



BakBone[™]
S O F T W A R E

NetVault[®] : Backup

APM/plugin user's guide

for the
Sybase ASE APM

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APM/Plugin User's Guide for the Sybase ASE APM

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BakBone Software

NetVault®: Backup

APM/plugin user's guide

Sybase ASE APM

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SY.0.0 About the Sybase ASE APM

As Sybase™ storage environments experience rapid growth, so has the importance of data management and storage. The increasing size and number of Sybase ASE applications brings to the forefront the need for a storage management solution that protects important corporate assets while keeping the Sybase application running and available. The Sybase ASE Application Plugin Module (**Sybase ASE APM**) for NetVault provides a high performance, reliable and easy-to-use Sybase-specific backup and restoration solution for protecting corporate data. The **Sybase ASE APM** for NetVault increases application availability by providing fast, online backup of databases for UNIX, Linux, and Windows environments. The main features included in the APM are described in the following list:

- **Hot Backup:** With the NetVault **Sybase ASE APM**, user databases remain online and fully accessible during backup operations, minimizing downtime.
- **Supports Multiple Database Servers Operating on One Machine:** The **Sybase ASE APM** allows backup or restore operations to be applied to any or all available Sybase ASE servers.
- **Selectable Database Backup Operations:** With the easy to use, point and click Sybase-specific user interface, administrators can select precisely what needs to be backed up or restored. If the database server node is opened, an administrator may select specific items from a list of databases, with a simple mouse click.
- **Multiple Backup Modes:** The **Sybase ASE APM** supports full backups and transaction log backups.
- **Logs Sybase ASE Error Messages:** The Sybase ASE software records all messages to private log files. During backup and recovery operations, NetVault intercepts log messages related to the current job and sends a copy to the NetVault log so they can be displayed with other NetVault job messages.

SY.0.1 Target Audience

Sybase DBA skills are not generally required for routine backup operations. However, initial configuration and recovery operations may require DBA experience.

SY.1.0 Installing the Sybase ASE APM

Installed via the **Client Management** window of NetVault, an installation environment for the **Sybase ASE APM** can be set up in one of two ways, depending on various factors including hardware availability and each system's overall resources:

- **Server-Only Environment** - In this environment, the NetVault Server and the Sybase database server software are installed on the same machine. This configuration allows the NetVault Server to act as a client to itself and backup Sybase data locally.
 - ❖ **Benefit** - Less hardware is required. (Only a single server machine is required to house both pieces of software.)
 - ❖ **Drawback** - Having both software items on the system may dramatically impact system resources. A high-end machine is required.
- **Client-Server Environment** - In this environment, the machine acting as the NetVault Server is an entirely different machine than the one acting as the Sybase Adaptive Server.
 - ❖ **Benefit** - There is less impact on both machines in use, so more resources are available for other operations, or lower-end machines may be used for each purpose. Also, additional Sybase Adaptive Servers can be easily added as need arises.
 - ❖ **Drawback** - Additional hardware is required.

SY.1.1 Installation Synopsis: Installation Environments

This section offers a synopsis of what is necessary to establish either of the above mentioned installation environments.

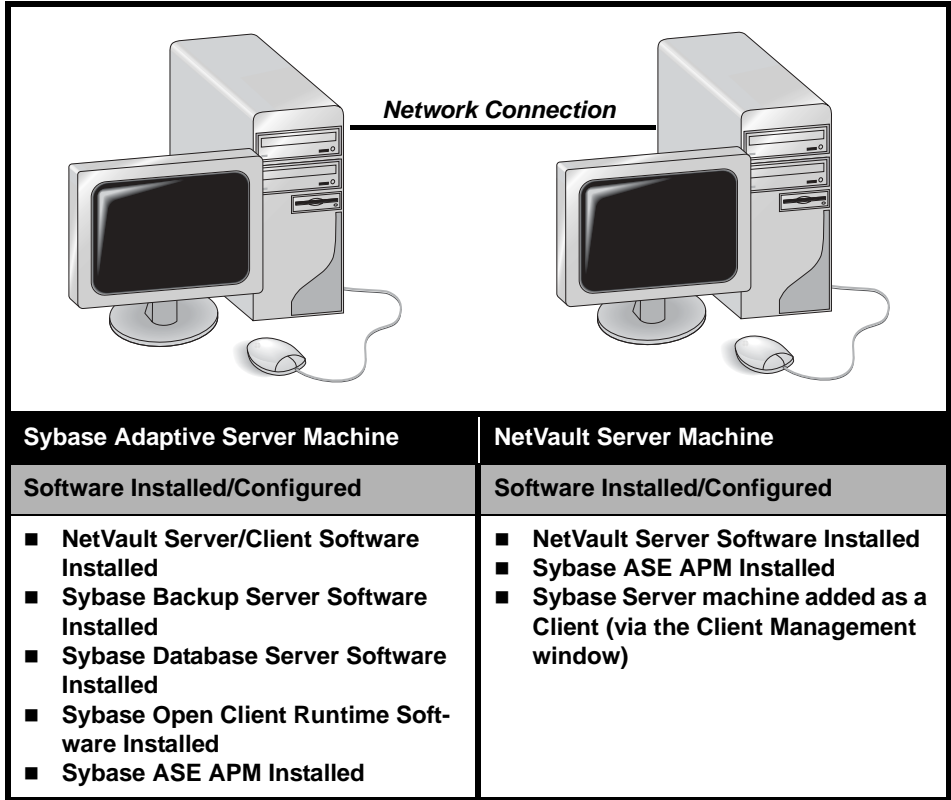
SY.1.1.a Server-Only Environment

A server-only environment allows for one machine to serve as the NetVault Server machine and Sybase Adaptive Server machine. The table gives a brief outline of the software requirements necessary to create this type of environment.

NetVault/Sybase Server
Software Installed:
<ul style="list-style-type: none"> ■ Sybase Adaptive Server Software ■ NetVault Server Software ■ Sybase Backup Server Software ■ Sybase ASE APM

SY.1.1.b Client-Server Environment

A client-server environment is one in which the NetVault Server and the Sybase Adaptive Server are two different machines, with the Sybase server acting as a client to the NetVault Server. The table that follows gives a brief outline of the software and configuration necessary to create this type of environment.



Important:

1. The **Sybase ASE APM** cannot successfully back up data from a client machine whose NetVault name contains a hyphen (e.g., "-"). Any NetVault machine named in this manner must have NetVault **re-installed** and a new name given to it, without a hyphen, in order to be a target of a **Sybase ASE APM** backup.
2. When many database servers and/or applications are running, more physical memory, as well as a higher shared memory setting, may be required.



SY.1.1.2 Pre-Installation Requirements

Pre-installation requirements vary based on the desired installation environment. The following sections offer details on these requirements.

Before installing the **Sybase ASE APM** to the target machine, make sure the following software is installed and configured, and that the following hardware requirements are met:

- **Sybase Adaptive Server** (installed on the NetVault machine containing the **Sybase ASE APM**)
- **Minimum of 128 Mb of Physical Memory**

SY.1.1.2.a Server-Only Environment

The following software must be successfully installed on the machine **before** the **Sybase ASE APM** is installed:

- **Sybase Database Server Software**
- **Sybase Open Client Runtime Software**
- **Sybase Backup Server Software**
- **NetVault Server Software** - Ensure that the **Server** version of NetVault is properly installed on the machine.

SY.1.1.2.b Client-Server Environment

The Sybase Adaptive Server Machine

The following software must be successfully installed on the machine **before** the **Sybase ASE APM** is installed:

- **Sybase Database Server Software**
- **Sybase Open Client Runtime Software**
- **Sybase Backup Server Software**
- **NetVault Client/Server Software** - Ensure that at least the **Client** version of NetVault is properly installed on this machine.

The NetVault Server Machine

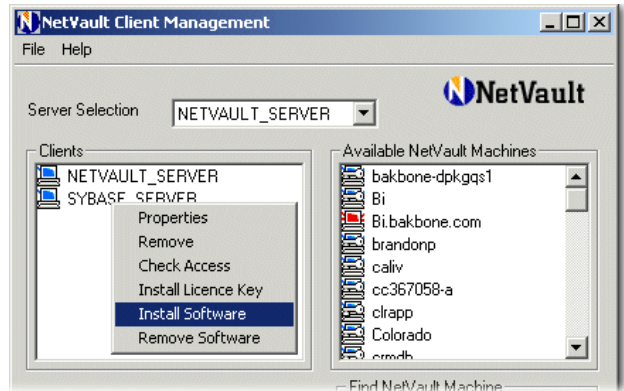
- **NetVault Server Software Installed** - Ensure that the server version of NetVault is properly installed and running on this machine.
- **The Sybase Adaptive Server Machine Must be Added to the NetVault Server for Access** - Once NetVault (Client or Server) has been successfully installed on the Sybase Adaptive Server machine, it is necessary to add it as a client to the NetVault Server. This will allow for the NetVault Server to access it for a backup/recovery. This is accomplished via the **Client Management** window of the NetVault GUI.

Important: For complete details on adding clients to the NetVault Server, please see the *NetVault Administrator's Guide*.

SY.1.3 Installation Procedure

Figure EX-1:
The Client Management window of NetVault

1. From the machine acting as the NetVault Server, open the NetVault **Client Management** window by clicking the **Client Management** button on the NetVault GUI (or select **Client Management** from the **Administration** pull-down menu).



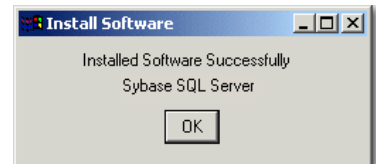
2. Right-click on the desired machine in the **Clients** window and select **Install Software** from the pop-up menu.
3. Navigate to the location of the “.npk” installation file (e.g., the NetVault APM Installation CD or the directory where it was downloaded). Select the file (e.g., **sybxxxx.npk**) and click on **Open** to proceed.

Important:

1. Based on the operating system being used, the directory path for this installation software may vary, but the file required for this process should be entitled “**sybxxxx.npk**” (where “xxxx” represents various software platforms and version numbers).
2. To install this software on a remote client via the NetVault Server, the Client must first be successfully added. For complete details on adding a Client to the NetVault Server, please see the *NetVault Administrator's Guide*.

Figure EX-2:
The dialog box launched upon the successful installation of the Sybase ASE APM

4. The installation process will occur automatically and once it has completed, a successful installation message will appear in the **Install Software** dialog box.
5. The APM is now installed.



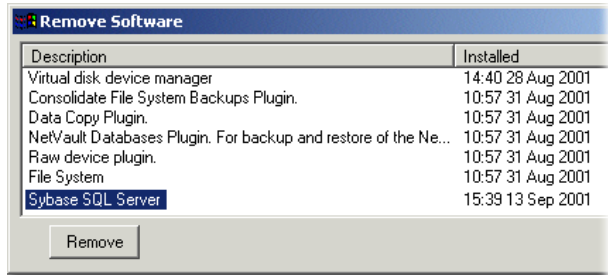
Important: For accessing the Sybase libraries, the **Sybase ASE APM** requires the following environment variable to be set post-installation on a UNIX/Linux based operating system.

LD_LIBRARY_PATH = <path to Sybase installation>/lib

SY.1.4 Removing the Sybase ASE APM

Figure EX-3:
The Remove Software window with the Sybase ASE APM selected for removal

1. From the machine acting as the NetVault Server, open the **NetVault Client Management** window by clicking the **Client Management** button on the NetVault GUI (or select **Client Management** from the **Administration** pull-down menu).



2. Right-click on the NetVault Server in the **Clients** window and select **Remove Software** from the pop-up menu.
3. In the **Remove Software** window, select the **Sybase SQL Server** item from the list and click the **Remove** button.
4. A dialog box will appear asking for confirmation of the remove command. Click **OK** to proceed (or **Cancel** to abort). Clicking **OK** results in the removal of the software and a confirmation message will appear. Click **OK** to close this dialog box and return to the **Client Management** window.

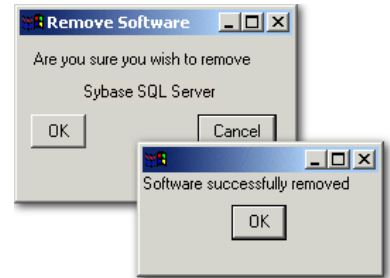


Figure EX-4:
The two dialog boxes that appear during the removal process for the Sybase ASE APM

SY.2.0 | Configuring the Sybase ASE APM

SY.2.1 Pre-Configuration

With the **Sybase ASE APM** installed and just prior to configuring the database environment through the NetVault GUI, it is necessary to ensure that the Sybase server is up and running. To verify this, perform the following steps.

SY.2.1.a Verifying the Sybase Server Status

1. Initiate a terminal session on the Sybase server.
2. Navigate to the directory containing the Sybase “**showserver**” utility. For example, in an environment running Sybase ASE version 12.5, this utility would reside in the following sub-directory of the Sybase installation directory (i.e., where “...” represents the path to the Sybase installation):

.../ASE-12_5/install/

3. From the command prompt, issue the command **showserver**. In the example that follows, the database server has been given the name “**rlgsw14**”.

Figure EX-5:

The showserver command is applied to the database server rlgsw14.

```
rlgsw14# showserver
UIDPIDPPIDCSTIMETTYTIMECMD
sybase344343013:48:24pts/20:00/opt/sybase/bin/backupser
ver -SSYB_BACKUP -e/opt/sybase/install
sybase338337013:48:08?0:03/opt/sybase/bin/dataserver
```

If the “-s” argument for the **dataserver** *does not appear* at the beginning of the argument (e.g., “**r -srlgsw14...**”, as shown in the final line of the example above), NetVault will not be able to look up the server name. If this is the case, edit the Sybase initialization file as described in the following step and reboot the server.

Figure EX-6:

Edit the content of the `RUN_<server name>` file (e.g., `RUN_rlgs14`) as shown in this example

- Edit the content of file “`RUN_<server name>`” file so that NetVault can successfully locate the database server name from the [dataserver] command by adding the “-s” argument. This file should be located as follows:

`$$SYBASE/install/`

By doing so, the command will output the [-s] argument information first.

```
#!/bin/sh
#
# Adaptive Server name: rlgs14
# Master device path: /opt/sybase/master.dat
# Error log path: /opt/sybase/install/rlgs14.log
# Directory for shared memory files: /opt/sybase
# /opt/sybase/bin/dataserver
-srlgs14 <----- Note: This Line was Added Here
-d/opt/sybase/master.dat
-e/opt/sybase/install/rlgs14.log
-M/opt/sybase
```

SY.2.1.b Setting the Administrator's Password

Figure EX-7:

The `sp_password` command is followed by the existing password, followed by the new password (NetVault) and finally the user

The Sybase administrator's password must **not** be set to a “null” value (i.e., an actual value must exist). In the example at left, syntax is used to create a password for the account “**sa**”, which currently has no password (it is set to the null value). The password will be changed to NetVault. The user can select any password (i.e., the password does not have to be “**NetVault**”).

```
#isql-Usa-P-Sbakbone
1>sp_password NULL,NetVault,sa
2>go
3>exit
#isql-Usa-PNetVault-Sbakbone
```

SY.2.1.c Working with NetVault Encryption Functionality

If NetVault's Encryption functionality has been enabled to protect data during backup and restore operations, one of the the following procedures must be followed to allow for successful backup and restore:

Important: If one of the following procedures is not used, and encryption functionality is enabled, any **Sybase APM** job will fail and an error message will be revealed.

Method 1: Change Read/Write Permissions

Proper permissions can be granted to a specific NetVault directory to allow for encrypted backups and restores. Perform these steps to accomplish this:

- Initiate a terminal session on the Sybase Server

2. Navigate to the following directory (i.e., where “...” refers to the complete path to the installation on the machine):

...\netvault\db\bkl

3. Initiate the following command to change the permissions on this directory and allow for encrypted backups and restores:

chmod o+rx bkl

Method 2: Disable Encryption

With the Encryption functionality disabled, no encryption will occur during backup and restore, but this error will not occur.

1. Access the Sybase Server machine and launch the NetVault Configurator.
2. Locate the **Encryption** tab and click on it to access its functionality.
3. Ensure that the **Use Secure Encryption on this Client** option is **disabled** (i.e., “unchecked”).
4. Click on the **Apply** button, followed by the **OK** button. This will confirm the setting and close the Configurator.

Important:

1. Disabling NetVault Encryption applies to the use of all NetVault APMs and Plugins. Once disabled on the Sybase Server, **no** NetVault backups of this machine will be encrypted.
2. If previous backups were performed of the Sybase Server machine with Encryption **enabled** (i.e., with a different NetVault Plugin or APM), the Encryption functionality must be re-enabled before a restore of these backups can be performed.

SY.2.2 Configuring the APM in the NetVault GUI

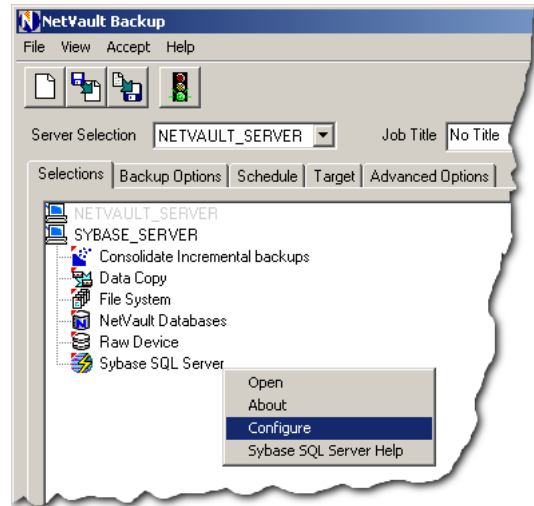
To successfully configure the **Sybase ASE APM** for use in a Sybase database environment, follow these steps:

1. From the NetVault Server, launch the **Backup** window by clicking either of the **Backup** buttons from the main GUI (or by selecting the **Backup** command from the **Operations** pull-down menu).
2. Locate the NetVault Client machine that is acting as the Sybase Server. Right-click on it and choose **Open** from the pop-up menu (or double-click on this client) to display a list of APM/plugins installed on this machine.

Figure EX-8:
When the **Configure** command is selected from the pop-up menu, the **Configure** dialog box is made available

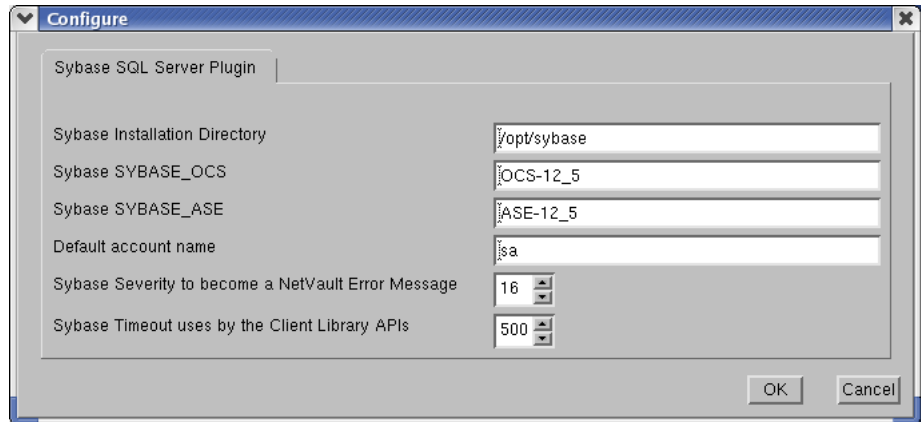
3. Right-click on the **Sybase SQL Server** and choose the **Configure** command from the pop-up menu.
4. The **Configure** dialog box will appear with the following options:

- **Sybase Installation Directory** - In this field, input the **exact** path to the local installation of the Sybase Server software
- **Sybase SYBASE_OCS (Sybase ver. 12.x ONLY)** - Input the name of the sub-directory contained in the Sybase installation directory which houses Sybase **library** files (e.g., files such as “**libinsck**”, and “**libtli**”). This directory title will vary, based on the version of Sybase in use:
 - ❖ **Sybase ver. 11.0** - **Leave blank if using this version of Sybase**
 - ❖ **Sybase ver. 12.0** - “**OCS-12_0**”
 - ❖ **Sybase ver. 12.5** - “**OCS-12_5**”
- **Sybase SYBASE_ASE (Sybase ver. 12.x ONLY)** - Input the name of the sub-directory contained in the Sybase installation directory which houses the **scripts** used to run the Sybase service. This directory title will vary, based on the version of Sybase in use:
 - ❖ **Sybase ver. 11.0** - **Leave blank if using this version of Sybase**
 - ❖ **Sybase ver. 12.0** - “**ASE-12_0**”
 - ❖ **Sybase ver. 12.5** - “**ASE-12_5**”
- **Default Account Name** - Enter the appropriate account name in this field. (This information should be obtained from the Sybase DBA).
- **Sybase Severity to become a NetVault Error Message** - Set the severity level in this box to filter Sybase error messages. The higher the value, the more likely that NetVault will record these items in the logs. For example, if the severity level is set to **nine**, any Sybase errors with a severity level of **10 or greater** would **not** be displayed.
- **Sybase Timeout uses by the Client Library APIs** - Set the Sybase timeout period (in milliseconds) in this box. The Client Library APIs will timeout after the interval specified here.



Important: For Sybase Servers running version 12.5.2 set the timeout value to **zero**. When set to a value greater than zero for this version of Sybase, the APM will hang during backup operation.

Figure EX-9:
The Configure window as it appears in a Linux/UNIX-based installation of the Sybase ASE APM



SY.2.2.a Post Configuration (Windows-based O/S ONLY)

In environments in which the Sybase Server is running a Windows-based operating system, the following additional step must be performed after configuration of the APM in the GUI (i.e., based on the version of Sybase installed):

- **Sybase ASE ver. 11.9.2** - Copy the file, “**libsyhook.dll**” from the “**lib**” sub-directory of the NetVault installation directory (e.g., “**...\NetVault\lib**” to the **same** sub-directory of the Sybase installation directory (e.g., “**...\Sybase\lib**”).
- **Sybase ASE ver. 12.0** - Copy the file, “**libsyhook.dll**” from the “**lib**” sub-directory of the NetVault installation directory (e.g., “**...\NetVault\lib**”) to the “**ASE-12_0\lib**” sub-directory of the the Sybase installation directory (e.g., “**...\Sybase\ASE-12_0\lib**”).
- **Sybase ASE ver. 12.5** - Copy the file, “**libsyhook.dll**” from the “**lib**” sub-directory of the NetVault installation directory (e.g., “**...\NetVault\lib**”) to the “**ASE-12_5\lib**” sub-directory of the the Sybase installation directory (e.g., “**...\Sybase\ASE-12_5\lib**”).

SY.3.0 Backing Up Data with the Sybase ASE APM

The following section offers basic instructions on performing a backup with the **Sybase ASE APM**. This process can be broken down into three basic phases:

- **Phase 1: Selecting Data Items for the Backup**
- **Phase 2: Setting Backup Options**
- **Phase 3: Finalizing and Submitting the Job**

Each of these three phases are covered in the following sub-sections.

Important: Since the **Sybase ASE APM** is used to back up databases on the Sybase server, which is constantly running, it **will not** back up the Sybase database **startup parameters** and **environmental settings**. Therefore, one of the following must take place in order to back up these necessary files:

- **Take the Sybase ASE Database Off-line and Perform a Backup of the Database -** With the database offline, these files will not be active and will be included in a standard backup of the database.
- **In the Event of a Failure of the Sybase ASE Database, Perform a Backup of These Necessary Files Before Attempting a Recovery of the Database -** In this case, the necessary files can be found in the directory: “**.../opt/sybase**”.

SY.3.1 Phase 1: Selecting Data Items for the Backup

1. Click on the **Backup** button in the command toolbar (or choose the **Backup** command from the **Operations** pull-down menu). The NetVault **Backup** window will display a list of NetVault Clients that have been successfully added to the NetVault Server in the **Selections** tab.

Important: While navigating in the **Selections** tab of the **Backup** window, items in the tree can be opened in one of the following two manners:

- **Double-click on the Item's Name in the List**
- **Right-click on the Item and Select the Open Command from the Pop-up Menu**

Figure EX-10:
With the Sybase SQL Server icon opened, the entire Sybase Server is revealed and it can be selected for inclusion in a backup

2. Open the machine serving as the Sybase Server to display the list of APMs/Plugins currently installed for use.
3. Locate **Sybase SQL Server** item in the list and open it. The entire Sybase Server will be revealed for inclusion in a backup. If a backup of the entire Sybase Server is desired, select this item and proceed to **Step 6.**, below. If a more granular backup is desired (i.e., selecting individual Sybase databases for inclusion), proceed to the next step.

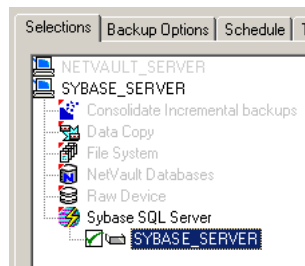


Figure EX-11:
The Sybase
Login window

4. Open Sybase Server. The **Sybase Login** window will appear, requiring login information be input to browse the Sybase Server's individual database items. Input these values as described below:

- **Account Name:** This field must contain the account name assigned to the Sybase Server during its creation (i.e., the account name that will allow access to the Sybase Server for backup/restore of its database information). The value input as the **Default Account Name** in the **Configure** window will appear here by default.
- **Password:** Input the password value that corresponds to the account name input in the previous field.

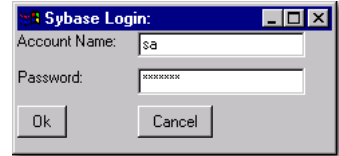
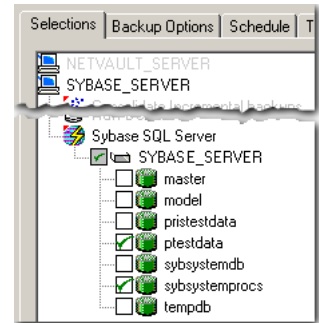


Figure EX-12:
With the
Account Name
and Password
verified,
individual
databases
housed on the
Sybase Server
can be
selected for
inclusion in a
backup

5. With successful input of the **Account Name** and **Password** information, the Sybase Server will be opened to reveal its individual database components, allowing for a more granular level of data selection. Select the desired database items for inclusion in a backup.
6. With the desired data items selected, it is recommended that a **Set** be created, using the **Selections Set** options at the bottom of the **Selections** tab. A **Set** allows for a selected range of data items to be saved into a composite group that can be accessed for use in future jobs, thereby eliminating the need to manually select the same items. **Set** creation is not unique to the **Sybase ASE APM**. Please see the *NetVault Administrator's Guide* for details on working with **Sets**.



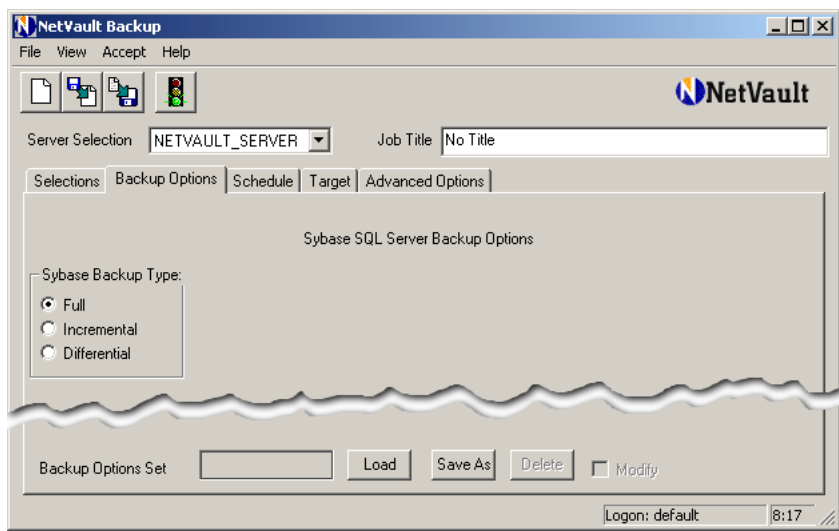
Important: In order to perform **Incremental** and **Differential** backups with the **Sybase ASE APM**, a **Selection Set** must be created when generating the initial Full backup.

SY.3.2 Phase 2: Setting Backup Options

With the desired items selected for a backup, the **Backup Options** tab can be accessed to display the options available here. This tab is comprised of two sections that allow for the setting of options.

- **The Sybase Backup Type Frame**
- **The Backup Options Set Options**

Figure EX-13:
The option available in the Backup Options tab for the Sybase ASE APM



SY.3.2.a The Sybase Backup Type Frame

This frame allows you to select the type of backup that will be performed:

Important: Options will only be displayed in this tab for use if data items have been selected from the **Selections** tab (i.e., they have been marked with a green check).

- **Full** - Performs a complete backup of selected data. This is the equivalent to the Sybase ISQL command “**DUMP DATABASE**”.
- **Incremental** - Performs a backup of the transaction log for the selected items. After the backup, these logs are truncated. This is the equivalent to the Sybase ISQL command “**DUMP TRANSACTION WITH TRUNCATE_ONLY**”. For complete details on the use of Incremental backups, please see the section, *Using Incremental Backups* on page 20.
- **Differential** - Performs a backup of the transaction log for the selected items. This is the equivalent to the Sybase ISQL command “**DUMP TRANSACTION**”. For complete details on the use of Differential backups, please see the section, *Using Differential Backups* on page 21.

Important:

1. Before performing an **Incremental** or **Differential** backup, a **Full** backup of the same data **must be** performed. In addition, **Incremental** or **Differential** backups can be performed **only** via a **Selection Set** of this initial **Full** backup. Therefore, while performing a **Full** backup it is essential to save the selected items into a **Selection Set**. Please see the *NetVault Administrator's Guide* for complete details on creating **Sets**.

2. For information on the how an **Incremental/Differential** backup sequence affects the way restores are performed, see *Restoring Incremental and Differential Backups* on page 24.
3. An **Incremental** or **Differential** backup of a database is only possible when the data and log are configured to reside on different devices. An error occurs if both data and log reside on the same device and an **Incremental** or **Differential** backup is attempted. This happens because the NetVault **Incremental** and **Differential** backups are equivalent to the **Dump Transaction** command of Sybase that backs up the transaction log. Sybase uses the transaction logs only in the event of disk failure in which case it is essential that this file exist in a different device.

SY.3.2.b The Backup Options Set

The lower portion of the **Backup Options** tab allows for the creation of a Set. A Set allows you to save the selections made in this tab into a group that can be used with future jobs, thereby making it unnecessary to manually select options in this tab. Set creation is not unique to this APM and complete details on this process can be found in *Appendix B: Working with Selection Sets* in the *NetVault Administrator's Guide*.

SY.3.3 Phase 3: Finalizing and Submitting the Job

With desired data items selected and the necessary **Backup Options** set, follow the steps below to finalize set up of the backup job and submit it.

1. Set additional options as appropriate in the **Schedule, Target and Advanced Options**. These options are consistent throughout all plugins and APMs in NetVault. Please see the *NetVault Administrator's Guide* for complete details on the options available in these tabs.
2. Enter a suitable title for the job in the **Job Title** box. It is recommended that a unique name be used, including the name of the APM used and the type of backup performed. This will allow for easy recognition of the job in the other areas of the NetVault GUI (e.g., when monitoring job progress or logs, or at restore time).
3. Submit the backup job by clicking the **Submit** button on the command toolbar. See the *NetVault Administrator's Guide* for information on viewing the job status, progress and log.

SY.3.4 Other Sybase ASE APM Backup Operations

The following sub-sections offer instructions on performing other backup operations with this APM.

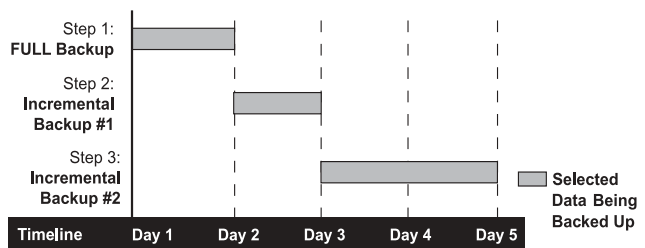
SY.3.4.a Using Incremental Backups

The following procedure outlines the steps necessary to perform a sequence of **Incremental** backups.

1. **Run a Full Backup** - This will perform a complete backup of all data selected in the **Selections** tab of the **Backup** window. Save these selected items into a **Selection Set** by clicking on the **Save As** button in the **Backup Selection Set** area of the **Selections** tab (See the *NetVault Administrator's Guide* for complete details on creating **Sets**). Follow this by selecting **Full** from the **Sybase Backup Type** frame in the **Backup Options** tab.
2. **Run the Initial Incremental Backup** - With the same data items included in the original Full backup selected from the **Selections** tab via a saved Backup Selection Set, launch an Incremental backup by selecting **Incremental** from the **Sybase Backup Type** frame in the **Backup Options** tab. Only the data that has **changed** since the original Full backup will be included in this job.

Figure EX-14:
An example Incremental backup scenario, with a Full backup performed on day two and Incrementals performed on day three and day five

3. **Run Additional Incremental Backups (as required)** - With the same data set selected as in the previous two backups, launch additional Incremental backups. These backups will create a backup saveset of **only** the data that has changed since the most recent backup, regardless of type (e.g., using the cycle started in the previous two steps, the next Incremental backup would only include data that is new or changed since the previous Incremental backup).



4. **Restore the Data as Required** - Restoring from an Incremental backup scenario requires that a specific set of steps be followed. Please see the section, *Restoring Incremental and Differential Backups* on page 24 for information on these required steps.

Synopsis - Faster Backup, Slower Restore

Incremental backup scenarios offer the fastest form of backup strategy because only data that is new or changed since the last backup is included. However, restoring data from an Incremental backup scenario tends to take a longer amount of time because each specific backup in the sequence, from the original Full through to the desired Incremental must be restored in order to

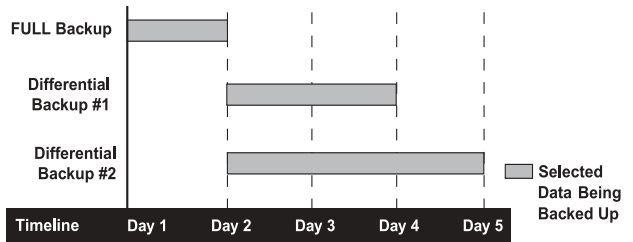
bring a database back to a specific point in time. For example, the original Full would need to be recovered first, followed by the individual restore of **each subsequent** Incremental, up to the desired point in time.

SY.3.4.b Using Differential Backups

The following procedure outlines the steps used to perform a **Differential** backup scenario.

Figure EX-15:
An example
Differential
backup
scenario, with
a Full backup
performed on
day two and
Differentials
performed on
day four and
day five

1. **Run a Full Backup -**
This will perform a complete backup of all data selected in the **Selections** tab of the **Backup** window. Save the these selected items into a **Selection**



2. **Run an Initial Differential Backup -** With the same data items used in the original Full backup selected from the **Selections** tab (e.g, via a saved Backup Selection Set), launch a Differential backup (by selecting **Differential** from the **Sybase Backup Type** frame in the **Backup Options** tab). Only data that has **changed** since the original Full backup will be included in this job.
3. **Perform Additional Differential Backups (as required) -** Each additional **Differential** backup performed will continue to include all data that is new or changed since the original Full backup, **including** all data included in any previous Differential backups.
4. **Restore the Data as Required -** Restoring from a **Differential** backup scenario requires that a specific set of steps be followed. Please see the section, *Restoring Incremental and Differential Backups* on page 24 for information on these required steps.

Synopsis - Slower Backup, Faster Restore

Differential backup scenarios offer a slower form of backup strategy because **all** data that is new or changed **since the original Full backup** is included for **each** Differential performed in a series. However, restoring data from this backup scenario is relatively fast, as only the original Full backup and the Differential performed at the desired point in time need to be recovered. For example, if a Full backup and a series of three Differentials have been performed and it is necessary to restore a database to its most recently backed up state, only the original Full backup, followed by the last Differential would need to be restored.

SY.4.0 Restoring Data with the Sybase ASE APM

This section offers basic instructions on the restore of a **Sybase ASE APM** backup. Similar to a backup job with this APM, the restore process can be broken down into four basic phases:

- **Phase 1: Selecting Data Items to be Restored**
- **Phase 2: Setting Restore Options**
- **Phase 3: Finalizing and Submitting the Job**
- **Phase 4: Post Restore Requirements**

The sub-sections that follow cover each of these phases.

SY.4.1 Phase 1: Selecting Data for the Restore

1. Launch the NetVault GUI and access the **Restore** window by clicking the **Restore** button on the command toolbar or by choosing the **Restore** command from the **Operations** pull-down menu. The NetVault **Restore** window will display a list of Clients that have served as successful backup targets in the **Selections** tab.

Important:

1. The database **must** be taken **offline** before performing an **Incremental** or **Differential** restore. An attempt to perform a restore of this type while the database is online will cause an error. For more information on **Incremental** and **Differential** restores, see the section, *Restoring Incremental and Differential Backups* on page 24
2. If restoring a master database, please see the section, *Restoring the Master Database* on page 26.
3. While navigating in the **Selections** tab of the **Restore** window, items in the tree can be opened in one of the following two manners:
 - **Double-click on the Item's Name in the List**
 - **Right-click on the Item and Select the Open Command from the Pop-up Menu**

2. Locate the Sybase Server in the list of Clients and open it. A list of the APMs/ plugins that have been used to backup data from this Client will be revealed.
3. Open the **Sybase ASE APM** to display a list of backup savesets created with this APM that are eligible for restore.
4. Open the desired backup saveset to display the Sybase Server(s) that served as a backup target. An entire Sybase Server item can be selected from this level of the tree. Selected in this manner, all items included in this particular backup will be restored. For example, if an entire Sybase Server was backed up in this backup saveset, **all** of this data will be restored. Also, if only

selected databases were included in the backup **all** of these individually selected databases will be restored.

Important: Items in the tree below the backup saveset level can only be opened by double-clicking on them (i.e., no pop-up menu with an **Open** command is available below this level).

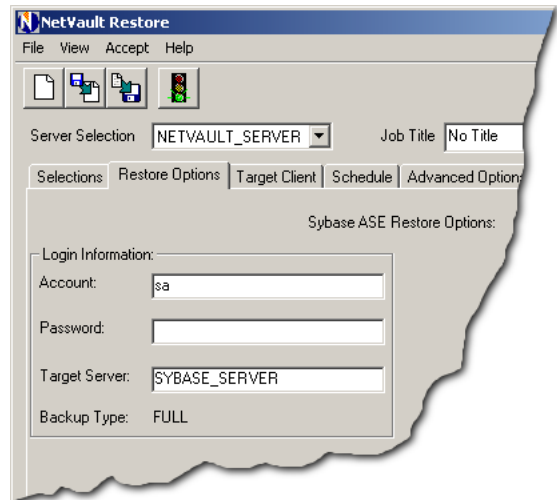
5. If a more granular restore is desired (i.e., not all of the data backed up is to be restored), open the Sybase Server to reveal the individual database contents. Select the desired databases for a restore.

SY.4.2 Phase 2: Setting Restore Options

Figure EX-16:
The options available in the Restore Options tab for the Sybase ASE APM

With the desired data selected for a restore, click the **Restore Options** tab to display the Sybase restore options. This tab is comprised of the **Login Information** frame which contains the following options:

- **Account** - Input the account name for the selected server that has the appropriate access for restore. By default, the value input in the **Default Account Name** field of the **Configure** window will appear in this field.
- **Password** - The password value associated with the specified account.
- **Target Server** - If it is necessary to relocate a restore to a different Sybase Server instance, input the name of the Sybase Server to which the restore should be sent. At default, the name of the Sybase Server from which this backup was initially taken will be displayed in this field. For more details on the use of this functionality, please see the section, *Restoring a Database to a New Location (Relocation)* on page 28.
- **Backup Type** - This defines the type of backup that was performed for the selected backup saveset (e.g., **FULL**, **INCREMENTAL** or **DIFFERENTIAL**).



Important: The **Account Name** used for the restore **must** have a Sybase password set for it (i.e., a password must have been set up for the account that is to be used and this value must appear in the Password field of the **Restore Options** tab). Using an Account Name that does not have a password set up for it will cause the restore job to fail.

SY.4.3 Phase 3: Finalizing and Submitting the Job

With the desired items selected for the restore and the Restore Options properly set, follow the steps below to finalize and submit the job.

1. Set options in the **Schedule**, **Target Client** and **Advanced Options** tabs as appropriate for the job. The options available in these tabs are not unique to the **Sybase ASE APM**. Please see the *NetVault Administrator's Guide* for complete details on the options available in these tabs.
2. Enter a suitable title for the job in the **Job Title** field. As with a backup job, it is recommended that a suitable name be used to allow for easy recognition of the job in NetVault (e.g., if it is necessary to access the job to view its progress of log entries).
3. Submit the restore job by clicking the **Submit** button on the command toolbar. See the *NetVault Administrator's Guide* for information on viewing the job status, progress and log.

SY.4.4 Phase 4: Post Restore Requirements

Once a Sybase database has been successfully restored with NetVault, the following must take place:

- **Each Database Restored *must be Brought Back Online*** - Through the use of the Sybase application software on the target Sybase Server, **each** successfully restored database must be brought back online. Please refer to the relevant Sybase Server software documentation for instructions on bringing a Sybase database back online.

SY.4.5 Other Sybase ASE APM Restore Operations

The following sub-sections offer instructions on performing several other forms of restore with this APM.

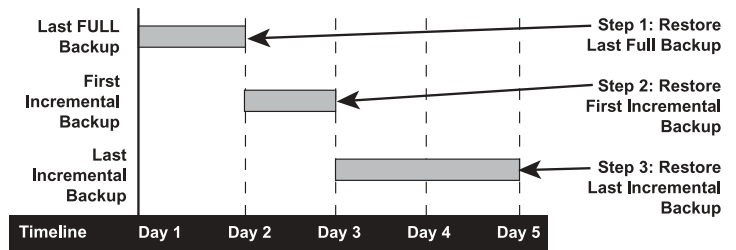
SY.4.5.a Restoring Incremental and Differential Backups

It is important to understand how Incremental and Differential backups are performed in order to properly restore either of these types of backup. Therefore it is recommended that the sections, *Using Incremental Backups* on page 20 and *Using Differential Backups* on page 21 be reviewed prior to attempting a restore of either type. The sections that follow give a brief outline on the required steps to successfully restore from both and Incremental and Differential backup.

Restoring from an Incremental Backup Scenario

Figure EX-17:
An example restore procedure for an Incremental backup scenario

Restore from an Incremental Backup: Last Full plus all Relevant Incrementals - Utilizing this strategy to



restore a database to a specific point in time, it is first necessary to restore the **original full backup** and then **each individual Incremental backup** in the order that they were created, up to the desired point in time. The example figure above, shows what would be required to restore a database to its most recently backed up state, after the original Full and two subsequent Incremental backups had been performed.

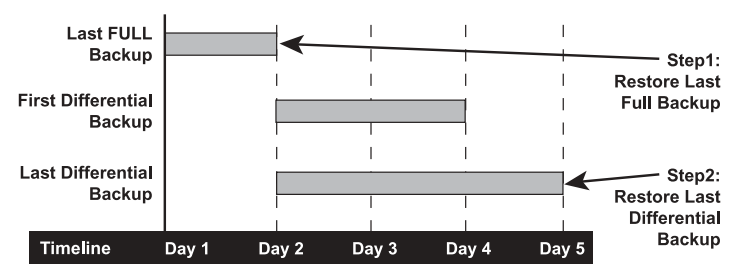
Important:

1. If **Incremental** backups are restored in the incorrect order, an error message will appear stating that the restore sequence is not correct, and the restore will fail. The recovery procedure will need to be restarted, including the restore of the most recent **Full** backup.
2. The database must be taken **offline before** performing an **Incremental** restore. An attempt to perform an Incremental restore while the database is online will cause an error.

Restoring from a Differential Backup Scenario

Figure EX-18:
An example restore procedure for a Differential backup scenario

Restore from a Differential Backup: Last Full plus Last Differential - Utilizing this strategy, it is first necessary to restore the



restore the **original full backup** and then **only** the subsequent Differential backup that was performed at the desired point in time. It is not necessary to restore each individual Differential backup in the order they were performed, because the nature of the Differential is to always backup all data that is new or has changed since the original Full. In the example figure above, it reveals that only the original Full backup and the most recently performed Differential would need to be restored in order to bring a database to its most recently backed up state.

Important: The database must be taken **offline** before performing a Differential restore. An attempt to perform a Differential restore while the database is online will cause an error.

SY.4.5.b Restoring the Master Database

Sybase requires the database server to be in single-user mode prior to restoring a master database. To restore a master database, follow these steps:

1. Place the database server in single-user mode. Please review the relevant Sybase Server documentation for instructions on this procedure.
2. Restore the master database backup following the steps in *Restoring Data with the Sybase ASE APM* on page 22 to initiate the restore.

Important: When selecting database items for a restore of this type, it is strongly recommended that the **only** item selected is the master database.

3. Once complete, the restore job will be displayed as “**Completed with Warnings**” in the NetVault **Logs** window (as well as the NetVault **Job Management** and **Status** windows). This is due to the fact that when the Sybase master database is recovered, the Sybase Server will shut down immediately **without** notifying NetVault of the completion status. This is expected behavior and the restore has actually completed successfully.
4. Restart Sybase as required.

SY.4.5.c Restoring a Non-Existent Database

In order to restore a database to a Sybase Server that currently does not contain the specified database, follow the instructions below:

1. **Re-create the Missing Database** - It is first necessary to create a database on the target Sybase Server that is the same as the one to be restored. Accomplish this by using the **Sybase ASE Software Tools** or through **Sybase ISQL**. Make sure the device allocations are the same as or larger than those defined for the original database.
2. Restore the **most recent Full backup** performed for the database in question, following the steps in the section, *Restoring Incremental and Differential Backups* on page 24.

SY.4.5.d Renaming a Database for a Restore

It is possible to rename a database item that is to be recovered during a restore. This functionality is especially useful when it is necessary to restore a previously backed up database item, without overwriting an existing one of the same name. Follow the instructions detailed below to accomplish this:

1. From the **Selections** tab of the **Restore** window, open the client machine that was used to perform the backup (i.e., the Netvault Client configured as the Sybase Server). Double-click on the **Sybase SQL Server** icon that appears in the tree to open it.
2. Open the backup saveset (by double-clicking on it) and the Sybase Server client will be revealed. Double-click on this to open it.
3. Individual database items will be revealed for selection. Locate the desired one and right-click on it to access its associated pop-up menu. Select the **Rename** command and the **Restore Rename** dialog box will appear.
4. Click the checkbox in this window in order to activate the **Rename to** field.
5. Input the desired new name in the **Rename to** field. Click on **OK** to commit the name change.
6. The window will close and the item will be displayed in the **Selections** tab, accompanied by its **Rename** information (i.e., enclosed in parenthesis).

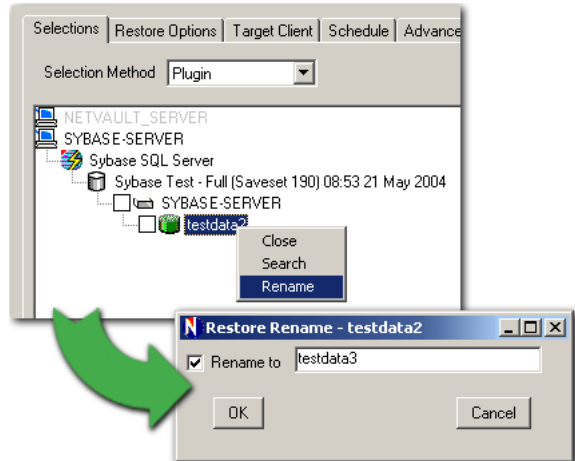


Figure EX-19:
With the desired database item located in the selections tree, right-click on it to access the Restore Rename window for the item

7. Select the renamed database item (i.e., by clicking in its accompanying checkbox) in order to include it in the restore job.
8. Perform any other standard restore operations as desired (as outlined in the section, *Restoring Data with the Sybase ASE APM* on page 22) and submit the job. Upon completion of the job, the renamed item will be restored to its original location, but will be assigned the new name value.

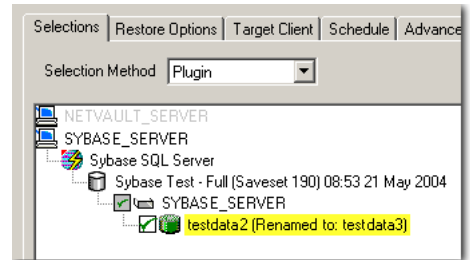


Figure EX-20:
With the Rename information input and the window closed, the database item will be accompanied with its Rename information

Important: Although the actual Sybase Server client item can be selected in order to perform a restore of an entire Sybase Server backup (e.g., the “**SYBASE_SERVER**” item revealed in the graphic above), it is not possible to utilize the **Rename** functionality outlined here at this level of the selection tree.

SY.4.5.e Restoring a Database to a New Location (Relocation)

Restoring a database to a new location allows the user to restore a database with its original name and configuration, but to a new location.

Important:

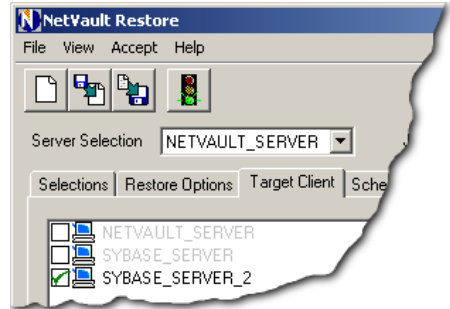
1. To properly restore a database to a new location, both machines (the machine that the original data was backed up from, as well as the machine to which the restore is to be relocated), must contain the same **Sybase Home** directory set up (i.e., in regards to location on the system).
2. In order to successfully relocate a Sybase database to another Sybase Server, the intended target machine must meet the following NetVault-related requirements:
 - **NetVault Installed** - At least the Client version of NetVault must be installed on the target machine. Also, the **Sybase ASE APM** must be installed and licensed for use.
 - **Added as a Client to the NetVault Server** - The new Sybase Server target machine must be added to the NetVault Server as a NetVault Client. This is all controlled from the Client Management window of the NetVault GUI. For complete details on this procedure, please see *Chapter 6: The Client Management Window of the NetVault Administrator's Guide*.

1. On the target Sybase Server, create a database that has the **exact same name and configuration** as the original. For details on creating a database in a Sybase environment, please refer to the relevant Sybase documentation.
2. Perform the initial steps, as described in the section, *Restoring Data with the Sybase ASE APM* on page 22 to select the desired database to be restored.
3. Select the **Restore Options** tab and input the name of desired new Sybase Server in the **Default Target Server** field.
4. In the **Account** field, input the account name that corresponds to newly set Sybase Server (i.e., an account name that will allow access to the installation of Sybase on the target machine).
5. Input the password value associated with this account in the **Password** field.

Important:

1. Entries in the **Password** field are case sensitive.
2. The **Account** and **Password** values given must be associated with the new target Sybase Server for this operation to function properly. Verify that the values input for these two fields correspond to the desired target Sybase Server.

6. Select the **Target Client** tab. From the list displayed, select the desired target Sybase Server. Ensure that the desired Sybase Server is the machine that is selected. Only machines that are currently added to the NetVault Server as clients will appear in this window. If the desired machine does not appear, it must be added as a NetVault Client.



7. Input a suitable name for the job in the **Job Title** frame and submit the job.
8. In the event that this is a recovery of a Incremental or Differential backup scenario, the instructions offered in the section, *Restoring Incremental and Differential Backups* on page 24 must be used in addition to these instructions in order to recover each phase of the backup.

SY.5.0 Troubleshooting

The following table describes commonly encountered problems and possible solutions. In those cases where an error occurs and is not described in this table, view the job log to extract the Sybase error number and then refer to the Sybase documentation for the resolution.

Symptom	Log Message	Solution
Backup failed	<i>Unable to open API library for device.</i>	Make sure the “ libsybhook ” file has been copied from the “ NetVault\lib ” directory to the appropriate Sybase directory. See the section, <i>Backing Up Data with the Sybase ASE APM</i> on page 16 for more details.
Backup failed (Linux/UNIX-based Sybase Server)	<p><i>Warning <Date and Time> Data Plugin AS3SMP Did not receive message back from libsybhook before grace time expired</i></p> <p>- or -</p> <p><i>Error <Date & Time> Data Plugin AS3SMP Sybase Message: ‘Error encountered by Backup Server. Please refer to Backup Server messages for details.’</i></p>	<p>The first time the Sybase ASE APM is used, NetVault will automatically generate a necessary symbolic link between the instance of Sybase and the NetVault Server (i.e., “\$SYBASE/ASE-<version #>/lib/libsybhook.<so/a/sl>” to “\$NV_HOME/lib/libsybhook.<so/a/sl>”). If this error is revealed, it is an indication that this symbolic link has been modified or removed. This link should be left alone and not modified. However, it can be re-established by issuing the following command from a terminal session prompt on the Sybase Server:</p> <pre>In -s /&lt;netvault_home&gt;/lib/libsybhook.<so/sl> \$SYBASE_HOME/ASE-<version #>/lib/libsybhook.<so/sl></pre> <p>Ensure that the proper version is used to call out the installation directory for Sybase (e.g., “12_5” for 12.5) and that the proper file extension is used for your O/S (e.g., “.so” or “.sl”).</p>

Symptom	Log Message	Solution
Backup failed	<i>... The attempt to connect to the server failed.</i>	Make sure the password for the database server has not been changed between the time the backup job was scheduled and the time the job ran. To resolve this, redefine the job.
An incremental or differential backup of a database failed.	<i>Syslogs does not exist in its own segment in database <database> with segmap <x> with logical start page number of '0'. You cannot use DUMP TRANSACTION in this case. Use DUMP DATABASE instead.</i>	The database device was configured so that the data and logs reside together and must be backed up as a unit. See your Sybase documentation for more information.
Cannot open the database server to display the databases within it.	<i>A NetVault Error dialog box opens with the message: Failed to get list of databases - check login information.</i>	Make sure the database server is online and ensure the correct password was entered when prompted in the Selections tab the NetVault Backup window.
Restore completed with warnings	<i>.... The attempt to connect to the server failed</i>	A password was not specified in the Restore Options tab of the Restore window. Enter the correct password for the account and resubmit the job. See the section, <i>Restoring Data with the Sybase ASE APM</i> on page 22 for more information.
Restore "Completed with Warnings"	<i>.... Net-Lib protocol driver call to connect two endpoints failed.</i>	The selected database server to be restored was offline. Ensure that the database server is online. See the section, <i>Restoring Data with the Sybase ASE APM</i> on page 22 for more information.

Symptom	Log Message	Solution
Database restore "Completed with Warnings"	<p><i>Attempt to locate entry in sysdatabases for database <name> by name failed - no entry found under that name. Make sure that name is entered properly.</i></p> <p><i>NOTE: When viewing the job log, in the NetVault Logs window, set the Filter Options to Information in order to view the complete message.</i></p>	The selected database for restore does not exist on the target Sybase Server. The database must be re-created with specifications that are the same as, or greater than the original, using Sybase ASE native utilities, before attempting the restore. Please see the relevant Sybase ASE documentation for instructions on re-creating a database.
Incremental restore "Completed with Warnings"	<i>Specified 'dump device' is out of sequence.</i>	An Incremental backup sequence is being recovered out of order. Previous Incremental backup(s) must be recovered first in order before attempting to recover the selected Incremental. See the section, <i>Restoring Incremental and Differential Backups</i> on page 24 for more information on successfully restoring an Incremental backup sequence.
Master Database restore "Completed with Warnings"	<p><i>...Net-Library operation terminated due to disconnect.</i></p> <p><i>or</i></p> <p><i>...The connection has been marked dead.</i></p> <p><i>or</i></p> <p><i>...There is a usage error. This routine has been called at an illegal time.</i></p>	These messages can be ignored. This is an expected behavior and the restore has actually completed successfully. These messages only state that the connection between NetVault Sybase APM and the Sybase Server was dropped due to the successful restore of the Master Database (i.e., any client connections to the Sybase Server are still valid).

