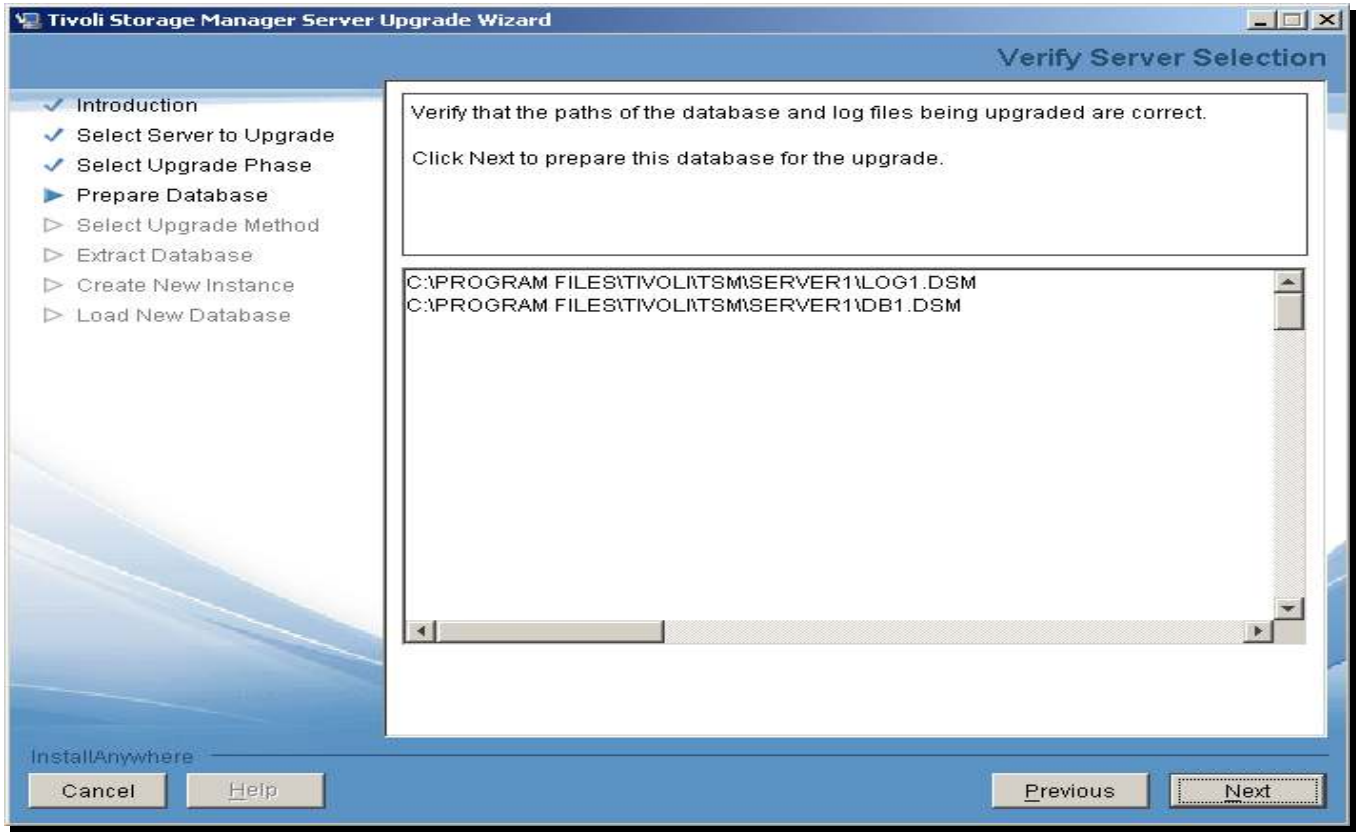
TSM upgrade wizard – select prepare db



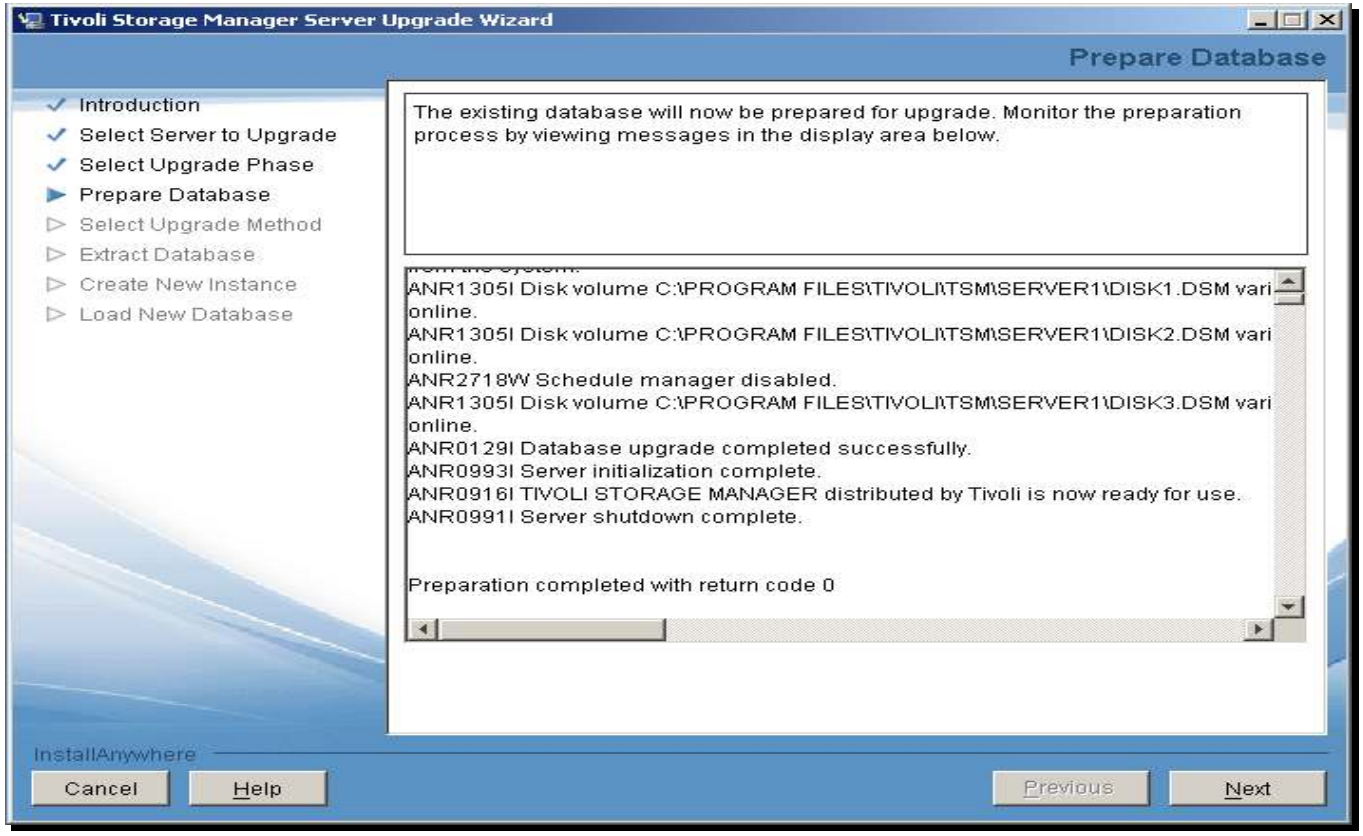
TSM upgrade wizard – select server to prepare



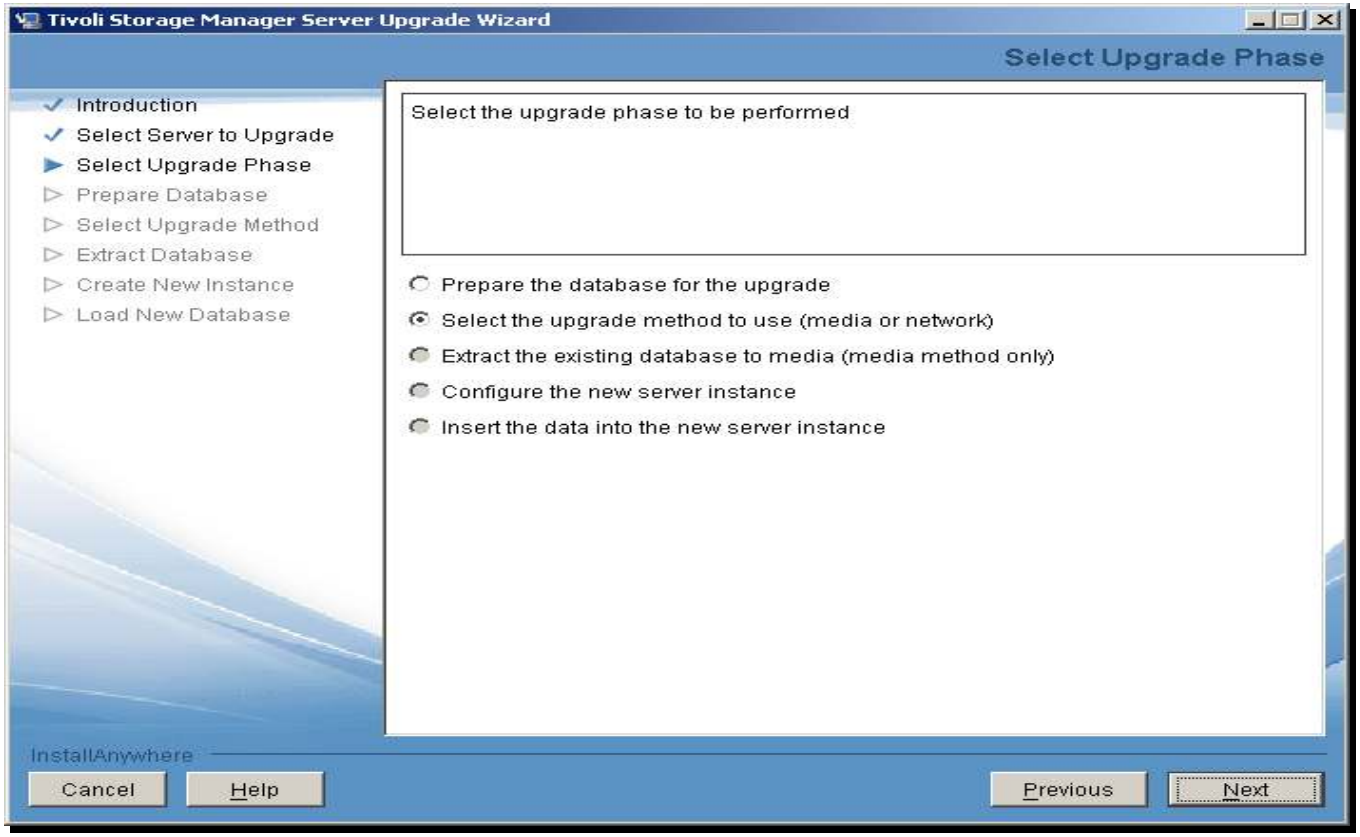
TSM upgrade wizard – verify V5 db and log files



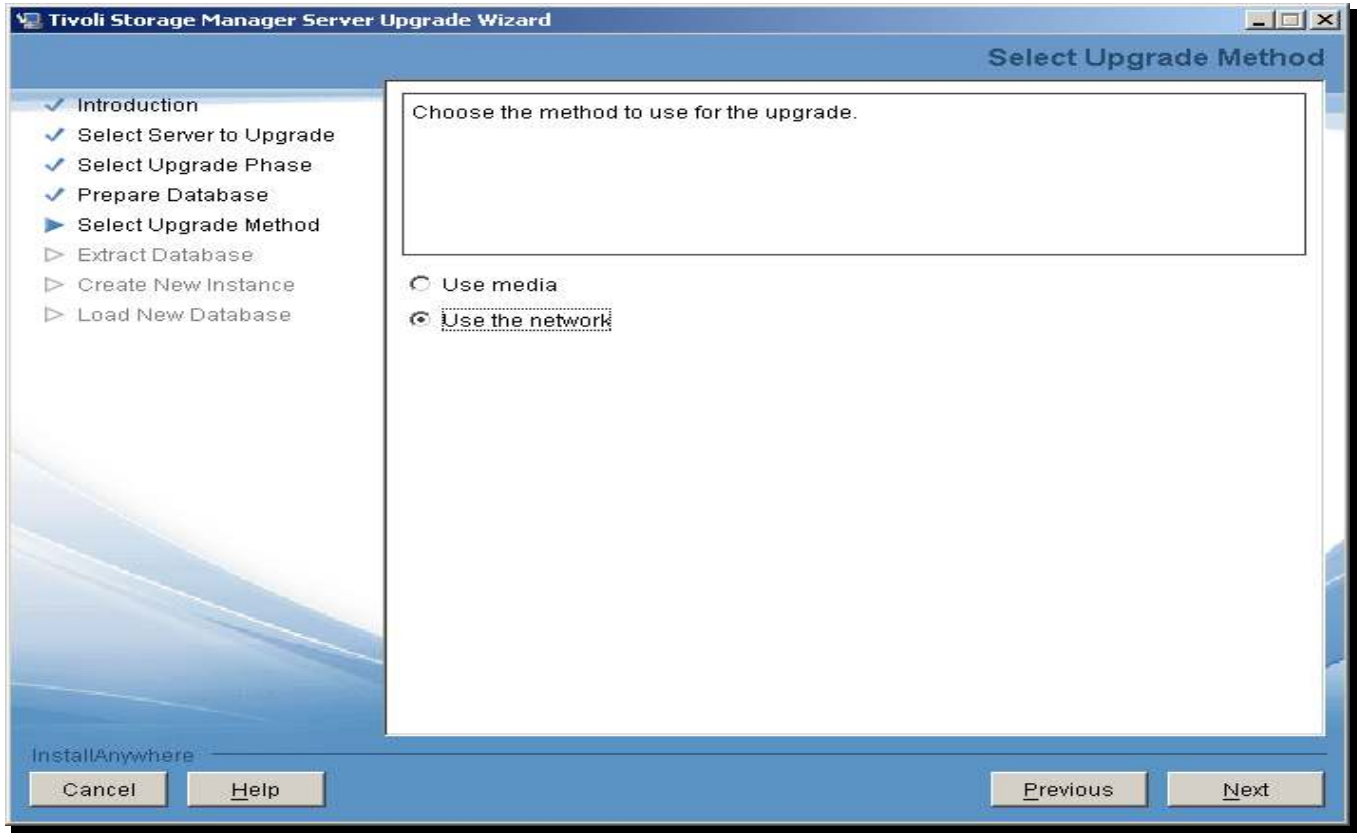
TSM upgrade wizard – prepare db completes



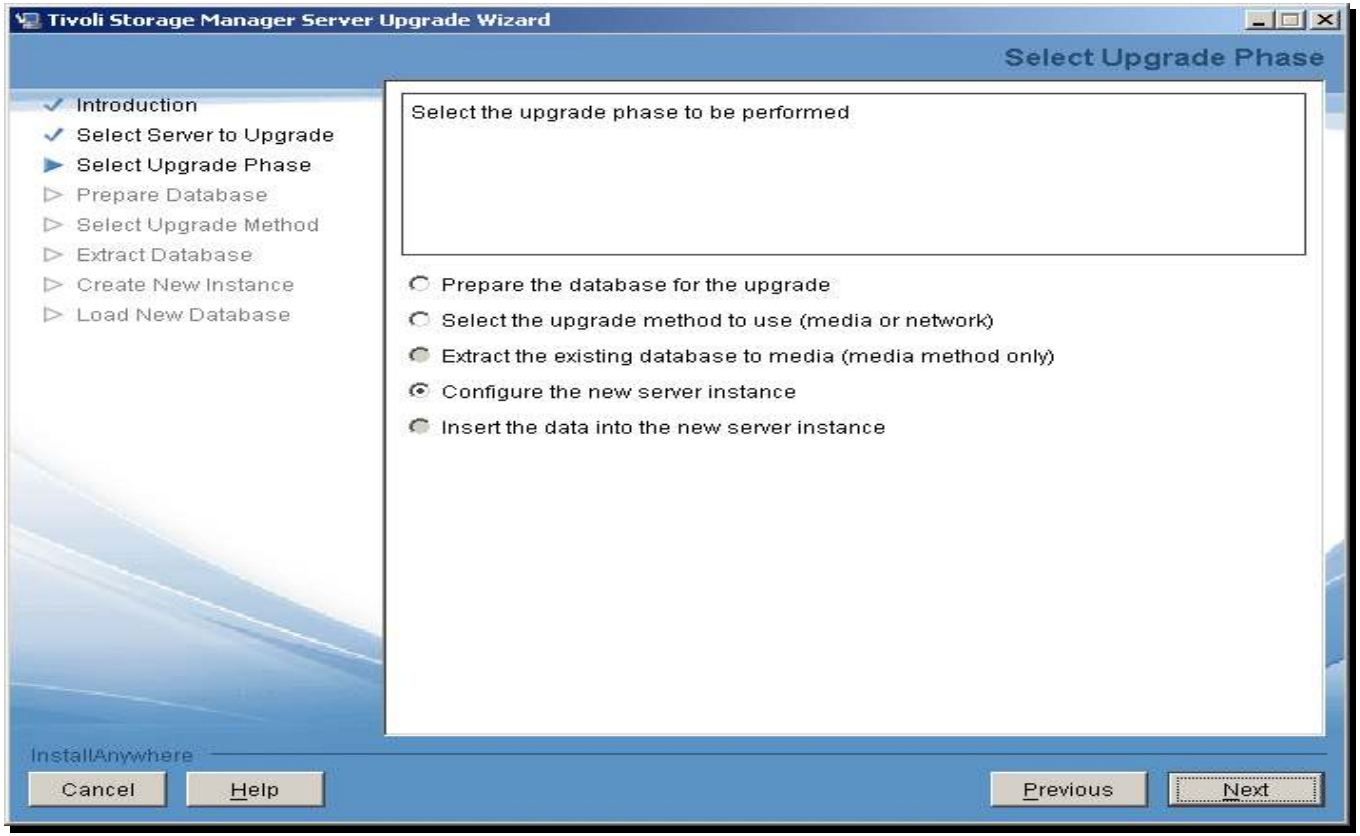
TSM upgrade wizard – select upgrade method



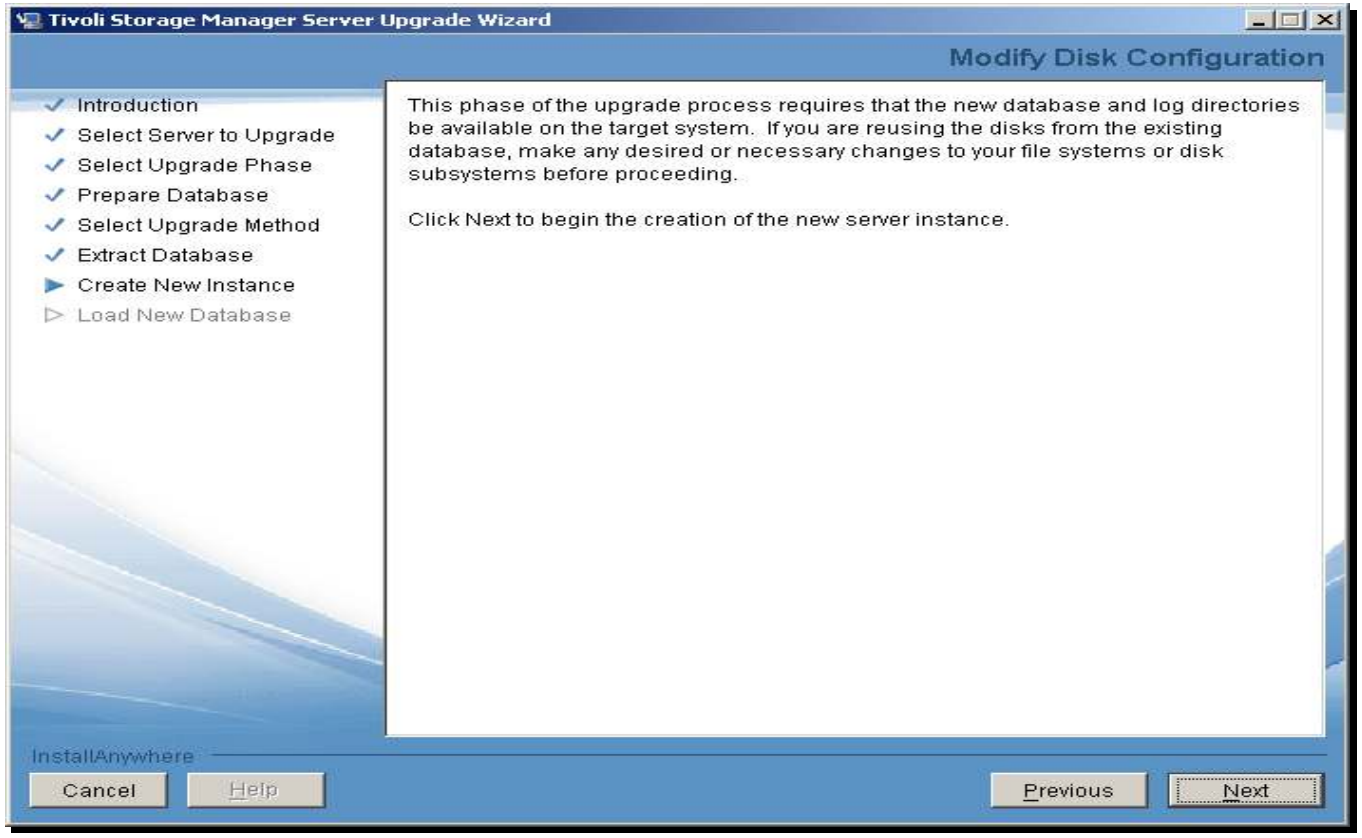
TSM upgrade wizard – select ‘Use the network’



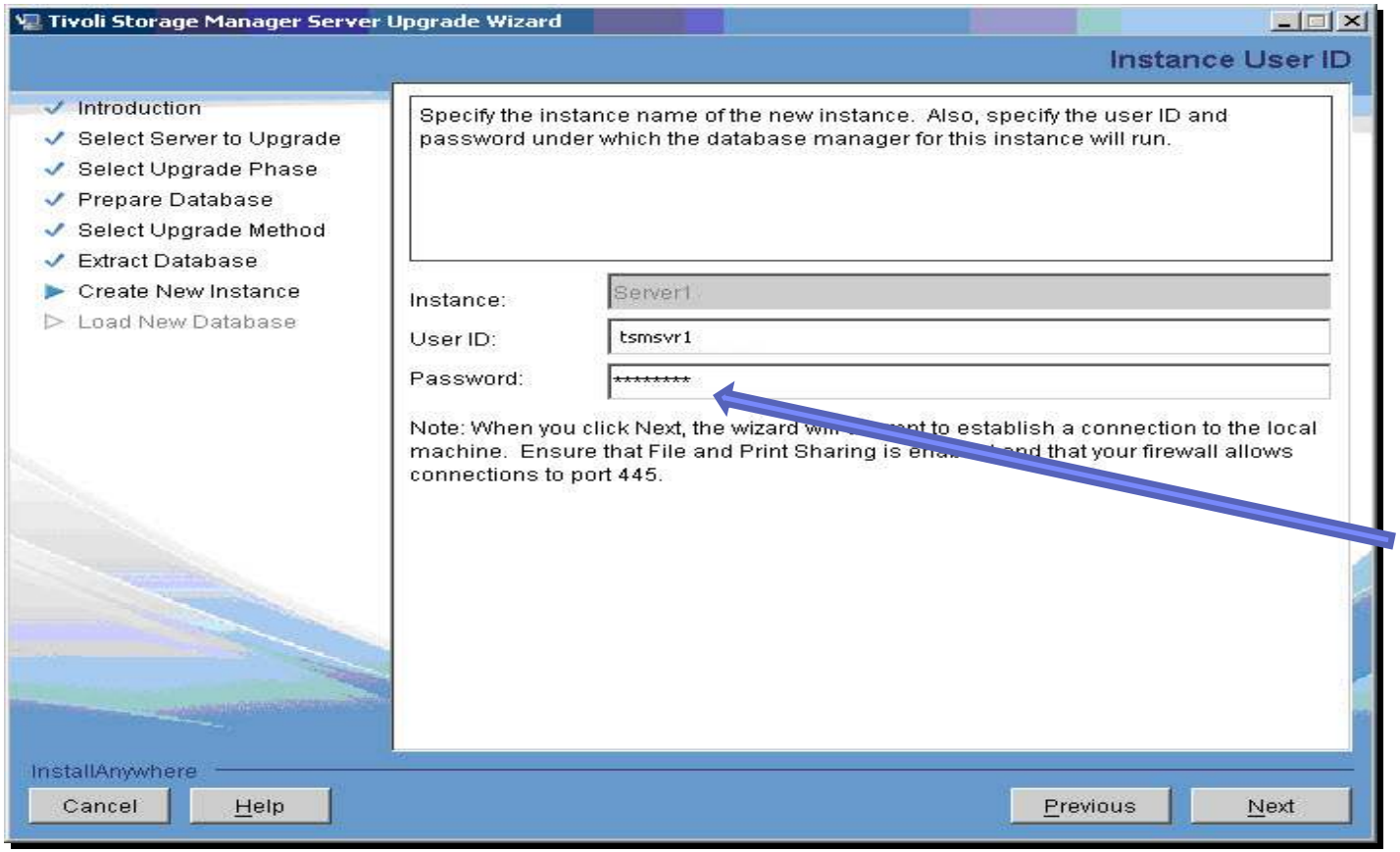
TSM upgrade wizard – configure new instance



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



TSM upgrade wizard – enter instance userid



- **UNIX;**

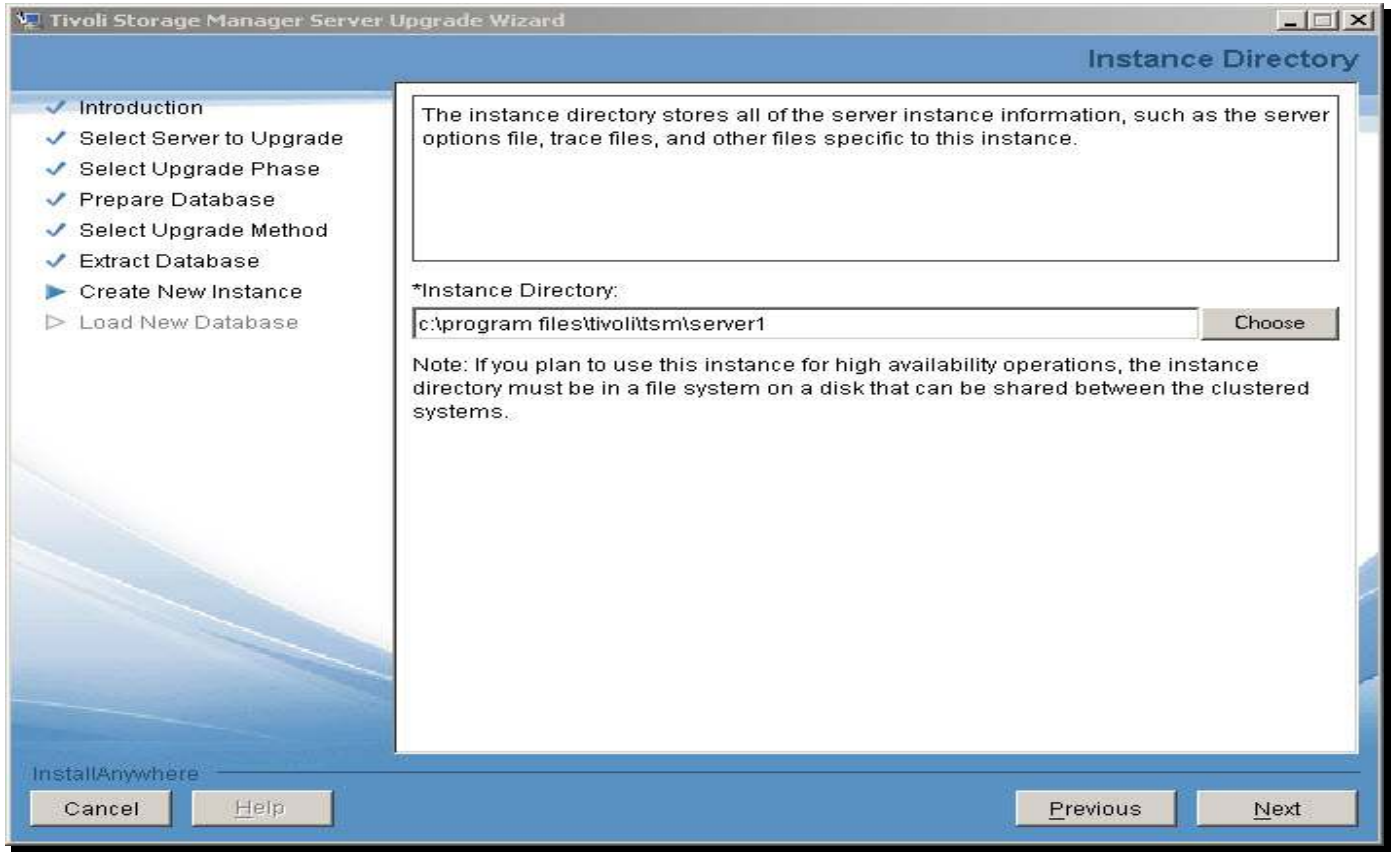
Unique user id per Instance

- **Windows;**

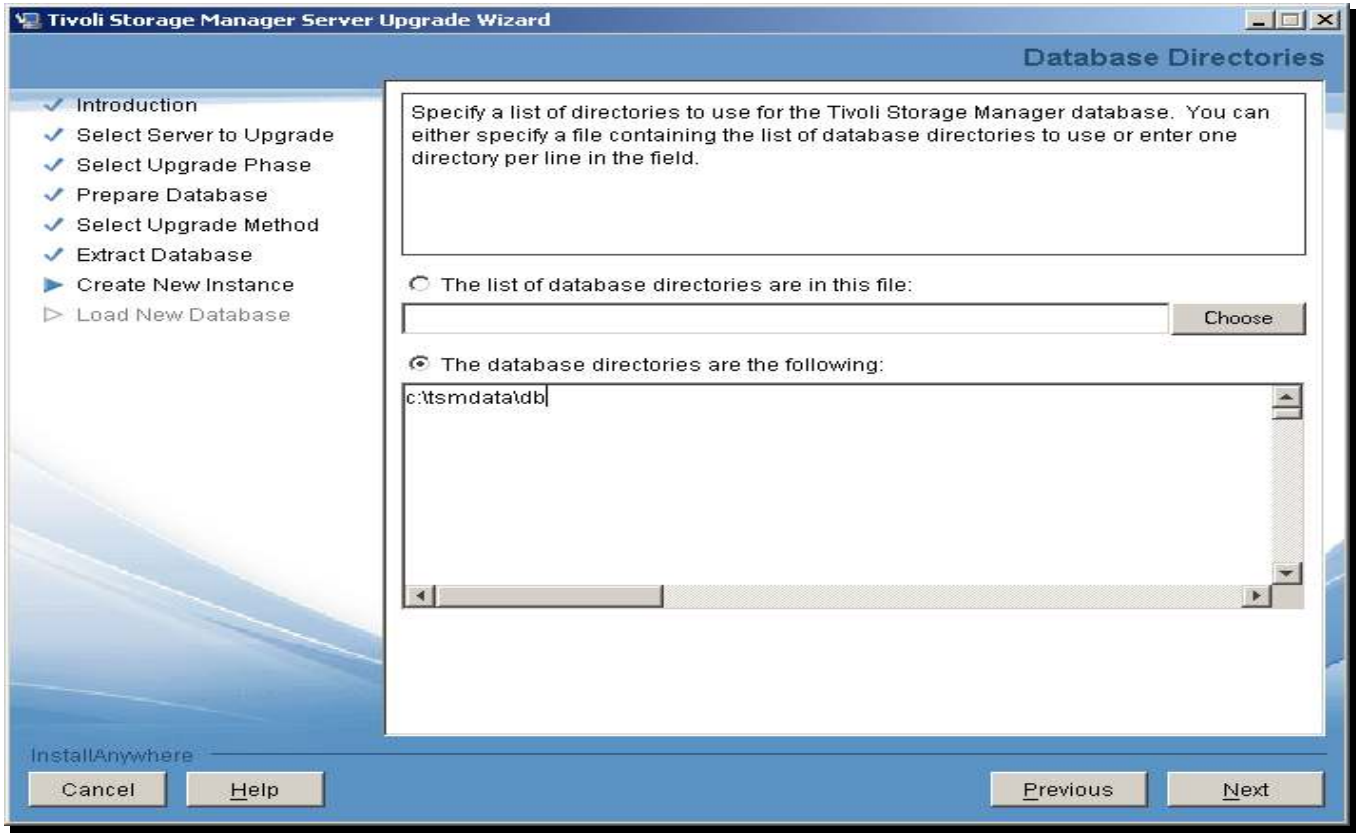
Can use same user ID for all instances

8 characters – DB2 requirements

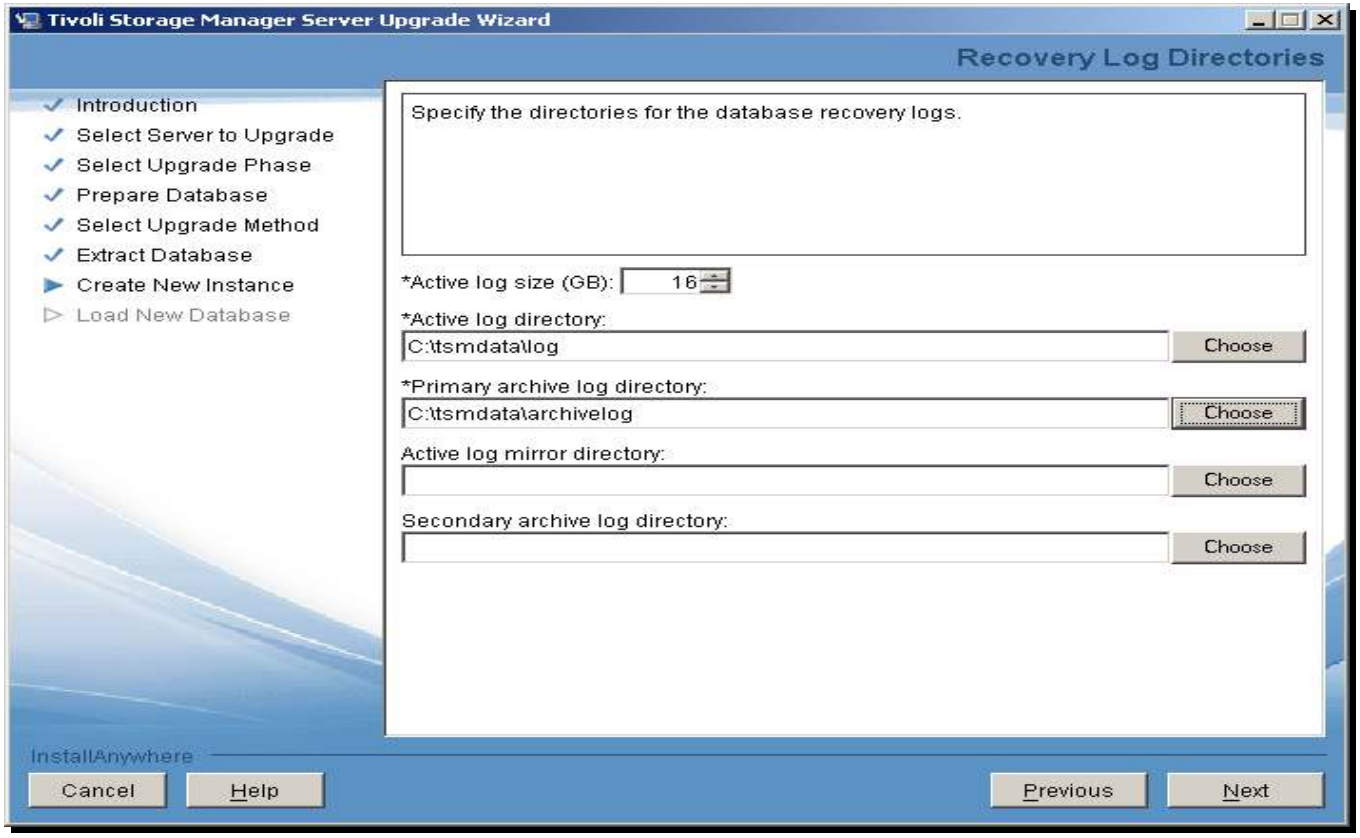
TSM upgrade wizard – select server instance DIR



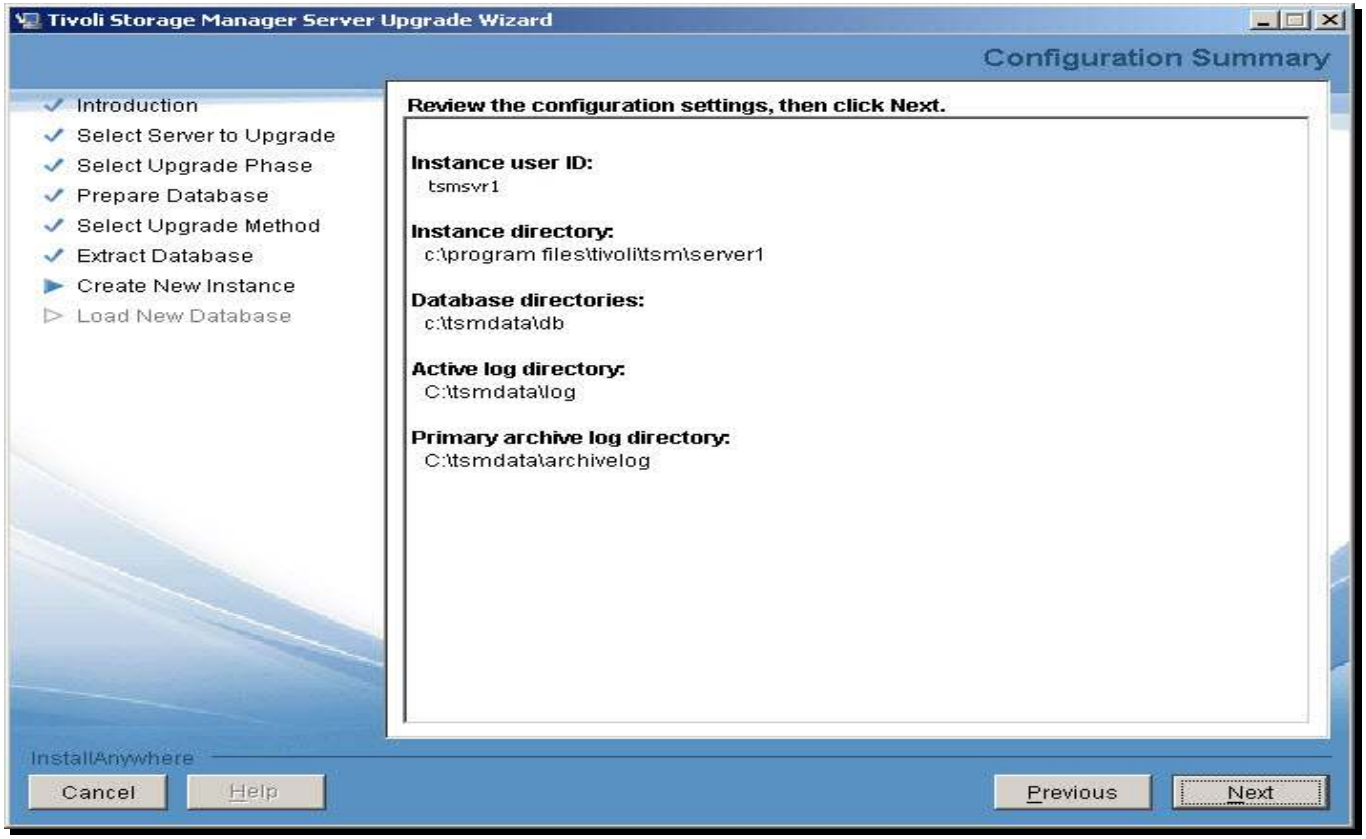
TSM upgrade wizard – enter tsm db directories



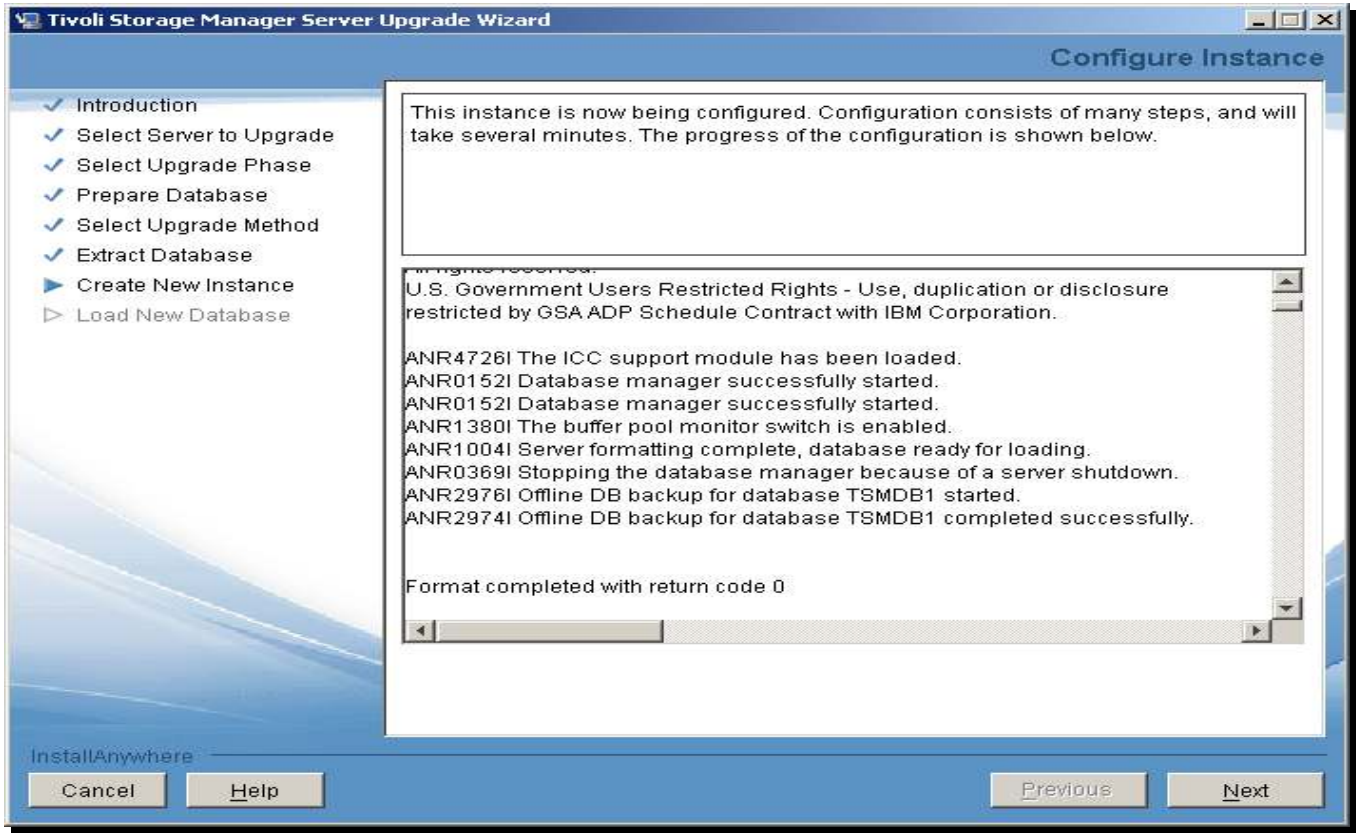
TSM upgrade wizard – enter log size and dirs



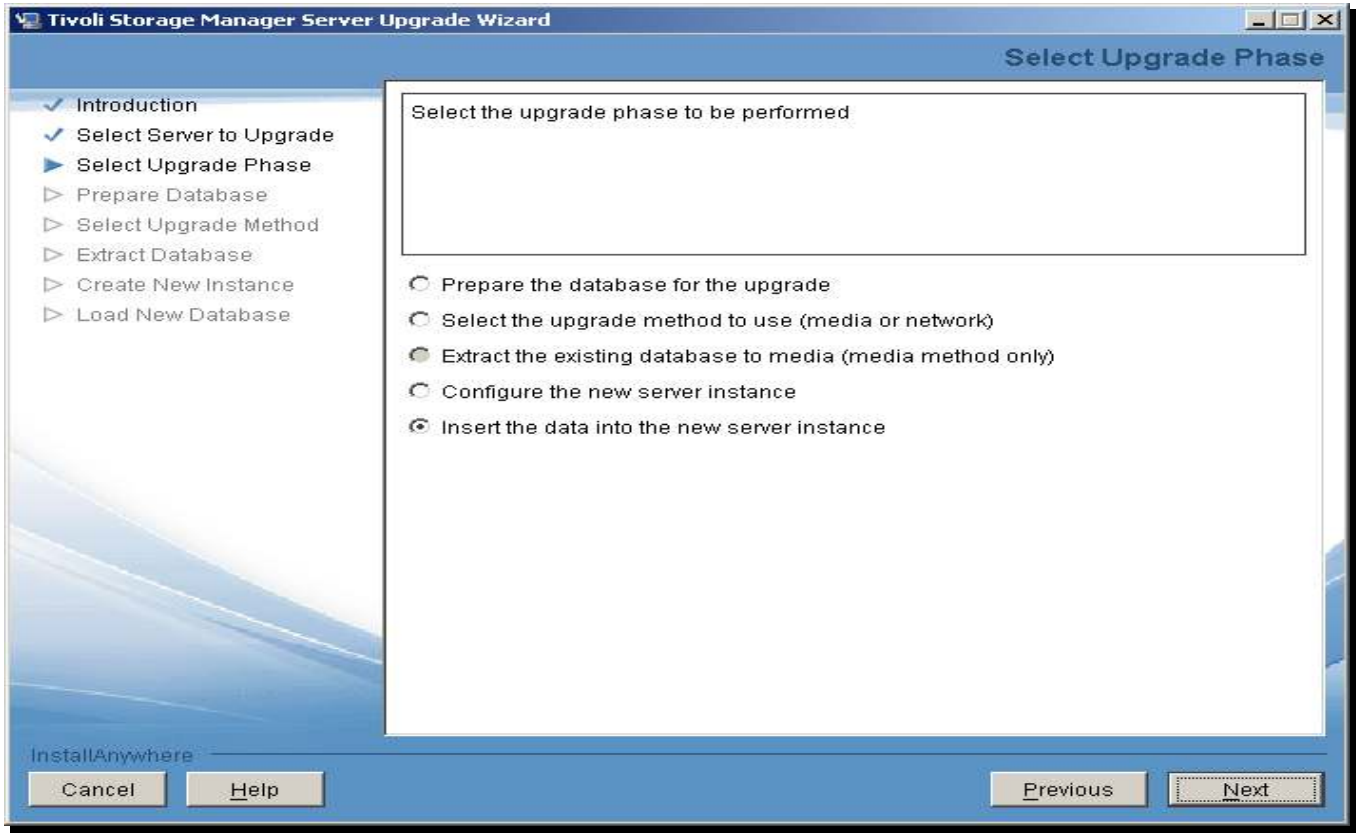
TSM upgrade wizard – review configuration



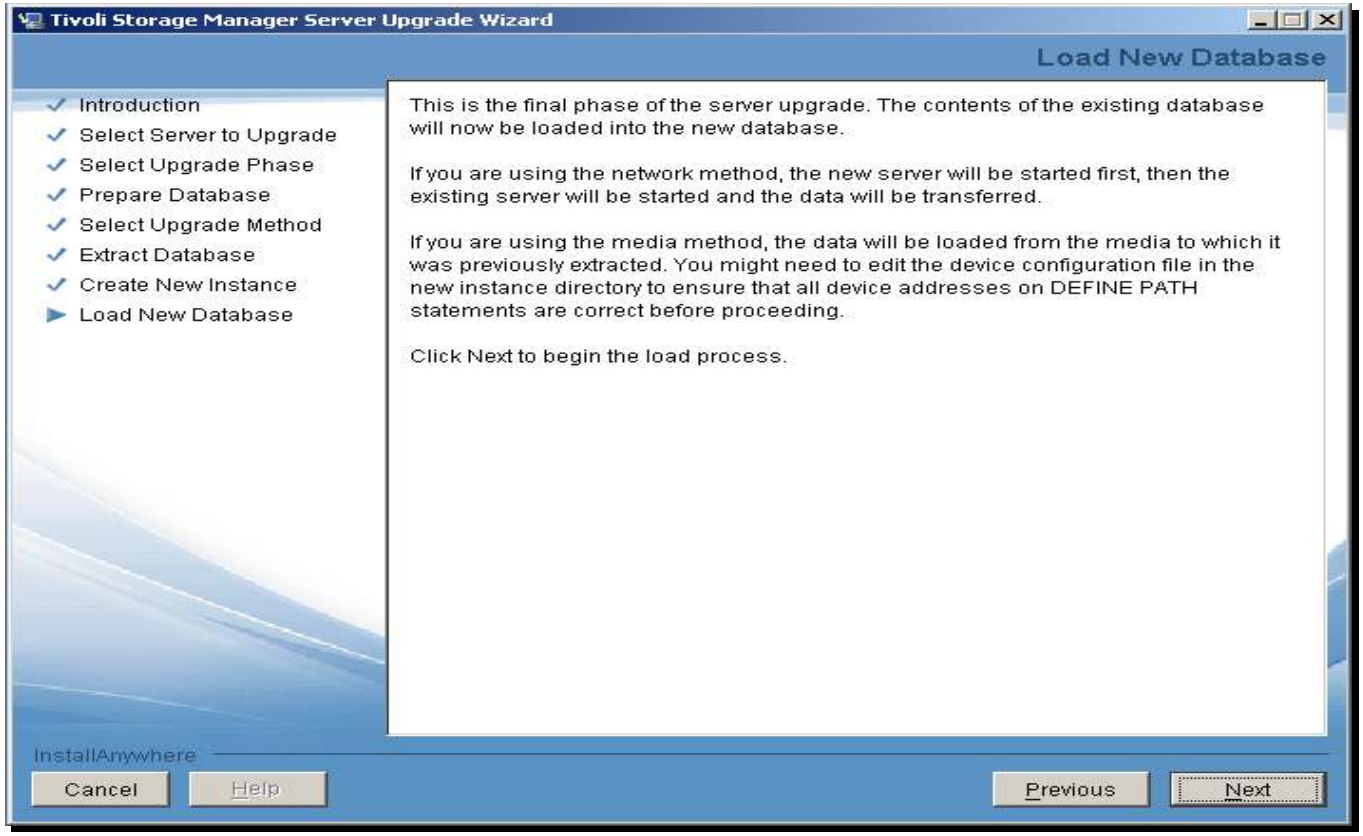
TSM upgrade wizard – create new instance



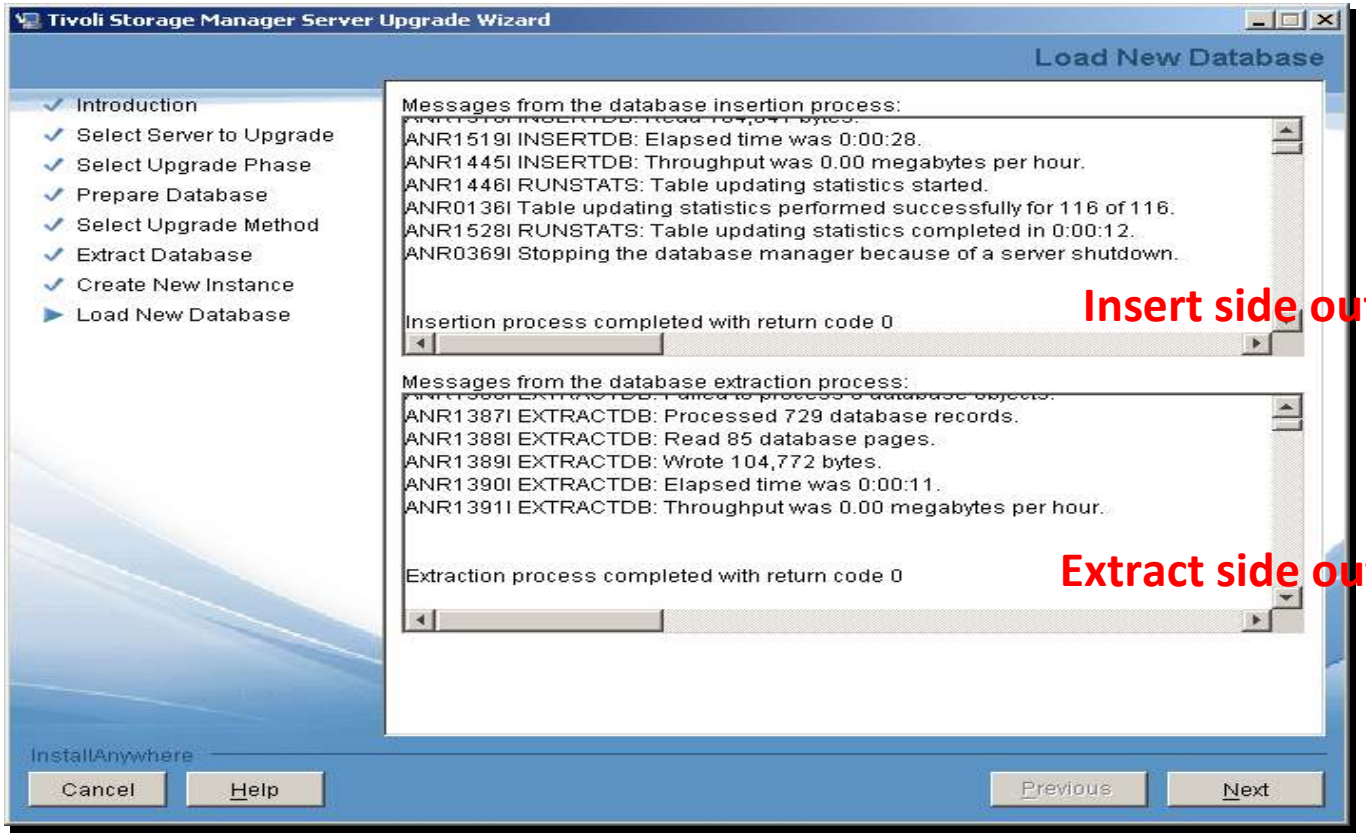
TSM upgrade wizard – select insert data



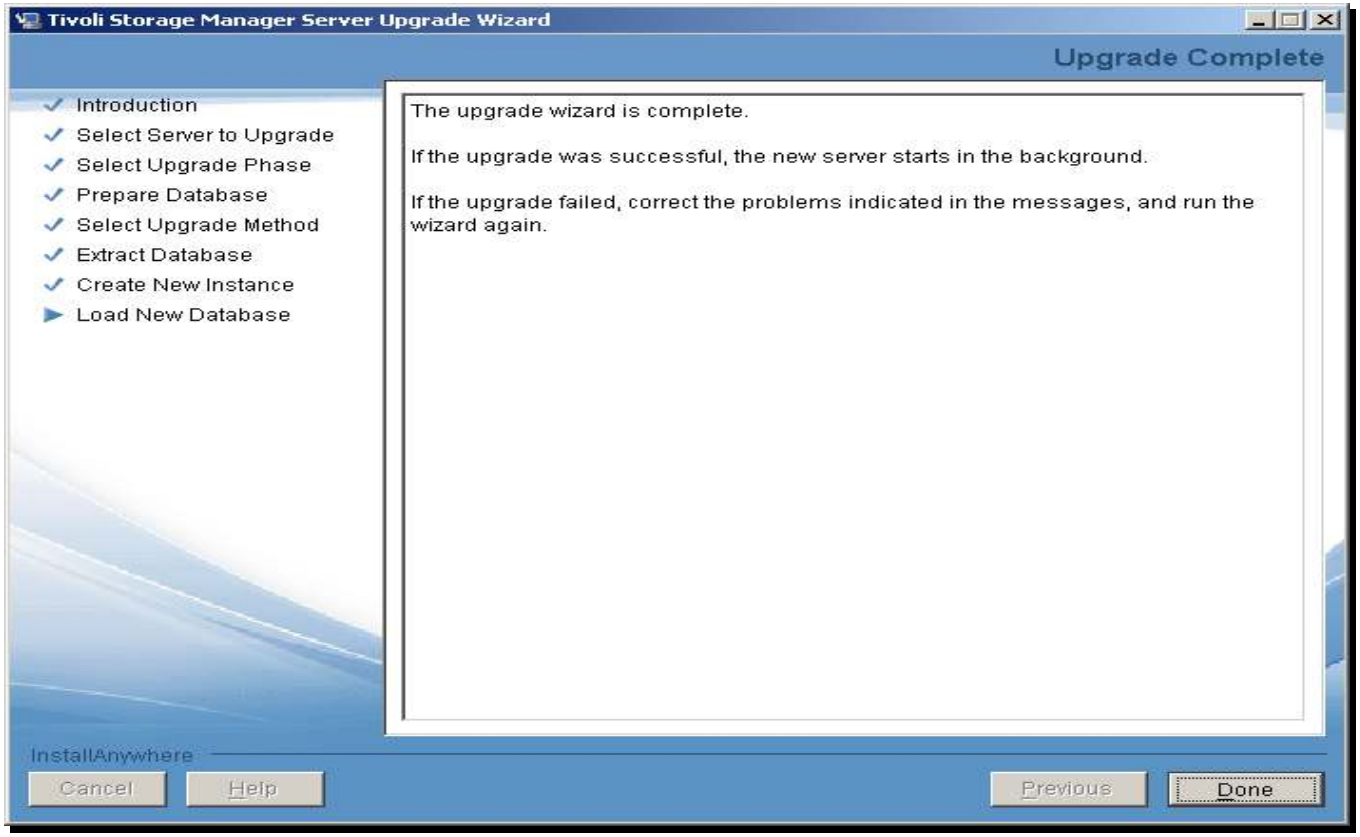
TSM upgrade wizard – load new db screen



TSM upgrade wizard – load new db status



TSM upgrade wizard – completion screen



THANK YOU
and Q&A