Sun StorageTek™ Business Analytics Database Agent Installation Guide

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Introduction to the Database Agent

The Sun StorageTek Business Analytics Database Agent collects information about database servers, such as database server type, version, allocated spaces, and input/output operation (statistics). The Database Agent currently supports four major commercial database servers: MS SQL server, Oracle, DB2, and Sybase.

Note: With the acquisition of StorageTek, Sun Microsystems has re-branded and re-named Global Storage Manager (GSM) as Sun StorageTek Analytics, a member of the Enterprise Storage Manager portfolio of software solutions. The functionality of Business Analytics is identical to GSM, only the name has changed.

The Database Agent requires that appropriate client software be installed on the system that runs the Database Agent. Be sure to install the client software and verify connectivity to the database before you proceed to install the Database Agent. Refer to the *Sun StorageTek Business Analytics Support Matrix* to obtain the latest information on supported databases and their support prerequisites.

To upgrade the Database Agent, uninstall the previously installed Database Agent before you install the Database Agent supplied with the latest Sun StorageTek Business Analytics software. The decision to upgrade an existing Database Agent to that in the latest Sun StorageTek Business Analytics software may be performed because:

- The Sun StorageTek Business Analytics Release Notes indicate a problem has been fixed or a new feature added.
- The upgrade is recommended by your Sun representative.

Automatic and Static Agent Registration

Automatic agent registration is a configuration option for agent data collection. In the storability.ini file, automatic agent registration is configured as follows:

- **Local Manager** – Specify the IP address or host name of the Local Manager to be contacted to activate agent registration.
- **Local Manager Registration Port** – Specifies the TCP port number used by the Local Manager for agent auto registration. The default port number is 17146.
- **Enable Auto Registration** – Turns agent auto registration on (default) or off.

To register the Database Agent statically, proceed as follows:

- Enter false in the **Enable Auto Registration** field.
- Modify the Routing Agent static agent configuration to include an entry (port number|<agent IP address/name>)
- Restart the Routing Agent
- Restart the companion Central Manager agents

DATABASE AGENT OBJECTS

Table 1 lists the objects that the Database Agent publishes regardless of the SQL type or installed server platform.

Table	Columns
alerts-3-0	sourceip, priority, alert_id, progname, alert, time, firsttime, refreshedtime, int1, text1, text2.
agent_version-2_0	ip_address, agent_name, version, compile_time, managed_entities, tz_name, tz, timestamp
gsa_cache_control-2_1	ip_address, port, table_name, cache_age, last_update_request_length, update_request_pending, group_name, group_master, timestamp
gsa_ini_control-2_0	ip_address, port, domain, parameter, value, status, timestamp
gsa_parm_info	ip_address, port, object, parm_name, value_syntax, description, example
gsa_dba_application_storage_unit-2_1	db_server_ip, instance_name, port_no, db_name, unit_name, owner, measure_type, measure, timestamp
gsa_dba_database_server-2_1	db_server_ip, port_no, database_type, version, instance_name, timestamp
gsa_dba_specific_data-2_1	db_server_ip, instance_name, port_no, db_name, map_type, item1, item2, timestamp
gsa_dba_db_stats-2_1	db_server_ip, instance_name, port_no, db_name, tables_count, views_count, indexes_count, users_count, active_users_count, sessions_count, timestamp
gsa_dba_io_indicators-2_1	db_server_ip, instance_name, port_no, unit_type, unit_name, reads, writes, timestamp
gsa_dba_physical_storage_unit-2_1	db_server_ip, instance_name, port_no, db_name, unit_type, unit_name, physical_type, physical_name, used_space, total_space, auto_increment, auto_incr_max_limit, timestamp
gsa_dba_served_databases-2_1	db_server_ip, instance_name, port_no, db_name, owner, timestamp

Table 1 – Database Agent Objects

DATABASE AGENTS MATRIX

Item	Description
Support Prerequisites	
Software and hardware agent support requirements	Refer to the *Sun StorageTek Business Analytics Support Matrix* that is located on the Documentation CD to obtain the latest agent support requirements.
Verify Database Client Interface Installed and Tested	Access method the Database Agent uses to collect data. • Oracle database server plug-in uses OCI libraries • Sybase database server plug-in uses Sybase OpenClient CT library • MS SQL Server database server plug-in uses DB Library for C • DB2 database server plug-in uses DB2 CLI Library, System Monitor APIs and Admin APIs.
Verify logical name, IP address, and port number of the database server	Obtain information from the Database Administrator (DBA).
Verify user created with required "Select" permissions to the required tables	Provides agent "Select" access to the database tables; Sun StorageTek Business Analytics provides Database User Creation scripts that DBA may modify to suit their environment.
Agent Installation	
Windows	• Windows Local Manager Installation CD (InstallShield) • Windows administrator privileges
Solaris	• Unix Local Manager Installation CD (package installation) • root user privileges • GSMbase, GSMlmutil, GSMdb, GSMsybase, GSMdb2, or GSMoracle
AIX/HP-UX	• UNIX Agents Installation CD (Tar Archive installation) • root user privileges
DB2 Database Reporting	Because of a Database Agent CLI/API restriction, the Database Agent for IBM DB2 does not currently report on used storage for the following storage elements of the DB2 database server: • Container (file, directory) • System Managed Storage (SMS) • Database Managed Storage (DMS) As a result, the Database Configuration/Capacity report in the Management Console shows the utilization for System Managed Storage, Database Managed Storage, and SMS tablespaces as 100% utilized. However, the Database Managed Storage tablespace utilization is correctly reported in this Management Console report.

Configuration Parameters	Description
User Login	The user name the Database Agent should use to connect to the database server.
User Password	User password for that user.
IP Address	The IP address of the host on which the database server is running.
Port Number	The port number at which the database server (or database instance for DB2) is listening for client connections.
Database Type	MS-SQL, Oracle, Sybase, DB2
Logical Name	Name of the database server; is the database instance name for DB2.
Local Manager	Network resolvable host name or IP address that identifies the Local Manager with which the Database Agent is to register if auto registration is enabled.
Local Manager Port	Local Manager's TCP port number used for agent auto registration; default port number is 17146.
Enable Auto Registration	Auto registration is enabled (true) by default; may disable auto registration by setting this configuration parameter to false.

Table 2- Database Agent Matrix

General Configuration Guidelines

The Database Agent can be installed on Windows or Solaris and collect data from other database server platforms using the database's client interface. See the *Sun StorageTek Business Analytics Support Matrix* located on the Documentation CD to obtain the latest

information on supported hardware platforms and databases as well as their support prerequisites.

Important Note: While you configure the Database Agent, you are prompted to enter the logical name, IP address, and port number of the database server. However, the Database Agent only uses the logical name to connect to the database server(s). The IP address and port fields are used for reporting purposes only.

Therefore, in order for the Database Agent to function, it must rely on a working logical name. In SQL, a working logical name means either:

- An entry in the registry key under: HKLM\Software\Microsoft\MSSQLSERVER\client\connectto or:
- A name or IP address that can be resolved by the SQL client osql

In Sybase or Oracle, the logical name must be manually configured through the respective client tools.

The installation of the Database Agent creates a directory structure (e.g., C:\Program Files\Storability\GSM\Utilities\Storability Local Manager Utilities\dbAgent User Creation Scripts\<subdirectory>) where the scripts are located to help your Database Administrator set up the necessary access permissions for the Database Agent to successfully connect to the database and collect data. On Windows, the <sub_directories> are \db2, \mssql, oracle, and sybase. In addition, the Readme_dbAgent.txt file describes general usage information and locations (all platforms) of the user creation scripts.

On an IBM AIX server, you must manually register the Database Agent to the Local Manager. This is performed by either adding the entries for the GSM_LM_HOST in the storability.ini file for the agent or by adding the SUB_AGENT entry in the Local Manager Routing Agent's configuration settings.

IBM DB2 AGENT

The following sections describe how you install, configure, and verify the Database Agent to report on IBM DB2 databases.

DB2 RUN TIME CLIENT SOFTWARE PREREQUISITE

The DB2 Run-Time client software must be installed on the server where the Storability Database Agent is to be installed. If the DB2 Run Time client is installed the following should exist:

- **Program Group** - The following program group is generally created by the DB2 Run-Time Client installation:

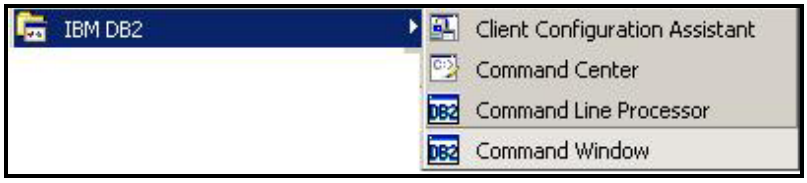


Figure 1 - DB2 Run-Time Program Group

- **Registry Key Entries** - The following registry keys are created by the DB2 Run-Time Client installation:

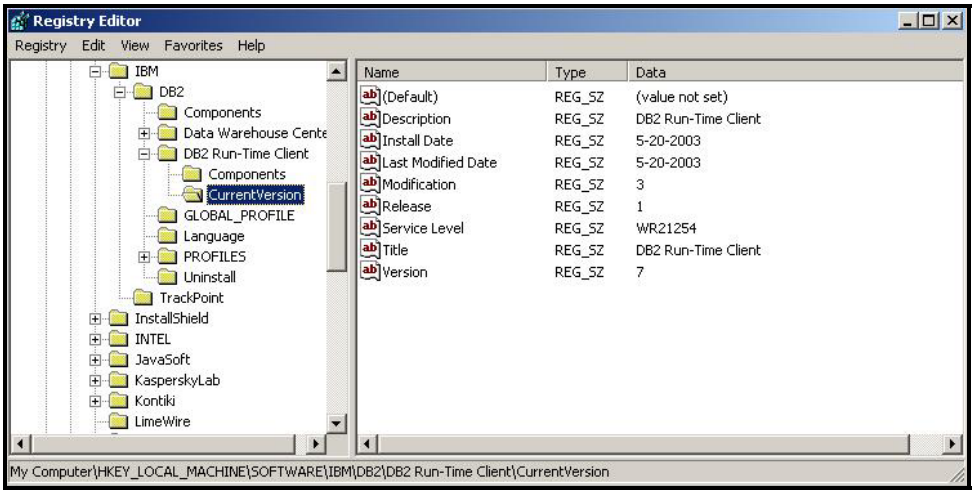


Figure 2 - DB2 Client Registry Entries

DB2 SERVICE NAME PREREQUISITE

This section describes how you verify that a configuration entry exists for the database you wish to connect to.

1. Use the DB2 Client Configuration Assistant from the IBM DB2 program folder to view a listing of the databases.

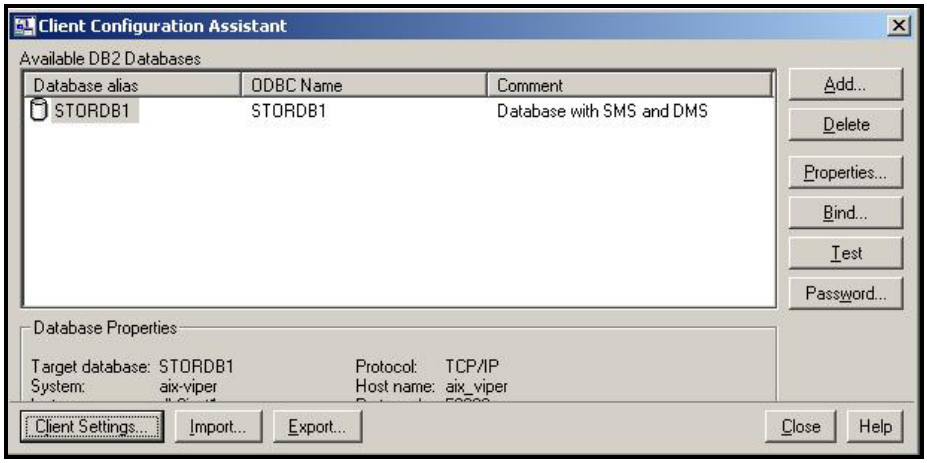


Figure 3 - DB2 Client Configuration Assistant

Note: If a DB2 database entry does not exist for the database, you must create it, as described below in Steps 2 to 12.

2. Start the DB2 Run-Time Client Configuration Assistant from the IBM DB2 program folder.
3. Click on the **Add** button to add a new database definition.

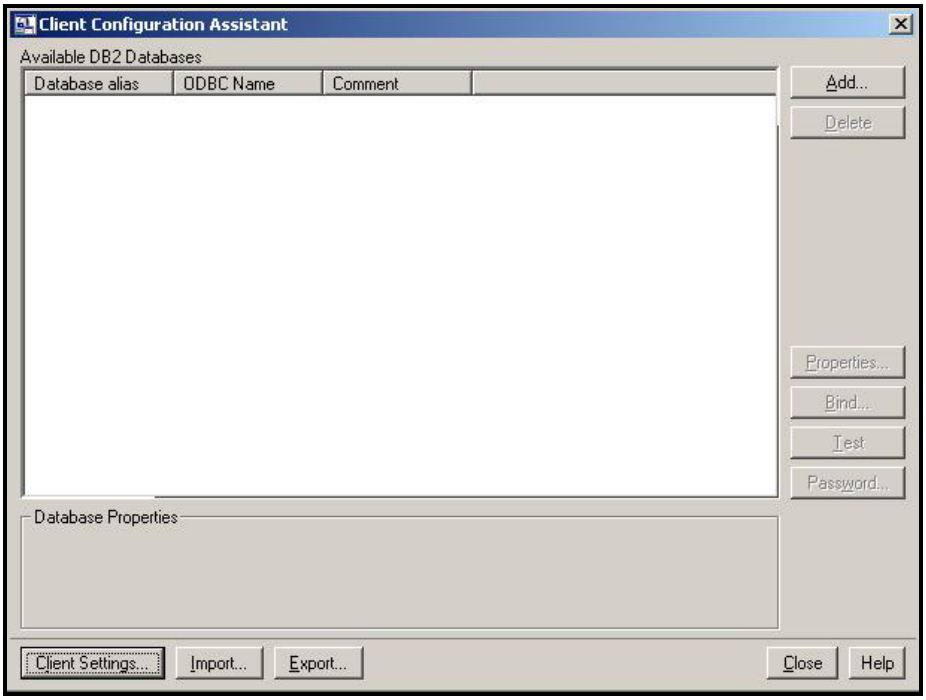


Figure 4 - IBM DB2 Client Configuration Assistant

4. A new window will appear prompting you for how you want to set up the connection. Select **Search the network** and click **Next**.
5. If there is no entry for the server under **Known Systems**, click **Add System**.
6. Select **TCP/IP** for the protocol and enter the **hostname** or **IP Address** of the server where the database is running and then click **OK**.

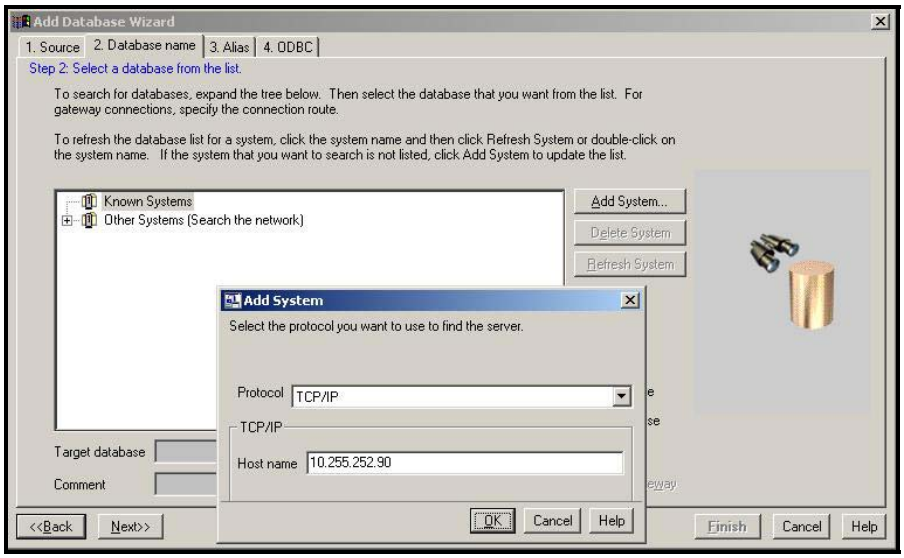


Figure 5 - Add System Using the Add Database Wizard

7. Expand the option for the system where the database you want to connect to is running. The tree should expand and display any instances of both locally and remotely installed databases.
8. Select the database you want to connect to and click **Next**.
9. Create an alias for database if desired and click **Next**.

10. On the ODBC screen, ensure that the Register this database for ODBC is checked, and that the "As a system data source" option is selected and click **Finish**.

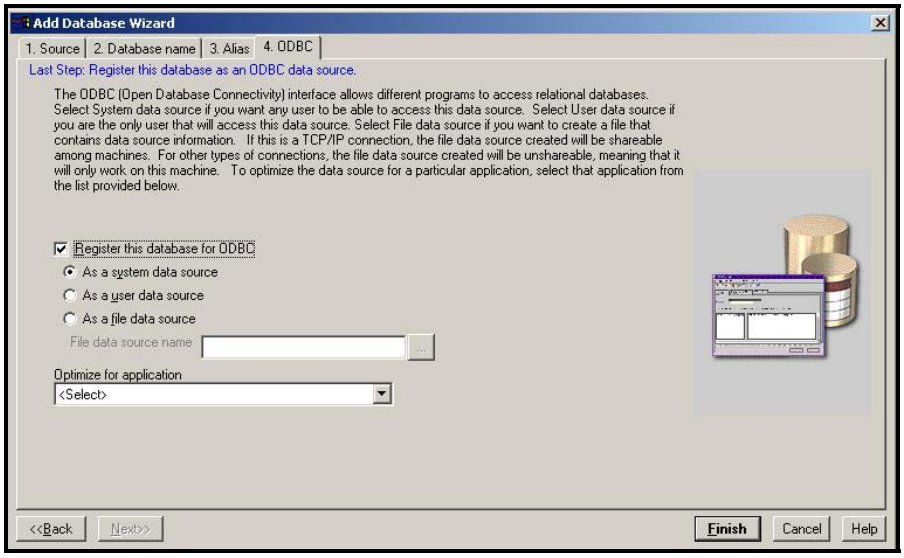


Figure 6 - Add Database Wizard ODBC Configuration

11. A message should appear indicating that the connection was successfully configured, and prompt you to test the connection. Click the **Test Connection** button to test the newly defined connection.
12. Enter the **User ID** and **Password** to test the connection with and click **OK**. A message box will appear that indicates whether or not the connection test was successful.

DB2 Node Name Prerequisite

You should now be able to use the Command Line Processor to list the node directory on the database. The node name will be required later for configuring the Database Agent.

1. Launch the DB2 Command Line Processor from the DB2 Program folder.
2. Execute the LIST NODE Directory command to list the node directory on the database, as shown in the following figure.

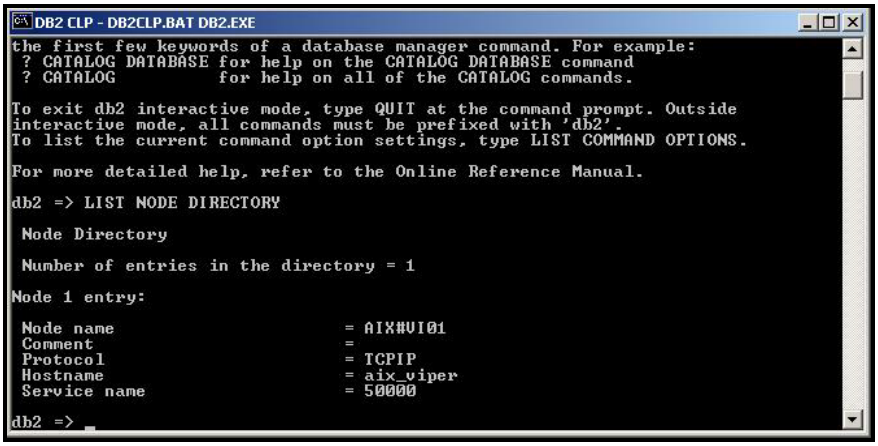


Figure 7 - List Node Directory

INSTALLING THE DATABASE AGENT FOR DB2 - WINDOWS

This section describes how to install and configure the Database Agent on a Windows platform.

1. Insert the Windows Local Manager CD into the CD-ROM drive.
2. Click **Next** on the Welcome menu to continue the installation.
3. Click **Yes** to accept the terms of the software license agreement.
4. Click **Next**.
5. Review/modify the **User Name** and **Company Name** and click **Next**.
6. Click **Next** to accept the default destination folder.
7. A screen listing the components available for installation will then appear. Check the **Database Agent** box to install the database agent.
8. A screen will appear prompting for the type of databases to install support for. Select **DB2** and any other databases the agent will be configured to communicate with.
9. If launched, close the Configuration Tool. You can run the Configuration Tool from the Storability Program Folder after you have created the Database User, which is a required configuration parameter.
10. Click **OK** to view the Readme_dbAgent.txt file.

CREATING THE DATABASE AGENT OPERATING SYSTEM ACCOUNT

The Database Agent requires that you create an account for it to use with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

Additionally, DB2 requires the user of an operating system account with group access to the database files.

The required permissions are listed in the following tables.

Permission	Object Name (<schema>.<table/view>)	Object type	Database Name
Select	SYSIBM.SYSCOLUMNS	System table	Every database
Select	SYSIBM.SYSVERSIONS	System table	Every database
Select	SYSIBM.SYSTABLES	System table	Every database
Select	SYSCAT.INDEXES	System view	Every database
Select	SYSCAT.TABLES	System view	Every database

Permission	Object Name (<schema>.<table/view>)	Object type	Database Name
Select	SYSCAT.VIEWS	System view	Every database
Select	SYSCAT.COLAUTH	System view	Every database
Select	SYSCAT.DBAUTH	System view	Every database
Select	SYSCAT.INDEXAUTH	System view	Every database
Select	SYSCAT.PACKAGEAUTH	System view	Every database
Select	SYSCAT.PASSTHRUAUTH	System view	Every database
Select	SYSCAT.SCHEMAAUTH	System view	Every database
Select	SYSCAT.TABAUTH	System view	Every database
Select	SYSCAT.TBSPACEAUTH	System view	Every database

API	Type of API	Authentication required
sqlegins	Admin API	None
sqlenops	Admin API	None
Sqlengne	Admin API	None
sqlencls	Admin API	None
sqledgne	Admin API	None
sqlbmtsq	Admin API	One of the following: *Sysadm, sysctrl, sysmaint, dbadm, load*
sqlbtcq	Admin API	One of the following: *Sysadm, sysctrl, sysmaint, dbadm*
sqlefmem	Admin API	None
sqlmonsz	Monitor API	One of the following: *Sysadm, sysctrl, sysmaint*
sqlmonss	Monitor API	One of the following: *Sysadm, sysctrl, sysmaint*
sqledosd	Admin API	None
sqledcls	Admin API	None
sqlbgtss	Admin API	One of the following: *Sysadm, sysctrl, sysmaint, dbadm, load*
sqleatin	Admin API	None
sqledtin	Admin API	None
API	**Type of API**	**Authentication required**
sqlaintp	Admin API	None

Note: If the user account does not have membership in the group that owns the database files, the agent will not have sufficient permission to report the following tables:

- gsa_dba_db_specific_data
- gsa_dba_db_stats
- sa_dba_io_indicators
- gsa_dba_logical_storage_unit
- gsa_dba_physical_storage_unit

For example, you may create an account, gsmdb, for use with the agent. To do so, you perform the following steps:

- Create an account on the server, gsmdb.
- Determine the group ownership permissions for DB2, and then add the user account gsmdb to that group.

Creating the Database Agent Account and Permissions

Once the operating system account has been created and added to the appropriate group, you create a database account and permissions. The Database Agent installation will install a set of user creation scripts located at:

```
 \Storability\GSM\Utilities\Storability Local Manager Utilities\dbAgent
User Creation Scripts\<sub_directory>
```

that can help the administrator to fulfill this requirement. On Windows, the following subdirectories are created: db2, mssql, oracle, and sybase.

1. Change directory into the db2 subdirectory of "dbAgent User Creation Scripts".

2. View the readme_windows.txt file for notes about the dbagent_db2_create_user.bat script.

3. Execute the script dbagent_db2_create_user.bat using the following syntax:

   ```
   dbagent_db2_create_user.bat NODE DBAGENT_USER DBAGENT_PWD ADMIN
   ADMIN_PWD
   ```

   where only ADMIN_PWD may be empty.

   Example:

   ```
   dbagent_db2_create_user.bat AIX#VI01 gsmdb <password> <db_admin>
   <admin_passwd>
   ```

Configuring the Database Agent for DB2 - Windows

1. Launch the Configuration Tool from the Storability Program Folder.
2. Select **File** ->**Edit** -> **Smart Agent Configuration**.
3. Select the **Database Agent** tab
4. Click the **Add** button to add another entry to the current configuration.
5. From the **Add** dialog box that appears, select **DB2** as the type of database to connect to.
6. Enter the name of the **database user account**, which has the required access permissions.
7. Enter the **port number** for the DB2 database.
8. Enter the **node name** of the DB2 database in the **Logical Name** field. This should match the node name returned by the LIST NODE DIRECTORY command.
9. Enter the **IP Address** of the database server.
10. Enter the password for the database user account.
11. Click the **Submit** button to add the database server to the configuration.
12. In the **Local Manager** field, enter the IP address or host name of the Local Manager that the Database Agent will contact for agent auto registration.

13. In the **Local Manager Port** field, specify the TCP port number the Local Manager uses for agent auto registration. The default port number is 17146.
14. Click **Show Advanced Settings** and review/modify the following parameters:

- **Enable Auto Registration** – Accept that auto registration is enabled (true) or set this parameter to false to disable auto registration.

- **DBA_NUM_ASUS** – Number of application units per database in the **gsa_dba_application_storage_unit** table; default value is five (5).

- **Connection Timeout SQL Server Only** – Only used for MS SQL Server.

- **QueryTimeout SQL Server Only** – Is only used for MS SQL Server.

- **DBA_TEST_MODE** – Sets the Database Agent's operational mode where zero (0) turns off test mode and one (1) enables it.

- **DBA_CACHE_EXPIRY_PERIOD** – How long (in seconds) the Database Agent should keep reporting cached database server information after it receives errors while retrieving information from a certain database server. The default value is 86400 seconds.

15. With "Save Configuration Settings" turned on (check mark), select **File->Save** and confirm changes to the storability.ini file.
16. Select **File->Exit** to close the Configuration Tool.
17. Use the Windows **Services** panel to start the agent before you verify agent functionality.

Note: The Database Agent uses a common configuration file regardless of the database. When using the Database Agent with DB2, the IP Address and Port fields are not used to make the connection. That is, only the account information and Node Name (which is entered in the Logical Name field) are used.

VERIFYING THE DATABASE AGENT ACCESS PERMISISONS FOR DB2

Check the **Message.log** for error information. Some notes follow.

- When the agent starts, the first message it will log is a startup banner. It shows the agent has started and its software version.
- If the agent has been configured properly and can access and authenticate itself to the database, an informational message similar to the following will be generated:

```
06/11/2003 16:02:51PM|INFO|0|Connection test (DB2,AIX#VI01,dbact)
:Passed|dbAgent.exe|CDblibHelper.cc|258
```

- If the **username** or **password** supplied to the agent is incorrect, it will generate the following error when trying to connect to the database:

```
06/12/2003 10:18:13AM|INFO|0|Connection test
(DB2,AIX#VI01,dbact):Failed: CDB2APIException:SQLCABC = 136, SQLCODE
= -1403, SQLERRMC = , SQLERRP = SQLEXAUS, SQLWARN = , SQLSTATE =
08004 SQL1403N  The username and/or password supplied is incorrect.
SQLSTATE=08004 |dbAgent.exe|CDblibHelper.cc|258
```

- If the database account's password is valid but has expired, the agent will not be able to login to the database and will generate the following error messages:

```
06/11/2003 15:16:39PM|INFO|0|Connection test
(DB2,AIX#VI01,dbact):Failed: CDB2APIException:SQLCABC = 136, SQLCODE
= -1404, SQLERRMC = , SQLERRP = SQLEXAUS, SQLWARN =            ,
SQLSTATE = 08004 SQL1404N  Password expired.  SQLSTATE=08004
|dbAgent.exe|CDblibHelper.cc|258
```

Note: If you receive this error message, you will need to change or reset the account's password using the **DB2 Command Line Processor**. When connecting to the database, use the database alias, not the node name. For example:

```
db2=> connect to <dbalias> USER <user-id> CHANGE PASSWORD
i.e.
db2 => connect to STORDB1 USER dbact CHANGE PASSWORD
Enter current password for dbact:
Enter new password for dbact:
Confirm new password for dbact:
```

- If the system account has not been created or if an invalid user name is used, the agent will not be able to login to the database and will generate the following error messages:

```
06/11/2003 14:28:57PM|INFO|0|Connection test
(DB2,AIX#VI01,gsmdbuser):Failed: CDB2APIException:SQLCABC = 136,
SQLCODE = -1046, SQLERRMC = , SQLERRP = SQLEXAUS, SQLWARN = SQLSTATE
= 28000 SQL1046N  The authorization ID is not valid.  SQLSTATE=28000
|dbAgent.exe|CDblibHelper.cc|258
```

- If the system account is not a member of the group which owns the database files on the server, the agent will not be able to collect and report some information and will generate the following error messages:

```
06/12/2003 11:22:54AM|ERROR|0|Exception while serving GSM table:
gsa_dba_db_specific_data: Connection(DB2,AIX#VI01,dbact):
D:\qa\storability\dev\src\dbAgent\CDB2DBServerInfo.cc:1183:CDB2APIEx
ception:SQLCABC = 136, SQLCODE = -1092, SQLERRMC = DBACT   ÿ,
SQLERRP = SQLEXCMN, SQLWARN = , SQLSTATE =  SQL1092N  "DBACT" does
not have the authority to perform the requested command.
|dbAgent.exe|CDblibHelper.cc|562
```

When this occurs, the agent will not publish any information for the following tables:

- gsa_dba_db_specific_data
- gsa_dba_db_stats
- sa_dba_io_indicators
- gsa_dba_logical_storage_unit
- gsa_dba_physical_storage_unit

Database Agent for Microsoft SQL Server

The following sections describe how you install, configure, and verify the Database Agent for MS SQL Server databases.

MICROSOFT DATA ACCESS COMPONENTS (CLIENT TOOLS) PREREQUISITE

The Microsoft Data Access Components (Client Tools) software must be installed on the server where the Storability Database Agent is to be installed. This is typically installed on the database server with SQL server. However, these components can be installed individually on a non-database server.

If the Microsoft Data Access Components (Client Tools) is installed the following should exist:

- **Program Group** - The following program group is generally created by the Microsoft Data Access Components (Client Tools) installation:

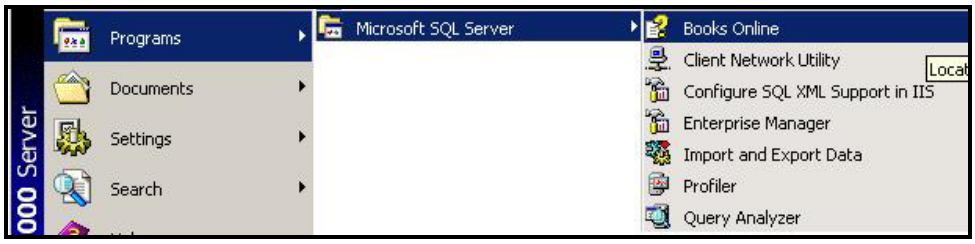


Figure 8 - Microsoft Data Access Components Program Group

- **ntwdblib.dll** - The **ntwdblib.dll** library should also exist in the %Windir%\system32 directory. This library must exist in the default path so the database agent can use it to communicate to the database.
- **Registry Entries** - The following registry keys are created by the Microsoft Data Access Components (Client Tools) installation:

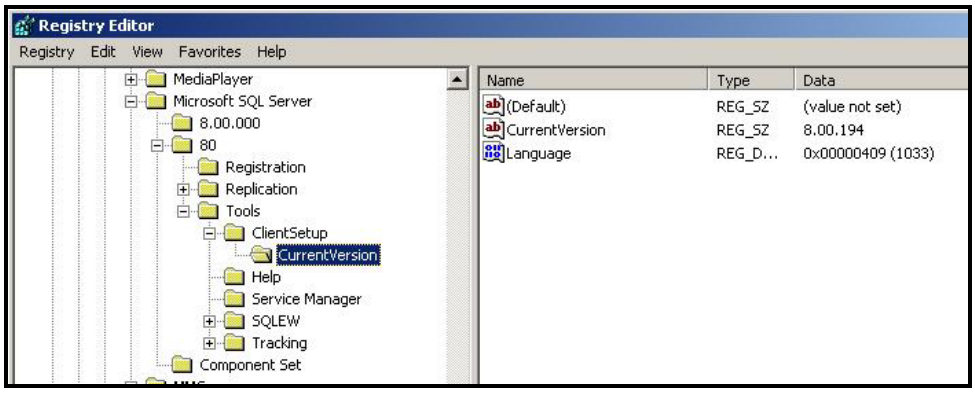


Figure 9 - Microsoft Data Access Components Registry Entries

- **ODBC data source name** – Verify that an ODBC data source name is configured for the database you wish to connect to.

  a. From the Control Panel, select **Administrative Tools** -> **Data Sources** (ODBC).
  b. Select the **System DSN** tab and verify that an entry exists for the database you wish to connect to.

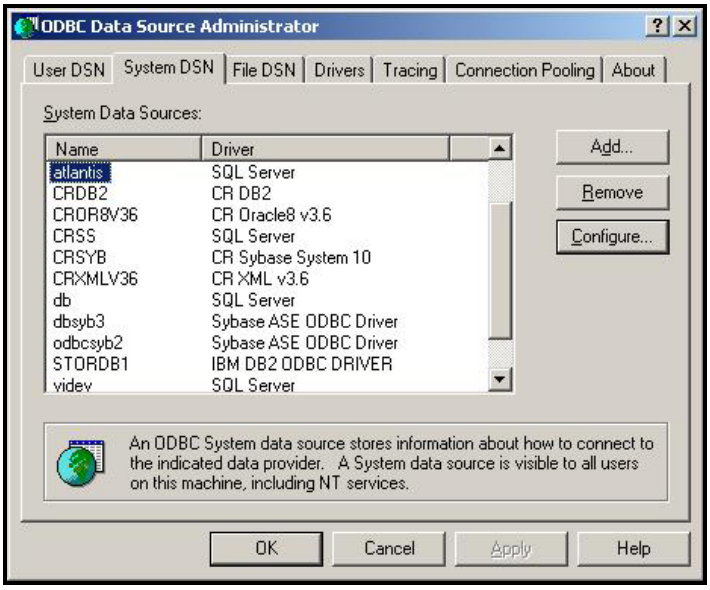


Figure 10 - ODBC Data Source Administrator

c. Test the connection by selecting the data source name (DSN) and click **Configure**.
d. Click **Finish** and from the window that appears click the Test **Data Source …** button. If the DSN is set up properly you should see a successful test message similar to the following.

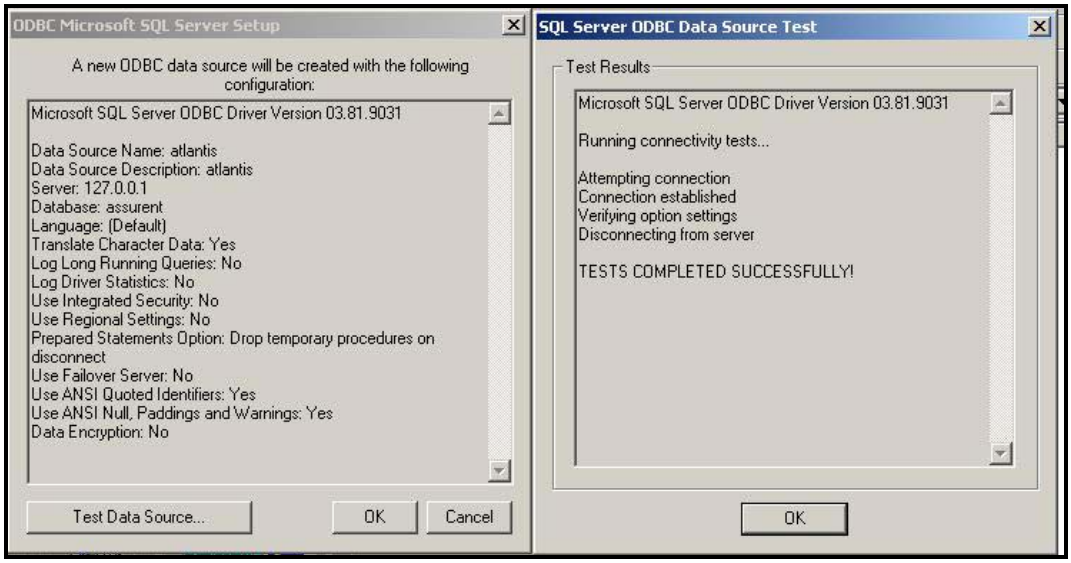


Figure 11 - SQL Server ODBC Data Source Test

Note: If an ODBC data source name does not exist for the database, it must first be created. The following steps (e-k) provide instructions to create a data source name.

e. From the Control Panel, select **Administrative Tools -> Data Source** (ODBC).
f. Select the **System DSN** tab and click the **Add** button to create a new data source name (DSN).

g. Enter the **name** and **description** for the data source, then enter the IP Address or hostname of the server on which the database exists and click **Next**.
h. Select **With SQL Server authentication ...** for the authentication type, and click the **Client Configuration** button.
i. Select **TCP/IP** from the list of network libraries and enter the **IP Address** or **hostname** for the alias and server name. If the database is running on a port other than the default of 1433, modify the **port number** and then click **OK**.
j. Click **Finish** to complete the configuration and from the confirmation window that appears click **Test Data Source** to test the configuration.
k. Test the DSN with the account created for the Database Agent, as shown below.

```
osql -Ugsm_db
Password:
1> use master
2> go
1> select * from sysdatabases
2> go
```

INSTALLING THE DATABASE AGENT FOR MSSQL

This section describes how to install and configure the Database Agent on a Windows platform.

1. Insert the Sun StorageTek Business Analytics Windows Local Manager CD into the CD-ROM drive.

2. Click **Next** on the Welcome menu to continue the installation.

3. Click **Yes** to accept the terms of the software license agreement.

4. Click **Next**.

5. Review/modify the **User Name** and **Company Name** and click **Next**.

6. Click **Next** to accept the default destination folder.

7. A screen listing the components available for installation will then appear. Check the **Database Agent** box to install the database agent.

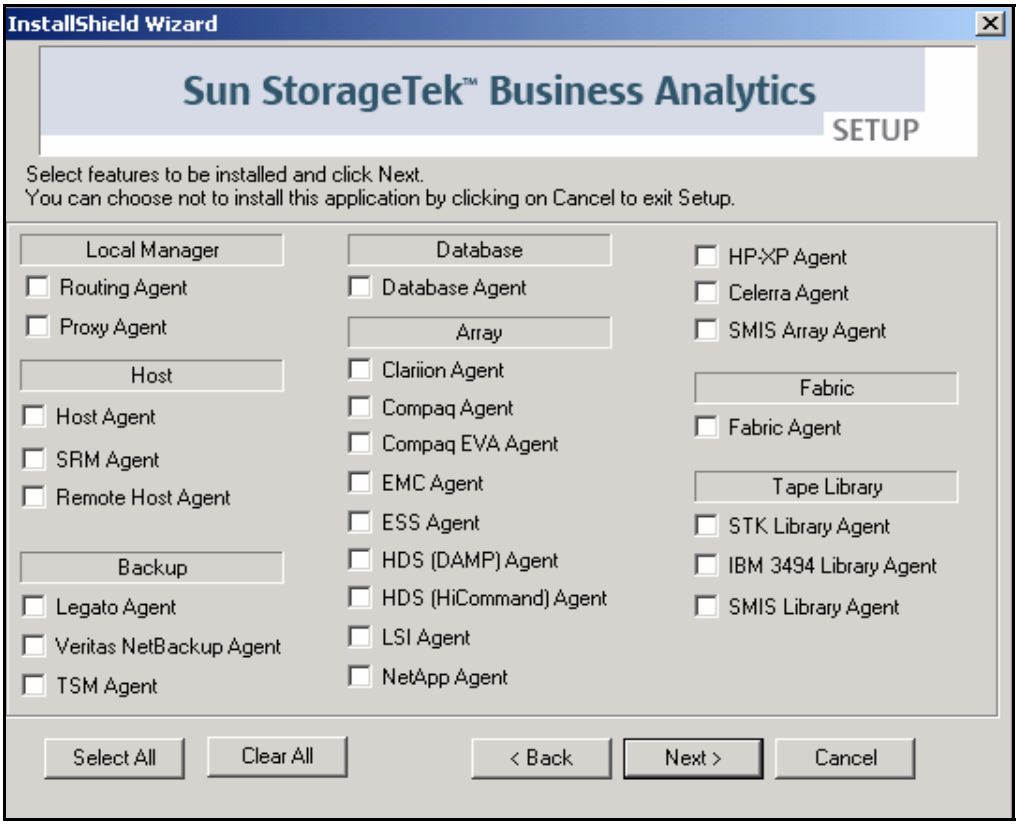


Figure 12 - Select Features To Be Installed

8. A screen will appear prompting for the type of databases to install support for. Select **SQL** and any other databases the agent will be configured to communicate with.

9. If the Configuration Tool is launched, close its window. You can run the Configuration Tool from the Storability program folder after you have created the database user, which is a required configuration parameter.

10. Click **OK** to view the **Readme_dbAgent.txt** file.

CREATING THE DATABASE AGENT ACCOUNT

The database agent requires that you create an account for it to use with SELECT permissions to specific tables, as shown below.

Permission	Object Name	Object type	Database Name
Select	sysservers	System table	master
Select	sysdatabases	System table	master
Select	sysprocesses	System table	master
Select	sysfiles	System table	Every database
Select	sysfilegroups	System table	Every database
Select	sysobjects	System table	Every database
Select	sysindexes	System table	Every database
Select	sysusers	System table	Every database
Select	sysprotects	System table	Every database

Table 3 – SELECT Permissions to Tables for MS SQL

To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Storability Database Agent installation will install a set of utilities in the directory:

```
..\Storability\GSM\Utilities\Storability Local Manager Utilities\dbAgent
User Creation Scripts
```

a. From a command prompt, change directory into the mssql subdirectory of "dbAgent User Creation Scripts".

b. View the readme.txt file for notes about the dbagent_mssql_create_user.bat script.

c. Execute the script dbagent_mssql_create_user.bat using the following syntax:

   Usage: dbagent_mssql_create_user.bat SERVER DBAGENT_LOGIN DBAGENT_USER DBAGENT_PWD ADMIN_PWD

   Where:

   ```
   SERVER is your MS SQL SQL database server name or IP address
   DBAGENT_USER is the name of the account to be created for use by
   dbAgent
   DBAGENT_PWD is the password for DBAGENT_USER that will be created.
   ADMIN_PWD is the password of the "sa" admin account.
   ```

   For example:

   ```
   dbagent_mssql_create_user.bat 192.168.1.17 dbagent dbagentpswd
   password
   ```

CONFIGURING THE DATABASE AGENT FOR MSSQL

1. Launch the Storability Configuration Tool from the Storability Program Folder.
2. Select **File** ->**Edit** -> **Smart Agent Configuration**.
3. Select the **Database Agent** tab

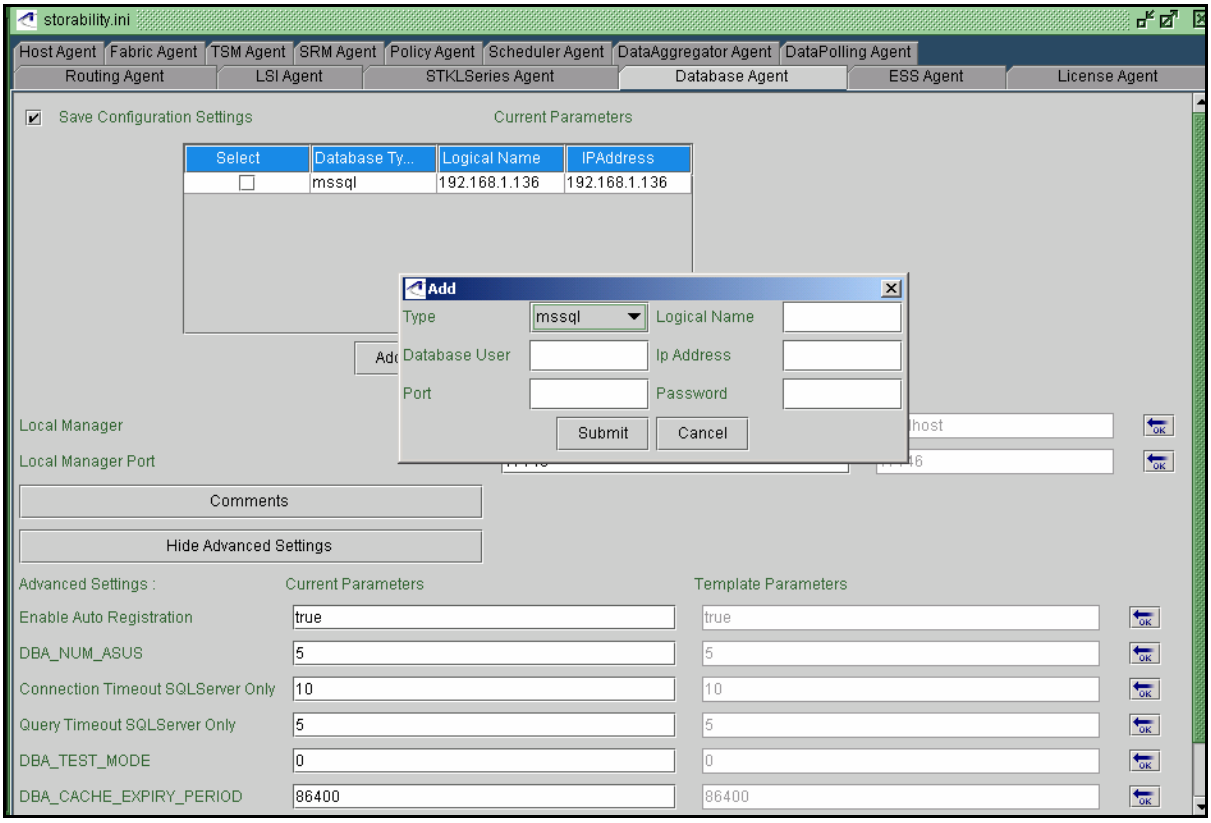


Table 4 - Database Agent Configuration Tool Window

4. Click the **Add** button to add another entry to the current configuration.
5. In the **Add** dialog box that appears, select **MSSQL** as the type of database to connect to.
6. In the **Database User** field, enter the name of the **database user account**, which has the required access permissions.
7. In the **Port** field, enter the TCP port number to connect to the SQL database instance (typically 1433).
8. Enter the **IP Address** or the **host name** for the database server in the **Logical Name** field.
9. Enter the **IP Address** or **host name** of the database server in the **Ip Address** field.
10. Enter the password for the database user account in the **Password** field.
11. Click the **Submit** button to add the database server to the configuration.
12. In the **Local Manager** field, enter the network resolvable host name or IP address for the Local Manager that the Database Agent will contact for agent auto registration.
13. In the **Local Manager Registration Port** field, specify the TCP port number the Local Manager uses for agent auto registration. The default port number is 17146.
14. Click **Show Advanced Settings** and review/modify the following parameters:

    - **Enable Auto Registration** – Accept that agent auto registration is enabled (true), or set this parameter to false to disable agent auto registration for the Database Agent.

    - **DBA_NUM_ASUS** – Number of application units per database in the **gsa_dba_application_storage_unit** table; default value is five (5).

- **Connection Timeout SQL Server Only** – How long (in seconds) the agent tries to connect to the database; default value is 10 seconds.

- **QueryTimeout SQL Server Only** – How long (in seconds) the agent waits for a SQL Query statement to complete; default value is 5 seconds.

- **DBA_TEST_MODE** – Sets the Database Agent's operational mode where zero (0) turns off test mode and one (1) enables it.

- **DBA_CACHE_EXPIRY_PERIOD** – How long (in seconds) the Database Agent should keep reporting cached database server information after it receives errors while retrieving information from a certain database server. The default value is 86400 seconds.

15. With "Save Configuration Settings" turned on (check mark) select **File->Save** and confirm changes to the storability.ini file.
16. Select **File->Exit** to close the Configuration Tool.
17. Use the Windows **Services** panel to start the agent before you verify agent functionality.

VERIFYING DATABASE AGENT ACCESS PERMISSIONS FOR MSSQL

To verify that the Database Agent is configured with the necessary database access permissions, check the **Message.log** for error information. Some notes follow.

- When the agent starts, the first message it will log is a startup banner that shows the agent is started.

- If the agent has been configured properly and can access and authenticate itself to the database, an informational message similar to the following will be generated:

```
07/15/2003 11:16:17AM|INFO|0|Connection test
(mssql,192.168.0.239,gsm_db): Passed|dbAgent.exe|CDblibHelper.cc|258
```

- If the username/password supplied to the agent in the storability.ini file there will be an error similar to the following

```
07/15/2003 11:14:57AM|INFO|0|Connection test
(mssql,192.168.0.239,gsm_db): Failed: MSSQLDBLibException:dbopen:Login
failed for user 'gsm_db'.Severity [14] MsgNum [18456] MsgState
[1].DBLibrary error: Login incorrect.DB Error [10003] OS Error: not
available. [-1]|dbAgent.exe|CDblibHelper.cc|258
```

that is followed by a number of other messages for each published table similar to the following:

```
07/15/2003 11:14:57AM|ERROR|0|Exception while serving GSM table:
gsa_dba_application_storage_unit:
Connection(mssql,192.168.0.239,gsm_db):
D:\release\storability\dev\src\dbAgent\sda\dbapi\src\mssql\mssqldbconne
ction.cpp:92:MSSQLDBLibException:dbopen:Login failed for user
'gsm_db'.Severity [14] MsgNum [18456] MsgState [1].DBLibrary error:
Login incorrect.DB Error [10003] OS Error: not available. [-
1]|dbAgent.exe|CDblibHelper.cc|562
```

- If Microsoft SQL database server is not running, the agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
07/15/2003 11:25:25AM|INFO|0|Connection test
(mssql,192.168.0.239,gsm_db): Failed:
MSSQLDBLibException:dbopen:DBLibrary error: Unable to connect: SQL
Server is unavailable or does not exist.  Unable to connect: SQL Server
does not exist or network access denied.DB Error [10004] OS Error:
ConnectionOpen (Connect()). [2]|dbAgent.exe|CDblibHelper.cc|258
```

- If the agent has been configured with an invalid logical server (IP Address or host name) for the database (i.e. the system DSN name instead of the hostname or IP Address of the database server), the agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
07/15/2003 11:25:25AM|INFO|0|Connection test
(mssql,192.168.0.239,gsm_db): Failed:
MSSQLDBLibException:dbopen:DBLibrary error: Unable to connect: SQL
Server is unavailable or does not exist.  Unable to connect: SQL Server
does not exist or network access denied.DB Error [10004] OS Error:
ConnectionOpen (Connect()). [2]|dbAgent.exe|CDblibHelper.cc|258
```

- If the database account used by the database agent does not have sufficient select permissions for a particular object, the agent will generate a number of error messages similar to the following:

```
07/15/2003 11:37:41AM|ERROR|0|Exception while serving GSM table:
gsa_dba_application_storage_unit:
Connection(mssql,192.168.0.239,gsm_db2):
D:\release\storability\dev\src\dbAgent\sda\dbapi\src\mssql\mssqldbstate
ment.cpp:78:MSSQLDBLibException:dbsqlexec:Server user 'gsm_db2' is not
a valid user in database 'model'.Severity [14] MsgNum [916] MsgState
[1].DBLibrary error: General SQL Server error: Check messages from the
SQL Server.DB Error [10007] OS Error: not available. [-
1]|dbAgent.exe|CDblibHelper.cc|562
```

Database Agent for Oracle

The following sections describe how you install, configure, and verify the Database Agent for Oracle databases.

Oracle Client Interface Prerequisite

The Oracle Client Interface software must be installed on the server where the Storability Database Agent is to be installed. If the Oracle Client Interface is installed the following should exist:

- **Program Group** - The following program group is generally created by the Oracle Client Interface installation:

Figure 13 - Oracle Client Interface Program Group

- **Registry Keys** - The following registry keys are created by the Oracle Client Interface installation:

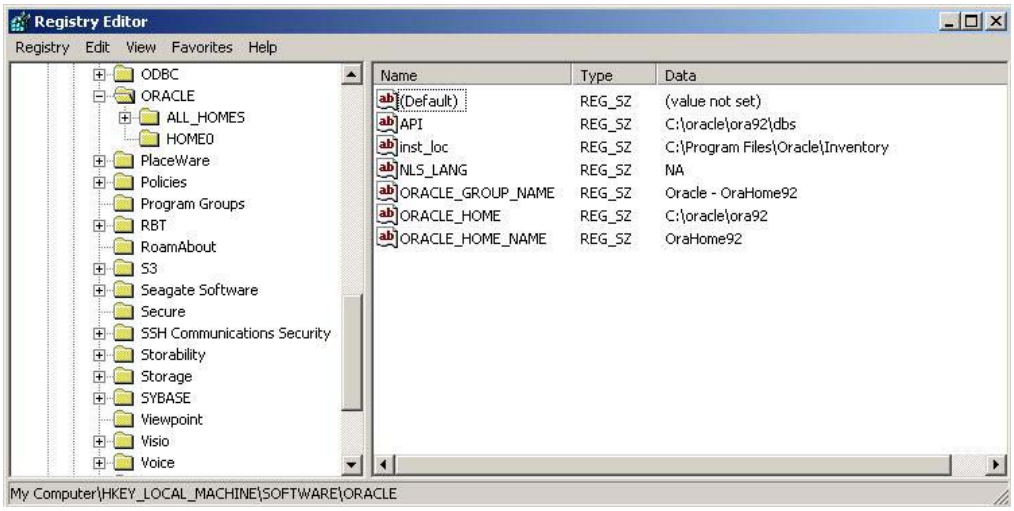


Figure 14 - Oracle Client Interface Registry Keys

- **Service Name configured** - Verify that a Service Name is configured for the database you wish to connect to.

  From the Oracle program group, launch the Oracle Net Manager. Expand the **Service Naming** tree and an entry should exist for each of the Oracle Service Names configured:

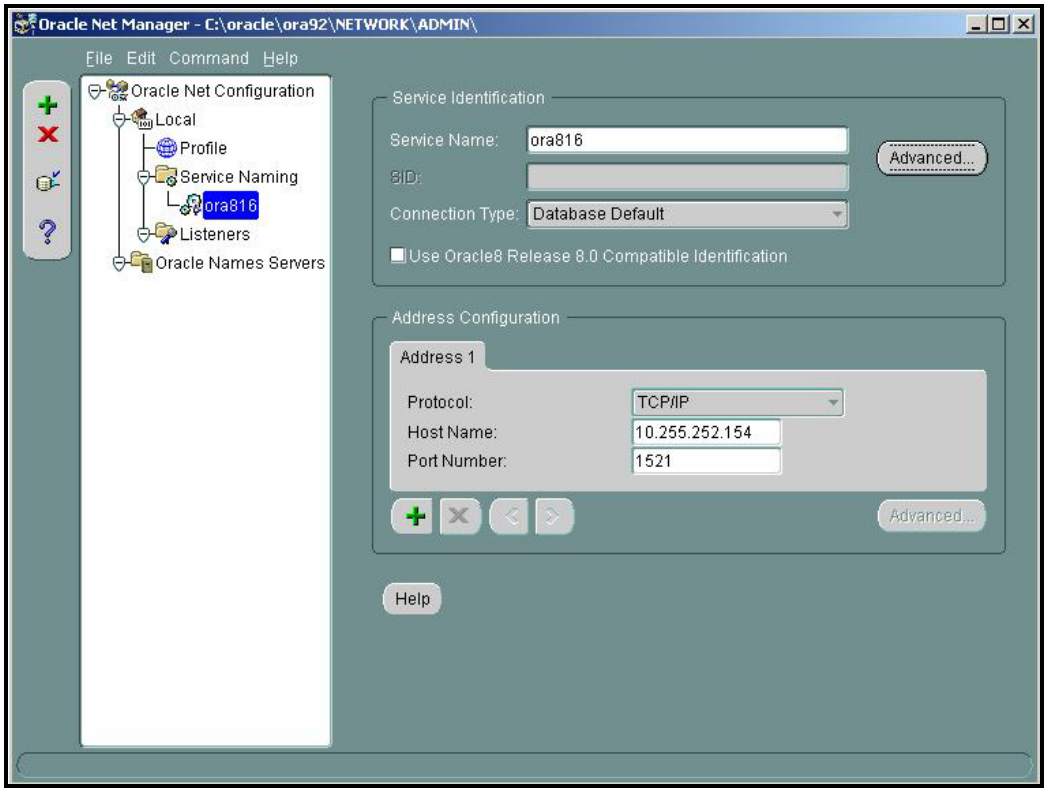


Figure 15 - Oracle Net Manager

Notes: If you can't find or open the Oracle Net Manager, you can also check the Oracle configuration file, tsnames.ora, to see if a service name has been defined for the database. The tsnames.ora file is typically located in the **C:\oracle\ora92\network\ADMIN** directory and would contain an entry similar to the following for each service name:

```
ORA816 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRES = (PROTOCOL = TCP)(HOST = 10.255.252.154)(PORT =
1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = ora816)
    )
  )
```

If an Oracle Service Name does not exist for the database, you must first create it. The following steps provide instructions on creating a Service Name with the Oracle Net Manager.

1. Start the **Oracle Net Manager** from the **Oracle Configuration and Migration Tools** Folder.
2. Click on the **Service Naming** folder and then click the **green +** button on the left to add a new name.

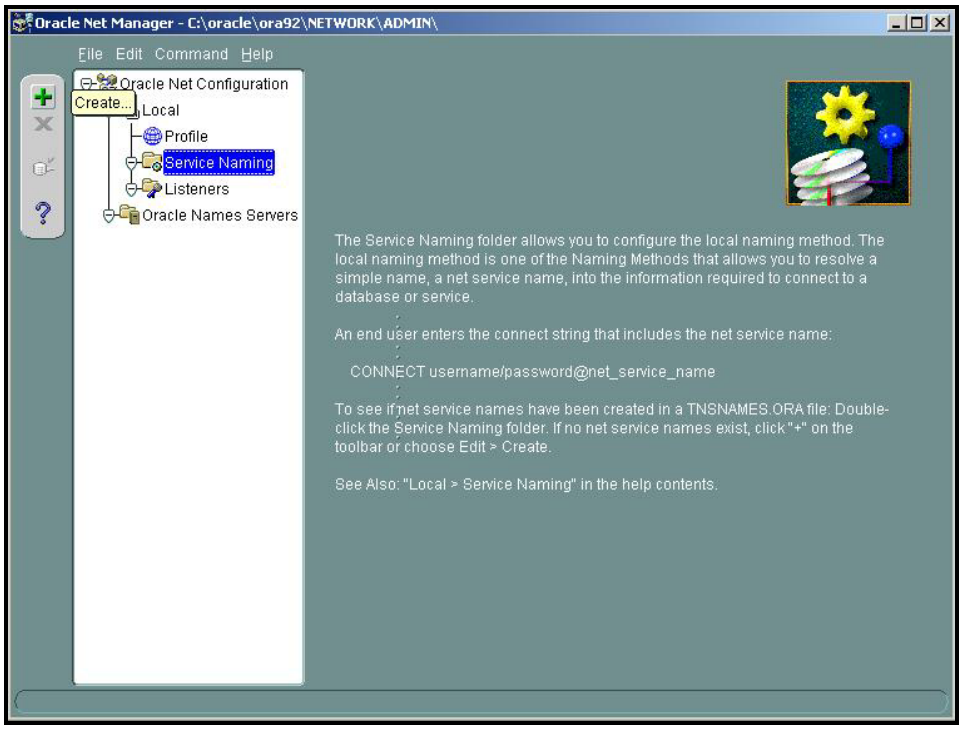


Figure 16 - Creating a Service Name Using Net Manager

3. The Net Service Name Wizard will appear. Enter a **service name** (which should match the instance name of the database you are connecting to) and click **Next**.

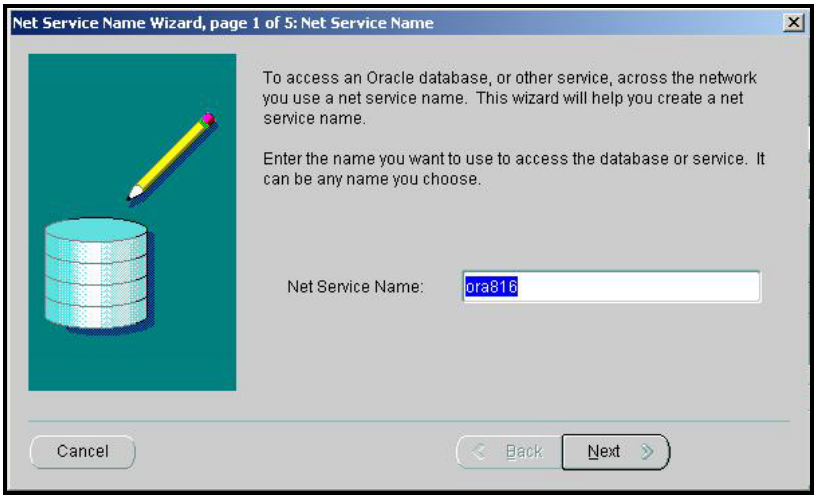


Figure 17 - Net Service Name

4. On step 2 of the wizard, select **TCP/IP** (Internet Protocol) and click **Next**.

5. On step 3 of the wizard enter the **IP Address** or **hostname** of the server where the database is running, the port number (1521 by default), and click **Next**.

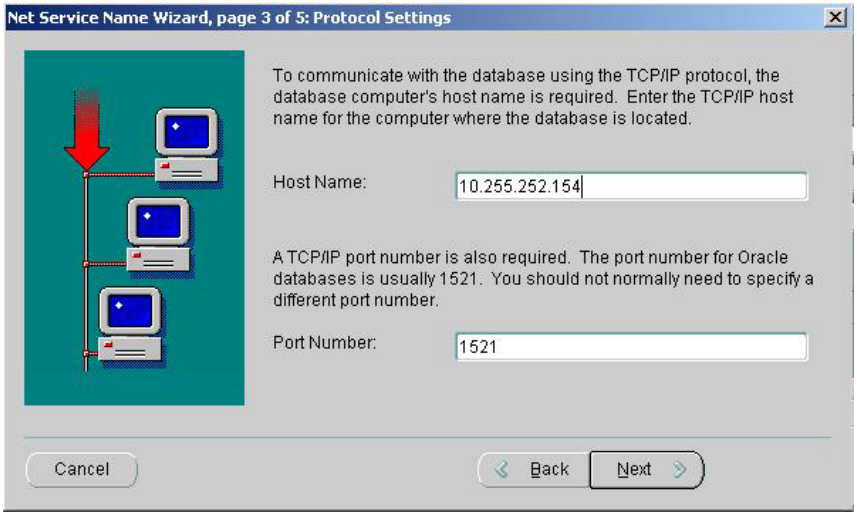


Figure 18 - Protocol Settings

6. On step 4 of the wizard, enter the service name for the database and click **Next**.

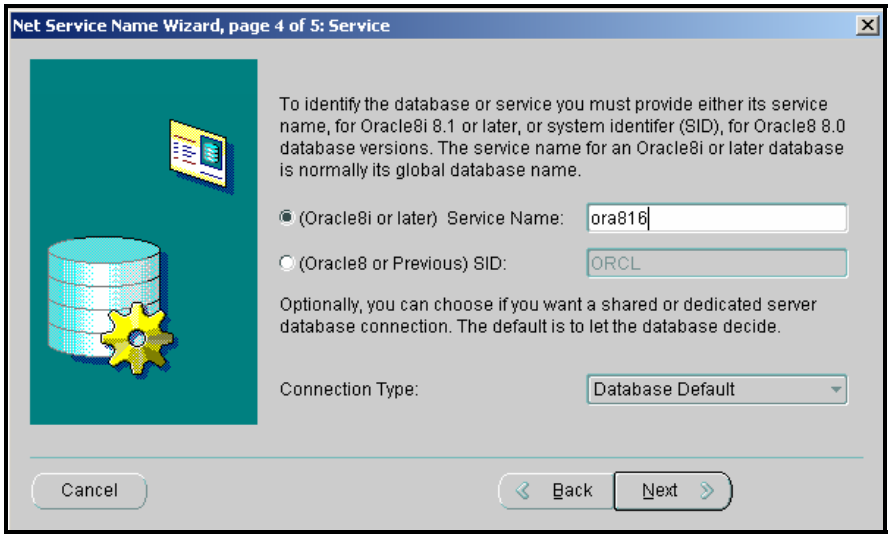


Figure 19 - Service Name

7. On step 5, click **Test** to test the database connection. Use the account created for the agent to perform the connectivity test to validate that the username and password are valid.
8. After you've completed the wizard, the Oracle Net Manager should then have a listing for the service names you've just created.

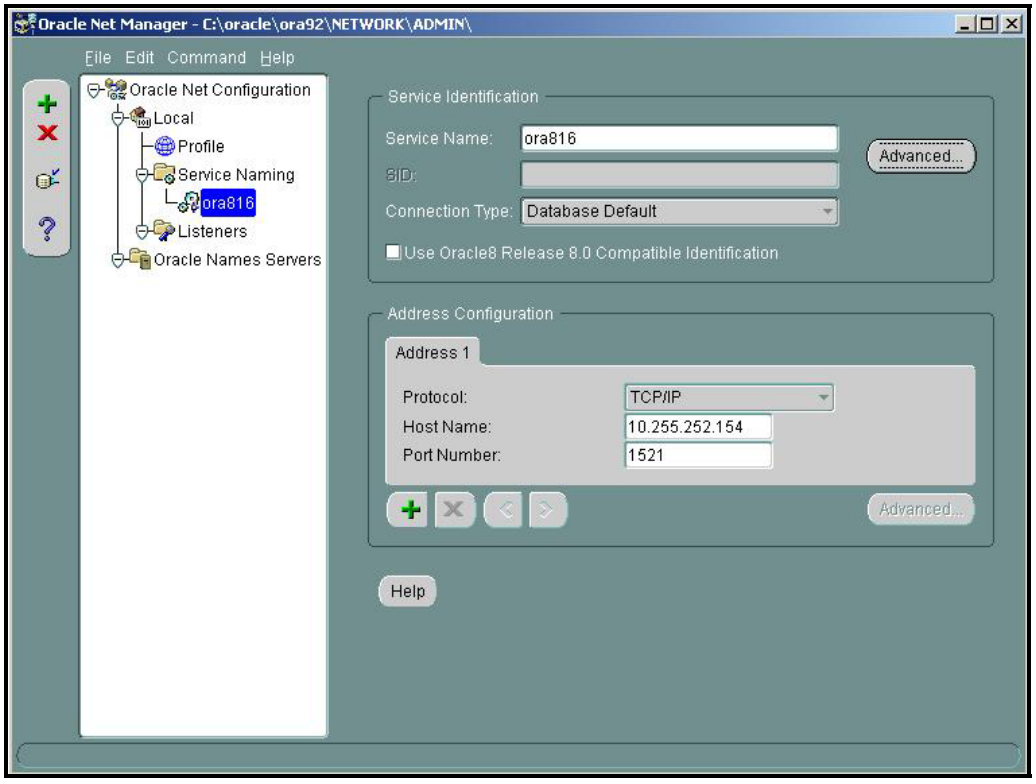


Figure 20 - Verifying Service Name Using Net Manager

9. You can test the new connection you've created using SQLPlus.

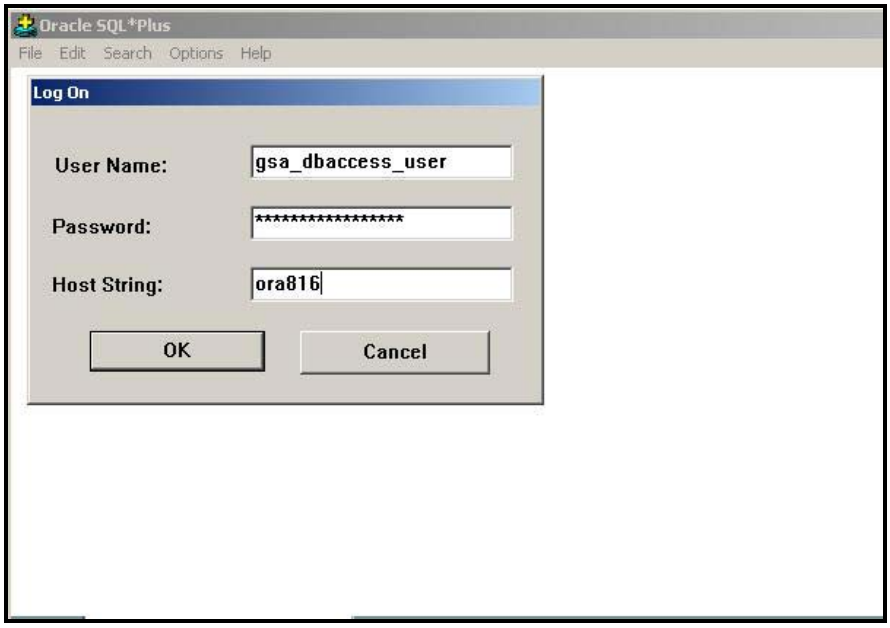


Figure 21 - Using SQLPlus to Test Connection

If the username and password you've supplied are valid, the following screen should appear.

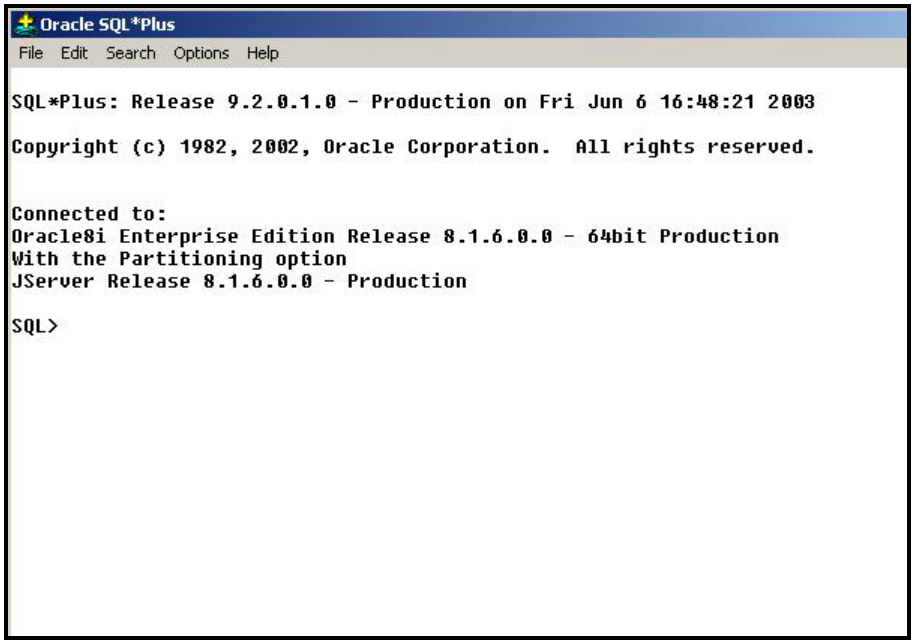


Figure 22 - Connection Verification Screen Using SQLPlus

10. You can now issue SQL commands to verify the account has the required access permissions. For example:

```
SQL> select * from DBA_DATA_FILES;

FILE_NAME
------------------------------------------------------------------------
------------
   FILE_ID TABLESPACE_NAME                    BYTES     BLOCKS
STATUS
```

```
---------- ------------------------------ ---------- ---------- ----
-----
RELATIVE_FNO AUT   MAXBYTES  MAXBLOCKS INCREMENT_BY USER_BYTES
USER_BLOCKS
------------ --- ---------- ---------- ------------ ---------- -----
------
/export/home/oracle/oradata/ora816/tools01.dbf
         2 TOOLS                          10485760       1280
AVAILABLE
           2 YES 3.4360E+10    4194302           40   10477568
1279

/export/home/oracle/oradata/ora816/drsys01.dbf
         7 DRSYS                          20971520       2560
AVAILABLE
           7 YES 3.4360E+10    4194302           80   20963328
2559
...
...
```

INSTALLING THE DATABASE AGENT FOR ORACLE - WINDOWS

This section describes how to install and configure the Database Agent on a Windows platform.

1. Insert the Windows Local Manager CD into the CD-ROM drive.
2. Click **Next** on the **Welcome** menu to continue the installation.
3. Click **Yes** to accept the terms of the software license agreement.
4. Click **Next**.
5. Review/modify the **User Name** and **Company Name** and click **Next**.
6. Click **Next** to accept the default destination folder.
7. A screen listing the components available for installation will then appear. Check the **Database Agent** box to install the Database Agent.

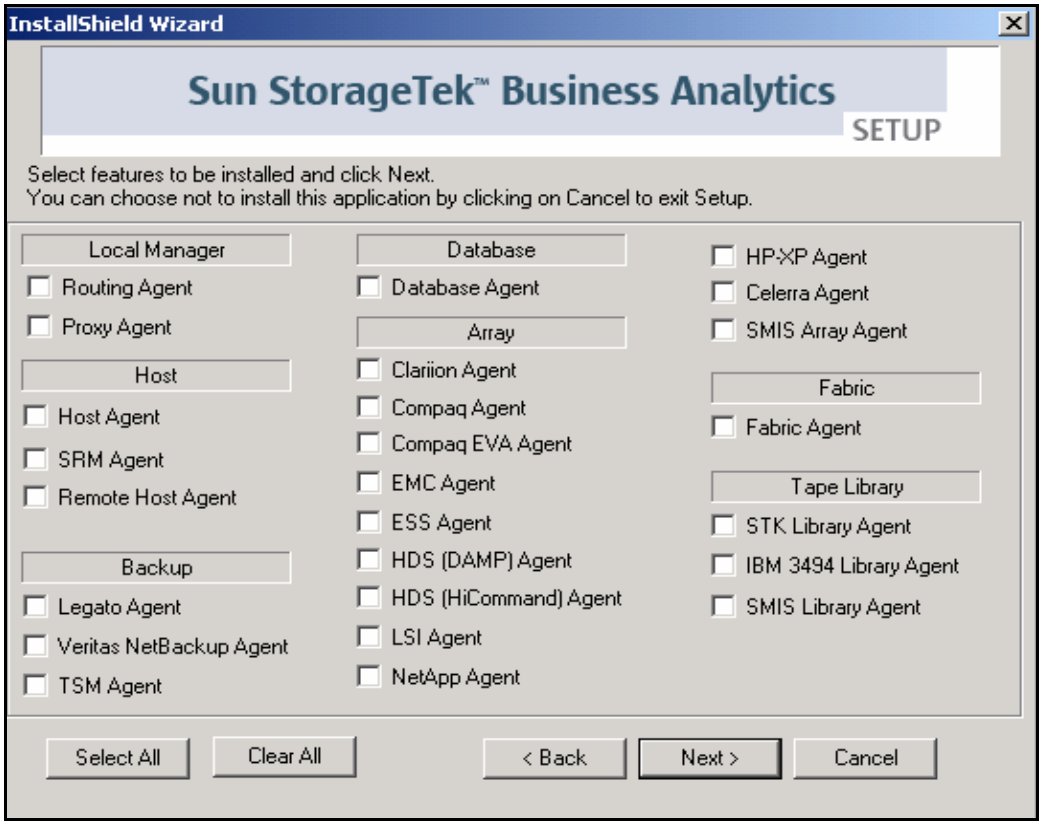


Figure 23 - Agent Selection Dialog

8. A screen will appear prompting for the type of databases to install support for. Select **Oracle** and any other databases the agent will be configured to communicate with.

9. If launched, close the Configuration Tool. You can launch the Configuration Tool after you have created the Database User, which is a required configuration parameter.

10. Click **OK** to view the Readme_dbAgent.txt file.

CREATING THE DATABASE AGENT ACCOUNT

The database agent requires that you create an account for it to use with SELECT permissions to specific tables. Permissions are granted using the Object Name, but the database selects are done using the Referenced Alias Name. The queries that the dbAgent uses rely on the default public synonyms for the V$ views being present for the tables that are identified below.

Permission	Object Name	Referenced Alias Name	Object type	Owner Name
Select	V_$INSTANCE	V$INSTANCE	System view	sys
Select	DBA_DATA_FILES	DBA_DATA_FILES	System view	sys
Select	DBA_FREE_SPACE	DBA_FREE_SPACE	System view	sys
Select	V_$FILESTAT	V$FILESTAT	System view	sys
Select	V_$DATAFILE	V$DATAFILE	System view	sys
Select	V_$PARAMETER	V$PARAMETER	System view	sys
Select	V_$SESSION	V$SESSION	System view	sys
Select	DBA_USERS	DBA_USERS	System view	sys
Select	DBA_INDEXES	DBA_INDEXES	System view	sys
Select	DBA_VIEWS	DBA_VIEWS	System view	sys
Select	V_$TABLESPACE	V$TABLESPACE	System view	sys
Select	V_$CONTROLFILE	V$CONTROLFILE	System view	sys
Select	V_$LOGFILE	V$LOGFILE	System view	sys
Select	DBA_TEMP_FILES	DBA_TEMP_FILES	System view	sys
Select	V_$TEMPSTAT	V$TEMPSTAT	System view	sys
Select	V_$TEMPFILE	V$TEMPFILE	System view	sys
Select	V_$LOG	V$LOG	System view	sys
Select	DBA_ALL_TABLES	DBA_ALL_TABLES	System view	sys
Select	V_$CONTROLFILE_RECORD_SECTION	V$CONTROLFILE_RECORD_SECTION	System view	sys
Select	DBA_TABLES	DBA_TABLES	System view	sys

Table 5 - SELECT Permissions for Oracle

The Storability Database Agent installation will install a set of utilities in the directory:

```
..\Storability\GSM\Utilities\Storability Local Manager Utilities\dbAgent
User Creation Scripts
```

To use the scripts, proceed as follows:

a. Change directory to the oracle subdirectory of "dbAgent User Creation Scripts".
b. View the readme_windows.txt file for notes about the **dbagent_ora_create_user.bat** script.
c. Execute the script, **dbagent_ora_create_user.bat**, using the following syntax:

```
dbagent_ora_create_user.bat SERVER DBAGENT_USER DBAGENT_PWD
ADMIN_PWD
```

Where: only **ADMIN_PWD** may be empty. For example:

```
   dbagent_ora_create_user.bat ora816 gsa_dbaccess_user
<password> <sys_passwd>
```

CONFIGURING THE DATABASE AGENT FOR ORACLE - WINDOWS

1. Launch the Storability Configuration Tool from the Storability Program Folder.
2. Select **File** ->**Edit** -> **Smart Agent Configuration**.
3. Select the **Database Agent** tab
4. Click the **Add** button to add another entry to the current configuration.

5. From the **Add** dialog box that appears, select **Oracle** as the type of database to connect to.
6. In the **Database User** field, enter the name of the **database user account**, which has the required access permissions.
7. In the **Port** field, enter the **port number** to connect to the oracle database (typically 1521).
8. Enter the **logical name** of the oracle database in the **Logical Name** field. This should match the service name created with the Oracle Net Manager for the database.
9. Enter the **IP Address** of the database server in the **Ip Address** field.
10. Enter the password for the database user account.
11. Click the **Submit** button to add the database server to the configuration.
12. In the **Local Manager** field, enter the IP address or host name for the Local Manager that the agent will contact for agent auto registration.
13. In the **Local Manager Port** field, specify the TCP port number the Local Manager uses for agent auto registration. The default TCP port number is 17146.
14. Click **Show Advanced Settings** and review/modify the following parameters:

- **Enable Auto Registration** – Accept that auto registration is enabled (true) or set this parameter to false to disable auto registration.
- **DBA_NUM_ASUS** – Number of application units per database in the gsa_dba_application_storage_unit table; default value is five (5).
- **Connection Timeout SQL Server Only** – Only used for MS SQL Server.
- **QueryTimeout SQL Server Only** – Only used for MS SQL Server.
- **DBA_TEST_MODE** – Sets the Database Agent's operational mode where zero (0) turns off test mode and one (1) enables it.
- **DBA_CACHE_EXPIRY_PERIOD** – How long (in seconds) the Database Agent should keep reporting cached database server information after it receives errors while retrieving information from a certain database server. The default value is 86400 seconds.

18. With "Save Configuration Settings" turned on (check mark) select **File->Save** and confirm changes to the storability.ini file.
19. Select **File->Exit** to close the Configuration Tool.
20. Use the Windows **Services** panel to start the agent before you verify agent functionality.

VERIFYING THE DATABASE AGENT ACCESS PERMISSIONS FOR ORACLE

Check the contents of the **Message.log** file for errors. The following notes apply to checking messages:

- When the agent starts, the first message it will log is a startup banner that indicates the agent has started.

- If the agent has been configured properly and can access and authenticate itself to the database, an informational message similar to the following will be generated:

```
06/09/2003 12:27:49PM|INFO|0|Connection test (oracle,ora816,
gsa_dbaccess_user):Passed|dbAgent.exe|CDblibHelper.cc|258
```

- If the username/password supplied to the agent in the storability.ini file is invalid, there will be a number of error messages similar to the following:

```
06/09/2003 11:41:33AM|ERROR|0|Exception while serving GSM table:
gsa_dba_database_server: Connection(oracle,ora816,gsa_dbacess_user):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\oracle\oradbconnection
```

```
.cpp:124:OCIException:OCISessionBegin:ORA-01017: invalid
username/password; logon denied|dbAgent.exe|CDblibHelper.cc|562
```

- If the Oracle TNS listener is not running on the database server, the agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
06/09/2003 11:38:44AM|ERROR|0|Exception while serving GSM table:
gsa_dba_database_server: Connection(oracle,ora816,gsa_dbacess_user):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\oracle\oradbconnection
.cpp:100:OCIException:OCIServerAttach:ORA-12541: TNS:no listener
|dbAgent.exe|CDblibHelper.cc|562
```

- If the agent has been configured with an invalid logical server (service name) for the database, the agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
06/09/2003 13:02:55PM|INFO|0|Connection test (oracle,bogusname,
gsa_dbaccess_user):Failed: OCIException:OCIServerAttach:ORA-12154:
TNS:could not resolve service name|dbAgent.exe|CDblibHelper.cc|258
```

- If the Oracle Service has not been defined on the system the agent is installed on, the agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
06/09/2003 13:54:50PM|INFO|0|Connection test (oracle,ora9011,
gsa_dbaccess_user):Failed: OCIException:OCIServerAttach:ORA-12154:
TNS:could not resolve service name|dbAgent.exe|CDblibHelper.cc|258
```

- If the database account used by the database agent does not have sufficient select permissions for a particular object, the agent will generate a number of error messages similar to the following:

```
06/09/2003 14:01:39PM|ERROR|0|Exception while serving GSM table:
gsa_dba_logical_storage_unit:
Connection(oracle,mydb,gsa_dbaccess_user):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\oracle\oradbresultset.
cpp:243:OCIException:OCIStmtExecute:ORA-00942: table or view does not
exist
|dbAgent.exe|CDblibHelper.cc|562
```

If the Oracle Client Interface software is not installed on the server where the agent has been installed, the following error message will pop-up on the console when the agent is started:

DATABASE AGENT FOR SYBASE - WINDOWS

The following sections describe how you install, configure, and verify the Database Agent for Sybase.

SYBASE OPEN CLIENT PREREQUISITE

The Sybase Open Client software must be installed on the server where the Storability Database Agent is to be installed. If the Sybase Open Client software is installed the following should exist:

- **Default Directory** - The Sybase Open Client installation does not typically create a program menu group, but the default directory is **c:\Sybase**. Additionally, the installation should also add its DLL and BIN sub-directories to the system PATH variable.
- **Registry Entries** - The following registry keys are created by the Sybase client installation:

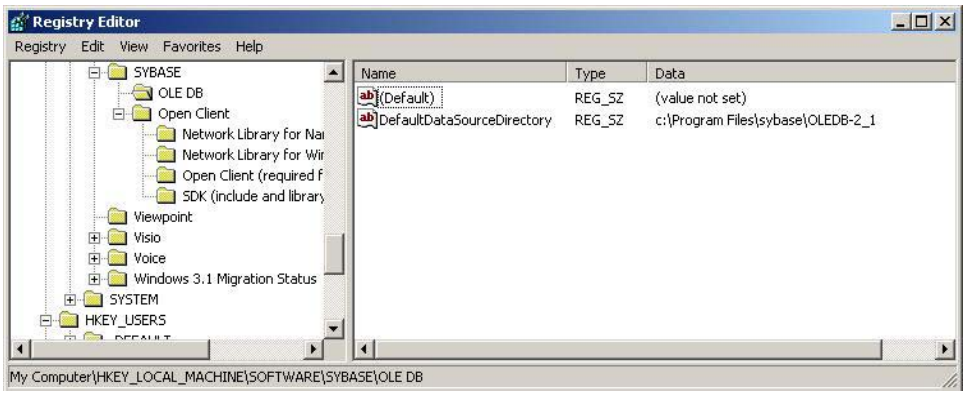


Figure 24 - Sybase Open Client Registry Entries

- **Data Server name defined** – Verify that a Service Name is configured for the database you wish to connect to.

1. From a command prompt, run **dsedit.exe**.
2. In the **Server** list on the left, locate the name of the Sybase server you wish to connect to and click it. The server address field should report the IP Address and port number for the Sybase server you want to connect to.

Notes: If you can't find or open DSEDIT, you can also check the Sybase configuration file, **sql.ini**, in the <install path>\sybase\ini directory to see if an interface has been defined for the database.

The following steps provide instructions on creating a Service Name using DSEDIT.

1. Start **dsedit.exe** (located in <installed drive>:\Sybase\ OCS-12_x\bin).
2. When prompted for a Directory Service to open, select **InterfacesDriver** and click **OK**.
3. Click in the server frame on the right.
4. Select Server Object and choose **Add**.
5. In the Input Server Name dialog, type the **Server Name** you want to use to refer to the database server and click **OK**.

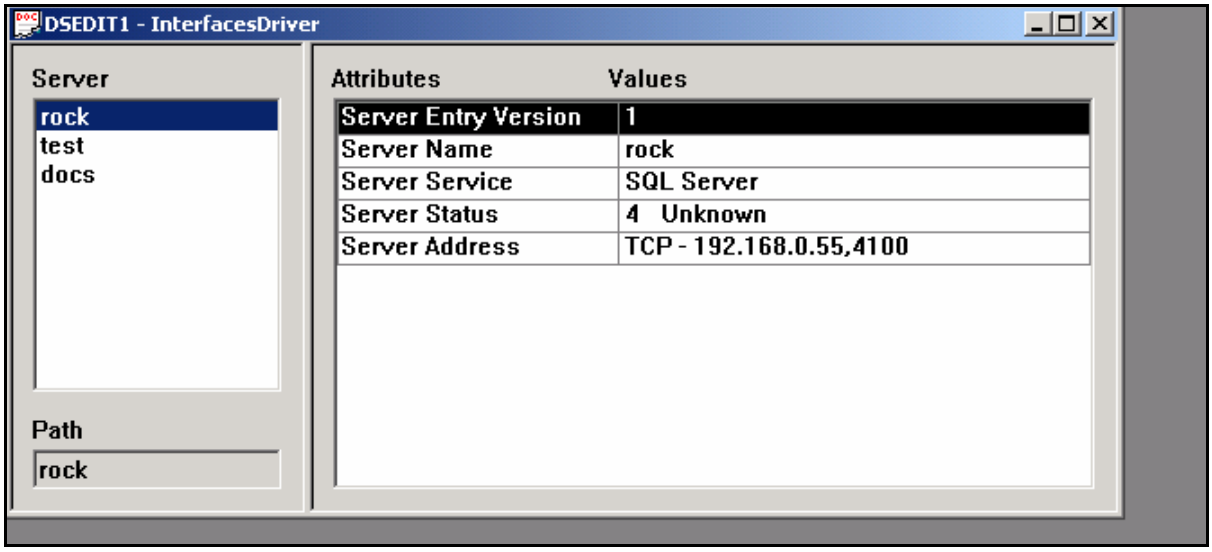


Figure 25 - dsedit InterfaceDriver

6. Click the newly created **Server** in the left frame to select it.
7. Right-click on the Server Address line in the frame on the right, and select **Modify Attribute** from the menu.
8. Click the **Add** button and then select **TCP** as the Protocol using the list box.
9. Enter the **IP Address** of the server followed immediately by a comma and the TCP port for the database (typically 4100).
10. Click **OK** twice to complete the configuration of the Server entry.
11. Right click on the newly created Server entry and select Ping Server. A Ping window will appear. Click the Ping button to test the connection to the Service entry. A success or failure message will then appear.
12. If successful. you should now be able to use the new Service name with isql to connect to the database. For example:

```
isql –U<sa> –P<sa password> –S<name of server entry created above>
```

INSTALLING THE DATABASE AGENT FOR SYBASE - WINDOWS

This section describes how to install and configure the Database Agent on a Windows platform.

1. Insert the Sun StorageTek Business Analytics Windows Local Manager CD into the CD-ROM drive.

2. Click **Next** on the **Welcome** menu to continue the installation.

3. Click **Yes** to accept the terms of the software license agreement.

4. Review/modify the **User Name** and **Company Name** and click **Next**.

5. Click **Next** to accept the default destination folder.

6. A screen listing the components available for installation will then appear. Check the **Database Agent** box to install the database agent.

7. A screen will appear prompting for the type of databases to install support for. Select **Sybase** any other databases the agent will be configured to communicate with.

8. If launched, close the Configuration Tool.

9. Click **OK** to view the Readme_dbAgent.txt file.

CREATING THE DATABASE AGENT ACCOUNT

The Database Agent requires that you create an account for it to use with SELECT permissions to specific tables that are identified below.

Permission	Object Name	Object type	Database Name
Select	sysconfigures	System table	Master
Select	sysservers	System table	Master
Select	sysdevices	System table	Master
Select	sysusages	System table	Master
Select	sysdatabases	System table	Master
Select	spt_values	User table	Master
Select	syslogins	System table	Master
Select	sysprocesses	System table	Master
Select	sysobjects	System table	Every database
Select	syssegments	System table	Every database
Select	sysusers	System table	Every database
Select	sysindexes	System table	Every database
Select	sysprotects	System table	Every database

Table 6 - SELECT Permissions for Sybase

The Storability Database Agent installation will install a set of utilities in the directory:

```
..\Storability\GSM\Utilities\Storability Local Manager
Utilities\dbAgent User Creation Scripts
```

To use the scripts, proceed as follows:

1. Change directory to the ..\Storability\GSM\Utilities\Storability Local Manager Utilities\dbAgent User Creation Scripts.
2. View the readme_windows.txt file for notes about the dbagent_sybase_create_user.bat script.
3. Execute the script, dbagent_sybase_create_user.bat. using the following syntax:

```
dbagent_sybase_create_user.bat SERVER DBAGENT_USER DBAGENT_PWD
ADMIN_PWD
```

Where: only ADMIN_PWD may be empty.

For example:

```
dbagent_sybase_create_user.bat dbsyb3 dbagent <password> <sa_passwd>
```

CONFIGURING THE DATABASE AGENT FOR SYBASE - WINDOWS

1. Launch the Storability Configuration Tool from the Storability Program Folder.

2. Select **File** ->**Edit** -> **Smart Agent Configuration**.
3. Select the **Database Agent** tab
4. Click the **Add** button to add another entry to the current configuration.
5. In the **Add** dialog box that appears, select **Sybase** as the type of database to connect to.
6. Enter the name of the **database user account**, which has the required access permissions.
7. Enter the **port number** for the Sybase database (typically 4100).
8. Enter the **logical name** of the Sybase database in the **Logical Name** field. This should match the service name created with the dsedit utility for the database.
9. Enter the **IP Address** of the database server.
10. Enter the password for the database user account.
11. Click the **Submit** button to add the database server to the configuration.
12. In the **Local Manager** field, enter the network resolvable host name or IP address for the Local Manager with which the Database Agent is to register if auto registration is enabled.
13. In the **Local Manager Port** field, accept the default TCP port number of 17146 for the Local Manager.
14. Click **Show Advanced Settings** and review/modify the following parameters:

    - **Enable Auto Registration** – Accept that auto registration is enabled (true) or set this parameter to false to disable agent auto registration.
    - **DBA_NUM_ASUS** – Number of application units per database in the **gsa_dba_application_storage_unit** table; default value is five (5).
    - **Connection Timeout SQL Server Only** – How long (in seconds) the agent tries to connect to the database; default value is 10 seconds.
    - **QueryTimeout SQL Server Only** – How long (in seconds) the agent waits for a SQL Query statement to complete; default value is 5 seconds.
    - D**BA_TEST_MODE** – Sets the Database Agent's operational mode where zero (0) turns off test mode and one (1) enables it.

    - **DBA_CACHE_EXPIRY_PERIOD** – How long the Database Agent caches its collected data.

15. With "Save Configuration Settings" turned on, select **File->Save** and confirm changes to the storability.ini file.
16. Select **File->Exit** to close the Configuration Tool.
17. Use the Windows **Services** panel to start the agent before you verify agent functionality.

VERIFYING THE DATABASE AGENT ACCESS PERMISSIONS FOR SYBASE

Check the contents of the agent's Message.log file for errors:

- When the agent starts, the first message it will log is a startup banner that indicates the agent started.

- If the agent has been configured properly and can access and authenticate itself to the database, an informational message similar to the following will be generated:

  ```
  06/16/2003 14:05:54PM|INFO|0|Connection test(SYBASE,dbsyb3,gsmdb)
  :Passed|dbAgent.exe|CDblibHelper.cc|258
  ```

- If the database agent has been configured with an invalid Data Server Interfaces entry (for the Logical Server name), or an incorrect username/password

combination, the database agent will not be able to connect with the database and will generate a number of error messages similar to the following:

```
06/16/2003 14:06:52PM|INFO|0|Connection test
(SYBASE,dbsyb5,gsmdb):Failed: SybaseException:Error: Connecting to
database(ct_connect)|dbAgent.exe| CDblibHelper.cc|258
```

```
...
06/16/2003 14:06:52PM|ERROR|0|Exception while serving GSM table:
gsa_dba_application_storage_unit: Connection(SYBASE,dbsyb5,gsmdb):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\sybase\sybdbconnecti
on.cpp:81: SybaseException:Error: Connecting to
database(ct_connect)|dbAgent.exe| CDblibHelper.cc|261
...
```

```
06/16/2003 14:06:52PM|ERROR|0|Exception while serving GSM table:
gsa_dba_application_storage_unit: Connection(SYBASE,dbsyb5,gsmdb):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\sybase\sybdbconnecti
on.cpp:81:SybaseException:Error: Connecting to
database(ct_connect)|dbAgent.exe| CDblibHelper.cc|562

06/16/2003 14:06:52PM|INFO|0|Error:Closing connection to
database(ct_close) ||eventlogadapter.cpp|68
```

If these error messages are encountered:

1. Verify that the data service was setup correctly. Use the Sybase dsedit tool to ping the server.
2. Verify that the username and password used by the agent are correct. Use isql to login to the database:

```
isql –U<db_agent_account> -P <db agent account password> -S<logical
server>

   1> select * from sysservers
   2> go
```

If the database account used by the database agent does not have sufficient select permissions for a particular object, the agent will generate a number of error messages similar to the following:

```
06/16/2003 14:42:31PM|INFO|0|Unexpected error during data
availability check ||eventlogadapter.cpp|68

06/16/2003 14:42:32PM|ERROR|0|Exception while serving GSM table:
gsa_dba_application_storage_unit: Connection(SYBASE,dbsyb3,portal):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\sybase\sybdbresultse
t.cpp:160:SybaseException:Client Library error:  severity(1)
number(155) origin(1) layer(1) Error text: ct_results(): user api
layer: external error: This routine cannot be called when the
command structure is idle.|dbAgent.exe| CDblibHelper.cc|562

06/16/2003 14:42:34PM|INFO|0|Unexpected error during data
availability check ||eventlogadapter.cpp|68

06/16/2003 14:42:34PM|ERROR|0|Exception while serving GSM table:
gsa_dba_db_specific_data: Connection(SYBASE,dbsyb3,portal):
D:\qa\storability\dev\src\dbAgent\sda\dbapi\src\sybase\sybdbresultse
t.cpp:160:SybaseException:Client Library error:  severity(1)
number(155) origin(1) layer(1) Error text: ct_results(): user api
```

```
layer: external error: This routine cannot be called when the
command structure is idle.|dbAgent.exe| CDblibHelper.cc|562
```

If the Sybase Open Client software is not installed on the server where the agent has been installed, the following error message will pop-up on the console (or will be present in the System Event Log) after the agent is started:

```
Application popup: dbAgent.exe - Unable To Locate DLL: The dynamic
link library libcs.dll could not be found in the specified path
C:\Program Files\Storability\GSM\Agents\Storability Database
Agent;.;C:\WINNT\System32;C:\WINNT\system;C:\WINNT;C:\Program
Files\Seagate Software\NOTES\;C:\Program Files\Seagate
Software\NOTES\DATA\;C:\WINNT\system32;C:\WINNT;C:\WINNT\System32\Wb
em;C:\Program Files\Microsoft SQL Server\80\Tools\Binn\.
```

If these error messages are encountered, verify that the Sybase Open Client is installed correctly and that the libcs.dll library, installed by Sybase, isl located in the system PATH.

Database Agent for Oracle - Solaris

This section describes how you install, configure, and verify the Database Agent for Oracle on Solaris.

Database Agent Prerequisites

Before installing the Database Agent for Oracle, verify the following prerequisites:

- **Working installation of SQLPLUS** - The installation of the database agent requires a working sqlplus available on the server. Ensure that the Oracle **sqlplus** utility is included in the PATH variable and that the required Oracle environment variable is set (e.g. ORACLE_HOME/bin dir is in the PATH, ORACLE_HOME/lib dir is in LD_LIBRARY_PATH)
- **Service Name Configured** – The installation and use of the database agent requires a service name be configured for the database server instance.

a. Using **SQLPLUS**, verify that you can connect to the service name or check the contents of the $ORACLE_HOME\network\admin\tnsnames.ora, and verify that the service name exists in the file.

   For example:

```
ORA816 =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP) (HOST = db-qa2) (PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = ora816)
    )
  )
```

Installing the Database Agent - Solaris

The Database Agent requires the following four Sun StorageTek Business Analytics packages to be installed on the Solaris server:

- GSMbase

- GSMlmutil
- GSMdb
- GSMoracle

In addition to these packages, the Host Agent (GSMhost) package is typically installed as well.

1. Mount the Local Manager CD on the server where the agent is to be installed. For example:

```
# mount -o ro -F hsfs /dev/dsk/c0t6d0s0 /cdrom
```

1. Change the directory to /cdrom/Unix (/cdrom/cdrom/Unix, if it is automounted):

```
# cd /cdrom/Unix
```

2. Change the directory to the directory corresponding to the host's Operating System.

```
# pwd
/cdrom/Unix/Solaris/8
```

```
root@symmsun01# ls
Unix
root@symmsun01# cd Unix
root@symmsun01# cd Solaris/8
root@symmsun01# ls
GSMacsls    GSMcpqeva  GSMhds     GSMlegato  GSMlsi536  GSMproxy   GSMsybase
GSMbase     GSMdb      GSMhicmd   GSMlmutil  GSMlsi540  GSMroute   STconsrv
GSMclarii   GSMemc     GSMhost    GSMlsi521  GSMnbu     GSMsrm
GSMclra     GSMess     GSMhpxp    GSMlsi530  GSMnetapp  GSMstats
GSMcpq      GSMfabric  GSMibmatl  GSMlsi533  GSMoracle  GSMstk
```

Figure 26 - Host OS Directory

3. Install the GSMbase, GSMlmutil, GSMdb, and GSMoracle packages. If the GSMbase and or GSMlmutil packages are already installed, the installation will display an informational message stating the package(s) are already installed.

```
# pkgadd -d . GSMbase GSMlmutil GSMdb GSMoracle
```

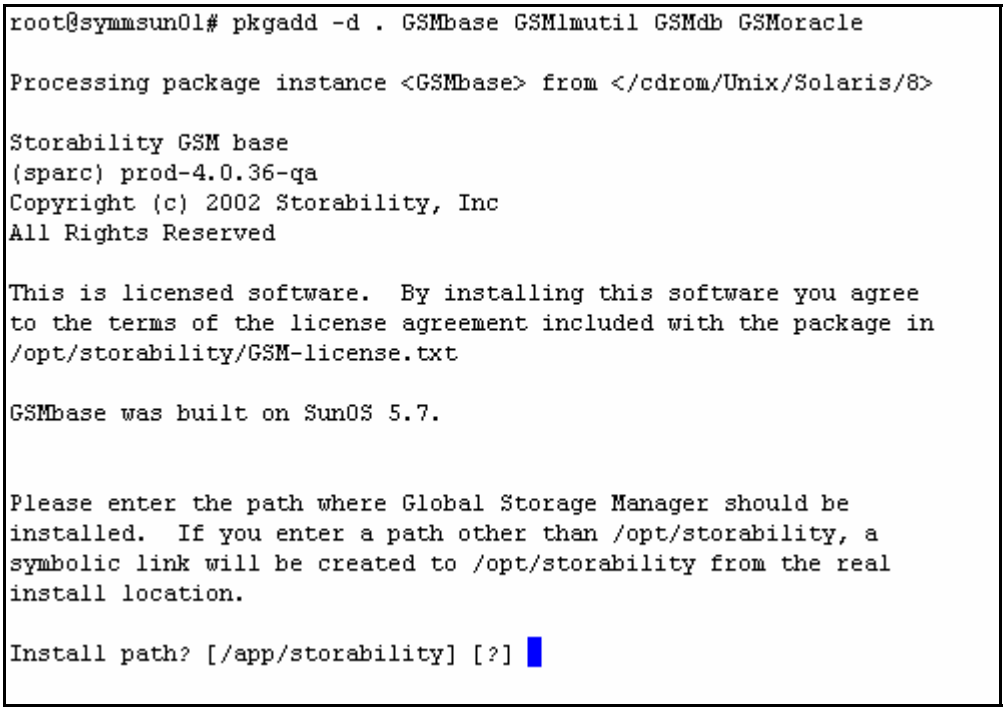


Figure 27 - Installation Directory

4. Enter a different installation location or press **Enter** to accept /app/storability. As the screen displays, a symbolic link will be made to /opt/storability from the installation path you specify.

5. Specify whether (y/n) to enable agent auto registration (default) or type **n** and press **Enter** to disable agent auto registration.

6. Specify the IP address or network resolvable host name of the Local Manager to be contacted for agent auto registration or press **Enter** to specify the local host (default).

7. Type the TCP Port Number the Local Manager uses for agent auto registration or press **Enter** to specify the default port number (17146).

8. Read the information on how agents that do not require root privileges will be run under a dedicated account. The default account is username "gsm" and group "gsm". The default Group ID is 1090.

9. Enter a group name to be used for ownership of gsm files or press Enter to use the default group (gsm). If the group was not created already, specify whether (y/n) the installation is to create it.

10. Type Group ID for the group or press Enter to accept the default GID (1090).

11. Specify whether (y/n) the Agent Monitor will restart the agent if it is detected as not running.

12. If the installation directory does not exist, specify whether (y/n) to have it created.

13. Specify whether (y/n) to have the installation of GSMbase continue.

14. The installation will proceed and the GSMlmutil package is next processed.

```
Installation of <GSMbase> was successful.

Processing package instance <GSMlmutil> from </cdrom/Unix/Solaris/8>

Storability GSM Local Manager utilities
(sparc) prod-4.0.36-qa
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMlmutil was built on SunOS 5.7.
```

Figure 28 - GSMbase Install Completed

15. The installation checks to determine if the username, gsm, exists. If not, specify whether (y/n) to create the user.
16. Specify the User ID for the user or press Enter to accept the default User ID (1090).
17. Specify whether (y/n) to continue with the installation of GSMlmutil.

```
Agents which do not require root privileges will be run under a dedicated
account (default username gsm, group gsm).
Username for GSM files? [gsm]
user 'gsm' does not yet exist

Automatically create account? [n] [y,n,?]
A 'gsm' account, member of the group 'gsm' must be created before this
```

Figure 29 - GSMlmutil Installation

18. Type **y** and press **Enter** to review/modify the Advanced Settings.

    - Specify whether (y/n) the Agent Monitor will be used to restart the agent if it is detected as not running.
    - Specify whether agent auto registration is turned on (default) or off.
    - Specify the IP address or network resolvable host name of the Local Manager to contact for agent auto registration. The default value is local host.
    - Specify the TCP port number the Local Manager uses for agent auto registration. The default port number is 17146.

```
Processing package instance <GSMdb> from </cdrom/Unix/Solaris/8>

Storability GSM Database Agent
(sparc) prod-4.0.36-qa
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMdb was built on SunOS 5.7.

The 'advanced' settings all have reasonable default values, which most
likely need not be changed.

Modify advanced settings? [n] [y,n,?] y

Automatically restart this agent from agentMonitor? [y] [y,n,?]

Enable automatic agent registration? [y] [y,n,?]

Local Manager address for agent registration? [localhost]
```

Figure 30 - GSMdb Installation

19. Specify whether (y/n) to continue with the GSMdb installation.

```
TCP port for agent registration? [17146] [?]
Using </app/storability> as the package base directory.
## Processing package information.
## Processing system information.
   6 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <GSMdb> [y,n,?]
```

20. If the installation continues, the GSMoracle package is next processed.

21. For "Name of the Oracle database", enter the service name of the Oracle instance.
22. When prompted, enter the **username** and **password** for the GSM database agent to use when connecting to the Oracle database.
23. Press **Enter** and confirm the password.

    Record the username and password information so that this information will be available when you create the Database Agent's account during the next step in the procedure.

    Username: _____

Password: _____

24. Repeat the above procedure to configure all the database instances.
25. Press **Enter** on a blank "Name of the Oracle database" line to indicate you have finished configuring database instances.

```
IP address of database server? 192.168.0.52

TCP port of database server? [1521] [?]

Name of the Oracle database? [done]


Where is Oracle home? [/export/home/oracle]  [?,q] /app/ora816/product/8.1.6

(Re-)start agents after install [y] [y,n,?,q]
Using </app/storability> as the package base directory.
## Processing package information.
## Processing system information.
   8 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <GSMoracle> [y,n,?] y
```

Figure 31 - GSMoracle Package Installation

26. Enter the directory path for the **Oracle Home directory** and press **Enter**.
27. When prompted, enter **y** to start the installed agents after installation has completed.
28. Specify whether (y/n) to continue installing the agent, when prompted.
29. The installation proceeds and returns you to the main package installation menu.
30. Select another GSM package to install, or type **CTRL-D** and **q** to exit.

CREATE DATABASE AGENT'S ACCOUNT ON SOLARIS - ORACLE

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Storability Database Agent installation will install a set of utilities and readme files under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the Oracle user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the oracle account.
4. Read the Readme.db_perms.oracle file located in /opt/storability/etc/dbAgent directory.
5. Run the `create_user.oracle.sh` script:

```
# su - oracle
# /opt/storability/etc/dbAgent/dbagent_ora_create_user.sh <SERVER>
<DBAGENT_USER> <DBAGENT_PWD>
```

Where:

- **SERVER** = The service name for the Oracle Instance.
- **DBAGENT_USER** = The username of the database account to create for the Database Agent.
- **DBAGENT_PWD** = The password for the database account being created.

6. At the "Enter Password:" prompt, enter the password for the sys account.

DATABASE AGENT FOR SYBASE - SOLARIS

This section describes how you install, configure, and verify the Database Agent for Sybase on Solaris.

DATABASE AGENT PREREQUISITES

Before installing the Database Agent for Sybase, verify the following prerequisites:

- **Sybase Open Client** – The Sybase Open Client software must be installed on the server where the Database Agent is to be installed.

- **Service Name Configured** – The installation and use of the database agent require a service name be configured for the database server instance.

  You may use iSQL to verify that you can connect to the service name. For example:

  ```
  isql –U <sa> –P <sa password> –S <name of server entry>
  ```

7. Mount the Local Manager CD on the server where the agent is to be installed. For example:

   ```
   # mount -o ro -F hsfs /dev/dsk/c0t6d0s0 /cdrom
   ```

8. Change the directory to /cdrom/Unix (/cdrom/cdrom/Unix, if it is automounted):

9. Change the directory to the directory corresponding to the host's Operating System.

   ```
   # pwd
   /cdrom/Unix/Solaris/8
   ```

10. Install the GSMbase, GSMlmutil, GSMdb, and GSMsybase packages. If the GSMbase and or GSMlmutil packages are already installed, the installation will display an informational message stating the package(s) are already installed.

    ```
    # pkgadd -d . GSMbase GSMlmutil GSMdb GSMsybase
    ```

11. Enter a different installation location or press **Enter** to accept /app/storability. As the screen displays, a symbolic link will be made to /opt/storability from the installation path you specify.

12. Specify whether (y/n) to enable agent auto registration (default) or type **n** and press **Enter** to disable agent auto registration.

13. Specify the IP address or network resolvable host name of the Local Manager to be contacted for agent auto registration or press **Enter** to specify the local host (default).

14. Type the TCP Port Number the Local Manager uses for agent auto registration or press **Enter** to specify the default port number (17146).

15. Read the information on how agents that do not require root privileges will be run under a dedicated account. The default account is username "gsm" and group "gsm". The default Group ID is 1090.

16. Enter a group name to be used for ownership of gsm files or press Enter to use the default group (gsm). If the group was not created already, specify whether (y/n) the installation is to create it.

17. Type Group ID for the group or press Enter to accept the default GID (1090).

18. Specify whether (y/n) the Agent Monitor will restart the agent if it is detected as not running.

19. Specify whether (y/n) to have the installation of GSMbase continue.

20. If continued, the installation will proceed and the GSMlmutil package is next processed.

21. The installation checks to determine if the username, gsm, exists. If not, specify whether (y/n) to create the user.
22. Specify the User ID for the user or press **Enter** to accept the default User ID (1090).
23. Specify whether (y/n) to continue with the installation of GSMlmutil.

24. The GSMdb package is next processed.

25. Type **y** and press **Enter** to review/modify the **Advanced Settings**.

    - Specify whether (y/n) the Agent Monitor will be used to restart the agent if it is detected as not running.
    - Specify whether agent auto registration is turned on (default) or off.
    - Specify the IP address or network resolvable host name of the Local Manager to contact for agent auto registration. The default value is local host.
    - Specify the TCP port number the Local Manager uses for agent auto registration. The default port number is 17146.

21. The GSMsybase package is next processed.

```
Storability GSM Sybase Agent
(sparc) prod-4.0.36-qa
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMsybase was built on SunOS 5.7.

Name of the Sybase database? [done] sybase

Username for agent access to database? [dbadmin]

Password for dbadmin? [password]
Confirm password?

IP address of database server? 192.168.0.55

TCP port of database server? [4100] [?]

Name of the Sybase database? [done]
```

Figure 32 - Install GSMsysbase

- Enter the name of the Sybase database and press **Enter**.
- Enter the Database user name and press Enter
- Enter the password for the above user and confirm the password.

Record the username and password information so that this information will be available when you create the Database Agent's account during the next step in the procedure.

Username: _____

Password: _____

- Enter the IP address of the database server. Be aware the above screen is for illustrative purposes only; the IP address line you use will be blank.
- Specify the TCP port number the database uses for client connections or press **Enter** to accept the default port (4100).
- Repeat the above steps for each database. Press **Enter** on a blank "Name of the Sybase database?" line to indicate you are finished and continue.
- Specify whether (y/n) to restart the installed agents when installation is finished.
- Specify whether (y/n) to continue the agent installation.
- If continued, the installation proceeds and returns you to the main package installation menu.
- Select another Sun StorageTek Business Analytics agent package to install or type **Ctrl-D** and **q** to exit.

CREATE DATABASE AGENT'S ACCOUNT ON SOLARIS - SYBASE

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Storability Database Agent installation will install a set of utilities under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the Sybase user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the Sybase administrator account.
4. Read the /opt/storability/etc/dbAgent/Readme.db_perms.sybase file.
5. Run the /opt/storability/etc/dbAgent/create_user.sybase.sh shell script.

DATABASE AGENT FOR DB2 - SOLARIS

This section describes how you install, configure, and verify the Database Agent for DB2 on Solaris. The Database Agent requires the following four packages to be installed on the Solaris server:

- GSMbase
- GSMlmutil
- GSMdb
- GSMdb2

In addition to these packages, the Host Agent (GSMhost) agent package is typically installed as well.

2. Mount the Local Manager CD on the server where the agent is to be installed. For example:

```
# mount -o ro -F hsfs /dev/dsk/c0t6d0s0 /cdrom
```

3. Change the directory to /cdrom/Unix (/cdrom/cdrom/Unix, if it is automounted):

```
# cd /cdrom/Unix
```

4. Change the directory to the directory corresponding to the host's Operating System. For example:

```
# pwd
/cdrom/Unix/Solaris/8
```

5. Install the GSMbase, GSMlmutil, GSMdb, and GSMoracle packages. If the GSMbase and or GSMlmutil packages are already installed, the installation will display an informational message stating the package(s) are already installed.

```
bash-2.04# pkgadd -d . GSMbase GSMlmutil GSMdb GSMdb2

Processing package instance <GSMbase> from </mnt/Unix/Solaris/7>

Storability GSM base
(sparc) prod-4.0.3
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMbase was built on SunOS 5.7.


Please enter the path where Global Storage Manager should be
installed.  If you enter a path other than /opt/storability, a
symbolic link will be created to /opt/storability from the real
install location.

Install path? [/app/storability] [?]
```

Figure 33 - Database Agent Package Installation for DB2

6. Enter a different installation location or press **Enter** to accept /app/storability. As the screen displays, a symbolic link will be made to /opt/storability from the installation path you specify.
7. Specify whether (y/n) to enable agent auto registration (default) or type **n** and press **Enter** to disable agent auto registration.
8. Specify the IP address or network resolvable host name of the Local Manager to be contacted for agent auto registration or press **Enter** to specify the local host (default).
9. Type the TCP Port Number the Local Manager uses for agent auto registration or press **Enter** to specify the default port number (17146).
10. Read the information on how agents that do not require root privileges will be run under a dedicated account. The default account is username "gsm" and group "gsm". The default Group ID is 1090.
11. Enter a group name to be used for ownership of gsm files or press Enter to use the default group (gsm). If the group was not created already, specify whether (y/n) the installation is to create it.
12. Type the Group ID for the group or press Enter to accept the default GID (1090).

```
Install path? [/app/storability] [?]

Enable automatic agent registration? [y] [y,n,?]

Local Manager address for agent registration? [localhost]

TCP port for agent registration? [17146] [?]

Agents which do not require root privileges will be run under a dedicated
account (by default, username gsm, group gsm).

That user account need not be set up yet, but the group ownership of all
the GSM files requires that the group exist.

Group name for GSM files? [gsm]

Automatically create group? [n] [y,n,?]

GID for gsm? [1090] [?]
```

Figure 34 - Set Up GSMbase Component

13. Specify whether (y/n) the Agent Monitor will restart the agent if it is detected as not running.
14. If the installation directory does not exist, specify whether (y/n) to have it created.
15. Specify whether (y/n) to have the installation of GSMbase continue.
16. The installation will proceed and the GSMlmutil package is next processed.
17. The installation checks to determine if the username, gsm, exists. If not, specify whether (y/n) to create the user.
18. Specify the User ID for the user or press Enter to accept the default User ID (1090).
19. Specify whether (y/n) to continue with the installation of GSMlmutil.

```
Agents which do not require root privileges will be run under a dedicated
account (default username gsm, group gsm).
Username for GSM files? [gsm]
user 'gsm' does not yet exist

Automatically create account? [n] [y,n,?]
A 'gsm' account, member of the group 'gsm' must be created before this
```

Figure 35 - GSMlmutil Installation

20. Type **y** and press **Enter** to review/modify the Advanced Settings.

    - Specify whether (y/n) the Agent Monitor will be used to restart the agent if it is detected as not running.
    - Specify whether agent auto registration is turned on (default) or off.
    - Specify the IP address or network resolvable host name of the Local Manager to contact for agent auto registration. The default value is local host.
    - Specify the TCP port number the Local Manager uses for agent auto registration. The default port number is 17146.

```
Processing package instance <GSMdb> from </cdrom/Unix/Solaris/8>

Storability GSM Database Agent
(sparc) prod-4.0.36-qa
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMdb was built on SunOS 5.7.

The 'advanced' settings all have reasonable default values, which most
likely need not be changed.

Modify advanced settings? [n] [y,n,?] y

Automatically restart this agent from agentMonitor? [y] [y,n,?]

Enable automatic agent registration? [y] [y,n,?]

Local Manager address for agent registration? [localhost]
```

Figure 36 - GSMdb Installation

21. Specify whether (y/n) to continue with the GSMdb installation.

```
TCP port for agent registration? [17146] [?]
Using </app/storability> as the package base directory.
## Processing package information.
## Processing system information.
   6 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <GSMdb> [y,n,?]
```

Figure 37 - Completing GSMdb Installation

22. If the installation continues, the GSMdb2 package is next processed.

```
Processing package instance <GSMdb2> from </mnt/Unix/Solaris/7>

Storability GSM DB2 Agent
(sparc) prod-4.0.3
Copyright (c) 2002 Storability, Inc
All Rights Reserved

This is licensed software.  By installing this software you agree
to the terms of the license agreement included with the package in
/opt/storability/GSM-license.txt

GSMdb2 was built on SunOS 5.7.

DB2 database instance name?

Username for agent access to database? [db2inst1]

Password for db2inst1? [admin]

Confirm password?

Hostname or IP address of database server?

TCP port of database server? [50000] [?]
```

Figure 38 - GSMdb2 Configuration

23. For **DB2 database instance name**, enter the Node Name for connecting to the database instance.
24. For **username for agent access to database [db2inst1]**, enter the user name the agent will use to connect or press Enter to accept the default user name (db2inst1).
    For **Password for [user name]**, type the password for the above database user and then confirm that password. Record the username and password information

so that this information will be available when you create the Database Agent's account during the next step in the procedure.

Username: _____

Password: _____

25. For **Hostname or IP address of database server**, type the network resolvable host name or IP address of the database server.
26. For **TCP port of database server**, type the TCP Port number on which the database server listens for connections or press Enter to accept the default TCP port number of 5000.
27. Repeat the above procedure for each database server instance to be monitored.
28. At the **DB2 database instance name? [done]** prompt, press **Enter** to indicate you have completed configuring DB2 instances and the installation continues.

```
DB2 database instance name?  [done]

Where are the DB2 client libraries (e.g. libdb2.so) installed?  [?,q]

(Re-)start agents after install [y] [y,n,?,q]

Using </app/storability> as the package base directory.
## Processing package information.
## Processing system information.
   8 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.

The following files are already installed on the system and are being
used by another package:
* /app/storability/lib/libdb2helper.so
* /app/storability/lib/libdbdrv_db2.so

* - conflict with a file which does not belong to any package.

Do you want to install these conflicting files [y,n,?,q]

## Checking for setuid/setgid programs.
```

Figure 39 - Completing GSMdb2 Installation

29. At the **Where are the DB2 client libraries installed prompt**, type the fully qualified path to the DB2 client libraries. For example: `/opt/IBMdb2/V7.1/lib`.
30. Specify whether (y/n) o restart the agents after the installation has completed.
31. The installation completes and returns you to the command line.

```
Installing Storability GSM DB2 Agent as <GSMdb2>

## Executing preinstall script.
Stopping Storability database agent:    dbAgent is not running.
## Installing part 1 of 1.
/app/storability/etc/dbAgent/Readme.db_perms.db2
/app/storability/etc/dbAgent/create_user.db2.sh
/app/storability/lib/libdb2helper.so
/app/storability/lib/libdbdrv_db2.so
/etc/init.d/db2Agent <symbolic link>
[ verifying class <none> ]
/app/storability/etc/agents:    updated.
[ verifying class <cfg> ]
/app/storability/etc/storability.ini:   updated.
[ verifying class <ini> ]
/app/storability/gsm/.cshrc:    updated.
/app/storability/gsm/.profile:  updated.
[ verifying class <prof> ]
## Executing postinstall script.
Storability agent startup:
Starting Storability database agent:    dbAgent started
Storability agent startup complete.

Installation of <GSMdb2> was successful.
bash-2.04#
```

Figure 40 - GSMdb2 Agent Installation Completed

CREATE DATABASE AGENT'S ACCOUNT ON SOLARIS – DB2

The Storability Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Storability Database Agent installation will install a set of utilities under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the DB2 user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the DB2 administrator account.
4. Verify the /opt/storability/etc/dbAgent/create_user.db2.sh script file has execute permissions. If not, use the `chmod` command to add execute permissions.
5. Run /opt/storability/etc/dbAgent/create_user.db2.sh shell script.

Note: If the dbAgent is installed on Solaris for DB2, there is a manual configuration setting that needs to be in place before the agent is started. If the you choose to run the agent under gsm user, for example, the environment variable DB2INSTANCE in /opt/storability/gsm/.profile, needs to be set to the active instance. For example:

```
DB2INSTANCE=<db2inst1>
export DB2INSTANCE
```

If you choose not to run the agent under gsm user, the dbAgent script under /etc/init.d must have the DB2INSTANCE variable set up. If the variable is not configured, stop dbAgent and set it up as described above and then restart the dbAgent again.

Installing Database Agent on IBM AIX

All currently supported AIX agents are provided as a "Tarball" with installation an script. Dependencies between agents are not automatically detected, so they must be installed in the correct order.

The dependencies for the existing agents are listed as follows:

- Host Agent – None
- SRM Agent – Host Agent
- Database Agent – Host Agent

To install an agent, simply ensure that the tarball (dbAgent-AIX.tgz) and the install script dbAgent-install.sh) reside in the same location, and run the script.

AIX Database Agent Configuration

The Database Agent for AIX can be configured to support DB2 and/or Oracle database instances.

1. Mount the installation CD in the CD-ROM drive of the AIX server. For example:

```
mount -v cdrfs -r /dev/cd0 /mnt # /mnt directory must exist
```

2. Change directory to the software installation directory. For example:

```
cd /cdrom/Unix/AIX/5.2
```

3. Run the installation script:

```
./dbAgent-install.sh
```

4. When prompted, specify the database type is Oracle or DB2.
5. To configure the Database Agent for a DB2 database instance, the installer is prompted to supply the following information:
   - DB2 instance name
   - User Name with which to connect; default name is "db2inst1"
   - Password for above user; default password is "admin"
   - IP address of the database server
   - TCP port of database server; default port number is 50000

   To configure the Database Agent for Oracle, the installer is prompted to supply the following information:
   - Database instance name
   - User name and password with which to connect
   - IP address and port of the database server
   - The location of ORACLE_HOME if not detected

Agent Auto Registration

On an IBM AIX server, you must manually register the Database Agent to the Local Manager after the software installation has competed. This is performed manually by

either adding the entries for the GSM_LM_HOST in the storability.ini file for the agent or by adding the SUB_AGENT entry in the Local Manager Routing Agent's configuration settings.

Sample agent storability.ini file (/opt/storability/etc/storability.ini) entries appear below.

```
GSM_LM_HOST = 10.255.252.34
GSM_LM_PORT = 17146
GSM_ENABLE_LM_REGISTRATION = true
```

CREATE DATABASE AGENT'S ACCOUNT ON AIX – DB2

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Database Agent installation will install a set of utilities under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the DB2 user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the DB2 administrator account.
4. Read the /opt/storability/etc/dbAgent/Readme.db_perms.db2 file.
5. Run the /opt/storability/etc/dbAgent/create_user.db2.sh shell script.

CREATE DATABASE AGENT'S ACCOUNT ON AIX - ORACLE

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Database Agent installation will install a set of utilities and readme files under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the Oracle user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the oracle account.
4. Read the Readme.db_perms.oracle file located in /opt/storability/etc/dbAgent directory.
5. Run the `create_user.oracle.sh` script:

```
# su - oracle
# /opt/storability/etc/dbAgent/dbagent_ora_create_user.sh <SERVER>
<DBAGENT_USER> <DBAGENT_PWD>
```

Where:

- **SERVER** = The service name for the Oracle Instance.

- **DBAGENT_USER** = The username of the database account to create for the Database Agent.
- **DBAGENT_PWD** = The password for the database account being created.

At the "Enter Password:" prompt, enter the password for the sys account.

INSTALLING DATABASE AGENT ON HP-UX

The Database Agent supports Oracle and Sybase databases when installed on a HP-UX server. Proceed as follows:

1. Mount the installation CD in the CD-ROM drive of the HP-UX server. For example:

```
# pfs_mount –o xlat=unix /dev/rdsk/cXtXd0 /SD_CDROM
(where /dev/rdsk/cXtXd0 is the cdrom device)
```

2. Change directory to the software installation directory. For example:

```
cd /cdrom/Unix/HP-UX/11.0
```

3. Run the installation script:

```
./dbAgent-install.sh
```

4. When prompted, specify the database type is Oracle or Sybase.
5. To configure the Database Agent for Oracle, the installer is prompted to supply the following information:
   - Database instance name
   - User name and password with which to connect
   - IP address and port of the database server
   - The location of ORACLE_HOME if not detected

   To configure the Database Agent for Sybase, enter:
   - Name of the Sybase database
   - Database user name
   - Password for the above user and confirm the password
   - IP address of the database server
   - TCP port number the database uses for client

Agent Auto Registration

On an HP-UX server, you must manually register the Database Agent to the Local Manager after the software installation has competed. This is performed manually by either adding the entries for the GSM_LM_HOST in the storability.ini file for the agent or by adding the SUB_AGENT entry in the Local Manager Routing Agent's configuration settings.

Sample agent storability.ini file (/opt/storability/etc/storability.ini) entries appear below.

```
GSM_LM_HOST = 10.255.252.34
GSM_LM_PORT = 17146
GSM_ENABLE_LM_REGISTRATION = true
```

Create Database Agent's Account on HP-UX - Oracle

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Storability Database Agent installation will install a set of utilities and readme files under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the Oracle user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the oracle account.
4. Read the Readme.db_perms.oracle file located in /opt/storability/etc/dbAgent directory.
5. Run the `create_user.oracle.sh` script:

```
# su - oracle
# /opt/storability/etc/dbAgent/dbagent_ora_create_user.sh <SERVER>
<DBAGENT_USER> <DBAGENT_PWD>
```

Where:

- **SERVER** - The service name for the Oracle Instance.
- **DBAGENT_USER** - The username of the database account to create for the GSM database agent.
- **DBAGENT_PWD** - The password for the database account being created.

At the "Enter Password:" prompt, enter the password for the sys account.

Create Database Agent's Account on HP-UX - Sybase

The Database Agent requires an account with SELECT permissions to specific tables. To avoid using the system account, it is recommended that you create a dedicated account with only the required permissions.

The Database Agent installation will install a set of utilities under the directory:

```
/opt/storability/etc/dbAgent
```

To use the utilities, proceed as follows:

1. Log in as root.
2. Verify that the Sybase user has write access to /opt/storability/etc/dbAgent. This is required because the script will create a log file under this directory.
3. Change user to the Sybase administrator account.
4. Read the /opt/storability/etc/dbAgent/Readme.db_perms.sybase file.
5. Run the /opt/storability/etc/dbAgent/create_user.sybase.sh shell script.

Verifying Database Agent Functionality

Use the Agent Diagnostic Tool (GSMDiag**)** to verify the Database Agent functionality. GSMdiag is installed as part of the Sun StorageTek Business Analytics Central Manager

or Local Manager software installation. It represents the primary tool to verify agent functionality or troubleshoot agent problems.

Proceed as follows:

1. Wait approximately 30 seconds after the Database Agent has started to allow it to initialize before querying it with GSMdiag.

    a. In the **Agent location** window, enter the IP Address or network resolvable Host Name of the server where the agent is installed in the ip address/host name input box.

    b. Set the port to 17148 (or select the Database agent from the drop down list of service names).

    c. Click the **Get Object List** button and you should receive a list of objects published by the Database Agent.

    d. Select the **gsa_dba_served_databases-2_1** object and it should report the monitored database servers, including database server IP address, TCP port number, database type (e.g., db2), version, instance name, and timestamp.

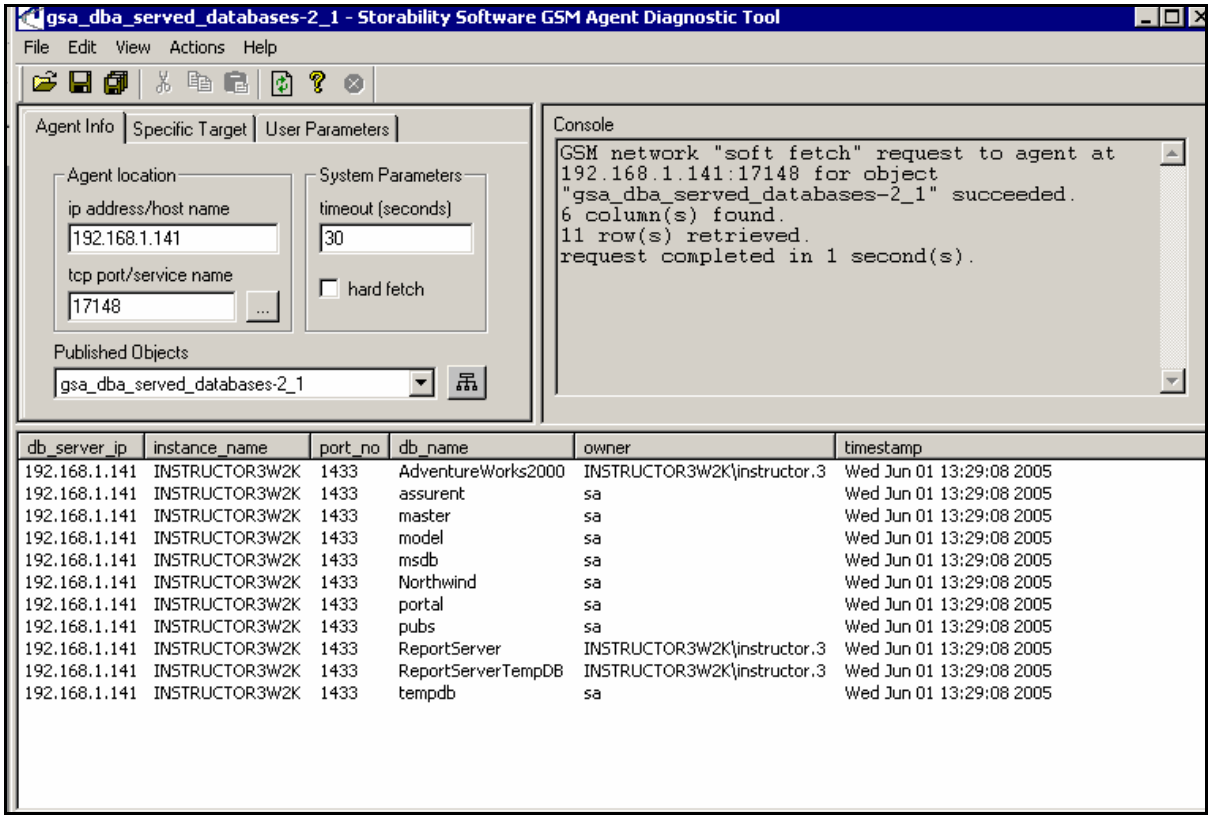


Figure 41 - gsa_dba_served_databases-2_1

    e. Proceed to collect all other objects published by the agent.

2. To verify the Database Agent has registered successfully with its configured Local Manager:

    a. In the **Agent Info** window, enter the IP Address or network resolvable Host Name of the Local Manager in the ip address/host name input box.

b. Set the port to 17146 (or select the Routing Agent from the drop down list of service names).

c. Click the **Get Object List** button and you should receive a list of objects published by the Routing Agent.

d. Select the **gsa_agent_register** table.

e. Verify this collected object reports the Database Agent in the "active_peer" field by IP address and port number of 17148.

Verifying Management Console Functionality

The following procedure describes how the Sun StorageTek Business Analytics administrator verifies the Database Agent's reports in the Management Console. Refer to the *Administration* chapter to obtain information on the administrative menus you can access from the **Tools** pull down menu, including the **Data Polling Schedule** and **Change Dashboard** menus.

1. Log in to the Management Console as an administrative user (e.g., gsmuser) whose views provide access to the desired assets (e.g., sites).
2. Verify that your customized Home Page includes the **Database Management** dashboard (or use **Change Dashboard** to assign one).
3. Select **Tools->Data Polling Schedule.**
4. Use the **Collect Now** button to collect the Database (collection type) Configuration (Collection Metric) data using a polling schedule that includes the specific site or all sites.
5. Use the **Collect Now** button to collect the Database (collection type) Performance (Collection Metric) data using a polling schedule that includes the specific site or all sites.
6. Close the **Data Polling Schedule** window.
7. Verify the **Database Management** dashboard reports information on the database servers monitored by the Database Agent you are verifying.
8. Click **Databases->Database Configuration/Capacity**. The **Change Parameters** dialog appears.
9. Set the desired start date and end dates and click **Generate Report**.
10. In the **Database Configuration/Capacity** window, expand the appropriate site.
11. Select a database server monitored at the site and the Database Server Detail report is displayed.
12. Repeat Step 11 for each monitored database server.
13. Close the browser session with the Management Console as the above steps complete verifying the Management Console functionality.

Database Agent Troubleshooting

1. **Verify system/agent prerequisites** – Refer to *Sun StorageTek Business Analytics Support Matrix* that is located on the Documentation CD to verify the most recent support requirements for the agent.
2. Verify the Database Agent has sufficient database access permissions by examining its Message Log.
3. Use **GSMdiag** to save the output for all the tables if escalating a problem to a Support representative.
   a. Run GSMdiag.

b. Enter the **IP Address** or **Hostname** of the server where the agent is installed and set the port to 17148 (or select the Database agent from the drop down list of service names).
c. Click the **Get Object List** button and you should receive a list of tables published by the Database Agent. If unsuccessful, verify the Ethernet connectivity to the server running the Database Agent and that the Database Agent is running.
d. Select the **alerts-3_1** table and examine the **Description** column for each reported alert.
e. Select **File->Save All** and the "This action will network fetch all objects published by the currently specified agent and save the data to a single file." Message appears.
f. Click **OK** and the **Save As** dialog appears.
g. Enter a meaningful file name and click **OK** to initiate the collection.
h. Enter the desired file name and click **OK**.

4. **Review the Message Log** – Review/collect the agent's Message. log file that can contain information on startup errors, configuration errors, or errors regarding accessing data or parsing output.

   Refer also to the *Verifying the Database Agent Access Permissions* section for your installed SQL dialect (e.g., Sybase) to review common messages related to database access permissions.

   Windows

   - Located by default in: <drive>:\Program Files\Storability\GSM\Agents\Storability Database Agent folder.
   - Can enable debug level logging by appending **LOG_SEVERITY=Debug** to the Database Agent section of the storability.ini file (if Customer Support requests it).

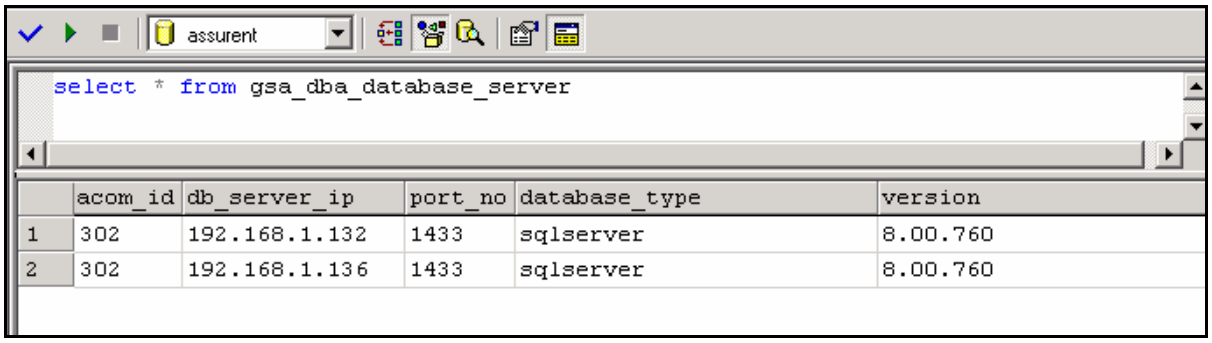
   Solaris

   - The agents common Message.log file located by default in: /opt/storability/data.
   - Can enable debug level logging by appending LOG_SEVERITY=Debug to the Database Agent section of the storability.ini file (if a Support representative requests it).

5. **Verify Local Manager Registration -** The configured Routing Agent's **gsa_agent_register** table should be reviewed if the auto-registration feature is enabled (default). Otherwise, verify the necessary sub agent entry has been added to the Routing Agent's storability.ini file.
6. **Review the Routing Agent Message Log** – Review/collect the Routing Agent Message Log to check for errors related to Ethernet connectivity problems contacting the Storability Database Agent and registration information.
7. **Confirm Data Polling Schedules** – Using the Management Console's **Data Polling Schedule** menu, review/modify the existing Polling Schedules for the Collection Type of Database for all sites.
8. **Review Aggregator Message Log** – Open the Aggregator's Message Log in a text editor and validate that the Database Tables are being requested and rows are being inserted into the database.

   The log contains two entries, TID (Transaction ID) and SID (Session ID), which can help you locate (e.g., Find) and view relevant logged entries. For scheduled polling requests, the TID will be equal to the Job ID in the Polling menu. Each SID is a unique identifier for a particular agent data collection session. For on-demand polling requests, the TID is a uniquely generated TID (not the Job ID) and SID, and the TID and SID will be equal to the same integer value.

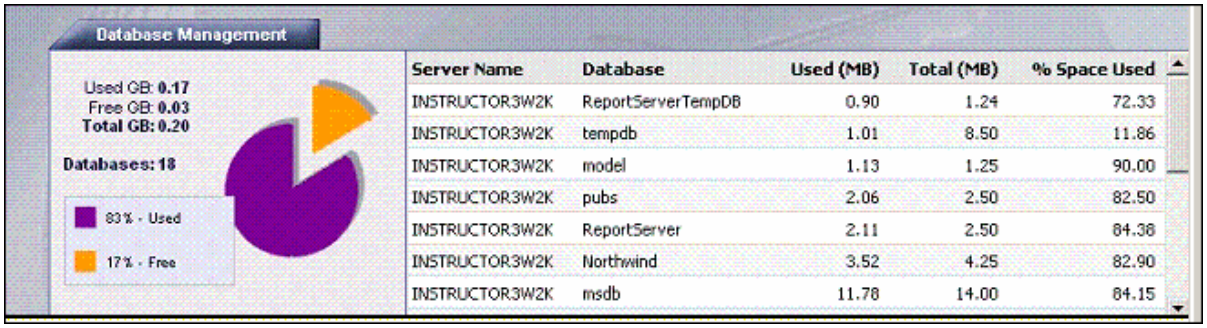
9. **Check the assurent database** – The assurent database is the data repository for your Sun StorageTek Business Analytics application. For the Database Agent, use any MS SQL Query interface, such as isql, to verify rows have been inserted into the database-related tables, such as the **gsa_dba_database_server** table.



	acom_id	db_server_ip	port_no	database_type	version
1	302	192.168.1.132	1433	sqlserver	8.00.760
2	302	192.168.1.136	1433	sqlserver	8.00.760

Figure 42 - Verify Rows in gsa_dba_database_server Table

10. **Verify Management Console** – To complete the troubleshooting procedure, minimally verify the monitored database servers are reported in the Database Management pane on the Management Console's Home Page.



Server Name	Database	Used (MB)	Total (MB)	% Space Used
INSTRUCTOR3W2K	ReportServerTempDB	0.90	1.24	72.33
INSTRUCTOR3W2K	tempdb	1.01	8.50	11.86
INSTRUCTOR3W2K	model	1.13	1.25	90.00
INSTRUCTOR3W2K	pubs	2.06	2.50	82.50
INSTRUCTOR3W2K	ReportServer	2.11	2.50	84.38
INSTRUCTOR3W2K	Northwind	3.52	4.25	82.90
INSTRUCTOR3W2K	msdb	11.78	14.00	84.15

Figure 43 - Database Management Pane

Upgrade Database Agent

For upgrading a Database Agent, uninstall the previous release of the Database Agent before you upgrade by installing the Database Agent for the current release of the Sun StorageTek Business Analytics software.

Uninstall Database Agent – InstallShield

1. Select **Start->Program Files->Storability->Uninstall->Uninstall Local Manager**
   Or:
   Start->Program Files->Storability->Uninstall->Uninstall <Database Agent Name>. The Storability **Uninstall** dialog appears.
2. Click the checkbox for the appropriate Database Agent.
3. Click **Next>**. The **Question** dialog appears.
4. Click **Yes** to confirm uninstalling the agent. An uninstalling agent splash box appears as each selected agent is uninstalled.
5. When the InstallShield Wizard Complete dialog box appears, click **Finish**.

Uninstall Database Agent – Solaris

To uninstall the Database Agent on Solaris, you uninstall the GSMsysbase or GSMoracle package and then uninstall the GSMdb package.

1. Type:

```
pkgrm GSM<DB_Agent_Name>
```

2. At the "do you want to remove this package" prompt, enter **y** and press **Enter**.

3. At the "do you want to continue the removal of the package?" prompt, type **y** and press **Enter**. The "Removal of GSM<DB_Agent_Name>" agent was successful" message appears.

4. Repeat the above procedure to uninstall the GSMdb package.

Reinstall Agent – Non-Solaris UNIX Host

The reinstallation procedure for all Storability agents supported on non-Solaris UNIX hosts, such as the Database Agent on an HP-UX server, requires that the installer perform the following steps **before** running the agent's installation script:

1. Make a backup copy of the existing agent configuration file (storability.ini).

2. Make a backup copy of the contents of /opt/storability/etc/agents.

3. Open the existing agent configuration file (storability.ini) in a system text editor.

4. Locate the configuration section for the agent to be reinstalled.

5. Delete all existing configuration settings for that Storability agent.

6. Save the modified agent configuration file.

7. Remove the existing /opt/storability/etc/agents directory.

At this point, you may reinstall the agent using the agent's installation script (e.g., dbAgent-install.sh).

APPENDIX A: DATABASE AGENT AND DB2

Sun StorageTek Business Analytics reports, such as the Database Management pane, can currently show one hundred percent (100%) storage utilization for some DB2 databases. The user is given the impression that the DB2 database is running out of space where, in fact, this is not necessarily true.

As this section will describe, this is not a correct storage utilization percentage if the DB2 database is wholly comprised of System-Managed Storage (SMS) tablespaces. Table 1 provides definitions for the two types of DB2 tablespaces.

As subsequently explained, the Database Agent does not correctly report storage utilization at the container level because of a restriction in the DB2 Call Level Interface (CLI), which the Database Agent (dbAgent) uses to query the DB2 database tablespace's total space and used space.

DB2 STORAGE MODEL

The following table describes the DB2 storage model.

DB2 Storage Element	Description
Tablespaces	Tablespaces in DB2 provides a logical layer between data and the storage devices. They define where table data is physically stored on disk. DB2 UDB (Universal Database) supports two types of tablespaces: System-managed storage (SMS) tablespaces and Database-managed storage (DMS) tablespaces.
SMS Tablespaces	• Storage is allocated by Operating System as needed. • A SMS tablespace can only use directory container. It cannot use files or raw container (character device). • Size will increase to the limits of the device on which the container (directory) is defined. Because of the above characteristics of SMS tablespaces, the Database Agent reports the used space and the total space as being equal.
DMA Tablespaces	• Tablespaces are built on pre-allocated portions of storage, which are known as "containers" • The "containers" can be either files or raw devices and the DB2 Database Manager manages their storage. Because of the above characteristics of DMS tablespaces, the Database Agent (dbAgent) can report on used space and total space allocated and thus storage utilization can be correctly calculated and reported.

DB2 Storage Element	Description
Containers	• A container is a directory, a regular file, or a raw device. • DB2's Call Level Interface API does not provide an interface to used storage (i.e., used page). • Page has size of 4K, 8K, 16K, and 32K at the container level. Because of the above characteristics of DB2 containers, the Database Agent is limited in reporting container's used space. Currently dbAgent report used space as total space for container.
Extent	• An extent is defined as a number of pages (default to 32 pages) within the container. • Currently, the Database Agent does not report on extents.

Table 7 - DB2 Storage Model

DATABASE AGENT'S REPORTING ON DB2 STORAGE UTILIZATION

When the Database Agent uses the DB2 CLI interface to query the tablespace's total space and used space, the DB2 Application Programming Interface (API) call returns a data structure in which the "usedPages" field is only applicable to Database-managed Storage (DMS) tablespaces. For SMS tablespaces, the "usedPages" field is the same as that for "totalPages." This limitation of the DB2 API results in the percentage (%) space utilized that the Database Agent reports to be inaccurate for SMS tablespaces.

Figure 2 shows how the Database Agent's **gsa_dba_logical_storage_unit-2_2** object reports the used space as the same as the total space for SMS tablespaces through the use of the Agent Diagnostic Tool (gsmdiag.exe).

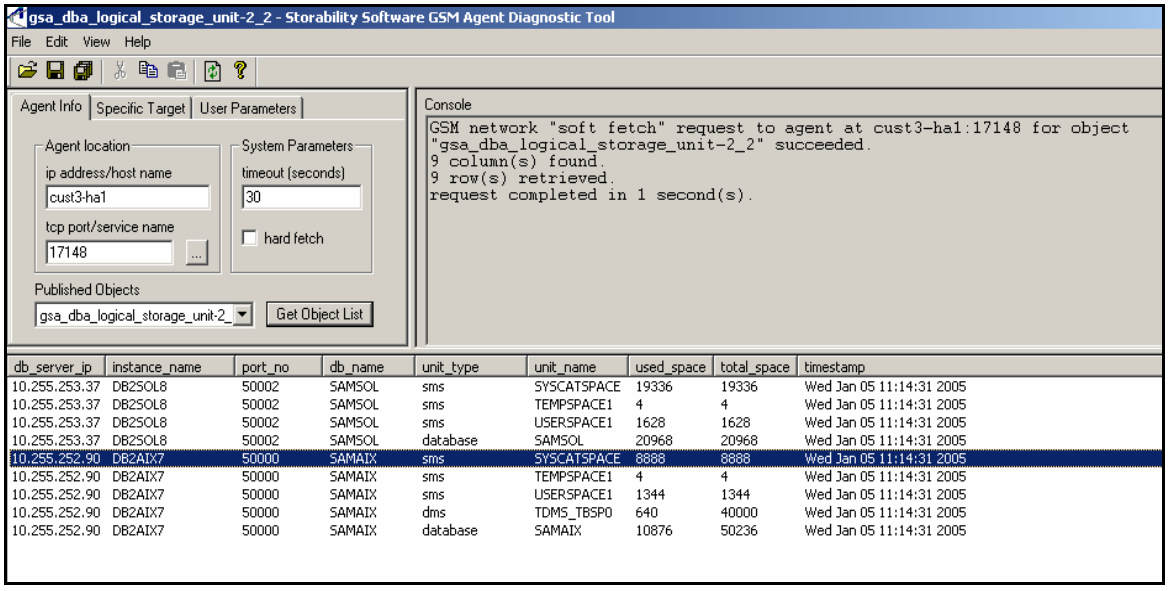


Figure 44 - Agent Diagnostic Tool

The used page and total page reporting issue for SMS tablespaces can also be demonstrated by issuing the list tablespaces show detail command as shown below.

```
      db2 => list tablespaces show detail

 Tablespaces for Current Database

 Tablespace ID                                = 0
 Name                                         = SYSCATSPACE
 Type                                         = System managed space
 Contents                                     = Any data
 State                                        = 0x0000
   Detailed explanation:
     Normal
 Total pages                                  = 4834
 Useable pages                                = 4834
 Used pages                                   = 4834
 Free pages                                   = Not applicable
 High water mark (pages)                      = Not applicable
 Page size (bytes)                            = 4096
 Extent size (pages)                          = 32
 Prefetch size (pages)                        = 32
 Number of containers                         = 1

Tablespace ID                                 = 3
 Name                                         = DMS_TBSP0
 Type                                         = Database managed space
 Contents                                     = Any data
 State                                        = 0x0000
   Detailed explanation:
     Normal
 Total pages                                  = 5000
 Useable pages                                = 4960
 Used pages                                   = 96
 Free pages                                   = 4864
 High water mark (pages)                      = 96
 Page size (bytes)                            = 4096
 Extent size (pages)                          = 32
 Prefetch size (pages)                        = 32
 Number of containers                         = 1
```

CONCLUSION

This appendix has illustrated the restriction in the DB2 CLI/API interface, which the Database Agent uses to report on DB2 databases, that can cause incorrect reporting on storage utilization for certain types of DB2 storage.