

# Sybase ASE – Advanced Backup Services

IBM® Tivoli® Storage Manager Option

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## **EXECUTIVE SUMMARY**

Backup and restore is one of the most important aspects of database product application. Hardware and software can always be replaced but the customer's data may be irreplaceable. There may be several reasons for failure that require the database to be restored back to its original state without losing any vital information. Database backup and restore functionality is critical for transaction intensive database applications. Maintaining high performance, reliability, and scalability for database backups are key requirements for customers with mission-critical applications.

Sybase Adaptive Server® Enterprise (ASE) provides database level backup and restore functionality using the Sybase Backup Server. Sybase Backup Server stores Sybase ASE database data on disk files or tapes. The IT industry has seen various types and versions of storage media evolve over a period of time, and the need for centralized management of such storage media continues to grow.

IBM Tivoli Storage Manager (TSM) is an effective storage management solution from IBM that provides enterprise wide centralized management of storage. It also supports various storage media and provides efficient storage management capabilities.

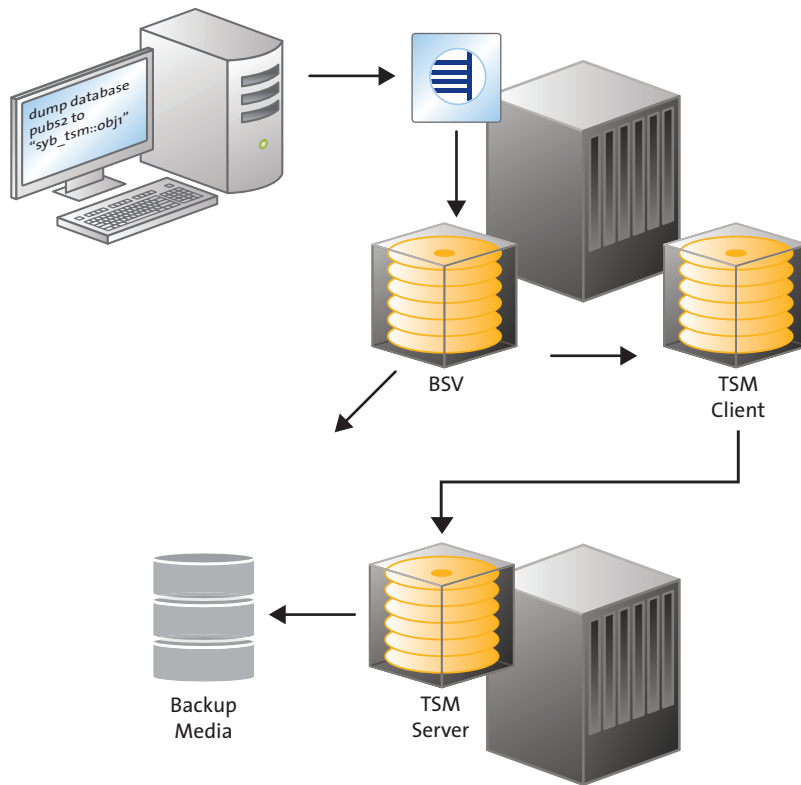
Sybase ASE Advanced Backup Services – Tivoli Storage Manager Option integrates with IBM TSM. The option allows Sybase ASE database backup and restore operations to IBM TSM, hence leveraging IBM TSM storage management capabilities for Sybase ASE databases. The database management features offered by Sybase ASE coupled with storage management features offered by IBM TSM give a powerful technology to Sybase and IBM customers to overcome the challenges of data protection faced in today's business environment.

## **OVERVIEW**

With ASE 15.5, Sybase is introducing the ASE Advanced Backup Services – Tivoli Storage Manager Option. This option allows Sybase Backup Server to perform Sybase ASE database backup and restore operations with IBM TSM. This option is based on Backup Server API architecture. A new module for Sybase Backup Server to interface with IBM TSM named 'syb\_tsm' provides this functionality. The existing Sybase database backup and restore operation commands are extended to make use of the new module 'syb\_tsm' to interface with IBM TSM.

The 'syb\_tsm' module is supplied with the Sybase ASE installation and internally it is responsible for communication with IBM TSM. IBM TSM solution is based on client server model.

The following figure illustrates the high-level architecture of Sybase ASE Backup Server integration with IBM TSM feature.



ASE – Sybase Adaptive Server Enterprise

BSV – Sybase Backup Server

For this solution, the following products need to be installed on same machine:

- Sybase ASE
- Sybase Backup Server
- IBM TSM client

The TSM server product can be on the same or different machine based on the TSM configuration.

#### TYPES OF BACKUP AND RESTORE

Sybase ASE supports online backups which are backups performed while database is running. There are two types of online backups:

- **Full backup:** A full database backup is a backup of database data files and the transaction log. Typically, full backups are interspersed with several incremental backups.
- **Incremental backup:** An incremental database backup is a backup of only the database transaction log.

In addition both full and incremental backups support following functionalities:

- Compressed backups
  - Zlib based compression
  - FastLZ based compression
- Split backups for parallelism
- Password protected backups
- Backups with flexible data transfer size
- Cross platform dump / load

Sybase ASE backup and restore to IBM TSM supports both full database backups and incremental backups. It also supports all the above listed functionalities for both backup and restore operations.

### OPTION OFFERINGS

The Advanced Backup Services – TSM Option enables existing Backup and Restore commands to seamlessly interface with IBM TSM.

Command	Description
dump database	Dumps Sybase ASE database data to IBM TSM
dump transaction	Dumps Sybase ASE database transaction data to IBM TSM
load database	Loads Sybase ASE database data from IBM TSM
load transaction	Loads Sybase ASE database transaction data from IBM TSM
load database with verify / verify only	Verifies Sybase ASE database data backup object stored at IBM TSM
load database with header only	Prints Sybase ASE database data backup object's header information from IBM TSM

This option also introduces two new ASE stored procedure interfaces to list and delete Sybase database backup objects from IBM TSM.

Stored Procedure	Description
sp_querysmobj	Lists Sybase ASE database backup objects from IBM TSM
sp_deletesmobj	Deletes Sybase ASE database backup objects from IBM TSM

### PRODUCTS AND LICENSES

The Sybase ASE Advanced Backup Services – TSM Option is a licensed Sybase ASE offering. This functionality is available in Sybase ASE 15.5 Enterprise, Developer and Cluster edition. Customers need to purchase the Advanced Backup Services – TSM Option license for Sybase ASE 15.5 to use this functionality. Please refer to Sybase ASE documentation for further details.

Sybase ASE 15.5 does not include any IBM TSM software. The TSM server product is a licensed product that customers need to purchase from IBM.

## SUPPORTED PLATFORMS

Sybase ASE 15.5 Enterprise and Developer edition supports backup and restore to IBM TSM on the following platforms.

- Linux (64 bit)
- Solaris (64 bit)
- AIX (64 bit)
- HP Itanium (64 bit)
- Sun OS (64 bit)
- Windows (64 bit)

Sybase ASE 15.5 Cluster edition supports backup and restore to IBM TSM on the following platforms.

- Linux (64 bit)
- Solaris (64 bit)
- AIX (64 bit)
- HP Itanium (64 bit)

The TSM server need not be running on the same operating system as Sybase ASE or the TSM client. The certified TSM server versions are following:

- TSM Server v. 5.4
- TSM Server v. 5.5

Refer to the IBM TSM documentation for compatible TSM client versions supported with the above mentioned TSM Server versions.

The TSM client product should be of the same bit architecture as that of the Sybase Backup Server module and needs to be installed on the same machine. Following is the required TSM client bit architecture.

<b>Sybase ASE 15.5 platform</b>	<b>TSM client bit architecture</b>
Linux	64 bit
Solaris	32 bit
AIX	32 bit
HP Itanium	64 bit
Sun OS	64 bit
Windows	64 bit

## SETTING UP BACKUP SYSTEM

The Sybase ASE backup and restore to IBM TSM functionality is designed to keep the configuration aspects to a minimum to ensure ease of use. Configuring the backup system is a one-time effort. This section highlights the configuration steps required for Sybase ASE Backup Server to work with IBM TSM.

The following is a list of steps to set up IBM TSM products:

- Install and configure the TSM server product. Refer to the IBM TSM documentation for details.
- Install Sybase ASE 15.5 and the IBM TSM client on the same machine.
- Configure the TSM client API component. This involves setting up configuration parameters in the TSM client configuration file (dsm.sys and/or dsm.opt file). This step educates the TSM client of the whereabouts of the TSM server and configuration to use while communicating with the TSM server. At a minimum, set these parameters:
  - SERVERNAME – TSM server name
  - COMMETHOD – TSM server communication type
  - TCPPORT – TSM server port number
  - TCPSEVERADDRESS – fully qualified name of TSM server
  - NODENAME – registered name of TSM client
  - PASSWORDACCESS – access method type of TSM password set this parameter to “generate” value.
  - PASSWORDDIR – directory location of TSM password
- Create a TSM client node name entry at TSM server.
- Use the ‘sybtspasswd’ utility supplied with Sybase ASE 15.5 to:
  - Register the TSM client node with TSM server.
  - Generate the TSM-encrypted password file on the TSM client node.

‘sybtspasswd’ generates the TSM password file (TSM.PWD) in the directory specified by the PASSWORDDIR parameter in the TSM configuration file. Execute ‘sybtspasswd’ while logged in as the operating system user ‘root’. ‘sybtspasswd’ prompts for the existing password and the new password for the registered TSM client node. TSM client will use credentials stored in ‘TSM.PWD’ password file to communicate with the TSM server.

- Optionally, the TSM client node can be granted permission to delete backup copies at TSM server.
- TSM does not allow cross-client-node backup and restore. Users can define a common client node name for source and target TSM client nodes and perform cross client node backup and restore operations.

The following is a list of steps to setup Sybase ASE Backup Server:

- Install Sybase ASE 15.5 product.
- Set following TSM specific environment variables in Backup Server startup file supplied with Sybase ASE 15.5.
  - DSMI\_DIR – TSM installation directory location
  - DSMI\_LOG – TSM error log location
  - DSMI\_CONFIG – TSM configuration file
  - DSMI\_LIB – TSM shared library fully qualified path name
- Start Sybase ASE Backup Server using the startup file.

## USING BACKUP SYSTEM WITH IBM TSM

### Backup and Restore

The following command illustrates how to back up Sybase ASE database 'pubs2' to IBM TSM. The backup object name is 'bkp\_obj'

#### *Backup Command:*

```
dump database pubs2 to "syb_tsm::bkp_obj"
```

#### *Sample output:*

```
Backup Server session id is: 9. Use this value when executing the 'sp_volchanged' system stored procedure after fulfilling any volume change request from the Backup Server.
```

```
Backup Server: 4.132.1.1: Attempting to open byte stream device: 'syb_tsm::bkp_obj::00'
```

```
Backup Server: 6.28.1.1: Dumpfile name 'pubs20928010A9E ' section number 1 mounted on byte stream 'syb_tsm::bkp_obj::00'
```

```
Backup Server: 4.188.1.1: Database pubs2: 4140 kilobytes (100%) DUMPED.
```

```
Backup Server: 3.43.1.1: Dump phase number 1 completed.
```

```
Backup Server: 3.43.1.1: Dump phase number 2 completed.
```

```
Backup Server: 3.43.1.1: Dump phase number 3 completed.
```

```
Backup Server: 4.188.1.1: Database pubs2: 4162 kilobytes (100%) DUMPED.
```

```
Backup Server: 3.42.1.1: DUMP is complete (database pubs2).
```

Correspondingly, to restore the Sybase ASE database 'pubs2' from the IBM TSM backup object 'bkp\_obj':

#### *Restore Command:*

```
load database pubs2 from "syb_tsm::bkp_obj"
```

The following command illustrates how to backup the Sybase ASE database 'pubs2' to the IBM TSM by splitting the backup into multiple objects. Each backup object is backed up in parallel.

#### *Backup Command:*

```
dump database pubs2 to "syb_tsm::bkp_obj1"
```

```
stripe on "syb_tsm::bkp_obj2"
```

```
stripe on "syb_tsm::bkp_obj3"
```

#### *Restore Command:*

```
load database pubs2 from "syb_tsm::bkp_obj1"
```

```
stripe on "syb_tsm::bkp_obj2"
```

```
stripe on "syb_tsm::bkp_obj3"
```

Following command illustrates backing up Sybase ASE database 'pubs2' transaction data to IBM TSM.

**Backup Command:**

```
dump transaction pubs2 to "syb_tsm::bkp_obj_txn"
```

**Restore Command:**

```
load transaction pubs2 from "syb_tsm::bkp_obj_txn"
```

**Listing Database Backup Objects**

**List Command:**

```
sp_querysmobj 'syb_tsm','/tmp/q.tsm','prathod_pd3_aries_2k','pubs2'
```

**Sample output:**

Backup Server: 3.67.1.1: Querying storage manager for server 'prathod\_pd3\_aries\_2k', database 'pubs2', object '\*' completed successfully. You can find the output in file '/tmp/q.tsm'.

```
(1 row affected)
(return status = 0)
```

```
Object Name (filesystem) : /prathod_pd3_aries_2k
Object Name (high level) : /pubs2.DB
Object Name (low level)  : /bkp_obj.0
Object Owner              :
object Id (hi, lo)       : 0, 81923
object Size Estimates     : 0, 8388608
Object State              : ACTIVE
Backup Creation Date     : 10/7/2009 19:13:22
Backup Expiration Date   : 0/0/0 0:0:0
Copy Group                : 1
Object Machine Name      : DEFAULT
Object Compression Type  : NO TSM Compression
Object Encryption Type   : NO TSM Encryption
```

**Deleting Database Backup Objects**

**Delete Command:**

```
sp_deletesmobj 'syb_tsm', 'prathod_pd3_aries_2k', 'pubs2'
```

**Sample output:**

Backup Server: 3.69.1.1: Deletion of storage manager backup object for server 'prathod\_pd3\_aries\_2k', database 'pubs2', object '\*' completed successfully. Total '5' backup objects deleted.

```
(1 row affected)
(return status = 0)
```

## TROUBLESHOOTING

The Sybase ASE Advanced Backup Services – TSM Option introduces many new messages to assist in diagnosing erroneous situations. It also couples TSM messaging capabilities and routes TSM reported informational and error messages back to the user.

In the case of problem situations, users are encouraged to explore the following to find more information:

- Sybase ASE Backup Server error log
- Sybase ASE Backup Server tracing mechanism for API module
- IBM TSM server error log
- IBM TSM client error log
- IBM TSM client tracing mechanism

## PERFORMANCE

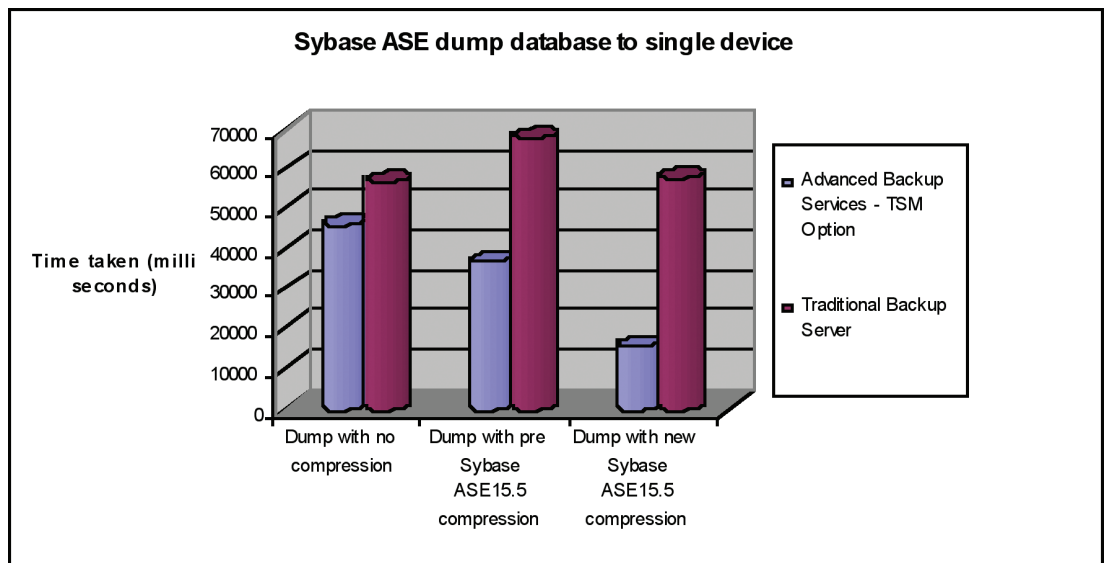
Sybase ASE Advanced Backup Services – TSM Option provides improved performance for backup and restore operations.

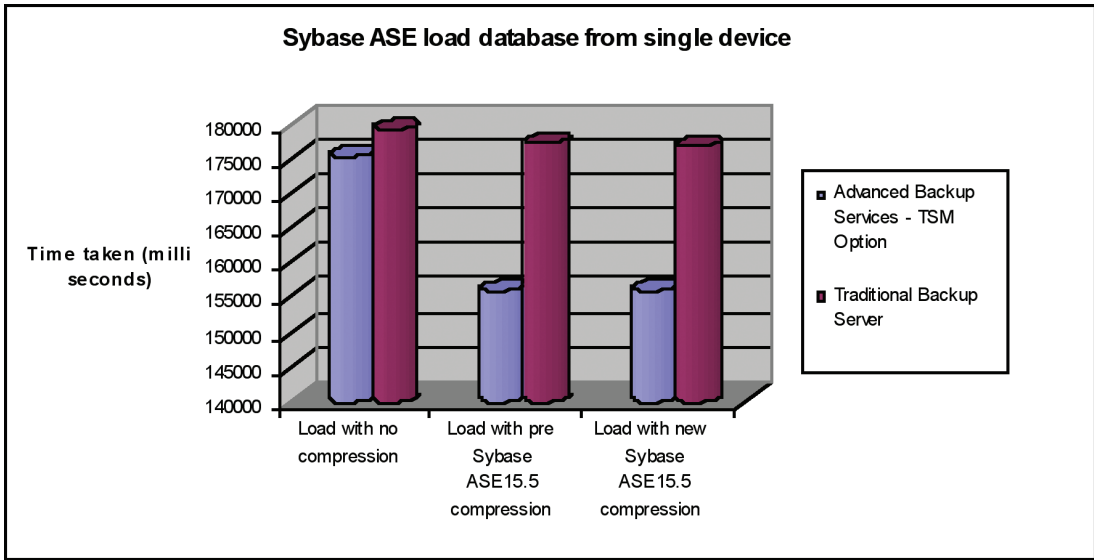
Backups with data compression technology reduce the amount of data sent to the IBM TSM server and also reduce the storage space for backups. This eventually speeds up the backup operation.

Sybase ASE 15.5 also introduces new enhanced backup compression technique that can be coupled with the backup operation to the IBM TSM. Refer to 'Sybase ASE – Lightweight Compression for Backup Server' white paper for details. Alternatively, users can opt for TSM backup data compression technology. Both of these backup compression technologies improve the backup operation performance.

Internal testing with a 20GB Sybase ASE 15.5 database shows significant improvement in backup and restore operations to IBM TSM.

The following illustrates that the Sybase ASE backup compression technology coupled with IBM TSM provides 70% faster backups than standalone Sybase ASE Backup Server system.





**SUMMARY**

Sybase ASE 15.5 provides an advanced backup and restore solution with IBM TSM integration. This option provides the following high level benefits.

- Increased efficiency with storage management capabilities for Sybase ASE backups**

This integration functionality expands Sybase ASE database backup and restore capabilities by leveraging the storage management capabilities of IBM TSM. Sybase ASE backups are managed centrally by enterprise wide IBM TSM. This allows Sybase ASE database backups to be stored on the wide variety of storage media supported by IBM TSM.
- Ease of use and seamless integration**

Existing users of Sybase ASE and IBM TSM can seamlessly perform Sybase ASE database backup and restore operation to IBM TSM. The existing backup and restore operation commands of Sybase ASE are extended to work with IBM TSM with a minimal, one-time backup system configuration in a manner already familiar to Sybase ASE users.
- Faster Backup and Restore**

This feature provides improved backup-and-restores operation performance with IBM TSM. Backup data compression technology provided by Sybase ASE or IBM TSM can be coupled with backup and restore operation to the IBM TSM, resulting in faster backup and restore operations.



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