Sybase Server Maintenance Guide

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1. Server Maintenance Schedule

When Sybase is installed with a PD² teach 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 CACI'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)	☒		
PRweb (ACQ)	☒		
master		☒	
sybsystemprocs			☒
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 a task and what to look for that may indicate a potential problem.

2. DBCC

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 PD².

The following table lists the three DBCC commands that CACI 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 systemtables in a database
Checkalloc	checks all page allocations in a database

Also, please refer to the document entitled, "Guide to Database Corruption," (https://spssite.caci.com/document_display.cfm?id=6032) for additional instructions on how to perform DBCC checks.

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.
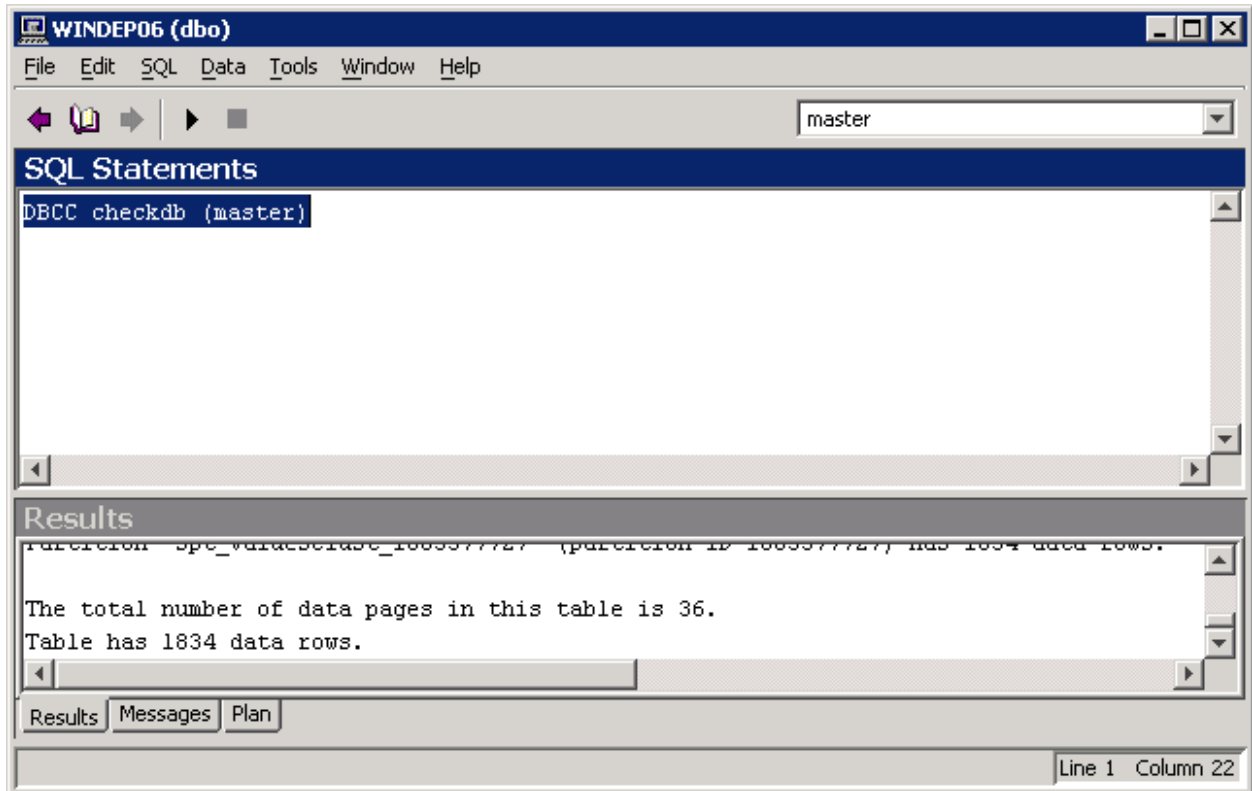
2.1.1 Syntax

Execute the following command in Interactive SQL.

DBCC checkdb (<database_name>)

<database_name> = name of the database that needs to be checked. If the database name is omitted from the command mentioned above, the DBCC will be run against whichever database is currently active in Interactive SQL

Example (dbcc of the 'master' database)

DBCC checkdb (master)

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.

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 data type 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 Interactive SQL.

> DBCC checkcatalog (<database_name>)
>
> <database_name> = name of the database that needs to be checked. If the database name is omitted from the command mentioned above, the DBCC will be run against whichever database is currently active in Interactive SQL
>
> Example (dbcc of the 'master' database)
>
> DBCC checkcatalog (master)
>
> go

The following is a sample of output from the DBCC checkcatalog command:
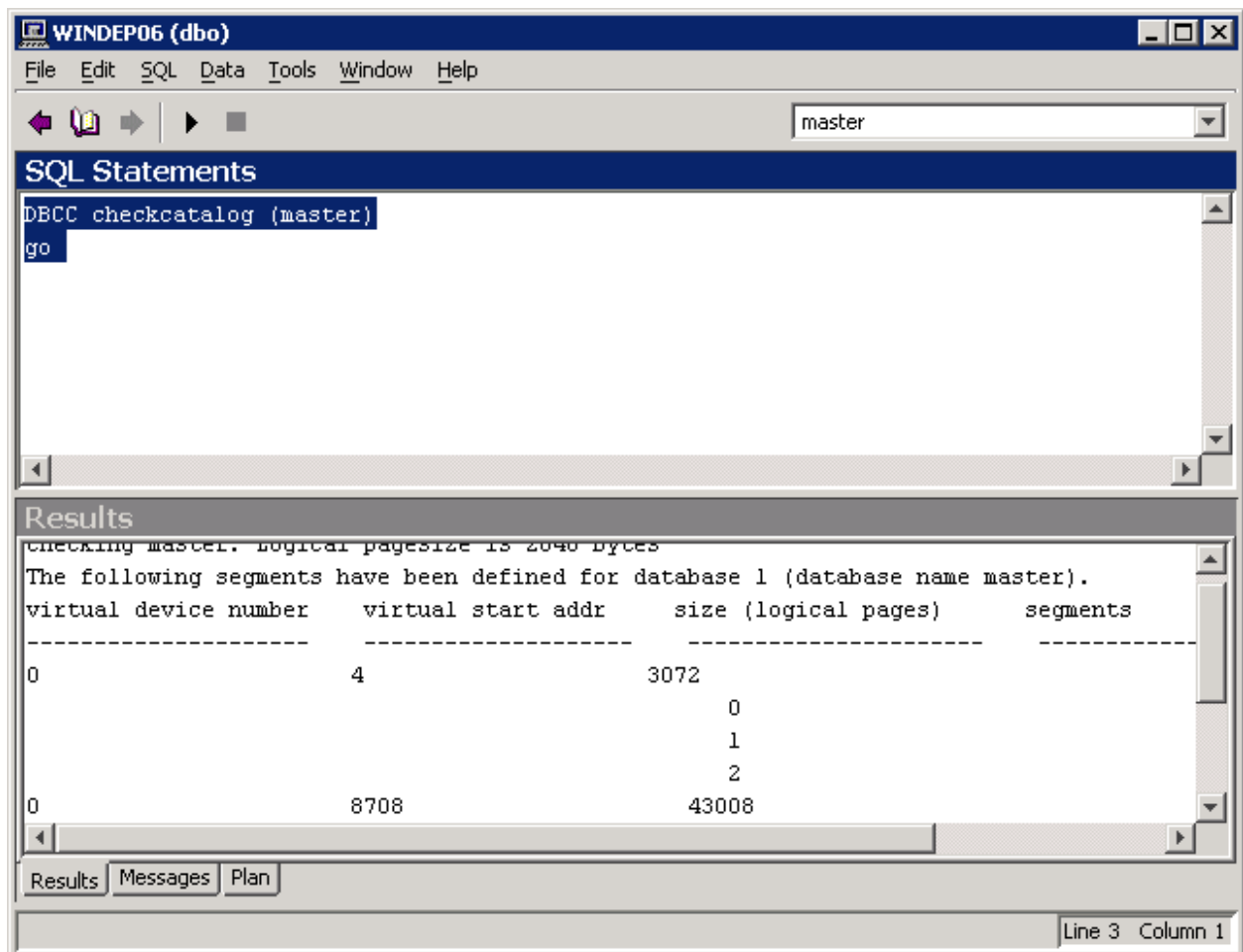
If no error messages are printed then the database passed this consistency check. If error messages are printed then copy the exact error message and contact the SPS Help Desk.

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.

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 Interactive SQL.

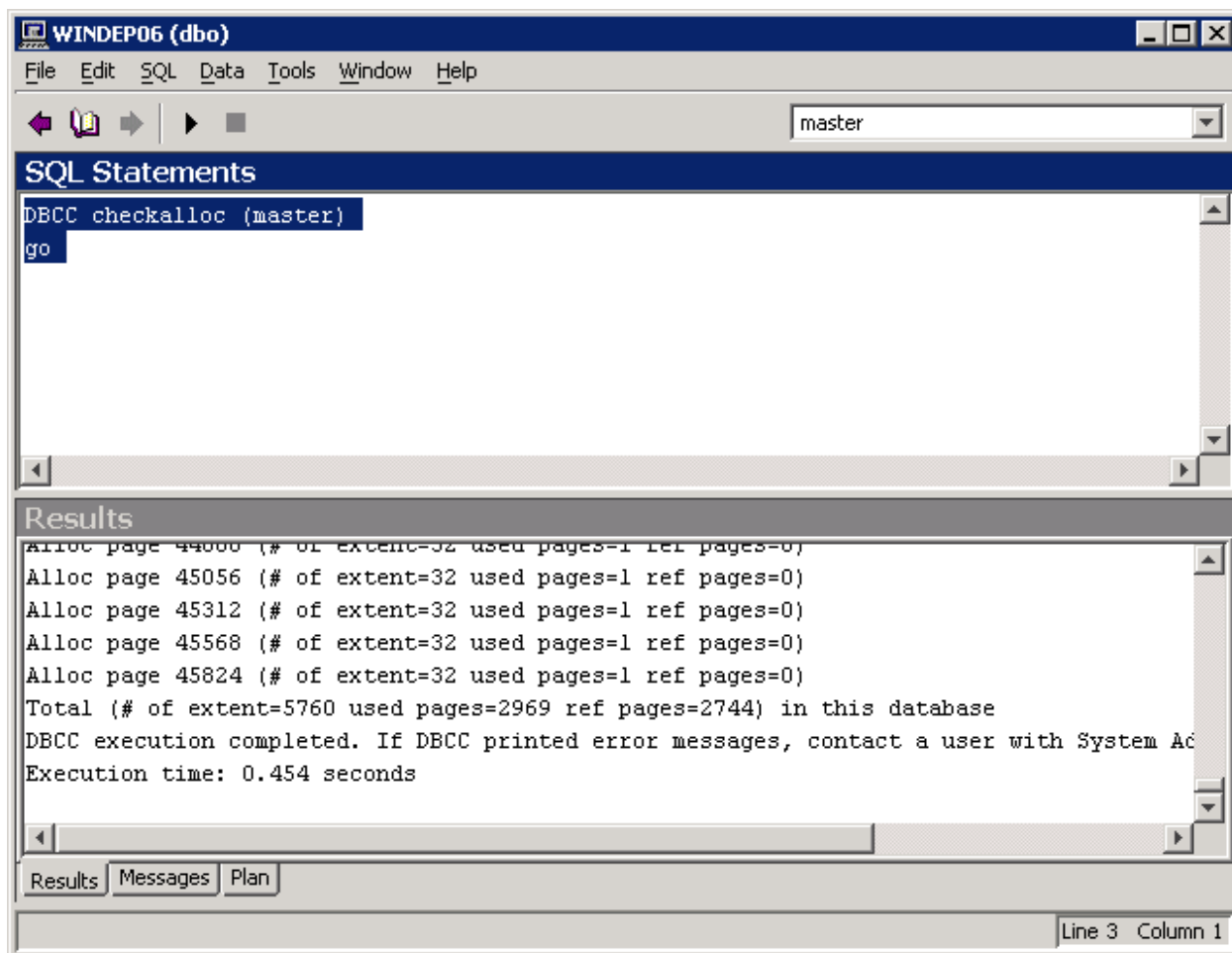DBCC checkalloc (<database_name>)

<database_name> = name of the database that needs to be checked. If the database name is omitted from the command mentioned above, the DBCC will be run against whichever database is currently active in Interactive SQL

Example (dbcc of the 'master' database)

DBCC checkalloc (master)

go

```
WINDEP06 (dbo)
File  Edit  SQL  Data  Tools  Window  Help

                                                        master

SQL Statements
DBCC checkalloc (master)
go




Results
Alloc page 44800 (# of extent=32 used pages=1 ref pages=0)
Alloc page 45056 (# of extent=32 used pages=1 ref pages=0)
Alloc page 45312 (# of extent=32 used pages=1 ref pages=0)
Alloc page 45568 (# of extent=32 used pages=1 ref pages=0)
Alloc page 45824 (# of extent=32 used pages=1 ref pages=0)
Total (# of extent=5760 used pages=2969 ref pages=2744) in this database
DBCC execution completed. If DBCC printed error messages, contact a user with System Ad
Execution time: 0.454 seconds

Results | Messages | Plan
                                                        Line 3  Column 1
```

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

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.

3. Backups

One of the most important functions of the DBA is to perform nightly backups on a daily basis (Production and PRweb (ACQ) Databases) weekly basis (master) and bi-monthly basis (sybsystemproc, sybsecurity, model) 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 document entitled, "Backing up Your PD² Database" (https://spssite.caci.com/ document_display.cfm?id=5949) for detailed instructions of how to perform backups. Here are a few things to keep in mind when performing backups.

- The DBA is unable to perform them. Please refer to document entitled, "Automating Sybase Back-ups" (https://spssite.caci.com/document_display.cfm?id=6026).

- Make sure there is space available on the drive where your dump devices are located (Windows Explorer →Right-Click on Drive →Properties →General Tab →Free Space). Dump devices expand as the amount of data in your database grows. But the dump device cannot 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 night's backup. This will protect you in case last night's backup is invalid or contains corrupt data that was not in the previous night's 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 (used for back-ups) on the same physical disk as your database devices (which are used to increase the size of your database). 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 databasefrom.dat files is no substitute for performing regular dumps to disk. Also keep in mind that file system backups cannot successfully backup .dat files when the server is online.

Note: Please be aware that in the event of a severe database failure CACI 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 cannot 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.

4. Monitoring Free Space

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. Section2 of the KB article entitled, "How to Increase Your PD²database", (https://spssite.caci.com/document_display.cfm?id=5951) 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 below100MB.

- 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.

- 500MBis the minimum device size that CACI 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 servers the device size limit is 32GB. You can make the device larger than2GB 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 (Seesection3). A backup cannot be restored to a smaller database regardless of whether the space is used or not.

5. Dumping the Transaction Log

All sites that are currently usingPD² version4.2 Increment 1 and above 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.

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 tranSPS_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 fromSPS_M00001_DB_BACKUP
   go

2. Restore the transaction logs in consecutive order.

   Example:

   load tranSPS_M00001_DB fromSPS_M00001_TRAN_0800_BACKUP

   go

   load tranSPS_M00001_DB fromSPS_M00001_TRAN_0900_BACKUP go

   load tranSPS_M00001_DB fromSPS_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.

CACI 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 PD² until space becomes available in the transaction log.

6. Examine Error Logs and Backup Logs

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: error log) is usually located on the Sybase Server in the c:\sybase\install directory for Windows 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 Web site http://www.Sybase.com. 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 (file name: backup.log) is usually located on the Sybase Server in the c:\sybase\install directory for Windows 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 reviewed 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 corruptor 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

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 Interactive SQL

> 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 Script Aid 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 Script Aid utility then contact the SPS Help Desk.

You can also execute the following command from within the production database in Interactive SQL 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:
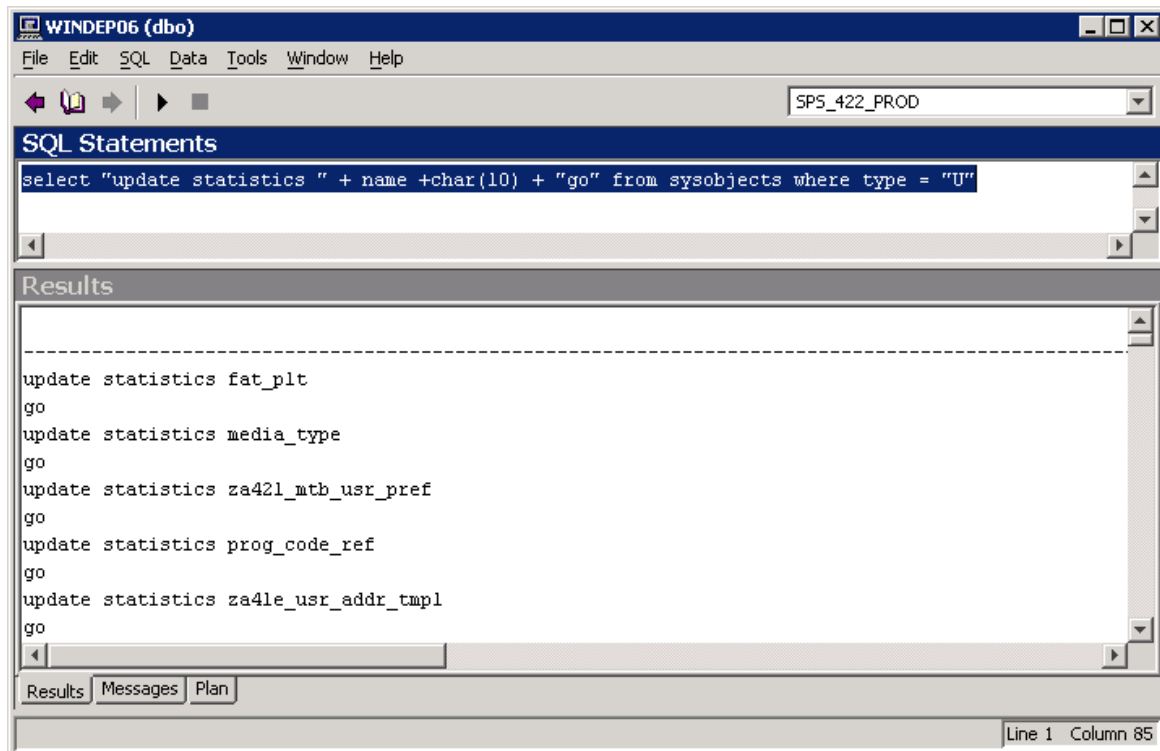
Highlight the results from the results window, paste, and then execute the entire list.

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

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 affects 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 Script Aid and a batch file is not available. However, you can execute the following command from within the production database in Interactive SQL 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:
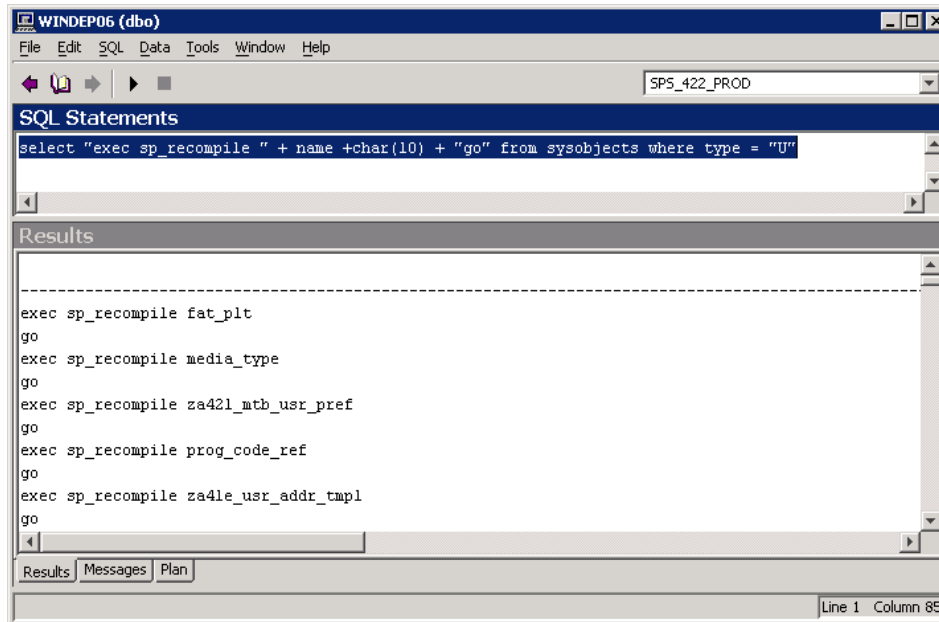
Highlight the results from the results window, paste, and then execute the entire list

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 (Windows Explorer →Right-Click on Drive →Properties →General Tab →Free Space). 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.