



# **Sybase Server Maintenance Guide\***

**March 31, 2000**

\* Because this topic is not covered by the current PMO funded SPS Helpdesk Agreement, this document has been provided to help you resolve this issue. If you still need assistance after reviewing this document, please contact a representative from your Customer Support Team.

# Table of Contents

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<b>1.</b>	<b>Server Maintenance Schedule .....</b>	<b>1</b>
<b>2.</b>	<b>DBCC.....</b>	<b>2</b>
2.1	DBCC checkdb .....	2
2.1.1	Syntax .....	2
2.2	DBCC checkcatalog .....	4
2.2.1	Syntax .....	4
2.3	DBCC checkalloc .....	5
2.3.1	Syntax .....	5
<b>3.</b>	<b>Backups .....</b>	<b>7</b>
<b>4.</b>	<b>Monitoring Free Space .....</b>	<b>8</b>
<b>5.</b>	<b>Dumping the Transaction Log .....</b>	<b>9</b>
<b>6.</b>	<b>Examine Error Logs and Backup Logs .....</b>	<b>11</b>
6.1	Error Log .....	11
6.2	Backup Log .....	11
<b>7.</b>	<b>Update Statistics.....</b>	<b>12</b>
<b>8.</b>	<b>Recompile Stored Procedures .....</b>	<b>14</b>
<b>9.</b>	<b>Monitor Resource Utilization on the Server.....</b>	<b>15</b>

# 1. Server Maintenance Schedule

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When Sybase is installed with PD<sup>2</sup> at each site, a Database Administrator (DBA) should be identified. The DBA is responsible for monitoring the server's performance and conducting several tasks to prevent data loss. Doing so will keep the server running at optimum efficiency and prevent a major disaster from occurring at the server level.

The follow maintenance schedule is a list of daily, weekly and monthly tasks that the DBA can perform to monitor the server's performance and to make sure that their server stays in normal working order. This schedule is AMS's suggestions for basic DBA tasks, but the DBA can perform these tasks on a more frequent basis if necessary.

Tasks	Daily	Weekly	Twice a Month
DBCC			
checkdb		✓	
checkalloc		✓	
checkcatalog		✓	
Backups			
Production	✓		
Interface (IDB)	✓		
Acquiline (ACQ)	✓		
master		✓	
sybssystemprocs			✓
sybsecurity			✓
model			✓
Monitor Free Space (db and log)		✓	
Dumping the Transaction Log	✓		
Examine Error Log and Backup Log		✓	
Update Statistics			✓
Recompile Stored Procedures			✓
Monitor Resource Utilization on the Server			✓

The following sections will give a detailed description of how to perform each task and what to look for that may indicate a potential problem.

## 2. DBCC

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The Database Consistency Checker (DBCC) is a set of utility commands that are used to check the logical and physical consistency of a database. These consistency checks are used to ensure that the database is not corrupt. These checks can also detect errors and correct them before they affect a user's ability to use PD<sup>2</sup>.

The following table lists the three DBCC commands that AMS suggests running on a weekly basis against *all* the databases on the server.

Command	Action
Checkdb	checks all user tables in a database
Checkcatalog	checks all system tables in a database
Checkalloc	checks all page allocations in a database

### 2.1 DBCC checkdb

The dbcc checkdb command checks each table in the specified database to see that:

- Index and data pages are linked correctly (i.e. verify previous page, current page and next page are consistently linked throughout the table).
- Indexes are sorted properly (i.e. verify that the indexes are in the correct order).
- Pointers are consistent (i.e. verify that the index pointer for each row and page are valid).
- Data rows on each page have entries in the object allocation map (OAM) page. The OAM page contains information about the location of rows and pages used by the table.

#### 2.1.1 Syntax

Execute the following command in SQL Advantage.

```
DBCC checkdb (<database_name>)
```

<database\_name> = name of the database that needs to be checked. If the database name is omitted then the current database will be checked.

Example

```
DBCC checkdb (master)  
go
```

The following is a sample of output from the DBCC checkdb command:

```
Checking master
Checking sysobjects
The total number of data pages in this table is 5.
Table has 68 data rows.
Checking sysindexes
The total number of data pages in this table is 5.
Table has 69 data rows.
Checking syscolumns
The total number of data pages in this table is 13.
Table has 457 data rows.
Checking systypes
The total number of data pages in this table is 1.
Table has 3 data rows.
Checking syslogs
The total number of data pages in this table is 3.
*** NOTICE: Notification of log space used/free cannot be reported
because the log segment is not on its own device.
Table has 73 data rows.
Checking sysprotects
The total number of data pages in this table is 1.
Table has 59 data rows.
Checking sysdatabases
The total number of data pages in this table is 1.
Table has 13 data rows.
Checking sysusages
The total number of data pages in this table is 1.
Table has 29 data rows.
Checking syslogins
The total number of data pages in this table is 14.
Table has 208 data rows.
Checking sysdevices
The total number of data pages in this table is 2.
Table has 32 data rows.
Checking sysconfigures
The total number of data pages in this table is 6.
Table has 109 data rows.
Checking syscharsets
The total number of data pages in this table is 1.
The total number of TEXT/IMAGE pages in this table is 7.
Table has 7 data rows.
Checking sys srvroles
The total number of data pages in this table is 1.
Table has 6 data rows.
Checking spt_committab
The total number of data pages in this table is 1.
Checking crt_script
The total number of data pages in this table is 1.
DBCC execution completed. If DBCC printed error messages, contact a
user with System Administrator (SA) role.
```

If no error messages are printed then the database passed this consistency check. If error messages are printed then copy the *exact* error message and contact the SPS Help Desk.

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**Note:** If you backed up a database that does not pass one of the database consistency checks, make sure you maintain (i.e. do not overwrite) any previous backups that have passed all the consistency checks.

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## 2.2 DBCC checkcatalog

The dbcc checkcatalog command checks for consistency within and between the system tables found in a particular database. The checks performed verify that:

- Every datatype in the syscolumns table has a matching row entry in the systypes table.
- Every table and view in sysobjects table has at least one row in the syscolumns table.
- The last checkpoint in the syslogs table is valid.
- The segment definitions in the syssegments table are valid.

### 2.2.1 Syntax

Execute the following command in SQL Advantage.

```
DBCC checkcatalog (<database_name>)
```

<database\_name> = name of the database that needs to be checked. If the database name is omitted then the current database will be checked.

Example

```
DBCC checkcatalog (master)  
go
```

The following is a sample of output from the DBCC checkcatalog command:

```
Checking master
The following segments have been defined for database 1 (database name
master).
virtual start addr      size      segments
-----
4                      1536      0
                      1
                      2
3588                    1024      0
                      1
                      2
DBCC execution completed. If DBCC printed error messages, contact a
user with System Administrator (SA) role.
```

If no error messages are printed then the database passed this consistency check. If error messages are printed then copy the *exact* error message and contact the SPS Help Desk.

---

**Note:** If you backed up a database that does not pass one of the database consistency checks, make sure you maintain (i.e. do not overwrite) any previous backups that have passed all the consistency checks.

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## 2.3 DBCC checkalloc

The dbcc checkalloc command checks the specified database to see that:

- All pages are correctly allocated.
- No page is allocated that is not used.
- No page is used that is not allocated.
- All allocation pages contain valid information.

### 2.3.1 Syntax

Execute the following command in SQL Advantage.

```
DBCC checkalloc (<database_name>)
```

<database\_name> = name of the database that needs to be checked. If the database name is omitted then the current database will be checked.

Example

```
DBCC checkalloc (master)
go
```

---

**Note:** The DBCC checkalloc command should only be performed when no one is in the database.

---

The following is a sample of output from the DBCC checkalloc command:

```
Checking master
Database 'master' is not in single user mode - may find spurious allocation problems
due to transactions in progress.
*****
TABLE: sysobjects                OBJID = 1
INDID=1  FIRST=1                 ROOT=8  SORT=0
      Data level: 1.  5 Data pages allocated and 1 Extents allocated.
      Indid   : 1.  1 Index pages allocated and 1 Extents allocated.
INDID=2  FIRST=16                ROOT=16  SORT=0
      Indid   : 2.  1 Index pages allocated and 1 Extents allocated.
TOTAL # of extents = 3
*****
TABLE: syscolumns                OBJID = 3
INDID=1  FIRST=48                ROOT=56  SORT=0
      Data level: 1.  13 Data pages allocated and 2 Extents allocated.
      Indid   : 1.  1 Index pages allocated and 1 Extents allocated.
TOTAL # of extents = 3
*****
TABLE: sysusers                 OBJID = 10
INDID=1  FIRST=160               ROOT=168  SORT=0
      Data level: 1.  1 Data pages allocated and 1 Extents allocated.
      Indid   : 1.  1 Index pages allocated and 1 Extents allocated.
INDID=2  FIRST=176               ROOT=176  SORT=0
      Indid   : 2.  1 Index pages allocated and 1 Extents allocated.
INDID=3  FIRST=184               ROOT=184  SORT=0
      Indid   : 3.  1 Index pages allocated and 1 Extents allocated.
TOTAL # of extents = 4
*****
TABLE: sysdatabases             OBJID = 30
INDID=1  FIRST=257              ROOT=264  SORT=0
      Data level: 1.  1 Data pages allocated and 1 Extents allocated.
      Indid   : 1.  1 Index pages allocated and 1 Extents allocated.
INDID=2  FIRST=272              ROOT=272  SORT=0
      Indid   : 2.  1 Index pages allocated and 1 Extents allocated.
TOTAL # of extents = 3
*****
TABLE: sysmessages              OBJID = 36
INDID=1  FIRST=368              ROOT=400  SORT=0
      Data level: 1.  265 Data pages allocated and 34 Extents allocated.
      Indid   : 1.  3 Index pages allocated and 1 Extents allocated.
INDID=2  FIRST=688              ROOT=691  SORT=1
      Indid   : 2.  48 Index pages allocated and 7 Extents allocated.
TOTAL # of extents = 42
*****
Processed 60 entries in the sysindexes for dbid 1.
Alloc page 0 (# of extent=32 used pages=96 ref pages=88)
Alloc page 256 (# of extent=32 used pages=155 ref pages=155)
Alloc page 512 (# of extent=32 used pages=122 ref pages=114)
Alloc page 768 (# of extent=32 used pages=165 ref pages=163)
Alloc page 1024 (# of extent=32 used pages=224 ref pages=223)
Alloc page 1280 (# of extent=26 used pages=183 ref pages=183)
Alloc page 1536 (# of extent=1 used pages=1 ref pages=1)
Alloc page 1792 (# of extent=1 used pages=1 ref pages=1)
Alloc page 2048 (# of extent=1 used pages=1 ref pages=1)
Alloc page 2304 (# of extent=2 used pages=8 ref pages=5)
Total (# of extent=191 used pages=956 ref pages=934) in this database
DBCC execution completed. If DBCC printed error messages, contact a user with System
Administrator (SA) role.
```

If no error messages are printed than the database passed this consistency check. If error messages are printed then copy the *exact* error message and contact the SPS Help Desk.

---

**Note:** If you backed up a database that does not pass one of the database consistency checks, make sure you maintain (i.e. do not overwrite) any previous backups that have passed all the consistency checks.

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## 3. Backups

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One of the most important functions of the DBA is to perform nightly backups of all the databases on the server. A good backup plan is like a “safety net” for your server. Without it it will be impossible to recover information in the event of a software or hardware failure. Please refer to the paper entitled “Backing Up Your PD<sup>2</sup> Database” for detailed instructions of how to perform backups. Here are a few things to keep in mind when performing backups.

- Try to automate your backups. This will ensure that backups are being done even when the DBA is unable to perform them. See paper entitled “How to Automate Sybase Backups on an NT Server” for detailed instructions.
- Make sure there is space available on the drive where your dump devices are located. Dump devices expand as the amount of data in your database grows. But the dump device can not expand beyond the space remaining on the drive.
- Try to test your backups at least twice a month by restoring them to a test database. This will allow you to demonstrate that backups are successful and the information can be restored when needed.
- Try to maintain a week’s worth of backups. In other words, do not overwrite the previous nights backup. This will protect you in case last night’s backup is invalid or contains corrupt data that was not in the previous nights backup. Ideally you should have at least one valid (i.e. tested) backup at all times. (See previous bullet.)
- Try not to store your dump devices on the same physical disk as your database devices. This will protect your dump devices from potential damage in case the disk that contains your database devices fails.
- Monitor your backup log to make sure the backups are successfully completed.
- If you use tape backups you may wish to backup the database to a disk then copy the backup to the tape. Also make sure the tapes are clearly labeled and stored in a dry, safe place.
- If you perform file system backups be aware that reconstructing the database from .dat files is no substitute for performing regular dumps to disk. Also keep in mind that file system backups can not successfully backup .dat files when the server is online.

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**Note:** Please be aware that in the event of a severe database failure AMS is only responsible for bringing a site back to its most recent *successful* backup. Keep in mind that your database is only as secure as your data and transaction log backups. If you can not find them or they do not work, then they are useless in the event of a disaster. You may wish to consider storing some backups offsite in case of a fire or earthquake.

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## 4. Monitoring Free Space

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Many DBAs have learned the hard way how to expand a database or add additional log space when their users receive messages announcing that the database is full. By watching the space remaining on the database it is possible to predict when it may be necessary to add additional space. Section 2 of the paper entitled “How to Increase Your PD<sup>2</sup> database” gives a detailed explanation of various methods that can be used to verify the space remaining in your database and transaction log. Here are a few things to keep in mind when monitoring free space.

- Check the space available on a weekly basis.
- Increase the size of your production database when the free space drops below 100MB.
- For sites that do not have the “truncate log on checkpoint” turned on in their database, try to automate your transaction log dumps and do not allow the free space in the log to drop below 10MB.
- When increasing your database do so in increments of 500MB to 2000MB at a time.
  - 500MB is the minimum device size that AMS recommends. You can make the device smaller but this will only reduce the amount of time before the database fills up again.
  - 2000MB (2GB) is a Sybase device size limit for all Unix servers (except Digital Unix). For Windows NT servers the device size limit is 32GB. You can make the device large than 2GB if there is space available, but you should also increase the test database by the same amount. This is necessary in order to test your production database backups (See section 3). A backup can not be restored to a smaller database regardless of whether the space is used or not.

## 5. Dumping the Transaction Log

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All sites that are currently using PD<sup>2</sup> version 4.1a and 4.1b have the “truncate log on checkpoint” option turned on in their database. This option prevents the transaction log from filling up. When this option is set there is no need to dump the transaction log because it is done automatically. With the advent of 4.1c sites can turn off the “truncate” option and begin performing automated backups of their transaction log.

Backing up the transaction log will allow a site to have up-to-the-minute recovery of their database in the event of a media failure. In other words, if a site performs an hourly dump of their transaction log they can recover their database up to the last successful backup of their transaction log. In which case only an hour’s worth of data may be lost.

The procedure for doing this is fairly simple:

1. Create a device for backing up your entire database.  
Ex: **SPS\_M00001\_DB\_BACKUP**
2. Create devices for backing up the transaction log. You should have a device for each hour that you want to perform the backup.  
Ex: **SPS\_M00001\_TRAN\_0800\_BACKUP**
3. Dump the entire database each night.

Example:

```
dump database SPS_M00001_DB to SPS_M00001_DB_BACKUP
go
```

4. Dump the transaction log at the top of each hour

Example:

```
dump tran SPS_M00001_DB to SPS_M00001_TRAN_0800_BACKUP
go
```

5. Create the files to automate the hourly transaction log backup and the nightly database backup. Then schedule these files to execute at the appropriate times.

If the time comes when you need to restore the database from these backups, the procedure is as follows:

1. Restore the database from the previous night’s backup.

Example:

```
load database SPS_M00001_DB from SPS_M00001_DB_BACKUP
go
```

2. Restore the transaction logs in consecutive order.

Example:

```
load tran SPS_M00001_DB from
SPS_M00001_TRAN_0800_BACKUP
go
```

```
load tran SPS_M00001_DB from
SPS_M00001_TRAN_0900_BACKUP
go
```

```
load tran SPS_M00001_DB from
SPS_M00001_TRAN_1000_BACKUP
go
```

...

Following these procedures will allow the site to recover all the transactions that were committed on the hour before the database went down.

AMS suggests that sites practice this on a test database to ensure that they can successfully perform this process if it ever becomes necessary.

The most important thing to keep in mind when doing transaction log dumps is to automate the dump transaction process and do not allow the free space to drop below 10MB. If this happens all transaction will be suspended and users will be locked out of PD<sup>2</sup> until space becomes available in the transaction log.

## 6. Examine Error Logs and Backup Logs

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One way of diagnosing problems with the server is by reviewing the information in the error logs. There are two error logs on the Sybase Server. They are the error log and the backup log.

### 6.1 Error Log

The error log (filename: errorlog) is usually located on the Sybase Server in the c:\sybase\install directory for NT servers or in the \$SYBASE/install directory on Unix servers. It is a file that captures information related to the server and the operating system on which it is installed. The error log captures information such as device initialization, disconnects, configuration changes, server error messages, etc.

When examining the error log search for anything that reads “Error” or “Warning”. Most error messages contain a number and a brief description of the problem. You may call the Help Desk to get a detailed explanation of the error or you can look it up in the technical reference manual section of Sybase’s website <http://sybooks.sybase.com/srg1100e.html>. Search the “Troubleshooting and Error Message Guide” for the error number or phrase that appears in the error log.

### 6.2 Backup Log

The backup log (filename: backup.log) is usually located on the Sybase Server in the c:\sybase\install directory for NT servers or in the \$SYBASE/install directory on Unix servers. Any time the system performs a backup or restore it is captured in backup log. The initiation, progress and completion of the backup and restore commands can be viewed in the backup log.

It is important to monitor the backup log because it is the easiest way to detect failures and determine if your backups are successful. When examining the backup log search for anything that reads “Error” or “Warning”. Most backups fail when the device becomes full or corrupt or when the disk where the backup is located runs out of space. Any error that is found in the backup log should be corrected *immediately* to guarantee a successful recovery of the data in the event of a media failure.

## 7. Update Statistics

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When an index is created on a table that contains data, the server creates a distribution page. The distribution page contains information about how the data is stored in the table in relation to the indexes. For example, if an index is placed on a column that contains last names, the distribution page will contain information about the page and row location of each last name in the table. Distribution pages are essential for proper functioning of the query optimizer. The query optimizer uses the information on the distribution page to determine the fastest way to retrieve data from a table. However, the server does not automatically update the data on the distribution page. You must run the update statistics command to update the information on the distribution page. You should run this command:

- After upgrading your database.
- After running the clause database installer.
- Wherever a new index is added to or dropped from a table.
- Whenever the system appears to be running slower than normal.

To update the statistics on a single table you can execute the following command in SQL Advantage

```
update statistics <table_name>
```

<table\_name> = the name of the table that needs to be updated.

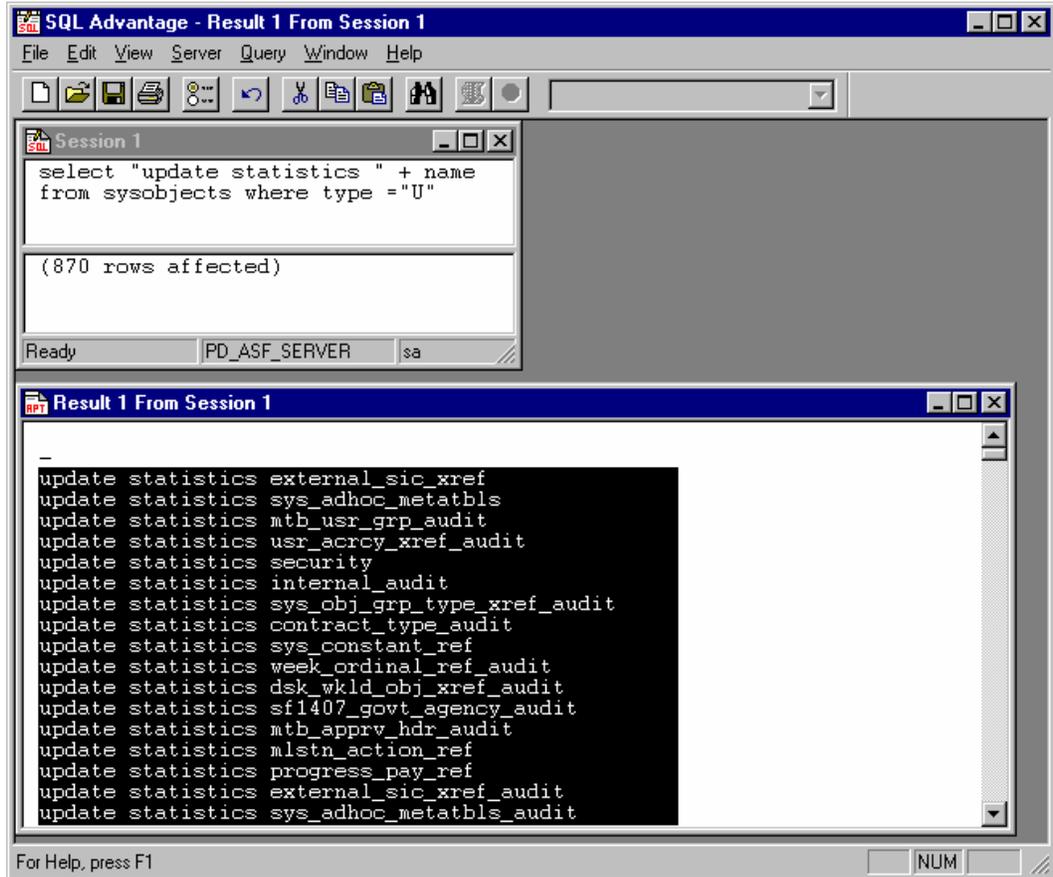
However, it is more efficient to update the statistics on all the tables in the database instead of one at a time.

The new ScriptAid utility contains an unsecured Update Statistics script that can be run by the user as often as they wish. If you do not have access to the ScriptAid utility then download it from the PD<sup>2</sup> Software library at <http://pd2.amsinc.com>.

You can also execute the following command from within the production database in SQL Advantage to compile a list of the update statistics commands then execute the results.

```
select "update statistics " + name  
from sysobjects where type ="U"  
go
```

The results will look as follows:



Highlight the results from the results window, paste them into to the query pane then execute the entire list.

---

**Note:** Update Statistics should only be run when no one is in the database. Running update statistics while users are in the system will impact performance and may also wipe out the statistics on any table that is use when the command is executed.

---

## 8. Recompile Stored Procedures

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The `sp_recompile` procedure causes each stored procedure and trigger that uses the named table to be recompiled the next time it runs. Queries used by stored procedures and triggers are optimized only once, when they are compiled. As indexes are added and/or other changes are made to the database that affect its statistics, the compiled stored procedures and triggers may lose efficiency. By recompiling the stored procedures and triggers that act on a table, the queries are optimized for greatest efficiency.

---

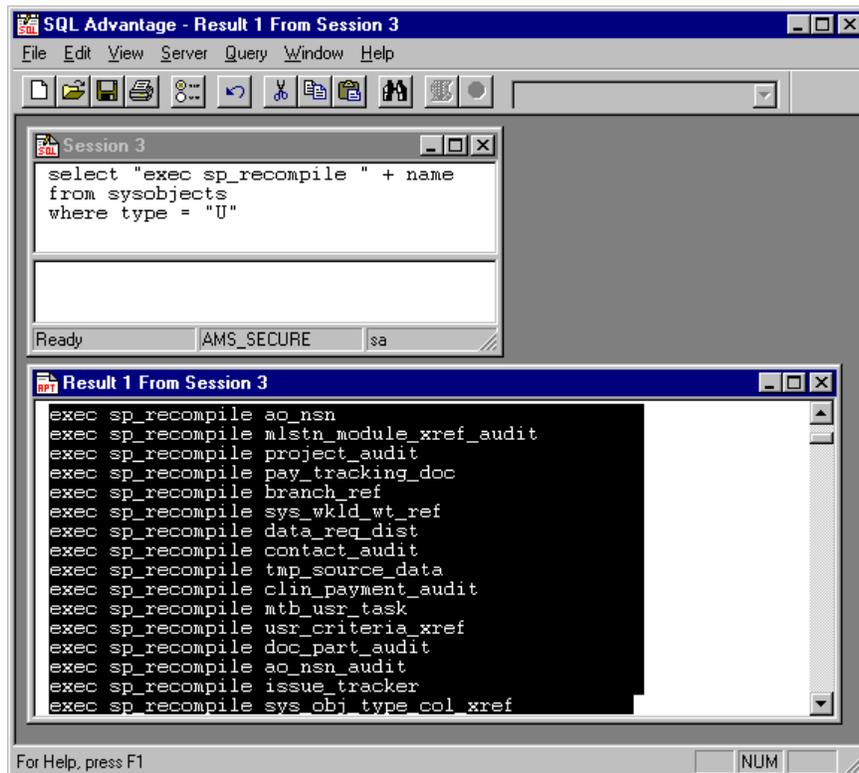
**Note:** You should run the `sp_recompile` procedure immediately after running update statistics on the database.

---

`Sp_recompile` is currently not part of ScriptAid and a batch file is not available. However, you can execute the following command from within the production database in SQL Advantage to compile a list of the `sp_recompile` commands then execute the results.

```
select "exec sp_recompile " + name from sysobjects
where type = "U"
go
```

The results will look as follows:



Highlight the results from the results window, paste them into to the query pane then execute the entire list.

## 9. Monitor Resource Utilization on the Server

---

As with all computer applications, an application can be in perfect working order and still experience problems if the operating system and hardware on which it is installed is left unattended.

The following is a list of basic tasks that can be performed to monitor the resources on the server.

- Check disk space on all the drives. If the disks run out of space you may not be able to create new devices, perform complete backups or run some operating system tasks.
- Perform regular virus scans on all system disks.
- Perform regular disk scans on all system disks to locate and repair any damage.
- Check CPU usage on the server. If the CPU usage is running at a high percentage, it can impact the server's performance. Consider adding more processors to handle the workload.
- Check Memory Usage on the server. If memory usage is running at a high percentage it can have an effect on the server's performance. Consider adding more physical memory to the machine and then increase the total memory allocated to Sybase.
- Check the event viewer and/or other system logs for any operating system errors.