Symantec NetBackup Blueprints

Blueprint for SQL Server

Symantec Backup and Recovery Technical Services

Notice

This NetBackup Blueprint presentation includes example diagrams that contain objects that represent applications and platforms from other companies such as Microsoft and VMware. These diagrams may or may not match or resemble actual implementations found in end user environments. Any likeness or similarity to actual end user environments is completely by coincidence.

The goal of the diagrams included in this blueprint presentation is not to recommend specific ways in which to implement applications and platforms from other companies such as Microsoft and VMware; the purpose of these diagrams is to illustrate NetBackup best practices only.

For guidelines and best practices on installing and configuring applications and platforms from other companies, please refer to best practice documentation and other resources provided by those companies.

Symantec NetBackup Blueprints
How to use ?

These **Blueprints** are designed to show customer challenges and how NetBackup solves those.

- Each Blueprint consists of:
  - **Pain Points**: Explain the current challenges a customer faces.
  - **Whiteboards & Example Diagrams**: Describe the implementation of NetBackup solution.
  - **Best Practices**: Present NetBackup best practices to avoid common pitfalls
- Use these **Blueprints** to present the NetBackup best practice implementation example

Pain Points

NetBackup Blueprints: Microsoft SQL
Today's Challenges

- SQL Server is a Business Critical Application
  - Downtime is expensive
  - SQL needs to remain online and functional at all times
- Requirement for High Availability
- Limited Recovery Options
- File System backup tools are insufficient
  - Not reliable; cannot ensure proper recovery of SQL
  - May require SQL to be taken offline before manual backup can be captured
  - Does not improve the availability of critical SQL systems

NetBackup Advantages

NetBackup Blueprints: Microsoft SQL
Advanced SQL Agent capabilities (1)

- Full integration with the NetBackup master server and Media Manager.
- Stream-based backup and restore of SQL Server objects to tape or disk with SQL Server's high-speed virtual device interface.
- Snapshot-based backup and restore of SQL Server objects with NetBackup Snapshot Client methods.
- Backup and recovery of databases, differentials, files, filegroups, & transaction logs
- Browse capability for SQL Server objects on the local nodes and remote nodes.
- Performance tuning through user control of backup stripes, transfer size, and buffer usage.
- Compression and encryption of backups.

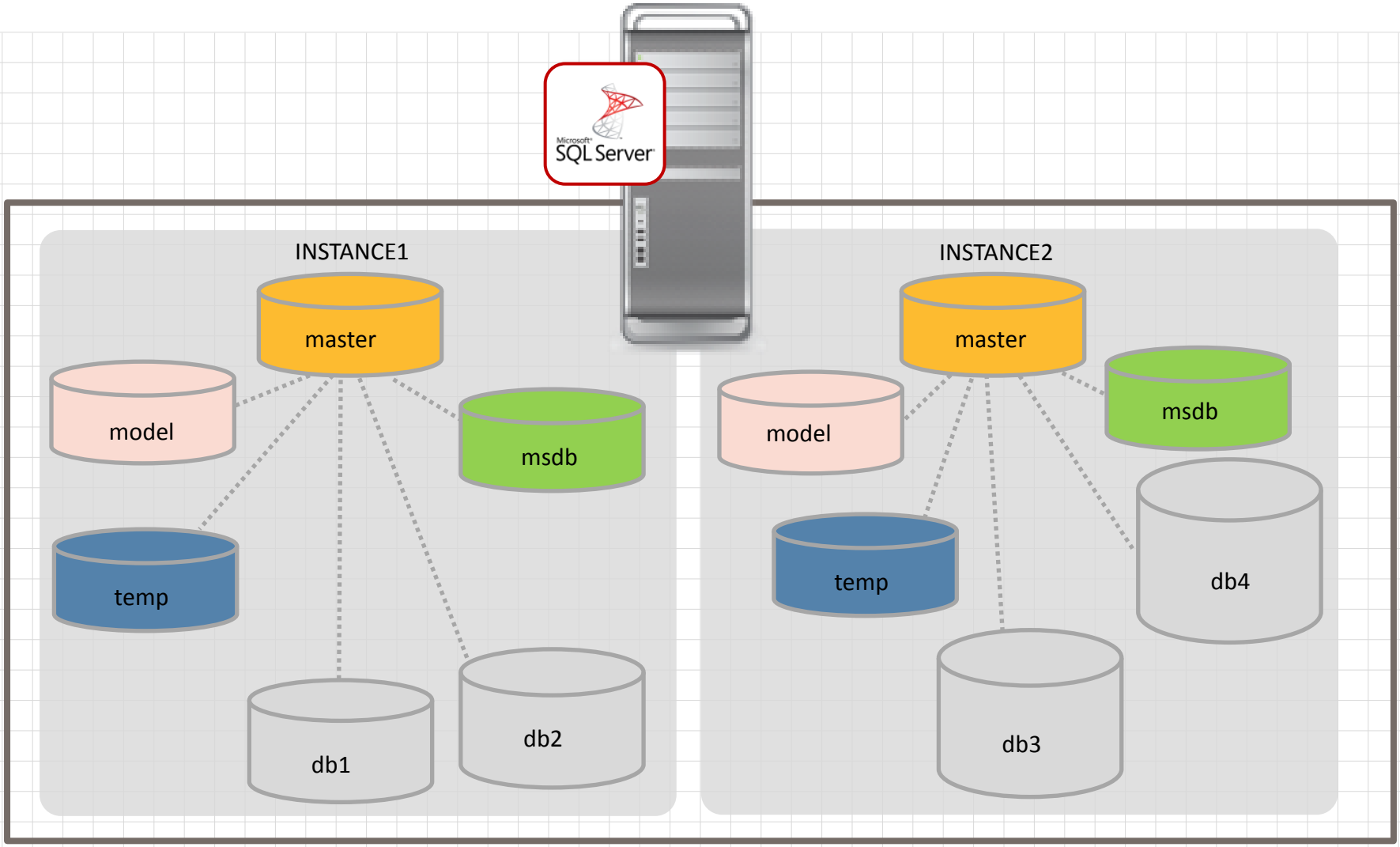
NetBackup Blueprints: Microsoft SQL
Advanced SQL Agent capabilities (2)

- Run operations with one of the following options:
  - Immediate launch through the NetBackup MS SQL Client
  - Scheduled backup in a backup policy
  - Command-line
- Recovery of the Microsoft SQL Server images that were backed up with Backup Exec
- Ability to restore a multistream backup with use of fewer devices than it was backed up with.
- Support for redirection of SQL Server restores to different locations.
- Support for multiple SQL Server instances.
- Support for instances of SQL Server that are clustered with Microsoft Cluster Server or VERITAS Cluster Server.

Whiteboards and Example Diagrams

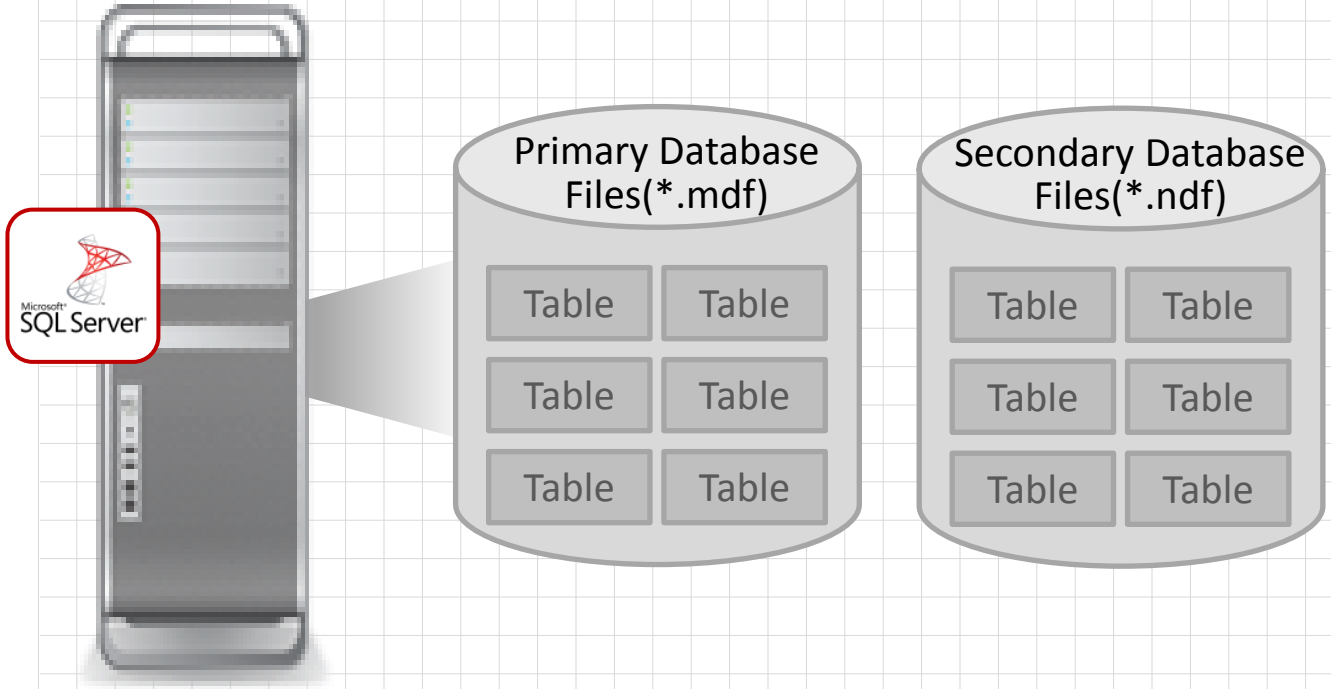
Whiteboards: Microsoft SQL Server

SQL server components



Whiteboards: Microsoft SQL Server

SQL Database components



Transaction Log Files (*.ldf)

- Transaction 1
- Transaction 2
- Transaction 3
- Transaction 4
- Transaction 5

For more information, refer to Microsoft article
http://technet.microsoft.com/en-us/library/ms189563.aspx

Whiteboards: Microsoft SQL Server
Filegroups

- Within the SQL Server, a number of files can be grouped into a logical container called a *file group*.
- Each database contains at minimum one primary file group and zero or more user-defined file groups.

Filegroup	Description
Primary	Contains the primary data file (MDF) and any other files which are not directly assigned a file group. Any system table allocations for the database are performed in the primary file group.
User-Defined	Can be created and destroyed by a user and are useful for dividing logical separations of data and to help manage growth. They may also be used to group data files which sit on similar disks, or RAID array so that you can partition by speed/fault tolerance.

Whiteboards: Microsoft SQL Server
Recovery models

A recovery model is a database property that controls how transactions are logged.

Recovery Model	Description
Simple	This method provides for minimal usage of log space. However, the database can only be restored to the last full backup. The inactive portion of the transaction log cannot be retained beyond the database checkpoint.
Full	The inactive portion of the transaction log is retained until it is truncated, which normally occurs when it is backed up. The transaction log can then be used to stage a recovery either to a point in time or to a named transaction.
Bulk logged	This method is identical to the Full Recovery model except that bulk operations are not logged and thus cannot be recovered.

Whiteboards: Microsoft SQL Server
Pre-Requisites for NetBackup

- Verify the operating system and platform compatibility.

http://www.symantec.com/docs/TECH126904

- Verify the NetBackup server and client requirements.
- Verify the SQL Server software is installed and operational.
- Add a valid license key for SQL agent on the master server.
- If the SQL client is on a different host than the master server or media server, then install the NetBackup client on that host
- In a VMware environment, the NetBackup client software must be installed on the virtual machines that have SQL Server running.

Configuring the NetBackup services

- NetBackup uses the *NetBackup Client Service* and the *NetBackup Legacy Network Service* to access the SQL Server when it performs backups and restores. The logon account NetBackup uses for these services must have the fixed server role "*sysadmin*." Both services must use the same logon account.

Choose a logon account for the NetBackup services as follows:

- For SQL Server 2008 and earlier, the sysadmin role is automatically applied to the NT AUTHORITY\SYSTEM and BUILTIN\Administrators groups. You can use Local System for the logon accounts for the NetBackup services.
- For SQL Server 2012, you must first apply the sysadmin role manually to the NT AUTHORITY\SYSTEM or the BUILTIN\Administrators group. Then you can use Local System for the logon accounts for the NetBackup services.

Whiteboards: Microsoft SQL Server
Permissions required for backup and restore

- NetBackup does not have any authentication requirements beyond Microsoft SQL Server's requirements for the backup and restore of SQL databases.
- The following SQL server roles have permissions to perform backups:
  SQL Server Role : sysadmin
  SQL DB role : db_backupoperator, dbo_owner
- The following roles have permissions to perform restores

SQL Server role : sysadmin, dbcreator
SQL DB role : db_owner (if the database exists)

- Refer to technote below to configure the NetBackup services for SQL server backups and restores:

http://www.symantec.com/docs/HOWTO85432

Example Diagrams: Microsoft SQL Server
Configuring the backup policy

Add New Policy - SQL-Test

Attributes | Schedules | Clients | Backup Selections

Policy type: MS-SQL-Server

Destination

Data classification: <No data classification>

Policy storage: b2d11

Policy volume pool: DataStore

Take checkpoints every: 0 minutes

Limit jobs per policy:

Job priority: 0

Media Owner: Any

Snapshot Client

Perform block level incremental backups

Perform snapshot backups — Options...

Retain snapshot for Instant Recovery or SLP management

HyperV server:

Perform off-host backup

Use:

Machine:

Go into effect at: 4/15/2014 10:41:45 PM

Follow NFS

Cross mount points

Compression

Encryption

Collect disaster recovery information for:

Bare Metal Restore

Collect true image restore information

with move detection

Allow multiple data streams

Disable client-side deduplication

Enable granular recovery

Use accelerator

Keyword phrase:

Enable indexing for search
(Must also be enabled for the schedule and client)

Indexing Server:

Microsoft Exchange Attributes

Exchange 2010 DAG or Exchange 2007 replication (LCR or CCR)

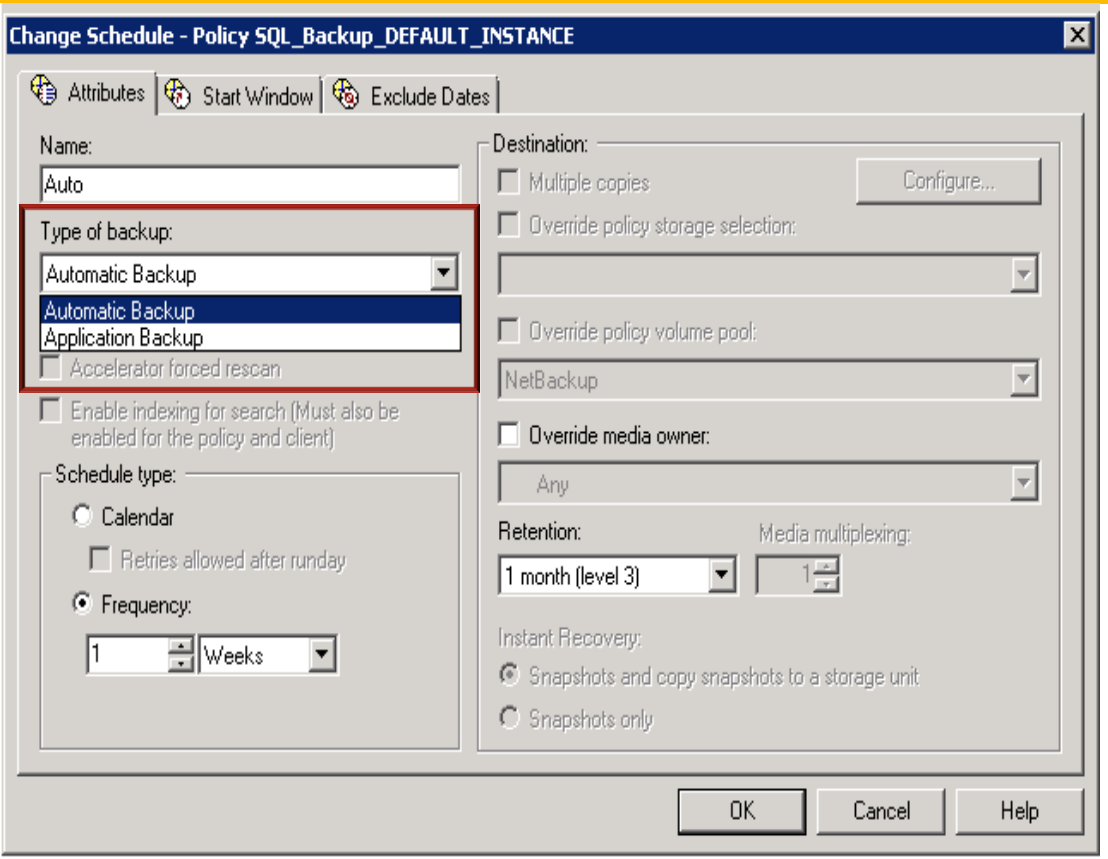
Database backup source:

Preferred server list... (Exchange 2010 DAG only)

OK | Cancel | Help

With a few exceptions, NetBackup manages a database backup like a file system backup

Example Diagrams: Microsoft SQL Server
Configuring the backup policy

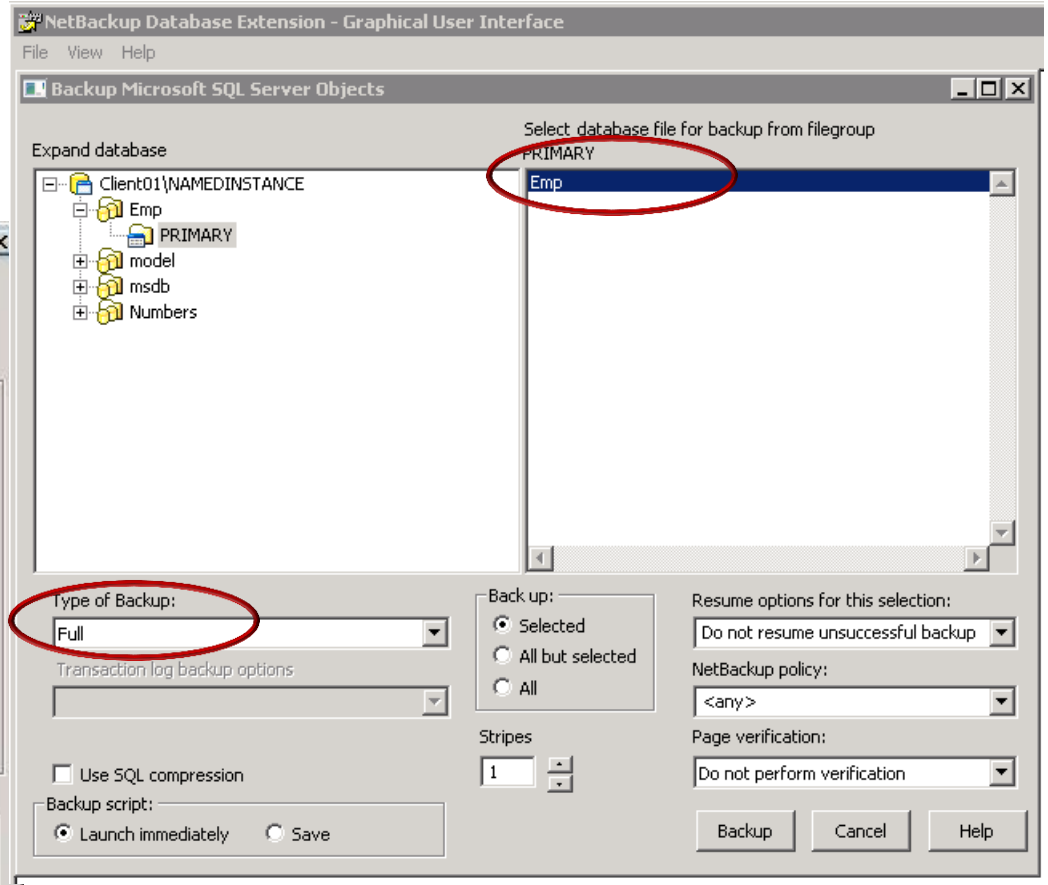


Application backup: This schedule enables user-controlled NetBackup operations from the client. These operations include those initiated from the client and those initiated by an automatic schedule on the master server. An application backup schedule has to exist and is used by NetBackup when the backup is run by the NetBackup scheduler or when run manually by a user.

Automatic backup: This schedule specifies the dates and times for NetBackup to automatically start backups. NetBackup runs the scripts in the order that they appear in the file list. If there is more than one client in the policy, the scripts are run on each client.

Example Diagrams: Microsoft SQL Server
Configuring NetBackup MS SQL client

Start the NetBackup Client software on the SQL server, by selecting **Start > Programs > Symantec NetBackup > NetBackup Agents > NetBackup MS SQL Client**.



From the "**Actions**" menu, select "**Backup**", and the "**Backup Microsoft SQL Server Objects**" dialog is presented .

Whiteboards: Microsoft SQL Server
Role of batch files

- Batch files are text files that contain directives that describe the backup or restore operation
- Individual batch files can be used explicitly with user directed operations
- Scripts are executed in the order they appear in the backup selection list
- For different types of backup to execute on different schedules:
  - Create multiple policies with automatic schedules
  - Assign each batch file to the appropriate policy that uses the desired schedule

Whiteboards: Microsoft SQL Server
Batch file guidelines and rules

- Rules
  - Batch file operations execute in sequential order
  - Each operation consists of a series of keyword value pairs
    - The keyword is not case-sensitive, but the value is
    - With the exception of the BATCHSIZE parameter, keyword value pairs are not global
    - The keyword value pairs can be in any order, except that each operation must end with ENDOPER TRUE
  - Operations are not nested
  - Comment lines begin with the pound sign (#)
- Guidelines
  - Code both the keyword and value in uppercase, except for the value of NBIMAGE
  - Name files using a unique name and the .bch file name extension
  - Save batch files on the NetBackup client in the default folder: install_path\NetBackup\DbExt\MsSql

Example Diagrams: Microsoft SQL Server
Batch files examples

Life Preservers

- The sample batch files `bkup.bch` and `rest.bch` are provided at installation, but they are not configured for your system.
- Modify these files or use them as examples.

Default `bkup.bch`

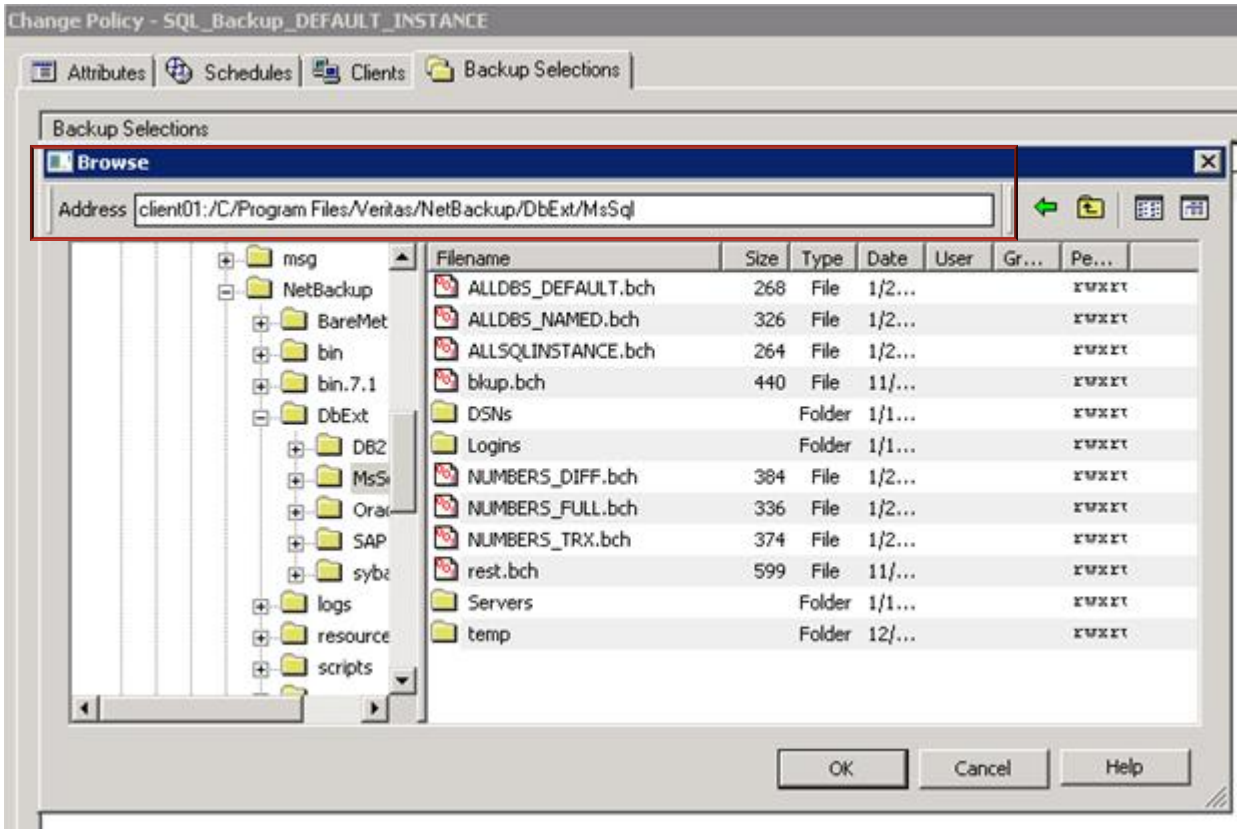
```
#************************
#* $VRTScprght: Copyright
#************************
#
OPERATION BACKUP
DATABASE "pubs"
SQLHOST "JUNEBERRY"
SQLINSTANCE "INSTANCEY"
NBSERVER "JUNEBERRY"
MAXTRANSFERSIZE 0
BLOCKSIZE 0
ENDOPER TRUE
```

Edited to back up all databases

```
OPERATION BACKUP
OBJECTTYPE DATABASE
DATABASE $ALL
SQLHOST "PC1TRAIN01"
SQLINSTANCE "LIBRARY"
NBSERVER "PC1TRAIN02"
MAXTRANSFERSIZE 0
BLOCKSIZE 0
ENDOPER TRUE
```

Example Diagrams: Microsoft SQL Server
Adding batch files to the backup selections list

In the NetBackup SQL policy->Backup Selections, you can specify batch files to be run.



Whiteboards: Microsoft SQL Server
Snapshot backups

- Requirements
  - A license key for both Snapshot Client and Microsoft SQL Server.
- Snapshot Client backups, are file-based.
  - NetBackup determines the file list that constitutes the SQL Server object and backs it up asynchronously with respect to SQL Server.
  - On the other hand, standard backups are stream-based, which means that SQL Server provides data to NetBackup buffer-by-buffer that constitutes a backup stream. The key role of SQL Server in file-based backups is to provide the mechanism to freeze database activity. NetBackup can then invoke a so-called snapshot provider that creates volume snapshots of the files.
- Limitations
  - Due to SQL Server limitations certain objects cannot be backed up by snapshots. These are database differentials, filegroup differentials, and transaction logs. If a Snapshot Client policy is selected to back up one of these object types, then NetBackup performs a stream-based backup.

Example Diagrams: Microsoft SQL Server
Snapshot backup options

Change Policy - SQL-Instance-1

Attributes | Schedules | Clients | Backup Selections

Policy type: MS-SQL-Server

Destination

Data classification: <No data classification>

Policy storage: master01-hcart-robot-tld-0

Policy volume pool: NetBackup

Take checkpoints every: 0 minutes

Limit jobs per policy:

Job priority: 0 (Higher number is greater priority)

Media Owner: Any

Snapshot Client and Replication Director

Perform block level incremental backups

Use Replication Director

Perform snapshot backups — Options...

Retain snapshot for Instant Recovery or SLP management

Hyper-V server:

Perform off-host backup

Use:

Machine:

Database backup source:

Preferred server list... (Exchange DAG only)

OK | Cancel | Help

Snapshot Options

Snapshot method: auto

auto
VSS
vxvm

Configuration Parameters

Parameter	Value

If no snapshot method is selected, an appropriate one based on hardware/software availability will be chosen at the time of backup.

Snapshot Resources

Array SN	Source	Snapshot Devices

Add | Change | Remove | Remove All

OK | Cancel | Help

ter01 Connected

Whiteboards: Microsoft SQL Server
dbbackex: command line backup

- Is the CLI for NetBackup agent for SQL Server
- Is used internally by NetBackup
- Can be invoked manually or programmatically
- Is useful for:
  - Client-scheduled backups
  - Running from scripts
- Syntax:

  install_path\NetBackup\bin\dbbackex -f *file* [-p *policy*][-u *userid*][-pw *password*] [-s *server*][-np]
- For more information, refer to http://www.symantec.com/docs/TECH87201

Whiteboards: Microsoft SQL Server
Types of database backup

Backup Type	Description
Full	The database, including all of its component files are backed up as a single image. The log file is included in a full database backup. Note: The transaction log is not automatically truncated following a full backup.
Differential	All of the changes since the last full are backed up to a single image.
Transaction Log	Transaction log backups are only available for the full and bulk-load recovery options. In this operation, the inactive portion of the transaction log is backed up. Four options are available when you select transaction log backup: ■ Back up and truncate transaction log. ■ Back up transaction log, but do not truncate it. ■ Truncate the transaction log, but do not back it up. (SQL Server 2000 only) ■ Back up and restore tail log. (SQL Server 2005 only)

Whiteboards: Microsoft SQL Server

Types of filegroup backup

Backup Type	Description
Filegroup Backups	A backup can be created from a single filegroup. Scripts for filegroup backups are created when you select individual filegroups in the object browser of the backup database dialog box.
Read-Write Filegroups Backups (SQL Server 2005 only)	A backup that contains only the read-write filegroups in a database. If all of the filegroups in a database are set to read-write, then the read-write filegroup backup has the same content as a full database backup.
Partial Database Backup (SQL Server 2005 only)	You can create a template for partial database backups when you select individual databases and select the "Create a partial database template" type of backup. You can choose the filegroups to include in the partial backup by removing the comments from the filegroups. Caution: Since the contents of a partial database backup are defined by the user, NetBackup for SQL Server does not use them for staging recovered backups. So if you rely on NetBackup to stage database recovery for you, the partial backup may not be a good choice.
Backup of all a filegroup's database files	You effectively back up a filegroup when you back up all of the database files in the filegroup.

Whiteboards: Microsoft SQL Server
Cluster configurations

- NetBackup for SQL Server is supported with Microsoft Cluster server (MSCS) or VERITAS Cluster Server (VCS).
- For VCS clusters, the VirtualName attribute under the Veritas Cluster Server resource type, Lanman, is the name of the virtual SQL Server.
- For MSCS clusters, the unique SQL Server instances are distinguished by the virtual server name.

For more information, view the following technote:

http://www.symantec.com/docs/HOWTO69798

Protecting virtualized SQL server

The following VMware SQL Server systems are supported.

- VMware only (No Hyper-V support)
- SQL Server 2005 and SQL Server 2008
- Windows Server 2003 and Windows Server 2008
- x86 and x64 only (no IA64 support)
- Virtual machine infrastructure. The ESX 3.5 Update 5, 4.0, 4.1 and 5.0 are supported.
- vSphere 4.0, 4.1 and 5.0; vCenter 2.5
- To understand the limitations of using a VMware policy to protect SQL Server, refer the article below:

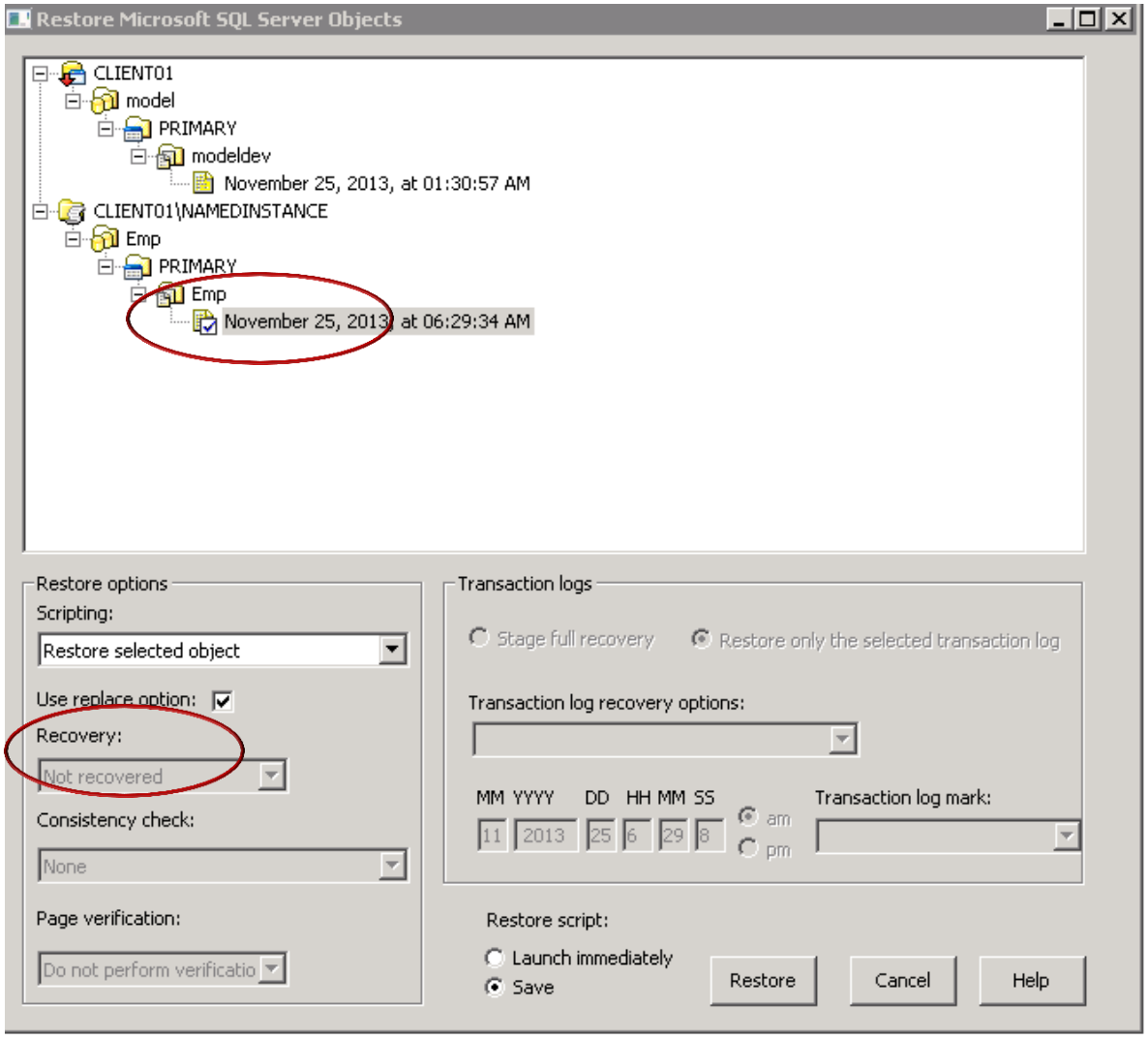
http://www.symantec.com/docs/HOWTO85424

Whiteboards: Microsoft SQL Server
Requirements for VMware

- The following VMware SQL Server applications and licenses are required.
  - NetBackup 7.6 on the master server and media server
  - NetBackup 7.6 Client needs to be installed in the guest OS
- Customers must have VMware Tools and the Symantec VSS Provider of the VMware Snapshot Provider.
- The Enterprise Client and App/DB Package licenses are required. One license per ESX Host is required
- For more information on creating a VMware backup policy to protect SQL Server, refer to the article:

http://www.symantec.com/docs/HOWTO69849

Example Diagrams: Microsoft SQL Server
Restoring a database backup (1)



1. Expand the database instance and select the database image that you want to restore.

2. To place the database in recovery mode, so that it is immediately usable following the restore, select **Recovered** from the **Recovery** list.

   (Be aware that after the database is placed in recovered mode, you cannot update it with additional differential or transaction log backups.)

Example Diagrams: Microsoft SQL Server
Restoring a database backup (2)

Example of the restore script

restore.bch - Notepad

File Edit Format View Help

```
OPERATION RESTORE
OBJECTTYPE FILE
DATABASE "Emp"
OBJECTNAME "Emp"
# The following image is type: File
NBIMAGE "client01.MSSQL7.CLIENT01\NAMEDINSTANCE.fil.Emp.Emp.7.001of0
SQLHOST "client01"
SQLINSTANCE "NAMEDINSTANCE"
NBSERVER "MASTER01"
BROWSECLIENT "client01"
MAXTRANSFERSIZE 6
BLOCKSIZE 7
RESTOREOPTION REPLACE
RECOVEREDSTATE NOTRECOVERED
```

This script, when executed, restores the EMP database .

RECOVEREDSTATE NOTRECOVERED indicates that other restore operations will be run after this (i.e. an incremental or differential still needs to be applied).

Whiteboards: Microsoft SQL Server
SQL database restore notes

- Redirecting a SQL database to a different location on a different host

http://www.symantec.com/docs/HOWTO85320

- Step-by-step procedure for using NetBackup to restore a Microsoft SQL Full Backup using a MOVE script

http://www.symantec.com/docs/TECH51062

- Performing SQL Server page-level restores

http://www.symantec.com/docs/HOWTO69794

- Restoring a SQL transaction log image without staging a full recovery

http://www.symantec.com/docs/HOWTO85280

- TDE (Transparent Database Encryption) and SQL restore

http://www.symantec.com/docs/TECH175316

Best Practices

Best Practices: Microsoft SQL Server
General best practices

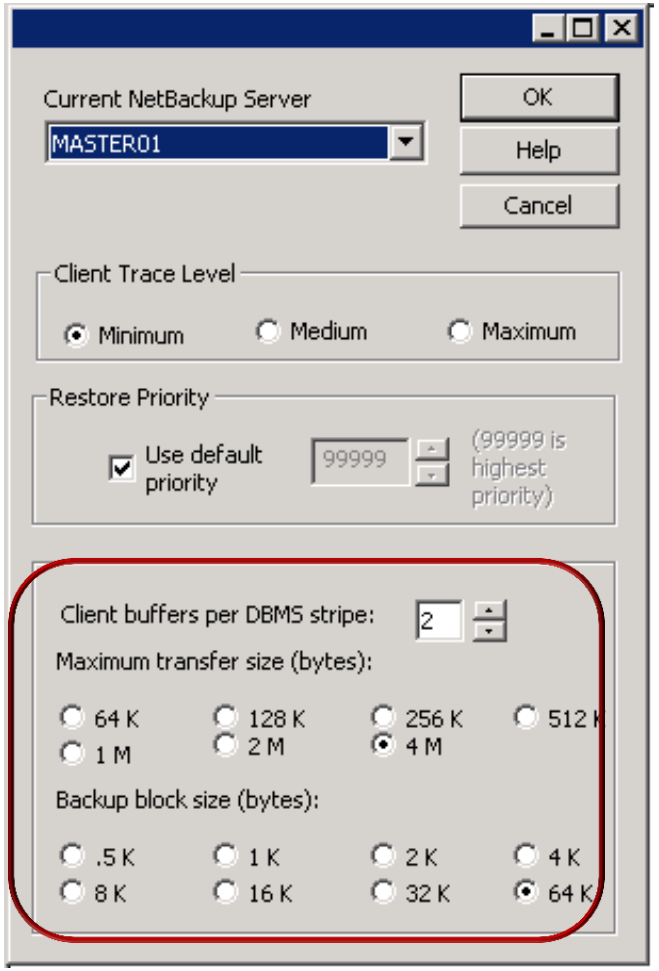
- Use weekly full database backups, daily differential database backups, and transaction log backups as necessary
- Perform test restores periodically
- Schedule backup jobs when database activity is low
- Avoid full database backups during peak hours or when database activity on the server is high

Optimizing SQL Agent performance

Following parameters can be set in the NetBackup client properties dialog box

- Backup block size (bytes)
  - Size of read into buffer
  - Keyword - **BLOCKSIZE**
- Maximum transfer size (bytes)
  - Size of buffer
  - Keyword – **MAXTRANSFERSIZE**
- Client buffers per DBMS stripe
  - Used for managing transfer speed
- Refer the article below for more information

http://www.symantec.com/docs/HOWTO69642



Best Practices: Microsoft SQL Server
Top support technotes

- Creating all NetBackup debug logs for SQL Server troubleshooting

http://www.symantec.com/docs/HOWTO69785

- Preparing for disaster recovery of SQL Server

http://www.symantec.com/docs/HOWTO69655

- Symantec NetBackup 7.6 for Microsoft SQL Server Administrator's Guide

http://www.symantec.com/docs/DOC6479

- A comprehensive list of solutions for the most common NetBackup for Microsoft SQL Server database agent backup and restore issues

http://www.symantec.com/docs/TECH74475

Thank You!

Symantec Backup and Recovery Technical Services