

IBM® Tivoli® Software

# **Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide**

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**Version 2.0**



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## REVISION HISTORY

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Date	Version	Revised By	Comments
2012-05-04	1.0	Project team	First version
2012-05-06	1.0	Van Hise	Misc. minor updates
2012-09-14	2.0	J Sauvanet	Updates based on feed back

# 1 Introduction Disclosure

This document is intended for customers, consultants, IBM® Business Partners, and IBM and Tivoli® staff who are familiar with earlier releases of Tivoli Storage Manager and want to understand the concepts of Tivoli Storage Manager for Virtual Environment 6.3, and provide those Guides for deployment.

Because an experienced audience is the target of this document, Tivoli Storage Manager shortcuts to commands and concepts are used. To learn more about Tivoli Storage Manager functions, see *IBM Tivoli Storage Management Concepts* (SG24-7447) and *IBM Tivoli Storage Manager Implementation Guide* (SG24-5416).

For TSM administrators that may not be familiar with VMware, refer to the section “VMware for the Storage Administrator” for additional background information.

For basics information about Tivoli Storage Manager for Virtual Environment product, refer to *Data Protection for VMware Installation and User's Guide* (SC27-2898-01)

This document can be used with the manuals and readme files provided with the products is not intended to replace any information contained in them. Also any changes or updates to the official documentation may not be reflected in this guide

If you use this procedure, you accept responsibility for your environment. If there are issues, go through the proper support channels for help (Tivoli Support).



## 2 Tivoli Storage Manager for Virtual Environments Overview

This part of the document provides an overview of IBM Tivoli Storage Manager for Virtual Environments (TSM for VE).

### 2.1 Solution components

A solution using TSM for VE involves a number of components.

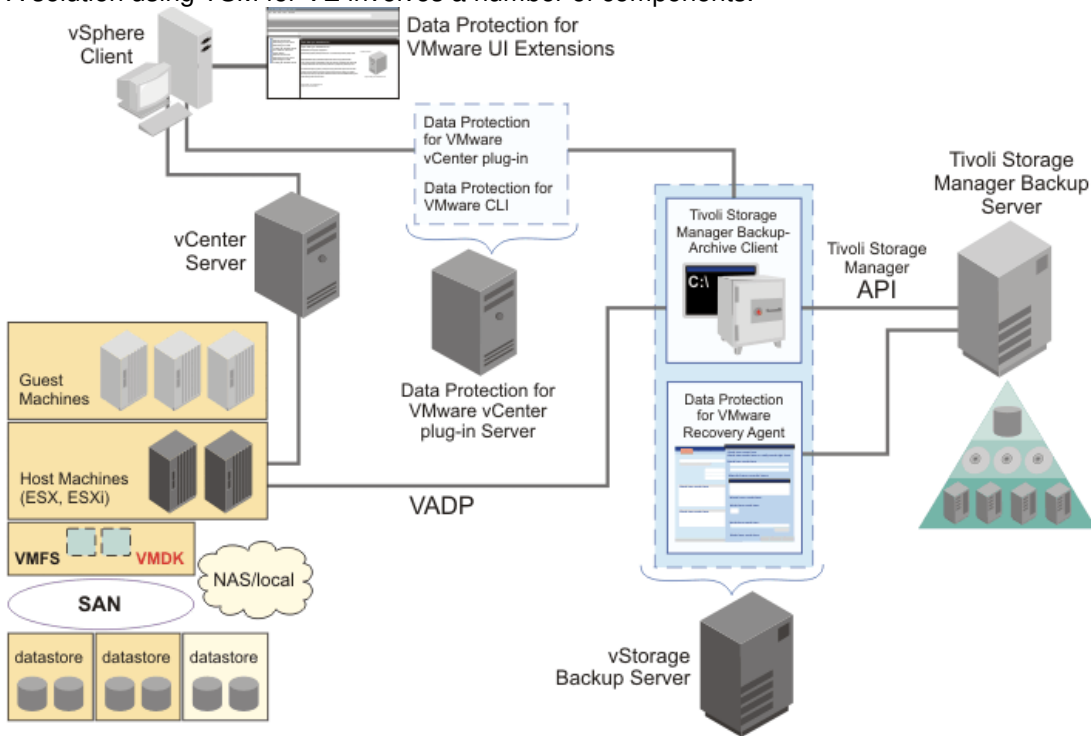


Figure 2-a: How the product components interrelate

**TSM Backup / Archive Client Data Mover (B/A client data mover)** – The B/A client data mover is installed on a vStorage backup server. This component provides the following functionality:

- **Full VM backup:** Backs up virtual machines to Tivoli Storage Manager Server storage. Full VM backup copies the VM configuration information and does a block level copy of VM disks to the Tivoli Storage Manager Server. The VM disk backup process involves reading blocks from a VMware guest disk snapshot using the vStorage APIs for Data Protection (VADP) and writing the data to the TSM server using the Tivoli Storage Manager API. Changed Block Tracking (CBT) is used (for supported environments) to provide content aware backups to only backup used areas of a disk. These backups are managed and retained according to storage policies setup by the Tivoli Storage Manager administrator. The full VM backup operation does not require a Tivoli Storage Manager for Virtual Environments license.
- **Incremental VM backup:** Backs up only the virtual machine data that has changed since the last backup completed. The B/A client data mover rely on VMware's Change Block Tracking (CBT) to determine the changed blocks. The Tivoli Storage Manager for Virtual

Environment license (included with the Tivoli Storage Manager for Virtual Environment install package) is required to enable incremental backup in the B/A client data mover.

- Full VM restore: Restores a full or incremental VM backup. The entire VM (i.e. VM configuration and VMDKs) is restored to the state it existed in when originally backed up.

The B/A client data mover can run on a Windows or Linux vStorage Backup Server and cross platform operations are supported. A Windows B/A client data mover can backup a Linux VM, and vice versa. A backup performed by a Linux proxy can be restored by a Windows proxy, and vice versa.

Two techniques are available to allow parallel operations and improve aggregate backup throughput (refer to the sizing sections in this document for additional information).

- There can be 1 to n B/A client data mover instances running on a vStorage Backup server.
- There can be 1 to n vStorage Backup Servers sending data to a TSM server.

The B/A client data mover is not provided as part of the TSM for VE installation package, but is a pre-requisite. Refer to IBM Tivoli Storage Manager for Windows / Unix Clients Version 6.3 Installation and Users Guide (section 'Backing up VMware virtual machine data') for detailed explanation: <http://publib.boulder.ibm.com/infocenter/tsminfo/v6r3/index.jsp>

**vStorage Backup Server** – This is the machine where the B/A client data mover is installed. The vStorage Backup Server could be a VM guest machine or off-host physical machine.

**Data Protection for VMware Recovery Agent** (DP for VMware Recovery Agent) – This agent is part of the TSM for VE installation package. This agent provides the following functionality:

**File restore:** File restore can be performed in-guest or off-host on supported Windows and Linux machines. File restore is accomplished using the DP for VMware Recovery Agent Mount function to expose a virtual disk snapshot from a TSM storage pool and copy the required files. The user chooses whether to expose a complete disk as an iSCSI LUN or a single partition from the selected disk as a local volume.

**Instant restore of a volume:** Instant restore is a method of restoring the contents of a single volume that provides the user / application on-demand access to data while a background process restore the entire volume contents. To the user / application, the volume appears to contain all the restored data, even though the restore process is in-progress. Instant restore can be done from a full or incremental virtual machine backup. Instant restore is performed using the DP for VMware Recovery Agent's Instant Restore function.

Mount and Instant restore can use full or incremental backups that were created with the B/A client data mover.

Refer to the IBM Tivoli Storage Manager Data Protection for VMware Installation and User's Guide for detailed explanation on Tivoli Storage Manager for Virtual Environment:

[http://publib.boulder.ibm.com/infocenter/tsminfo/v6r3/topic/com.ibm.itsm.ve.doc/b\\_ve\\_inst\\_user.pdf](http://publib.boulder.ibm.com/infocenter/tsminfo/v6r3/topic/com.ibm.itsm.ve.doc/b_ve_inst_user.pdf)

**Data Protection for VMware vCenter Plug-in** (DP for VMware Plug-in Server) - This is the TSM extension to VMware vSphere client GUI. This extension enables management of full VM backups and restores operations for multiple B/A client data mover nodes.

This plugin is part of the Tivoli Storage Manager for Virtual Environment installation package. Also provided is the VMCLI command line interface for the vCenter plug-in.

Refer to the IBM Tivoli Storage Manager Data Protection for VMware Installation and User's Guide for detailed explanation on Tivoli Storage Manager for Virtual Environment:

[http://publib.boulder.ibm.com/infocenter/tsminfo/v6r3/topic/com.ibm.itsm.ve.doc/b\\_ve\\_inst\\_user.pdf](http://publib.boulder.ibm.com/infocenter/tsminfo/v6r3/topic/com.ibm.itsm.ve.doc/b_ve_inst_user.pdf)

**DP for VMware Plug-in Server** VCENTER PLUG-IN (DP for VMware vCenter Plug-in) – This is the server where the DP for VMware Plug-in is installed.

**Tivoli Storage Manager Server** - The Tivoli Storage Manager Server provides the backup repository for the virtual machines being protected.

### 2.2 Overview of installation and configuration

The following table summarizes the basic steps involved in deploying the TSM for VE solution. Additional detailed information is described later in this document.

Task	Recommend Steps
Ensure prerequisites are in place	<p>Prerequisites requirements include considerations for the following:</p> <ul style="list-style-type: none"> <li>- VMware (environment and permissions)</li> <li>- TSM server</li> <li>- B/A client data mover</li> <li>- vCenter plug-in</li> <li>- DP for VMware Recovery Agent</li> </ul> <p>For additional information, refer to “Prerequisites” section in this deployment guide.</p>
Configure TSM server	<p>Register required nodes and grant required proxy relationships. For additional information, refer to the section “Tivoli Storage Manager Node Naming Convention” in this deployment guide.</p> <p>Define management class / copy group used to control the target storage pool for the VM backups and the VM backup retention (re. B/A client VMVC option for additional information on how this management class is used).</p> <p>When configuring backup to physical tape or VTL, there are additional configuration requirements needed to always keep TSM metadata (control files) on disk while allowing the actual virtual machine backup data to reside on tape (re. B/A client VMCTLMC option for additional information). The CTL files must always be in a device class file / disk storage pool and can not be migrated to tape or VTL.</p>
Install B/A Client Data Mover and VE enablement file on vStorage Backup Server.	<p>Install B/A client data mover on vStorage Backup Server. For additional information, refer to the section “Backup/Archive Client Installation” in this deployment guide. If no strong preference for Linux, recommend Windows for vStorage Backup Server.</p> <p>Install the Enablement File from the TSM for VE installation package.</p> <p>In addition to installing the Enablement file, recommend installing the following additional TSM for Virtual Environments components at this time (this will prepare you for follow-on tasks):</p> <ul style="list-style-type: none"> <li>- “Data Protection for VMware Recovery Agent”</li> <li>- “Recovery Agent Command-Line Interface”</li> <li>- “Documentation”.</li> </ul> <p>If the Data Protection for VMware Plugin is to be installed on the vStorage Backup Server it can also be selected.</p> <p>For additional information, refer to the section “DP for VMware Installation” in this deployment guide</p>
Configure B/A Client Data Mover on vStorage Backup	<p>Minimum VM-specific options to the dsm.opt file (dsm.sys for Linux):</p> <ul style="list-style-type: none"> <li>• VMHOST vcenter.server</li> <li>• VMCUSER vcenteradminid</li> </ul>

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Server	<ul style="list-style-type: none"> <li>• VMFULLTYPE vstor</li> <li>• VMBACKUPTYPE fullvm</li> <li>• DOMAIN.VMFULL "ALL-VM"</li> <li>• If required, specify the management classes to be used: VMMC (VM backup data) and VMCTLMC (control files).</li> </ul> <p>Configure vCenter access: <code>dsmc set password -type=vcb vcenter vcenteradminid password</code></p> <p>Validate configuration by performing the following:</p> <ul style="list-style-type: none"> <li>• Attempt to list vCenter VMs in DOMAIN.VMFULL: <code>dsmc show vm all</code></li> <li>• Backup VM: <code>dsmc backup vm vm1 -asnode=dcnode</code></li> <li>• Restore VM: <code>dsmc restore vm vm1 -asnode=dcnode -vmname=vm1restoretest</code></li> </ul> <p>To enable TSM server scheduling and integration with vCenter plugin perform the following:</p> <ul style="list-style-type: none"> <li>• Start the GUI (<code>dsm.exe</code>) and goto the menu Utilities – Setup Wizard to setup TSM web client.</li> <li>• Verify the CAD works by opening: <code>http://&lt;datamover_hostname&gt;:1581</code> in a browser. You should be able to see the B/A client GUI.</li> <li>• Verify that B/A Client GUI, accessed via browser, is working. Press "File-&gt;Connection information" to verify that Remote Client Agent can be started.</li> </ul>
Deploy DP for VMware Recovery Agent on vStorage Backup Server	<p>The DP for VMware Recovery Agent was installed on vStorage Backup Server in the previous step.</p> <p>Start DP for VMware Recovery Agent and mount VM backup snapshot to test file recovery.</p> <p>Deploying the DP for VMware Recovery Agent on the vStorage Backup Server is a recommend starting point. For additional information, refer to the Windows and Linux file restore sections in this document.</p>
Deploy DP for VMware vCenter Plug-In	<p>Install the DP for VMware plug-in (if not previously installed on vStorage backup server)</p> <p>Update <code>vmcli</code> profile (node names, TSM server)</p> <p>Set password for VMCLI node</p> <p>Validate configuration by performing the following:</p> <ul style="list-style-type: none"> <li>• Verify eWAS is running</li> <li>• Verify that VMCLI recognizes TSM server node configuration</li> <li>• Verify the client acceptor daemon (CAD is running)</li> </ul>

## **3 Before you begin discussion**

This chapter is intended to give you essentials topics you have to discuss before going to implement TSM for Virtual Environment.

### **3.1 The Needs**

What are the needs of your implementation, what are the goals or requirements you may have:

- ✓ RTO/RPO: this allow you to estimate the backup frequency and needed storage space
- ✓ What restoration will be needed? (file / full / both with frequency)
- ✓ Is there is any application hosted in VMWare guests? ( if yes the recommendation is still to use Tivoli Data Protection for ... within the guest)
- ✓ Do you need more than one policy per VM?
- ✓ How many vCenter servers do you have to address? (Limitation with plug-in and multiple vCenter connection... )

### **3.2 Sizing (see chapter 10.3 Sizing)**

- ✓ How many VM to proceed?
- ✓ What are the Operating System you need to protect?
- ✓ What storage do you have ( means backend disk systems )
- ✓ what LAN between ESX and vBS and TSM server
- ✓ Any plan for DRP?

### **3.3 Virtualization level of your infrastructure**

This is mainly to choose proxy type: Physical vs Virtual

- ✓ are you fully virtualized ?
- ✓ are you ok with a physical proxy? (in case of LanFree needs)

### **3.4 Specialties (see chapter 9 Limitations of Tivoli Storage Manager for Virtual E)**

Think about all constraints that exists in your VMware environment that have impact of Tivoli Storage Manager for Virtual Environments deployment

- ✓ RDM disk / independ disk
- ✓ HA clusters
- ✓ and all other VMware things that don't allow the snapshot to be done ....

### 3.5 TSM server layout (see chapter 11 Tivoli Storage Manager Server Considerations)

- ✓ Where VM backup data will be stored (Disk/File/Tape)?
- ✓ Where will be stored the VM backup control files (Disk/File/Tape) ?

## 4 Prerequisites

Before you install Data Protection for VMware, verify that your system is running a supported operating system, and that you meet all hardware and software requirements. Data Protection for VMware supports any disk configuration that is supported by the hardware and operating system. The disk configuration includes multipath device drivers. Remove any version of IBM Tivoli Storage Manager FastBack on the machine. The Data Protection for VMware installation procedure checks for the existence of FastBack on the Server. If it is found, the installation fails.

### 4.1 System requirements

TSM for Virtual Environments hardware and software requirements are described in the following tech note:

<https://www-304.ibm.com/support/docview.wss?uid=swg21567566>

If you plan to perform file recovery for a Linux VM, you must also have the windows version of DP for VMware mount installed to expose the iSCSI target. See requirements in this tech note:

[https://www-304.ibm.com/support/docview.wss?uid=swg21567566#Linux%20x86\\_64%20platform\\_0](https://www-304.ibm.com/support/docview.wss?uid=swg21567566#Linux%20x86_64%20platform_0)

### 4.2 Environment considerations

Data Protection for VMware Recovery Agent uses an internal Tivoli Storage Manager protocol to connect to the Server. Port 1500 is the default port that Tivoli Storage Manager uses for Data Protection for VMware Recovery Agent to work. You can customize the port. Consider the Windows disk type (Dynamic compared to Basic). The type of disk will cause the restore steps to be different (i.e. dynamic disks are only supported based on exposing an iSCSI target).

Windows Support is not provided for applications that use SCSI Pass Through Interface (SPTI) or SCSI Pass Through Direct (SPTD) for performing read and write operations. You cannot use Instant Restore while applications that use SPTI or SPTD are running. If you try to use Instant Restore while applications that use SPTI or SPTD are running, it might appear that the Instant Restore was completed, but the data might be corrupted.

### 4.3 Firewall considerations

If the environment is secured by VLANs, firewalls etc, make sure to allow proper connectivity among all the systems in your environment. Below you find a list of ports that are typically used in an environment with VMware and Tivoli Storage Manager Components

vStorage Backup Server	
Port 22	SSH for Linux VMware mount and shell
Port 1501	TSM client port
Port 3260	iSCSI default port

ESX / vCenter

Port 443          Data Recovery

Port 902          ESX Converter / for being able to create snapshots and restore them

DP for VMware Plug-in

Port 1527          Derby Database

Port 9080          eWas

A list of ports used by VMware components is available, in the following VMware article:

<http://kb.vmware.com/selfservice/microsites/search.do?cmd=displayKC&externalId=1012382>

### ***4.4 Recovery agent considerations***

Plan to use a Linux recovery agent if you have to restore files for Linux virtual machines. The following statement belongs in the description of the write cache path:

Restriction: To prevent any interruption during restore processing, exclude the write cache path from all antivirus software protection settings.

### ***4.5 VMware permissions considerations***

For a description of the vCenter Server permissions needed to perform backup and recovery operations, refer to:

<https://www-304.ibm.com/support/docview.wss?uid=swg21497028>

If you plan to use same user for vCenter plug-in utilization and installation, you will need these extension privileges to be enabled as well (in the roles management panel):

Extension > Register extension

Extension > Unregister extension

Extension > Update extension

We recommend creating a new VMware Role, for instance TSM4VE with all the privileges listed before. Then you will assign to this role all the admin who perform backup/restore operations.

### ***4.6 vCenter plug-in considerations***

Install the vCenter plug-in on the vCenter server, so it can be deployed on all vSphere Client interfaces as any other VMware plug-in.

We advise installing the vSphere plug-in interface within the Vsphere Client on the Vstorage Backup Server (VBS). This for manage all the backup related operations from the VBS.

For a description of the Tivoli Storage Manager administrative privilege needed to use the 6.3 TSM for Virtual Environments - Data Protection for VMware vSphere Client plug-in user interface, refer to: <http://www-01.ibm.com/support/docview.wss?uid=swg21584416>

See also the recommended vCenter user privileges needed for plug-in installation in chapter 4.5 VMware permissions considerations

### 4.7 vStorage Backup Server LUN access considerations

First of all, if you plan to use the SAN transport method, each of the vStorage Backup Server must have a SAN access to every LUN that comprise your VMware Environment.

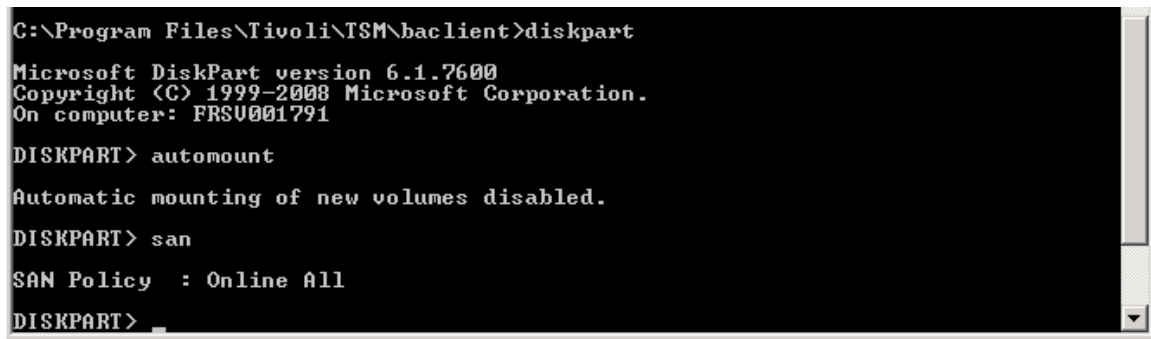
Here are the mandatory steps you have to perform, at the early beginning, on each vStorage Backup Server used for TSM for VE tasks.

The goal of these tasks is to ensure that the disk management policy is properly set up on your environment. You need to make sure that the Windows SAN policy is set to "OnlineALL" using diskpart.exe.

Issue following commands:

```
automount disable
automount scrub
san policy OnlineAll
exit
```

[Here are the commands to check your current configuration; the provided output is the output you \*\*must\*\* have to fit the recommendations:](#)



```
C:\Program Files\Tivoli\TSM\baclient>diskpart
Microsoft DiskPart version 6.1.7600
Copyright (C) 1999-2008 Microsoft Corporation.
On computer: FRSU001791

DISKPART> automount

Automatic mounting of new volumes disabled.

DISKPART> san

SAN Policy : Online All

DISKPART> _
```

[Pay attention to follow these recommendations to avoid some restoration known issue, documented by APAR IC80972 \(<http://www-01.ibm.com/support/docview.wss?uid=swg1IC80972>\)](#)

Refer to "Recommendations for Using LAN-free with TSM for Virtual Environments" for additional information:

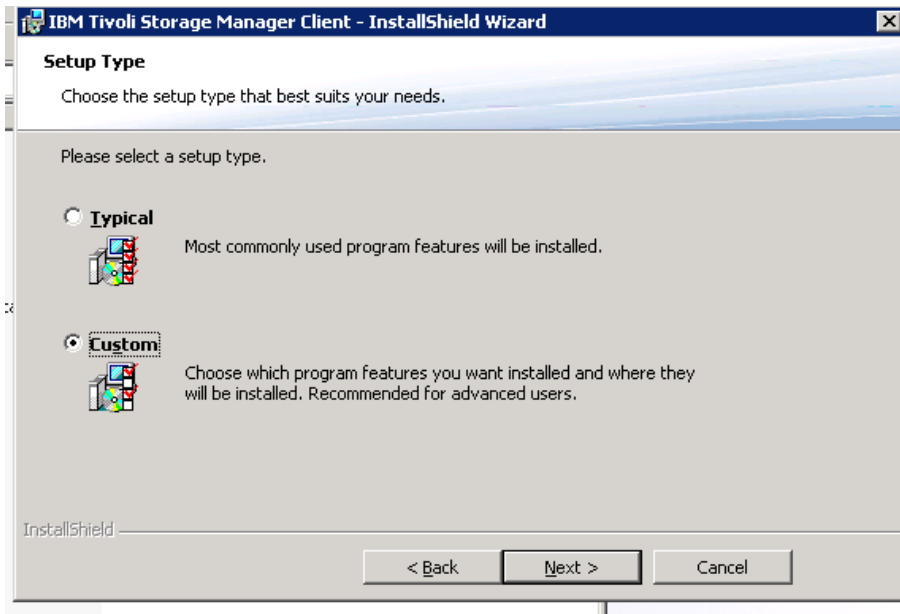
<https://www.ibm.com/developerworks/wikis/display/tivolistorage/Recommendations+for+Using+LAN-free+with+TSM+for+Virtual+Environments>



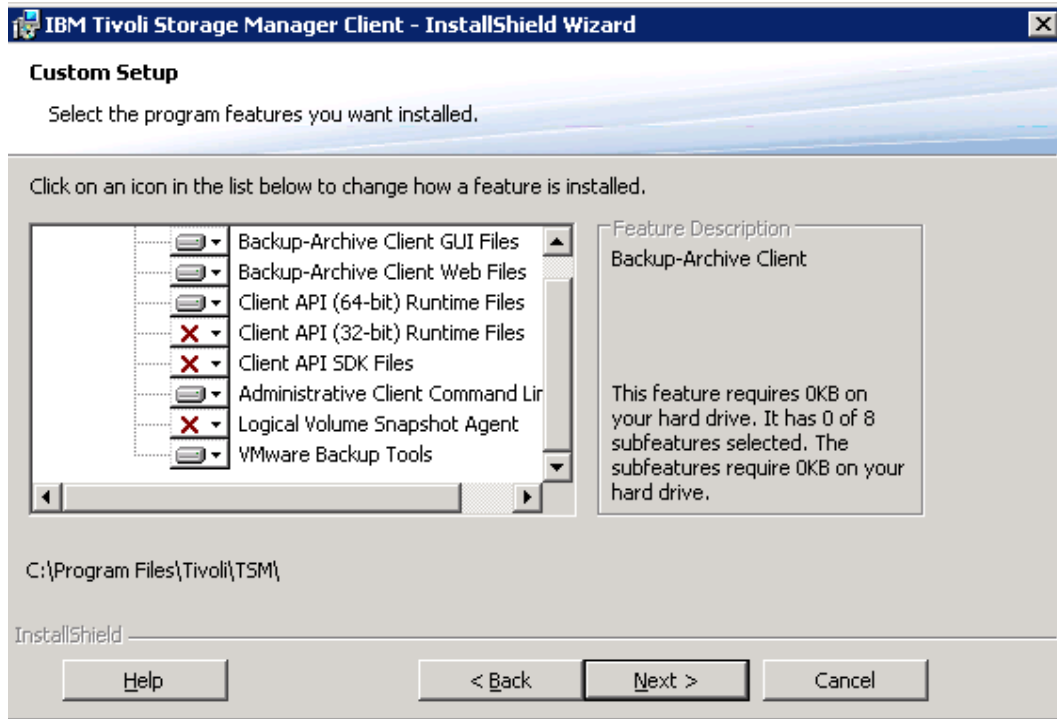
## 5 Installation and Configuration

### 5.1 TSM data mover (backup/archive client) installation

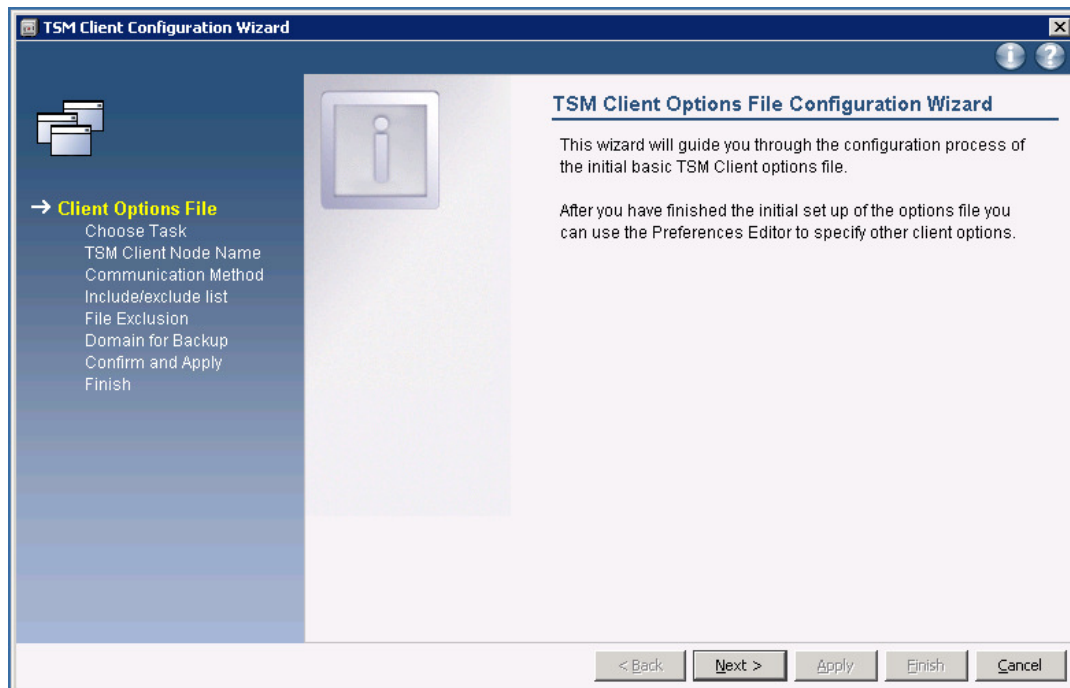
You MUST select Custom installation when installing Tivoli Storage Manager for Virtual Environment backup/archive client:

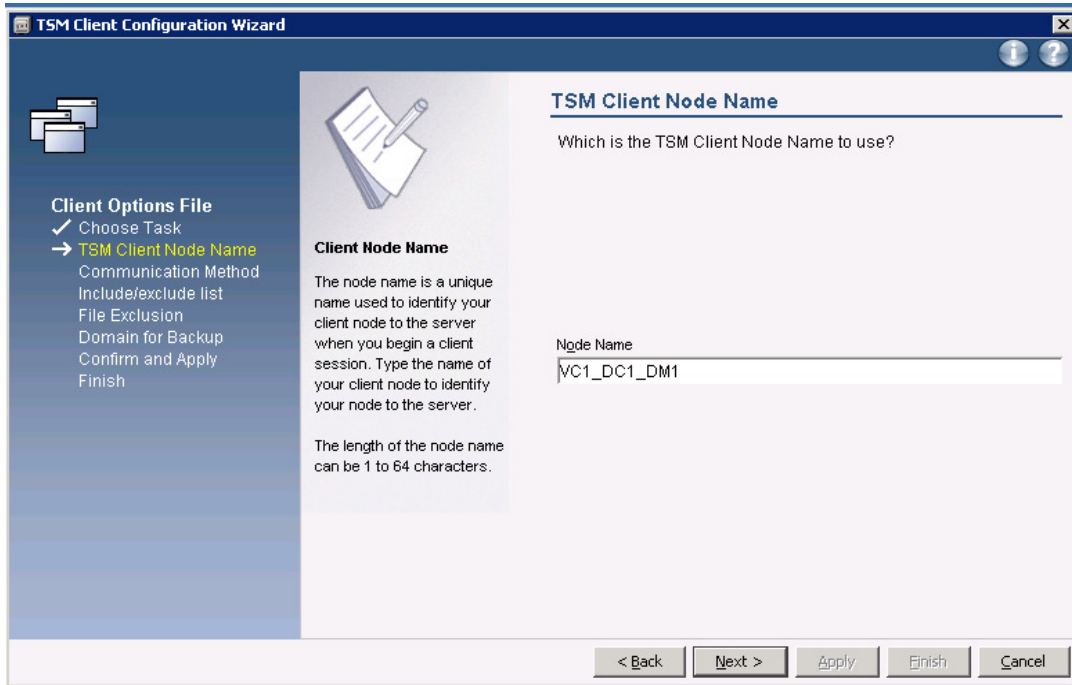
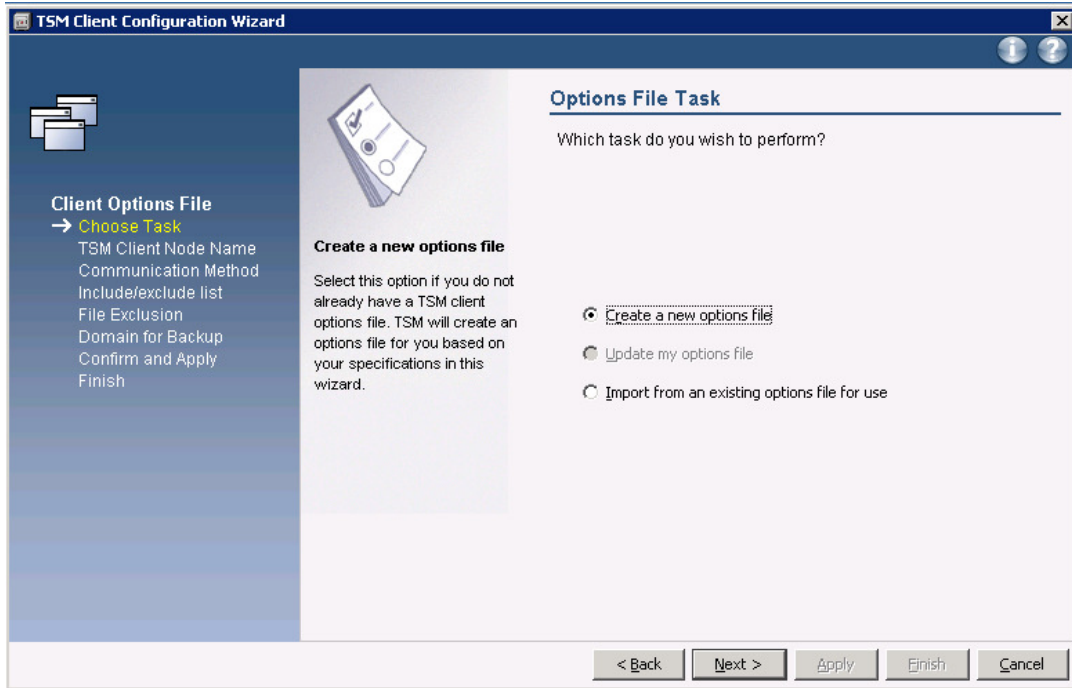


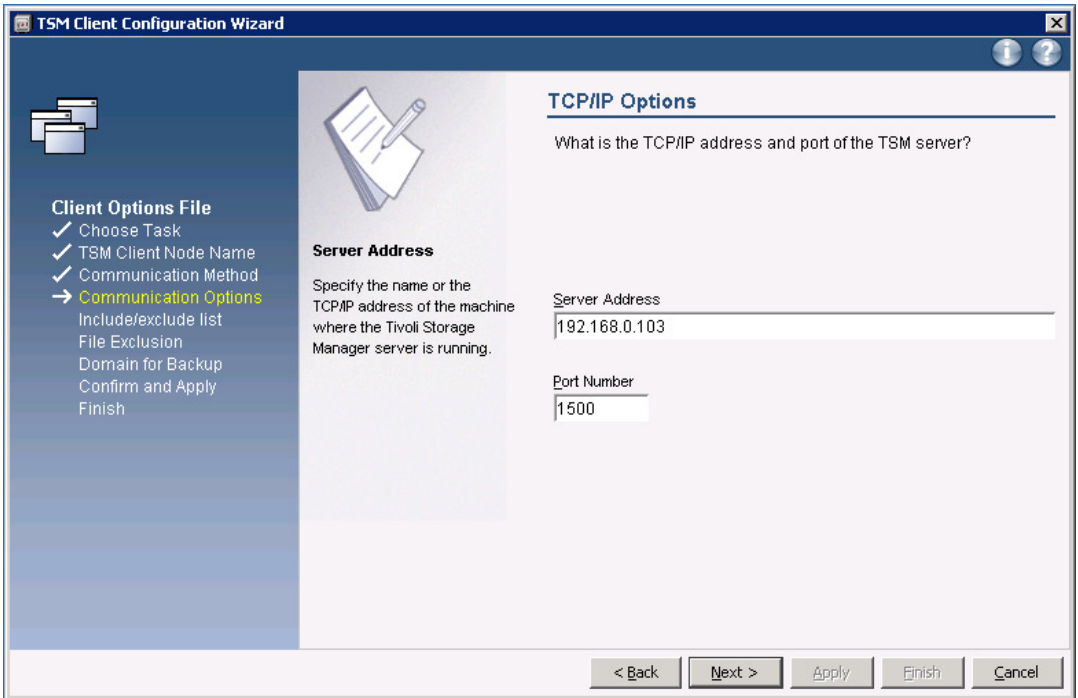
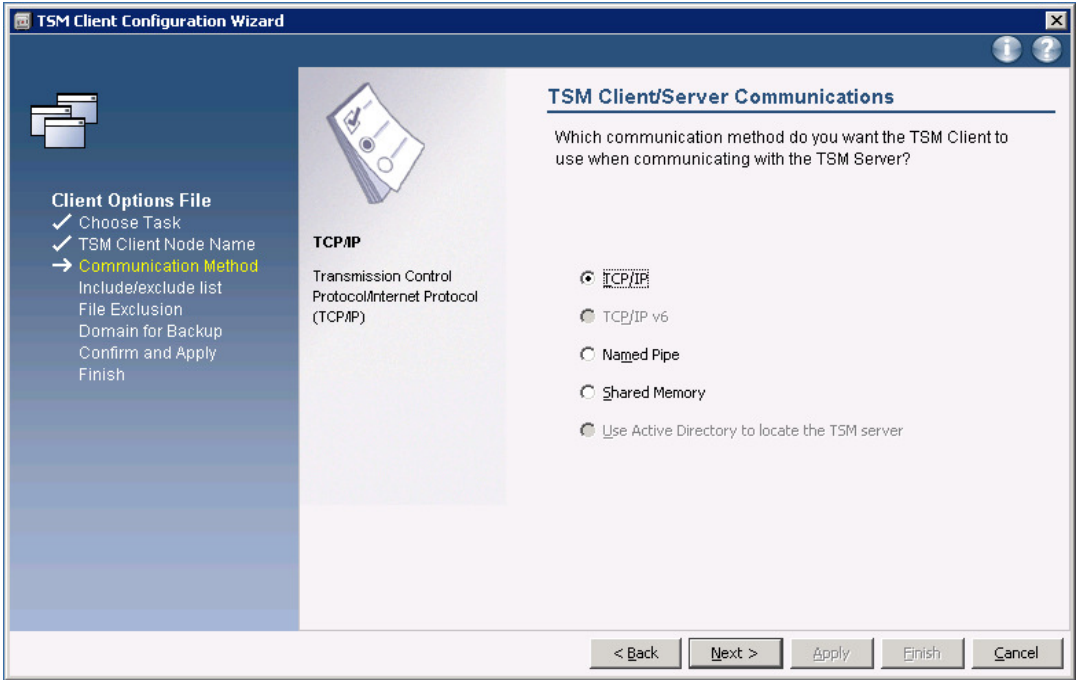
Execute Setup.exe file, and choose following components:

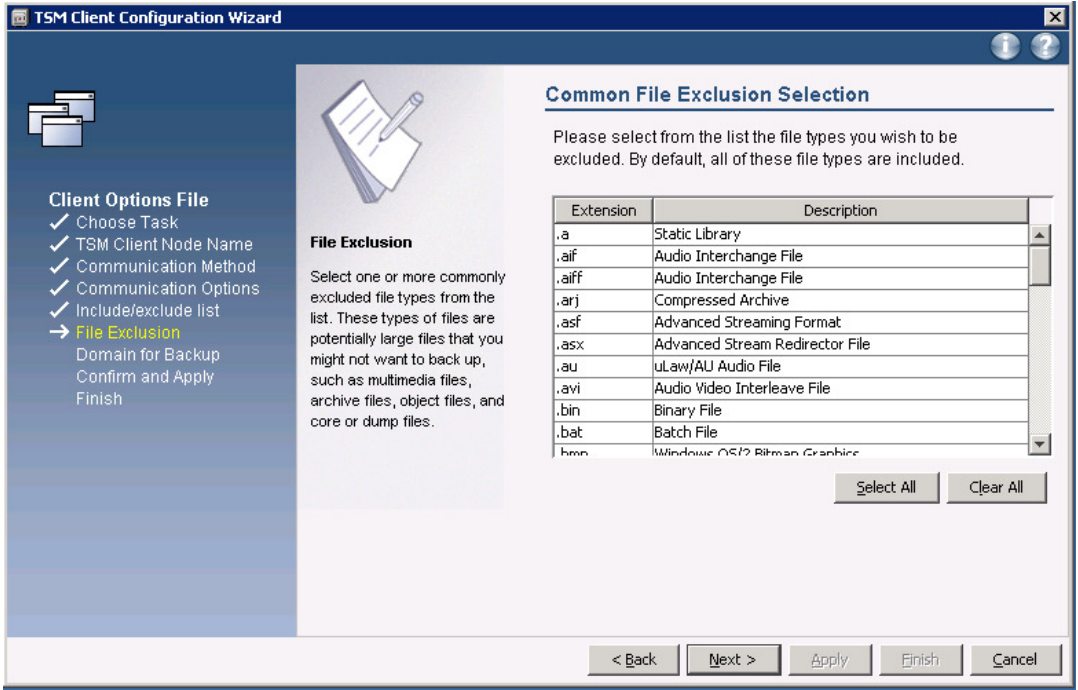
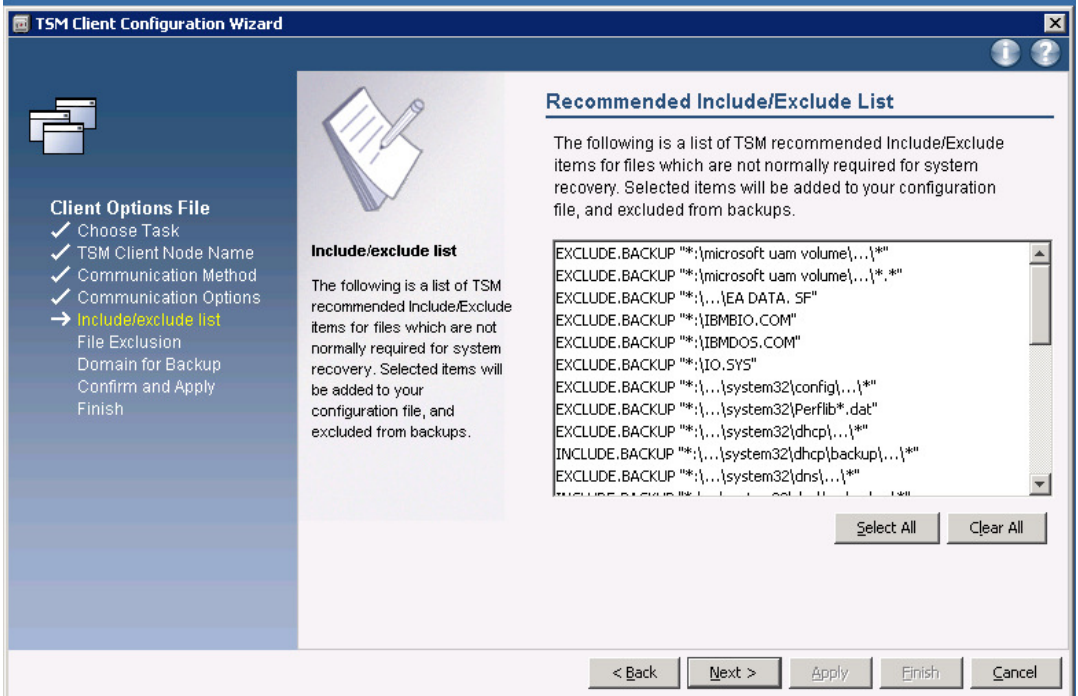


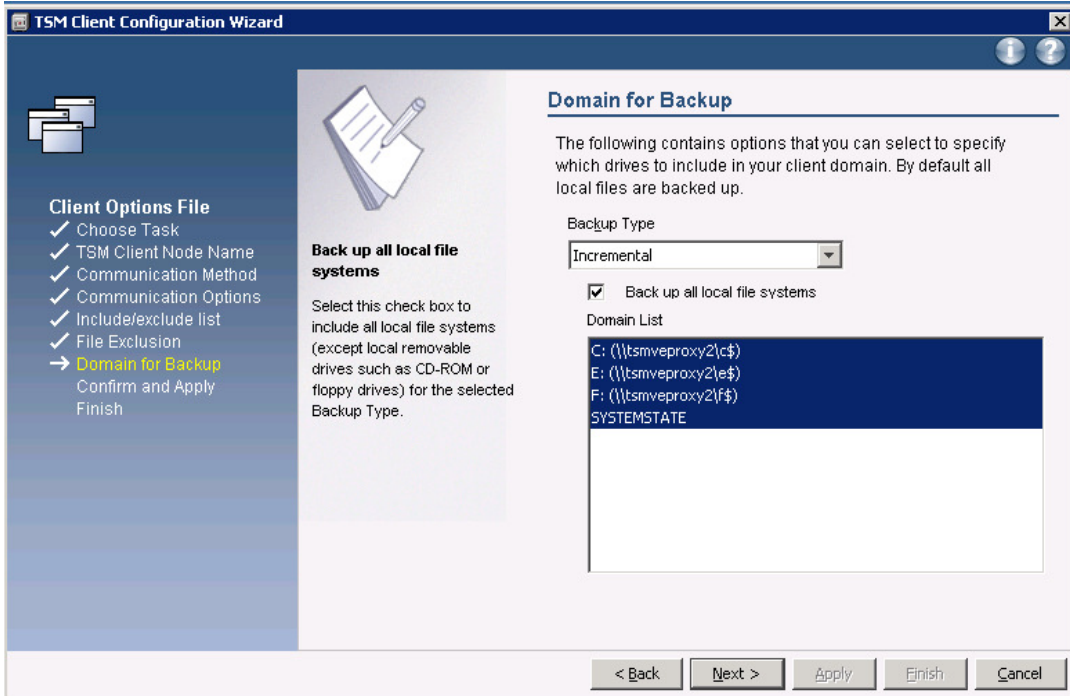
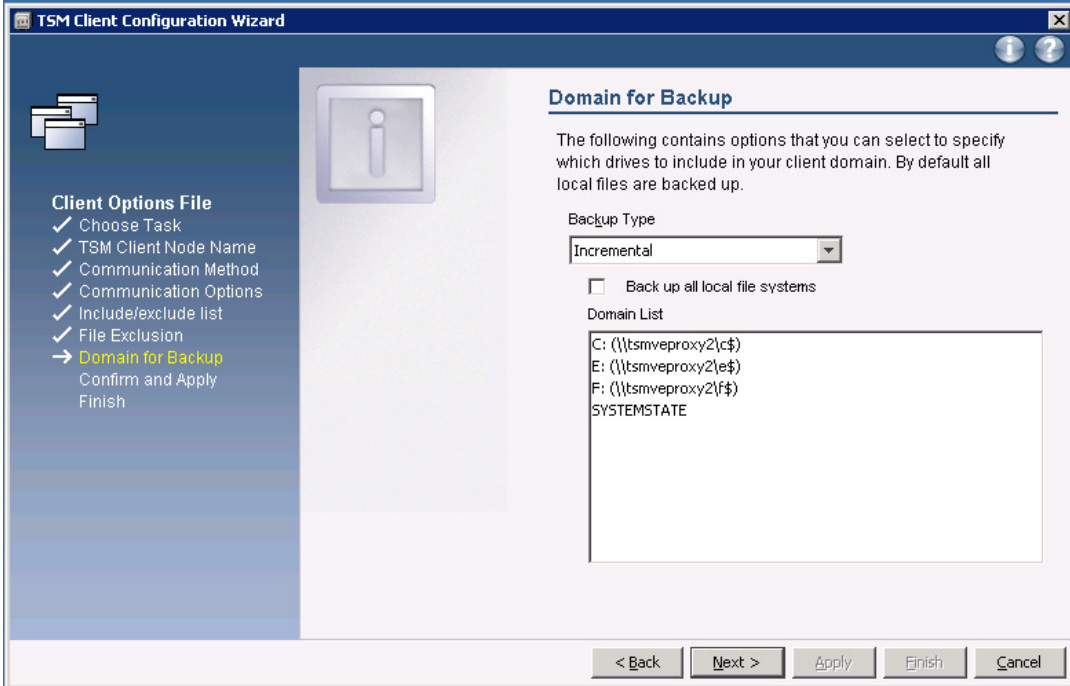
Follow the wizard with default options.

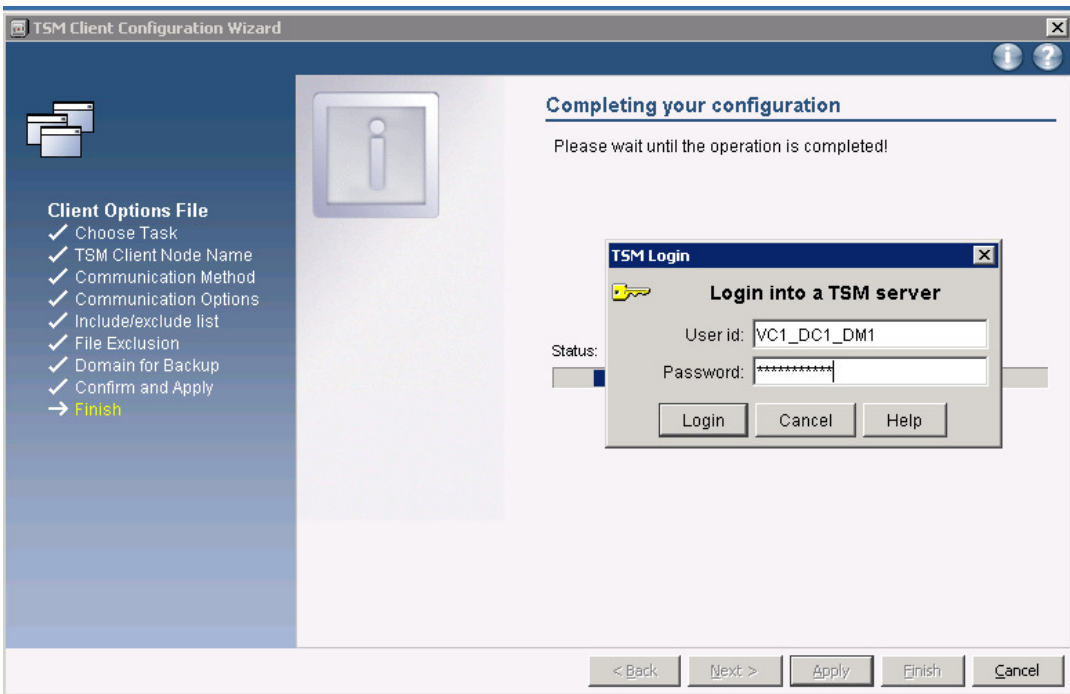
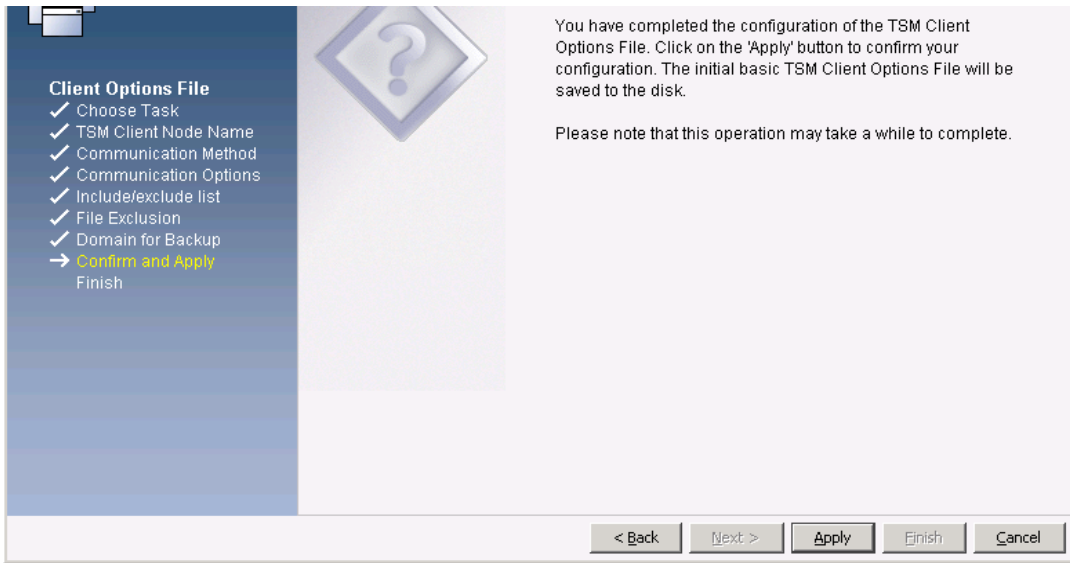








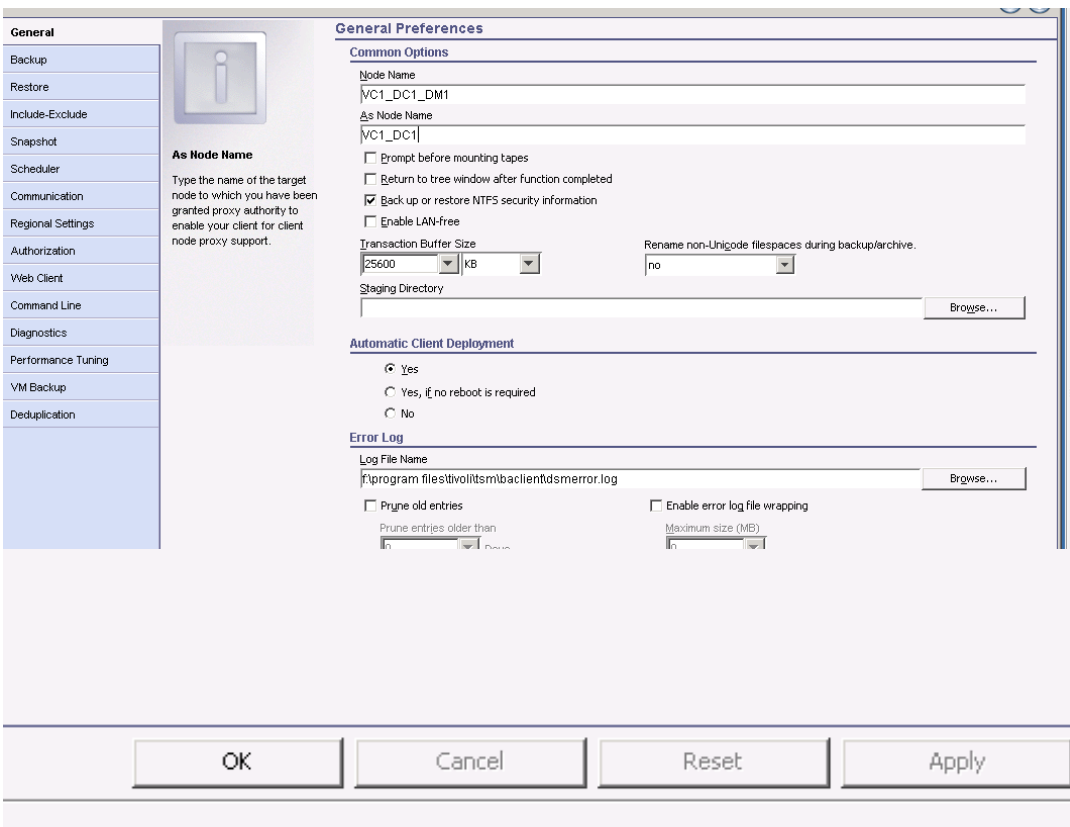
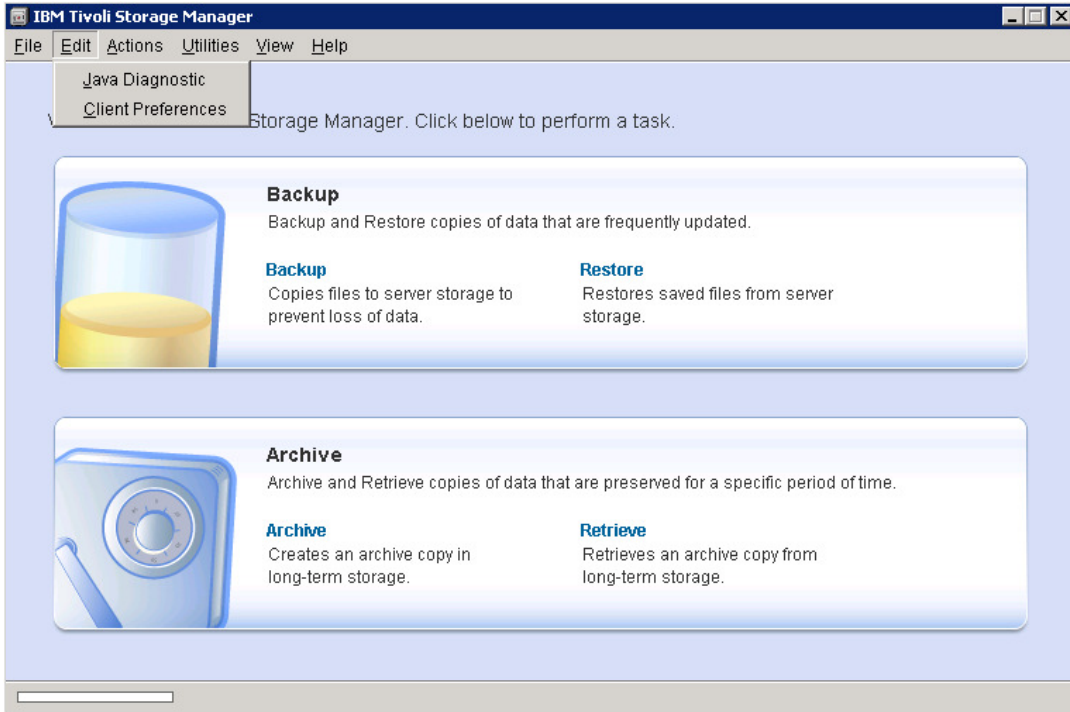




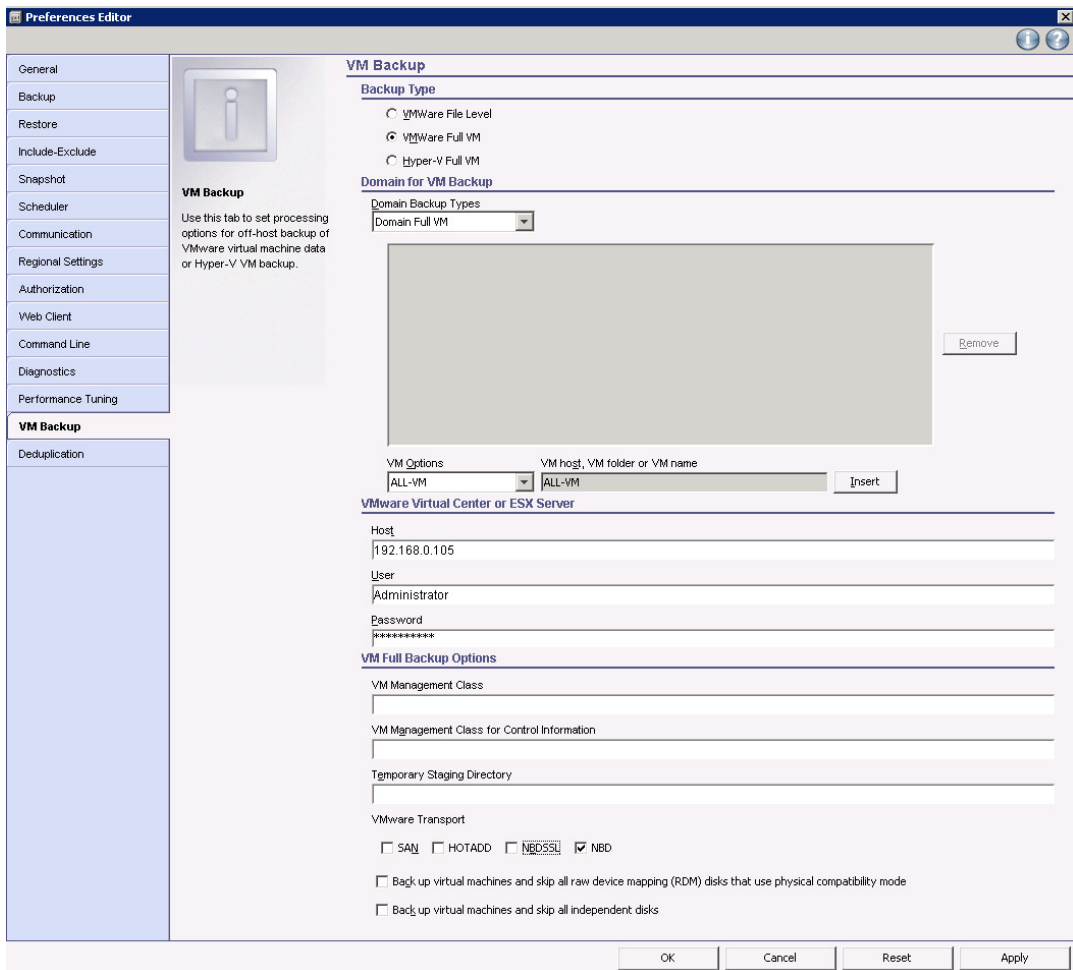
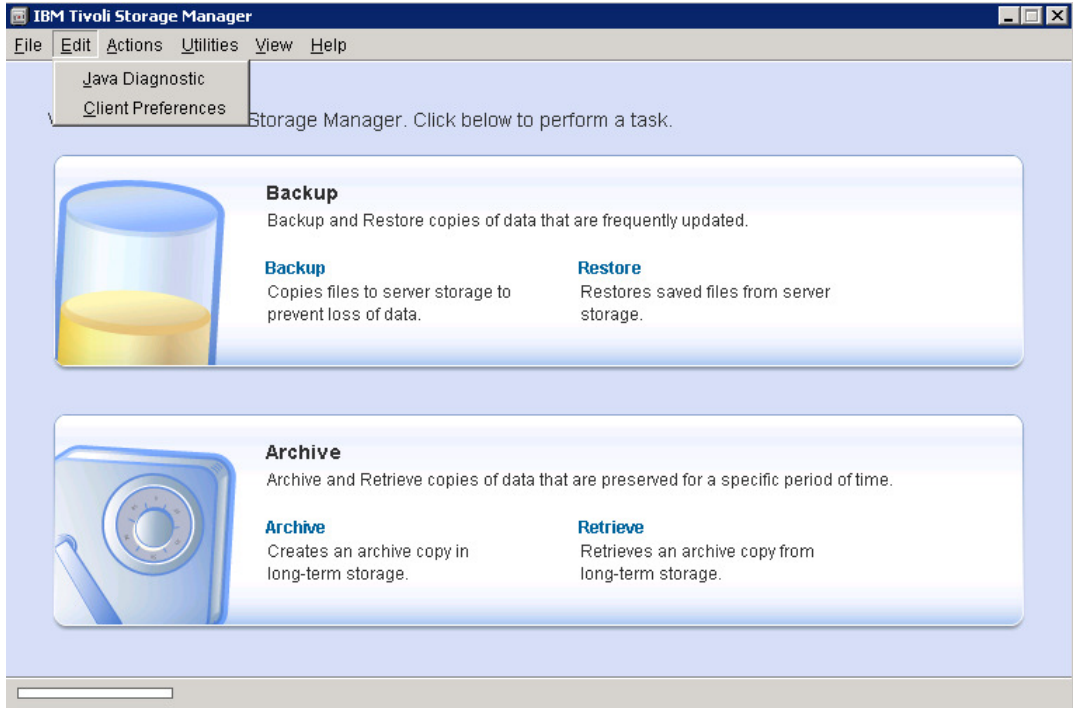
## 5.2 TSM data mover (backup/archive client) configuration

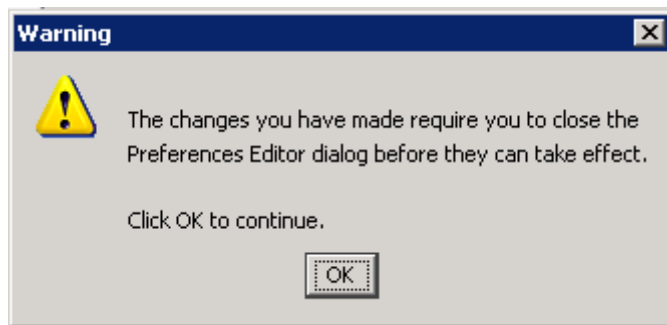
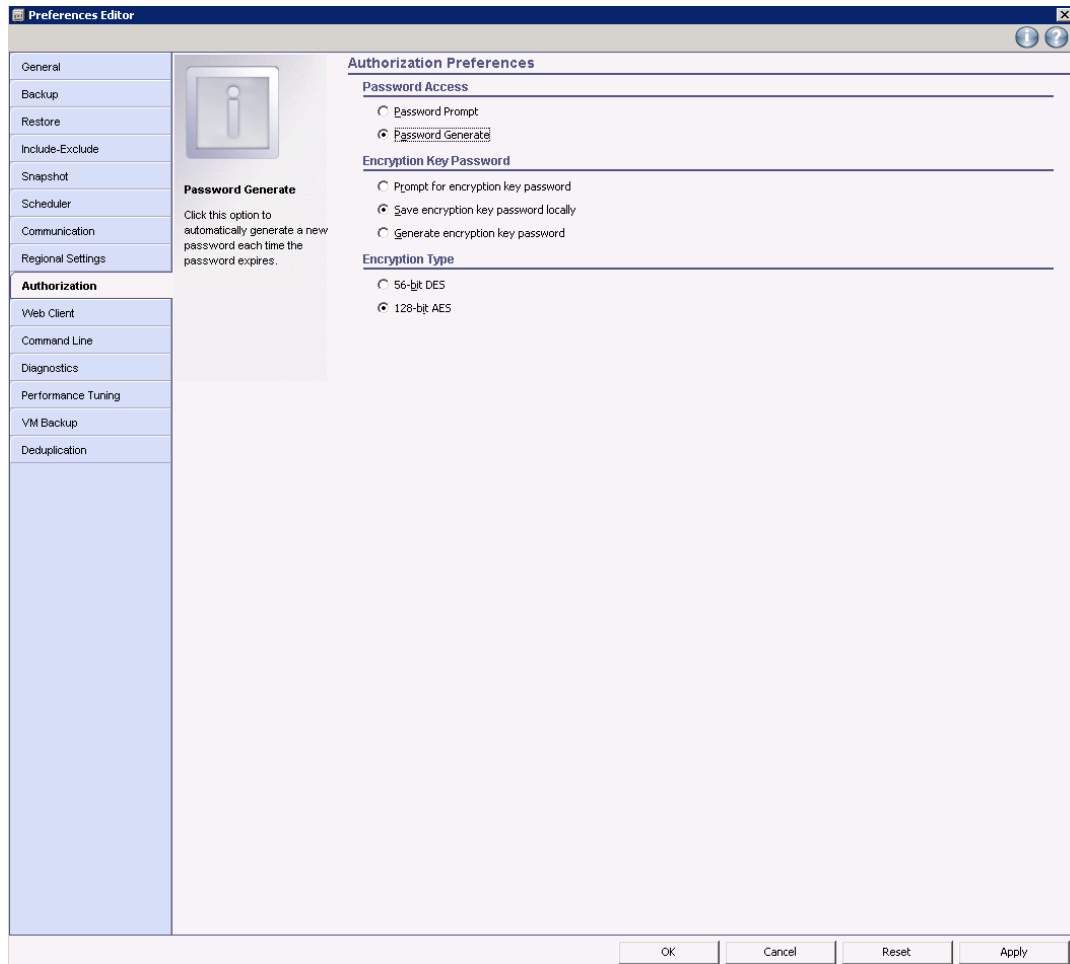
Configuration may be done either by editing the dsm.opt file directly or with the backup/archive client GUI preferences editor.











The datamover is the Tivoli Storage Manager node which will be responsible to transfer the data from ESX datastore to Tivoli Storage Manager Server. This node will deal through API with vCenter to access the data and perform VM snapshots.

## 5.2.1 Example data mover node opt file on VBS server:

```
NODENAME          VC1_DC1_DM1
PASSWORDACCESS    GENERATE
Subdir            Yes
```

```
COMMMETHOD          TCPIP
TCPPOINT              1500

TCPSEVERADDRESS       A.B.C.D
TCPCLIENTPORT        1510
TXNBYTELIMIT          25600
TCPBUFFSIZE           256
TCPWINDOWSIZE         63
SCHEDMODE              PROMPTED
schedlogname c:\exploit\logs\dsmsched_dm1.log
SCHEDLOGRETENTION     7
schedlogname c:\exploit\logs\dsmerror_dm1.log
ERRORLOGRETENTION     7
RESOURceutilization   2
COMMRESTARTDURATION   90
COMMRESTARTINTERVAL   30
LANGUAGE               ameng
```

\* VBS only

```
VMCHOST MYVCENTER
```

```
VMCUSER TSMUser
```

\* VMCPW - setted with dsmsc set password

```
VMMC VM_MGMT
```

```
VMCTLMC VM_CTL_MGMT
```

```
VMBACKUPTYPE FULLVM
```

```
VMFULLTYPE VSTOR
```

Set the vCenter account password to enable automatic communication between the datamover and the vCenter through API

```
Dsmc set password -type=vm MYVCENTER myvcenter_account mypassword
```

Create the DSM client acceptor, use by the vCenter plug-in based on the dsm\_dm1.opt config file. Use the Backup/Archive Client wizard to do so.

### ***5.3 TSM scheduler / web client configuration***

The following is required when using TSM server scheduling and when the vCenter plug-in is used.

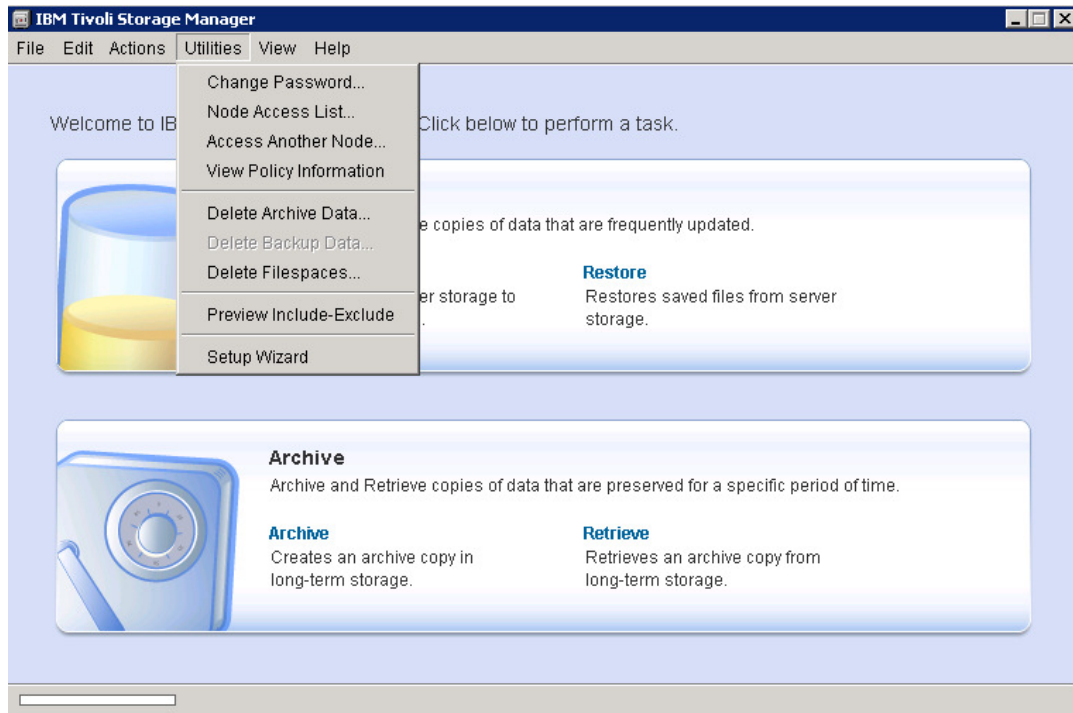
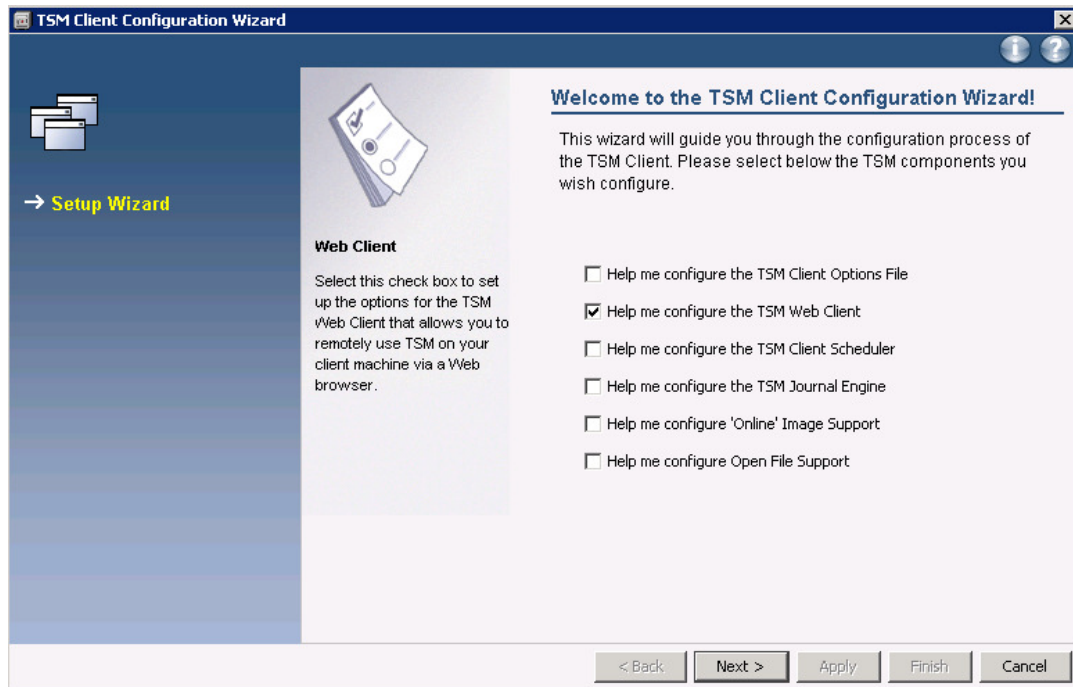
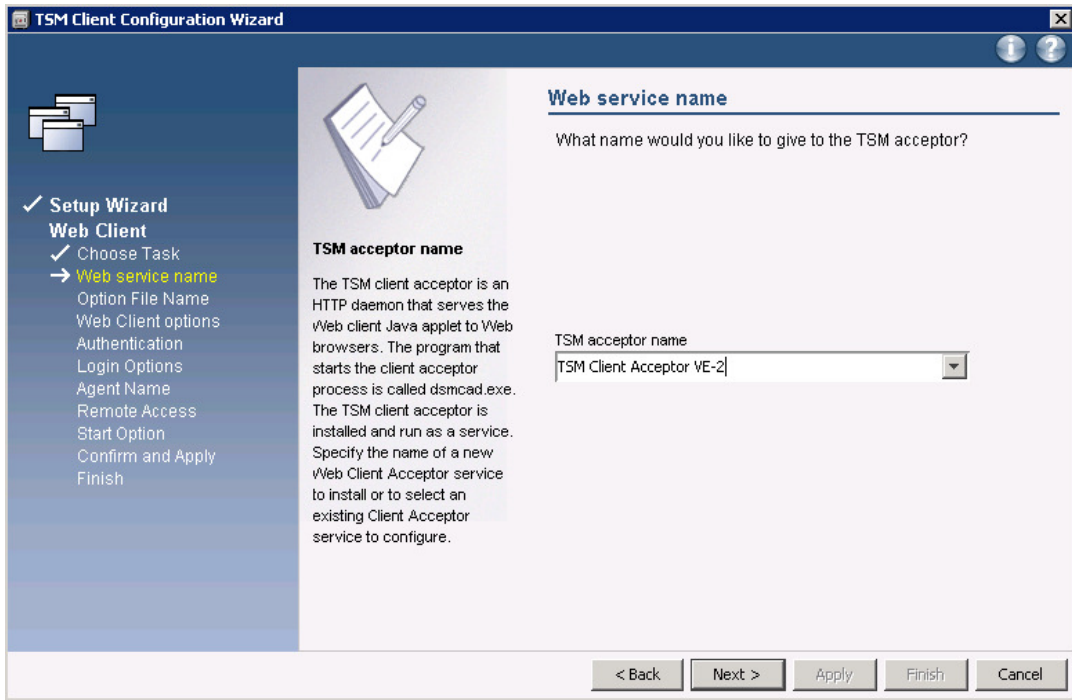
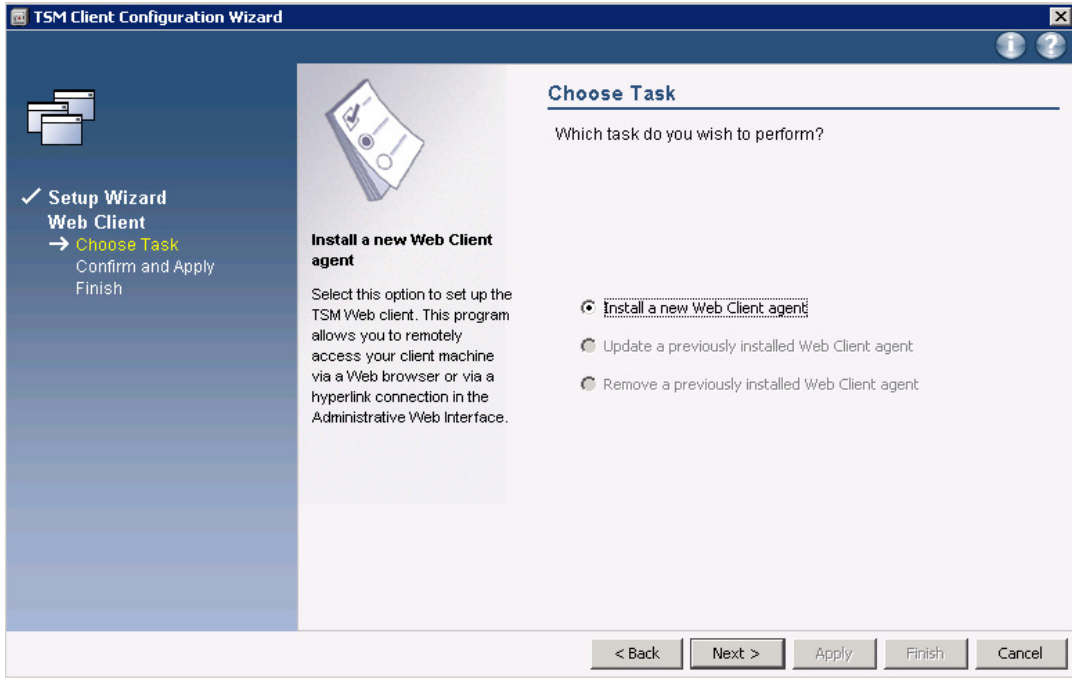
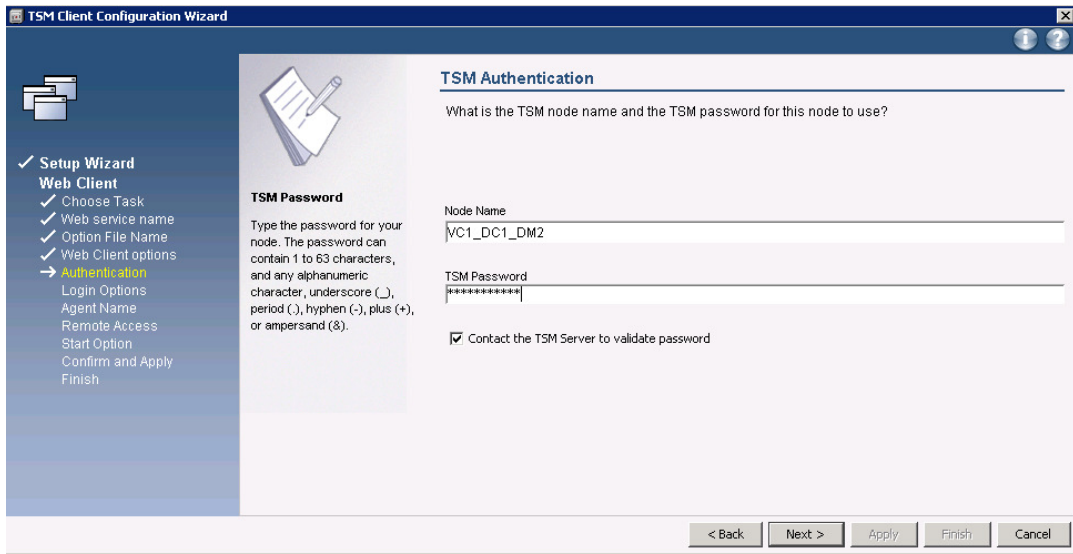
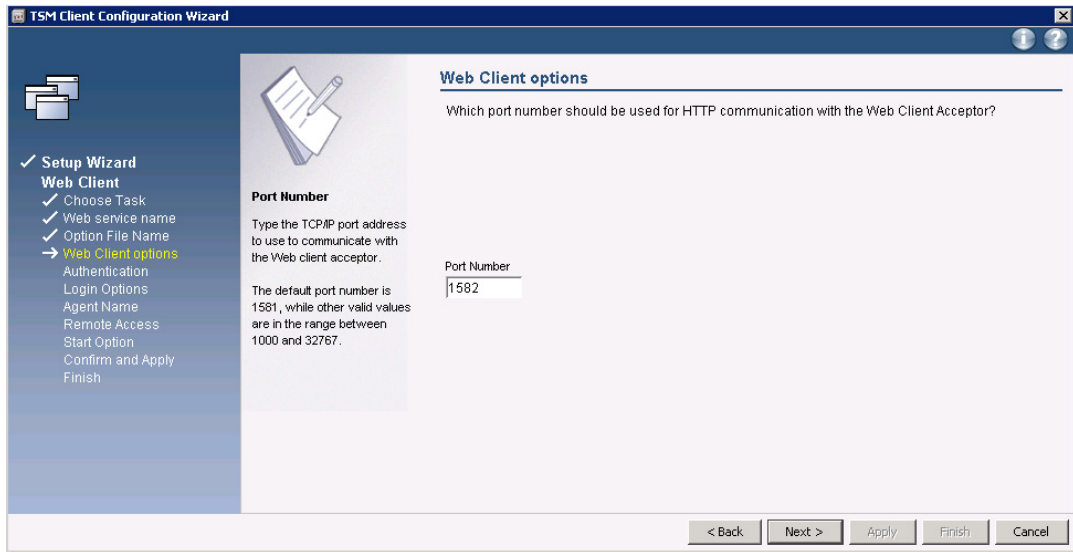
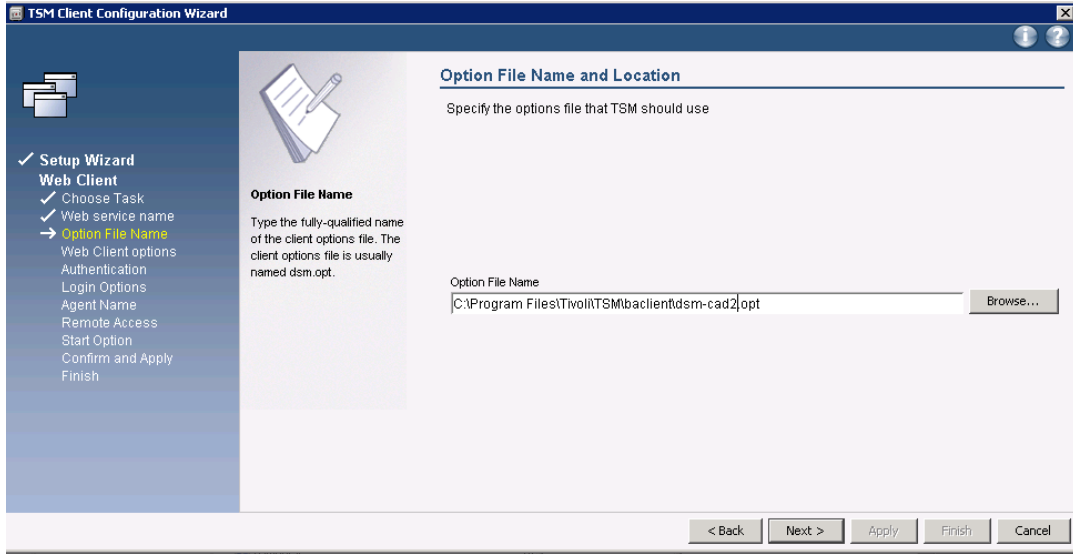
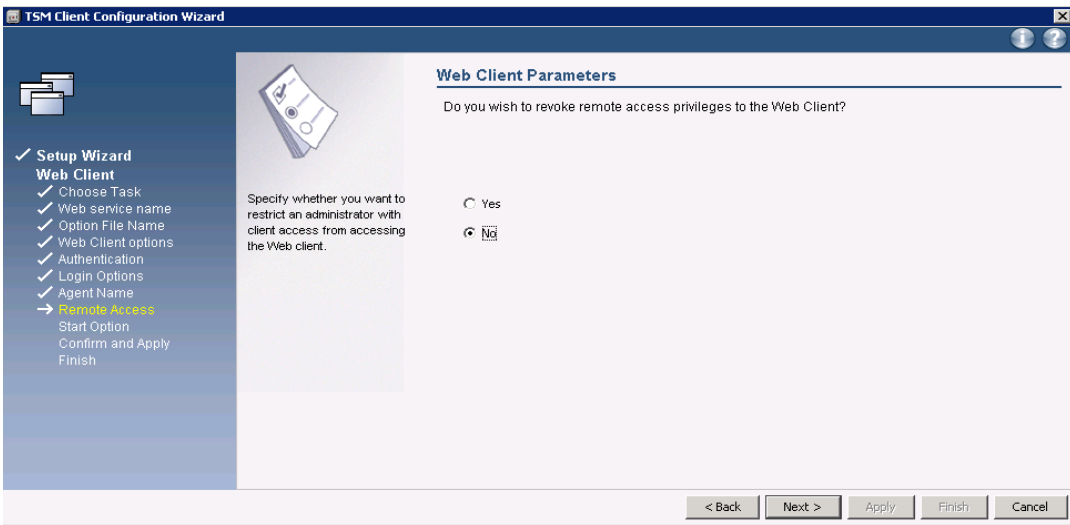
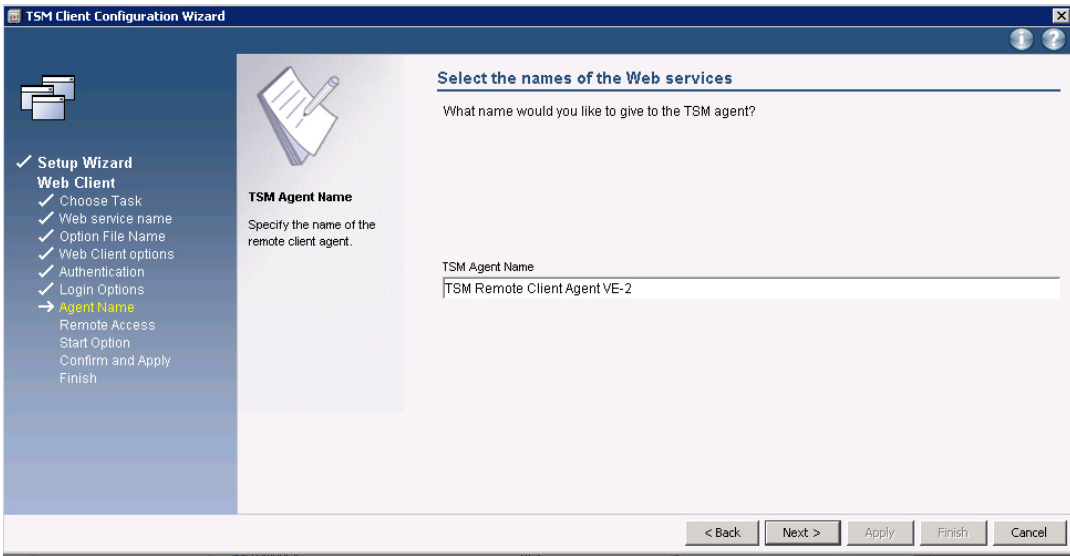
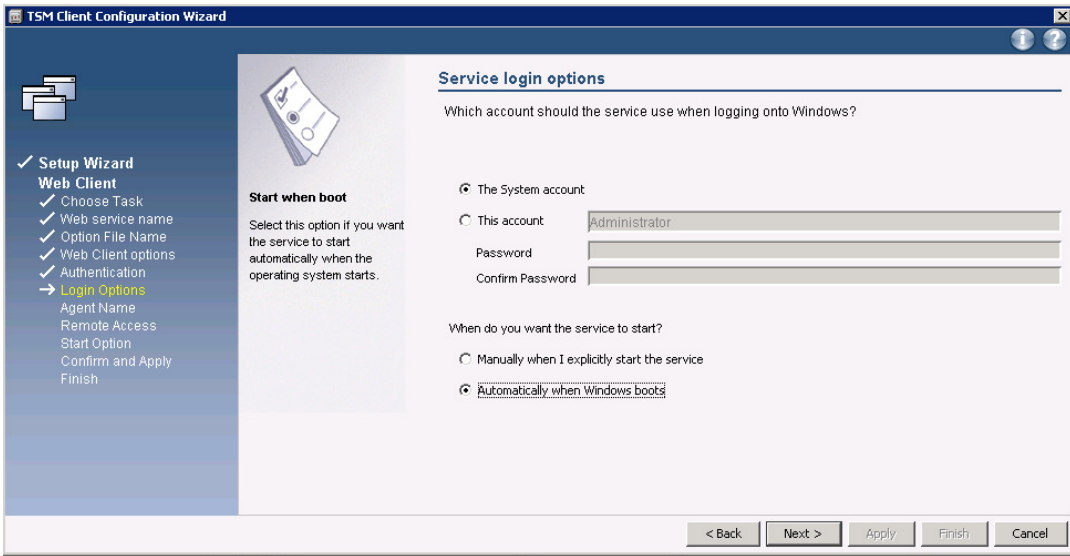


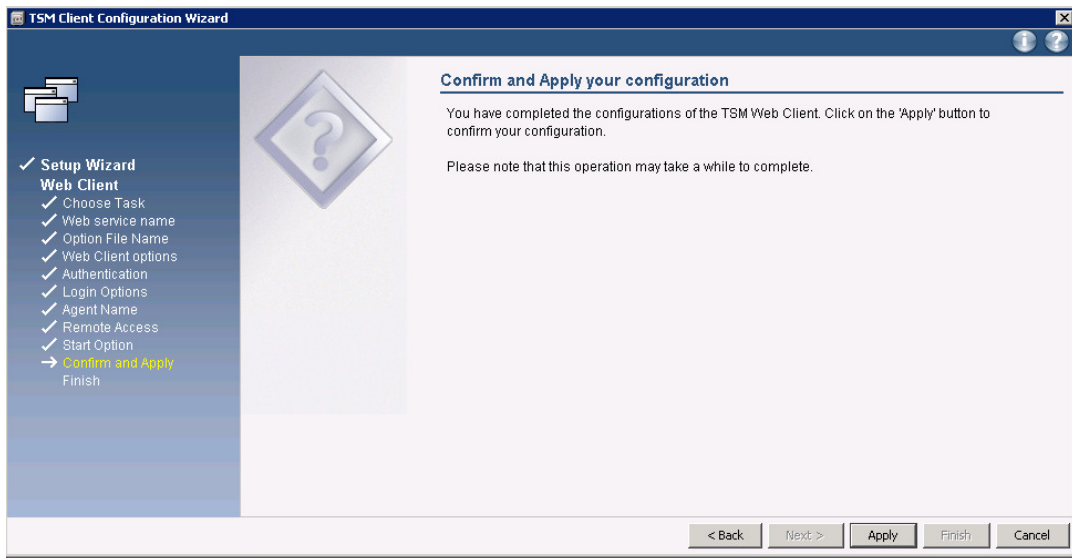
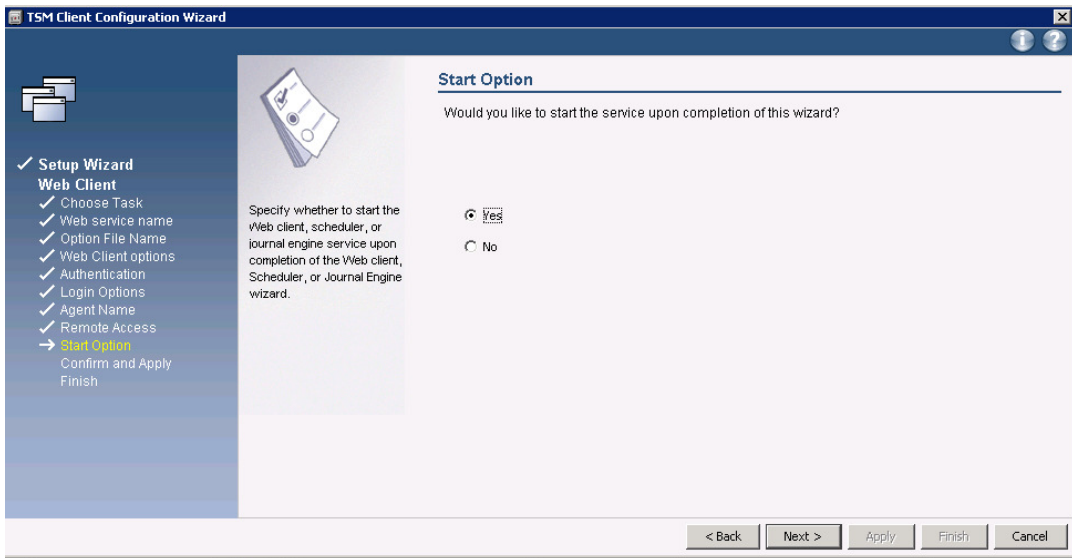
Figure 3-a: TSM BA-client interface



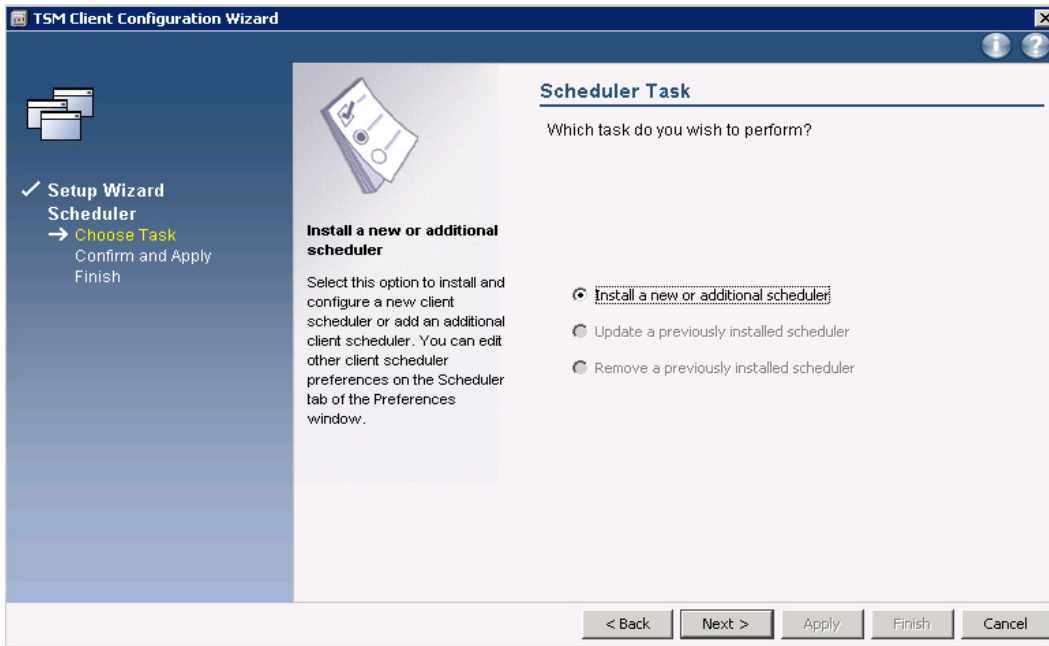
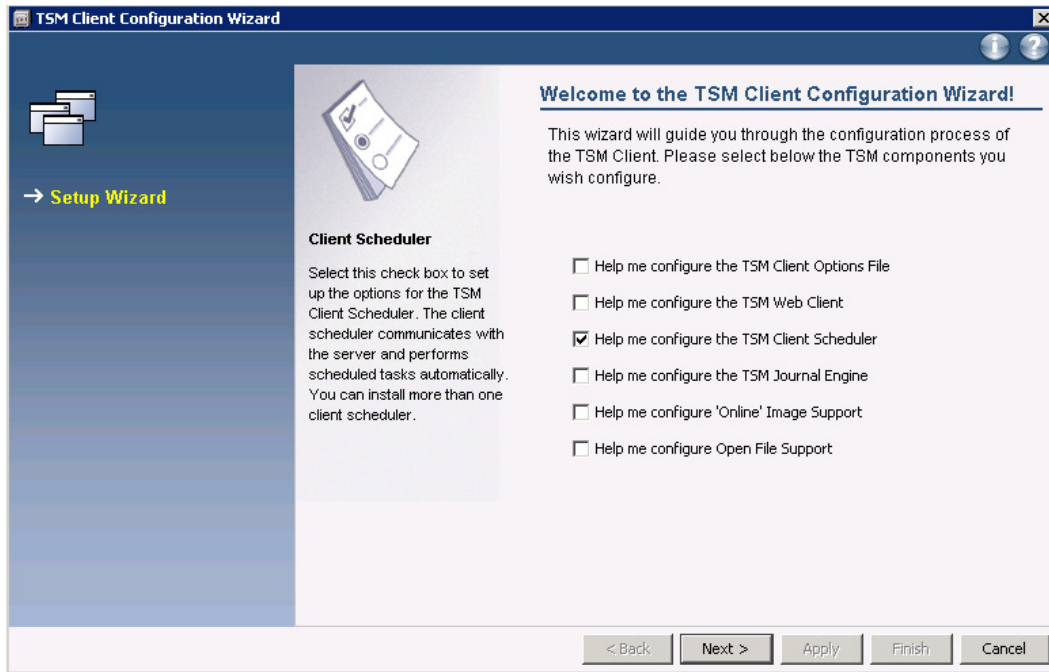


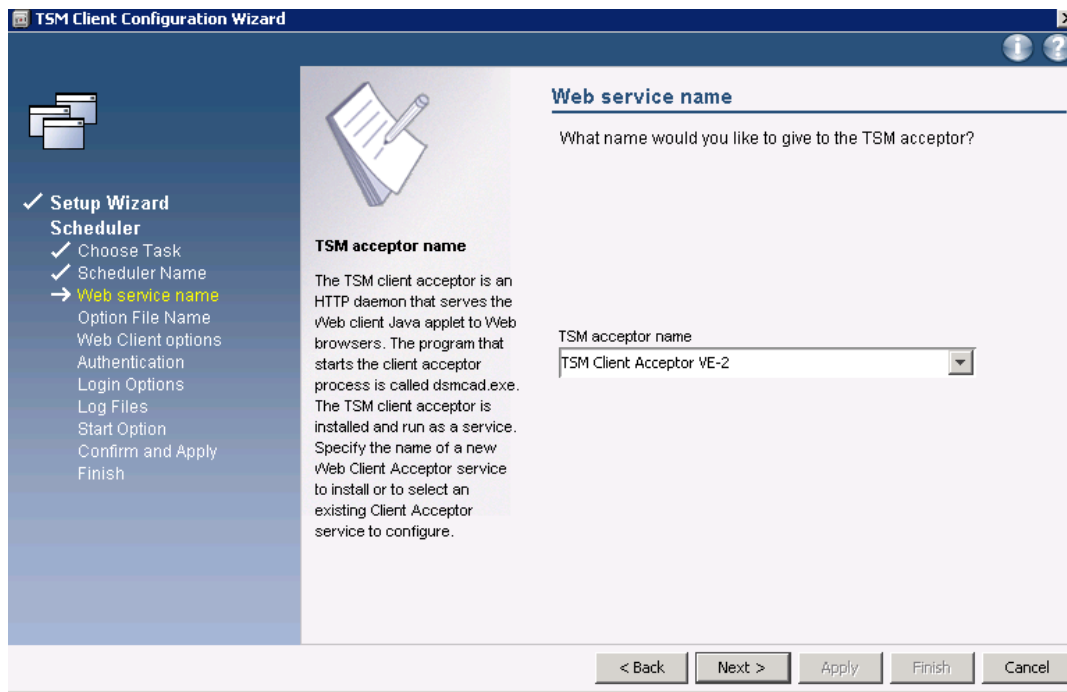
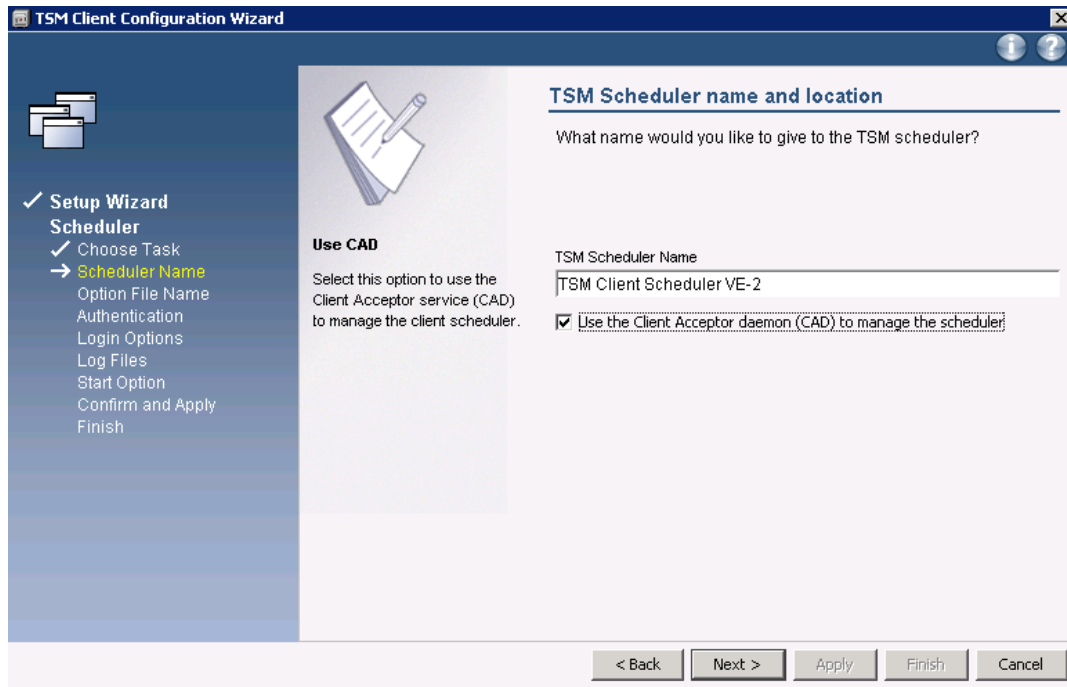


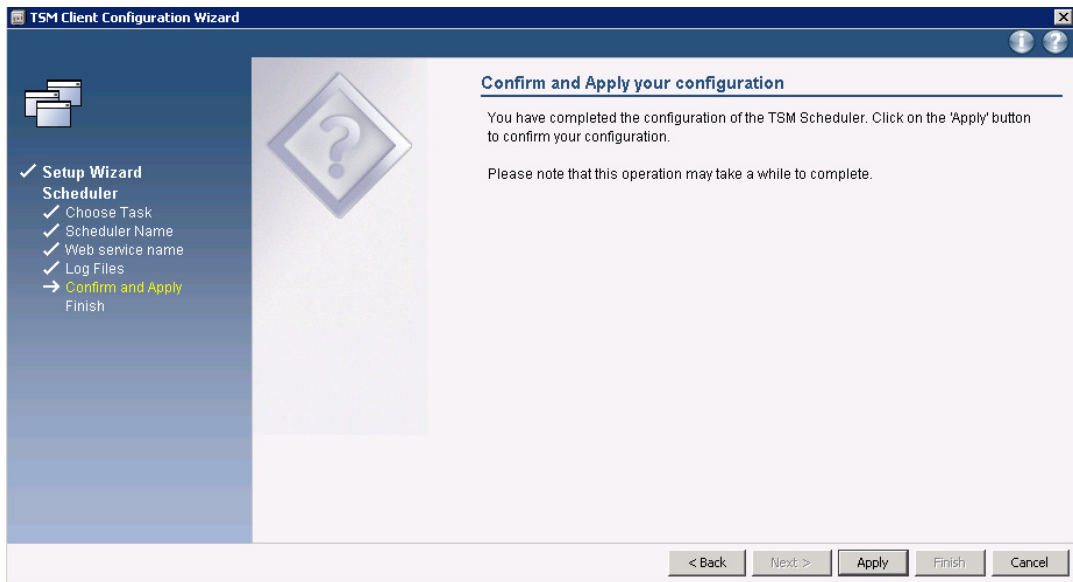
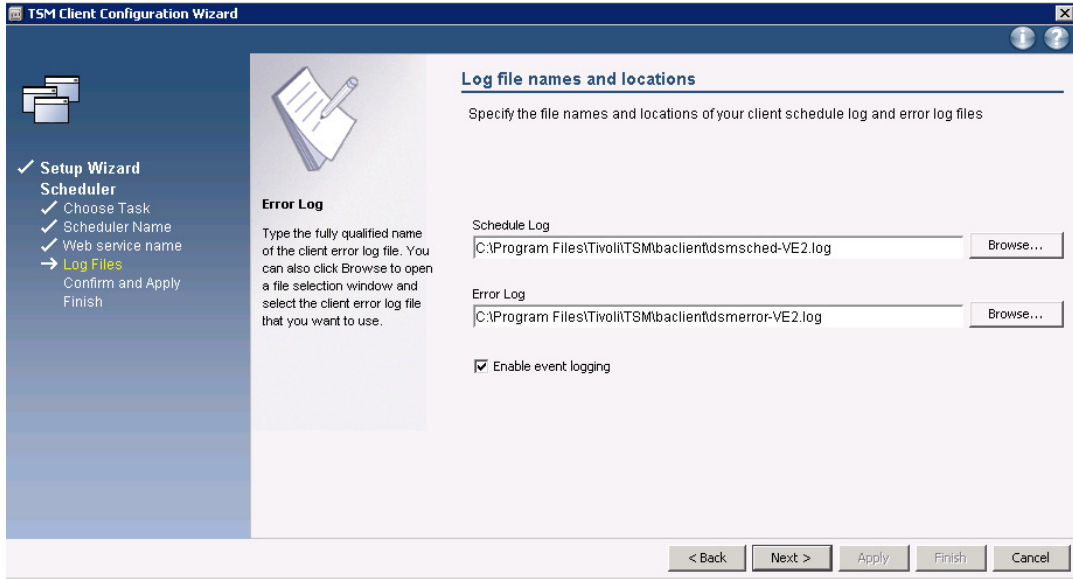












## 5.4 Configure multiple data mover on same vBS (proxy)

If you need to create more than one data mover, repeat tasks 5.2 and 5.3 , and create as many data mover option file, services as you need.

## 5.5 TSM for Virtual Environments installation

The TDP for VMware install package contains multiple components for Tivoli Storage Manager for Virtual Environment. You should decide which of the components are appropriate for your installation. However, for small test environments, it is recommended to install all components together on the same machine as the vStorage Backup Server.

## Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide

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Refer to the following:

Component	Description	When/Where to install
Recovery Agent Command Line Interface	Command line for File recovery operations.	Recommendation is to always install this on a machine that will have file-level recovery.
Data Protection for VMware Recovery Agent	This is the "Mount" code used for file-level recovery.	Install on machine where file-level recovery is desired.
Documentation	Documentation	Install on machine where file-level recovery is desired
Data Protection for VMware Enablement File	Required file for TSM-VE licensing.	Required to be installed on vStorage Backup Server along with the TSM Backup Archive client. If this is not installed then TSM-VE licensed features (such as incremental backup) will not be enabled.
Data Protection for VMware Vcenter Plugin	vCenter plug-in GUI for TSM-VE	This is the required installation code for the vSphere Client GUI interface to TSM-VE. This acts as a "plug-in server" and may be installed on any machine. It may be installed on the vStorage Backup Server (although not required), or any separate Windows or Linux machine.

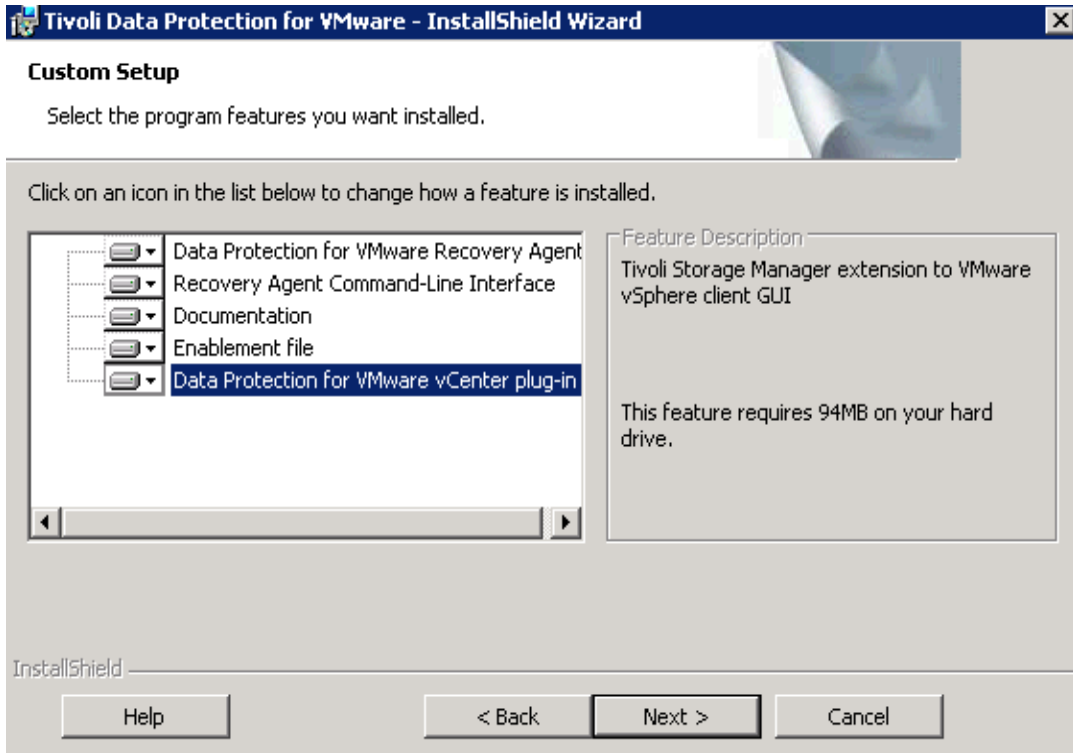


Figure 4.a: TSM client installer for 32 bit version – select components

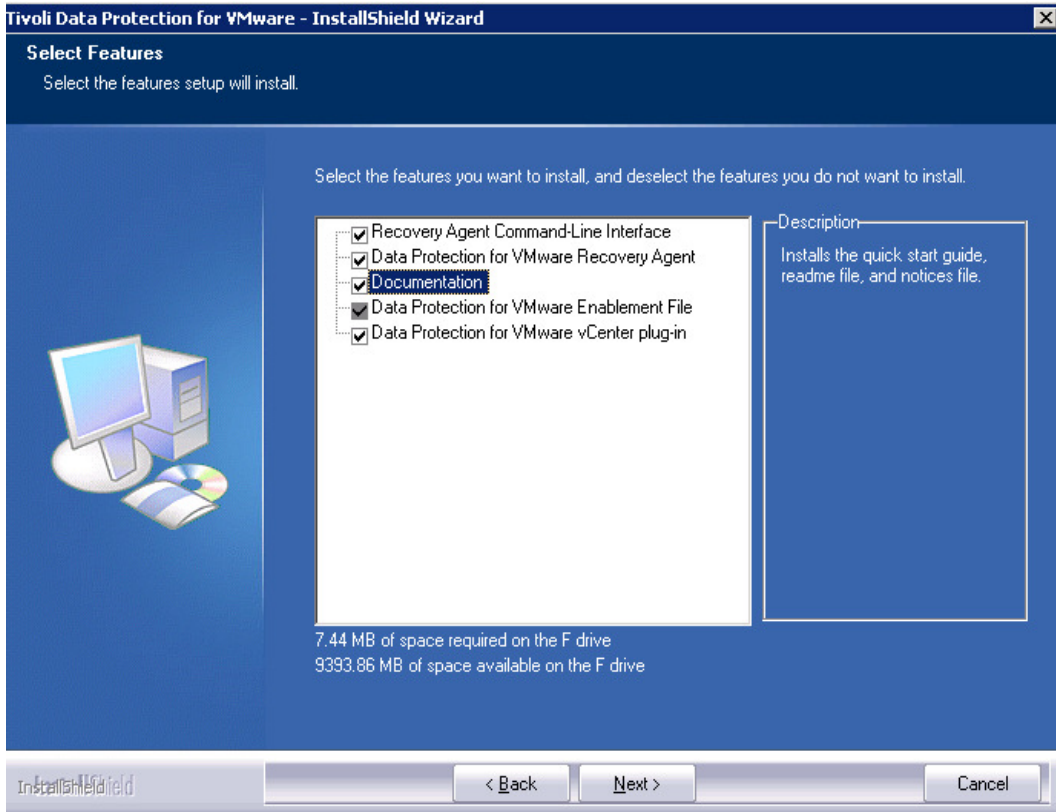


Figure 4.b: TSM client installer for 64 bit version – select components

When prompted, enter the following information describing your environment. “Advanced” is not usually required. Select “Next” and accept all defaults.

**Notice:** You can either use IP address or FQDN when entering information related to vCenter address. However, we recommend using the FQDN, assuming that your environment has a functioning DNS.

You may experience troubles if the IP address or FQDN specified at set-up is not reachable during the installation process. No error will be reported but the plug-in will not be available for use.

Have a look to the current limitation of vCenter plug-in installation documented out there:  
<http://www-01.ibm.com/support/docview.wss?uid=swg21507325>

**Tivoli Data Protection for VMware - InstallShield Wizard**

**Plug-in registration/unregistration**

Enter information to register (install) or unregister (uninstall) the Data Protection for VMware vCenter plug-in.

vCenter Server IP address / Name:

vCenter User Name:

vCenter Password:

Click Advanced to configure Derby Database and WebSphere Application Server parameters. If you want to use default values for these applications, click Next.

InstallShield

Figure 4.c: TSM client installer for 32 bit version – vCenter information

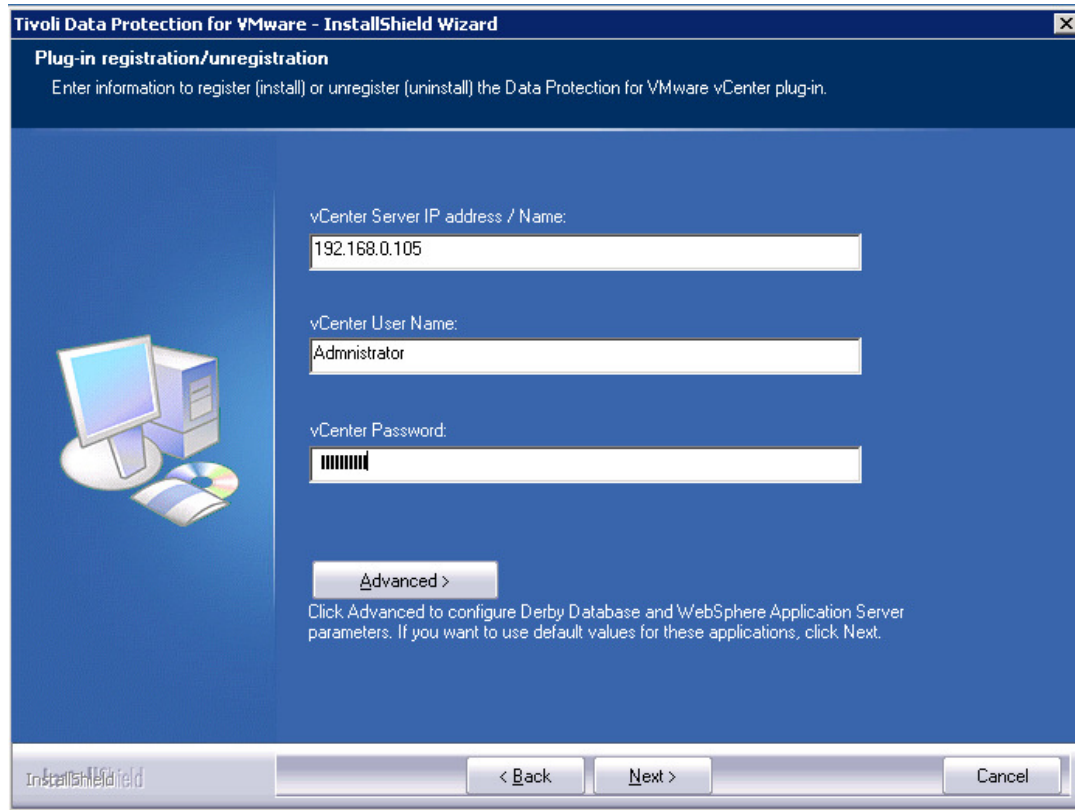


Figure 4.d: TSM client installer for 64 bit version - vCenter information

Once the installation is done you must perform the following configurations before using TSM for VE:

Client node configurations (on the TSM server, using the admin client)  
vCenter plugin configuration, (this is optional if the plug-in is not used).  
TSM backup/archive client configuration, either by editing the dsm.opt file directly or with the backup archive client GUI preferences editor. The TSM client provides the “datamover” functionality.

## 5.6 TSM server configuration

### 5.6.1 Register TSM for VE related node on Tivoli Storage Manager Server

The vCenter plug-in relies on the following set of node definitions and relationships. Make sure the TSM node definitions for datacenters map to the associated VMware data centers.

If the vCenter plugin is not used, you do not need to define TSMCLI and vCenter node names. But it is recommended to use the datacenter node convention and have the data mover(s) back up data on behalf of the datacenter node (i.e. maintain data mover / data center proxy node relationship and use `-asnode=datacenternode` option on dsm/dsmc).

# Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide

TSM for VE requires a specific node topology on the server. There are 4 types of nodes: VMCLI, Virtual Center, datacenter, data mover. These nodes are linked together via proxy associations (i.e. the TSM server's `grant` command).

- **VMCLI node** - Node belonging to the VMCLI.
- **vCenter node** - Represents the Virtual Center.
- **Datacenter node** - Represents a Datacenter.
- **Datamover node** - Used for backup and restore. This node belongs to a backup proxy (B/A Client).

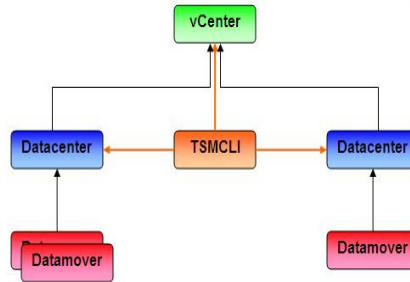


Figure 1 - TSM for VE 6.3 Node Topology

## Note

The arrows determine the proxy agent and target. For example,  means this `grant proxy agent=A target=B`

**“Datamover node”:** This is the TSM node ID that will perform the backup. You can have multiple TSM data mover nodes for each vStorage Backup Server. This node must be authorized to backup data on behalf of the data center target node with the `grant proxynode` command. No VM filesystems exist under this node. The TSM for VE User Guide uses the example “VC1\_DC1\_DM1”.

```
REGISTER NODE FRSV123012.DM1 tsm41vbs dom=TRI passexp=9999 keepmp=yes
```

**“Datacenter node”:** This is a virtual node that maps to a VMware data center. This is the node that “owns” the VM backup data and contains filesystems for backed up VMs. See next section for setting up proxynode authorities for the datamover node/s.

```
REGISTER NODE FRSV123012.DC1 tsm41vbs dom=TRI passexp=9999 keepmp=yes
```

**“vCenter node”:** This is a virtual node that maps to a VMware vCenter and is used by the vSphere Plugin.

```
REGISTER NODE FRSV123012.VC1 tsm41vbs dom=TRI passexp=9999
```

**“VMCLI node”:** This is a common node used by the vSphere Plug-in GUI to control backup / restore operations.

```
REGISTER NODE FRSV123012.TSMCLI tsm41vbs dom=TRI passexp=9999
```

## 5.6.2 Proxy relationship:

```
tsm: SP1MOPB2TSMCLI>grant proxy target=FRSV123012.VC1 agent=FRSV123012.TSMCLI,FRSV123012.DC1
ANR0140I GRANT PROXYNODE: success. Node FRSV123012.DC1 is granted proxy authority to node FRSV123012.VC1.
ANR0140I GRANT PROXYNODE: success. Node FRSV123012.TSMCLI is granted proxy authority to node FRSV123012.VC1.

tsm: SP1MOPB2TSMCLI>grant proxy target=FRSV123012.DC1 agent=FRSV123012.DM1,FRSV123012.TSMCLI
ANR0140I GRANT PROXYNODE: success. Node FRSV123012.DM1 is granted proxy authority to node FRSV123012.DC1.
ANR0140I GRANT PROXYNODE: success. Node FRSV123012.TSMCLI is granted proxy authority to node FRSV123012.DC1.

tsm: SP1MOPB2TSMCLI>grant proxy target=FRSV123012.DM1 agent=FRSV123012.TSMCLI
ANR0140I GRANT PROXYNODE: success. Node FRSV123012.TSMCLI is granted proxy authority to node FRSV123012.DM1.
```

### Node Relationships

1. 1 datacenter virtual node for each VMware datacenter.
2. 1 to n datacenter nodes associated with a vCenter node



3. Data mover B/A client node:
  - a. 1 to n data mover B/A client nodes associated with a datacenter node
  - b. Normally a data mover node is associated with only 1 datacenter. But, it is supported to allow a data mover node to be associated with more than 1 datacenter.
4. Datacenter node: Associated with 1 vCenter node.
5. 1 VMCLI node per vCenter node.

### 5.6.3 Configure the Management class to determine the retention and storage location

Define the VMMC and VMCTLC management classes on TSM. NOTE: "VMCTLC" refers to the management class for disk storage pool when tape or VTL is being used as the primary storage pool for the VM backup data.

```
DEFINE MGMTCLASS TRI STANDARD VE-D28-d desc='Disk class with 28 days retention'  
DEFINE COPYGROUP TRI STANDARD VE-D28-d type=backup vere=28 verdel=1 rete=28  
reto=28 dest=FF-DATA-D
```

```
DEFINE MGMTCLASS TRI STANDARD VE-CTL-d desc='Disk class with 28 days retention –  
CTL only'  
DEFINE COPYGROUP TRI STANDARD VE-CTL-d type=backup vere=28 verdel=1 rete=28  
reto=28 dest=VE-D28-D
```

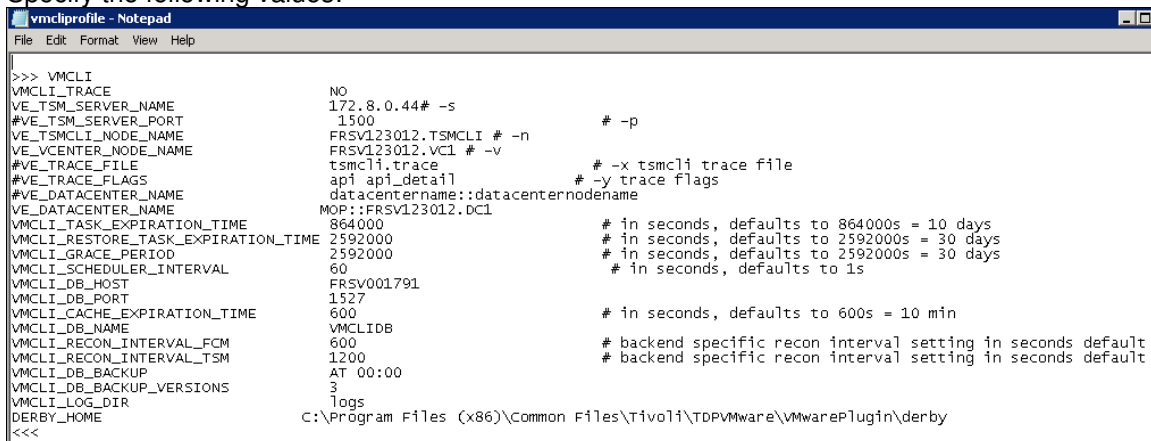
## 5.7 TSM for Virtual Environments vCenter plug-in configuration

Note: Only required if plug-in will be used. You may perform backups and restores from the TSM backup/archive GUI or command line without installation and configuration of the plug-in.

Open file located:

C:\Program Files (x86)\Common Files\Tivoli\TDPVMware\VMwarePlugin\scripts\vmcliprofile

Specify the following values:



```
vmcliprofile - Notepad  
File Edit Format View Help  
>>> VMCLI  
VMCLI_TRACE NO  
VE_TSM_SERVER_NAME 172.8.0.44# -s  
#VE_TSM_SERVER_PORT 1500 # -p  
VE_TSMCLI_NODE_NAME FRsv123012.TSMCLI # -n  
VE_VCENTER_NODE_NAME FRsv123012.VC1 # -v  
#VE_TRACE_FILE tsmcli.trace # -x tsmcli trace file  
#VE_TRACE_FLAGS api api_detail # -y trace flags  
#VE_DATACENTER_NAME datacentername::datacentername  
VE_DATACENTER_NAME MOP::FRsv123012.DC1  
VMCLI_TASK_EXPIRATION_TIME 864000 # in seconds, defaults to 864000s = 10 days  
VMCLI_RESTORE_TASK_EXPIRATION_TIME 2592000 # in seconds, defaults to 2592000s = 30 days  
VMCLI_GRACE_PERIOD 2592000 # in seconds, defaults to 2592000s = 30 days  
VMCLI_SCHEDULER_INTERVAL 60 # in seconds, defaults to 1s  
VMCLI_DB_HOST FRsv001791  
VMCLI_DB_PORT 1527  
VMCLI_CACHE_EXPIRATION_TIME 600 # in seconds, defaults to 600s = 10 min  
VMCLI_DB_NAME VMCLIDB  
VMCLI_RECON_INTERVAL_FCM 600 # backend specific recon interval setting in seconds default  
VMCLI_RECON_INTERVAL_TSM 1200 # backend specific recon interval setting in seconds default  
VMCLI_DB_BACKUP AT 00:00  
VMCLI_DB_BACKUP_VERSIONS 3  
VMCLI_LOG_DIR logs  
DERBY_HOME C:\Program Files (x86)\Common Files\Tivoli\TDPVMware\VMwarePlugin\derby  
<<<
```

Figure 4.e: Screen shot of vmcliprofile file

Store the VMCLI password, used by the plug-in later.

```
c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts>notepad vmcliprofile

c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts>echo tsn41spl>pwd

c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts>vmcli -f set_password -I pwd
Tivoli Storage Manager Command Line Wrapper for Virtual Environments Version: 6.3.0.00
Build Date: Mon Sep 26 16:14:08 2011
Tivoli Storage Manager API Version 63000
Tivoli Storage Manager Command Line Wrapper Compile Version 63000
#PARAM OPERATION_TYPE 6
#PHASE COUNT 3
#PHASE PREPARE
#PARAM BACKUP_TYPE=0
#PARAM TSM_SERVER_NAME=172.8.0.44
#PARAM TSMCLI_NODE_NAME=FRSU123012.TSMCLI
#PARAM UCENTER_NODE_NAME=
#PARAM DATACENTER_NODE_NAME=
#PARAM OFFLOAD_HOST_NAME=
#PARAM TSM_OPTFILE=C:\Users\fr045893.CE\AppData\Local\Temp\3\T4U3AB9.tmp
#PARAM INPUT_FILE=c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts\pwd
#PARAM TRACEFILE=
#PARAM TRACEFLAGS=
#PHASE INITIALIZE
#PHASE CHANGE_PASSWORD
Password updated.

STATUS=success
#END
#INFO FMM16014I The return code is 0.
#END
```

Figure 4.f: Screen shot – configure the vmcli password

Validate your configuration at this point by issuing the inquire\_config command:

```
c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts>umcli
-f inquire_config
#TASK 11 inquire_config 20120502220957850
#PARAM INSTALLED=TSM
#RUN 11 20120502220957850
#LANG en_US
#PARAM BACKEND=TSM
#PARAM OPERATION_TYPE 4
#PHASE_COUNT 4
#PHASE PREPARE
#PARAM BACKUP_TYPE=0
#PARAM TSM_SERVER_NAME=172.8.0.44
#PARAM TSMCLI_NODE_NAME=FRSU123012.TSMCLI
#PARAM UCENTER_NODE_NAME=FRSU123012.UC1
#PARAM DATACENTER_NODE_NAME=
#PARAM OFFLOAD_HOST_NAME=
#PARAM TSM_OPTFILE=C:\Users\fr045893.GE\AppData\Local\Temp\3\T4UFD5C.tmp
#PARAM INPUT_FILE=
#PARAM TRACEFILE=
#PARAM TRACEFLAGS=
#PHASE INITIALIZE
#PHASE INQUIRE_DATACENTER_NODES
#CHILD datacenternode:MOP::FRSU123012.DC1
#PARENT vcenternode:FRSU123012.UC1
#PHASE INQUIRE_PROXY_NODES
#CHILD targetnode:FRSU123012.DC1
#PARENT peernode:FRSU123012.DM1
#CHILD hladdress:
#PARENT peernode:FRSU123012.DM1
#CHILD lladdress:
#PARENT peernode:FRSU123012.DM1
#PARAM STATUS=success
#END RUN 11 20120502220958740
#END TASK 11
#INFO FMM16014I The return code is 0.
#END

c:\Program Files (x86)\Common Files\Tivoli\TDPUMware\UMwarePlugin\scripts>
```

### 5.7.1 vCenter Plug-in Interface Configuration:

First connect to the vCenter plug-in using the vSphere client

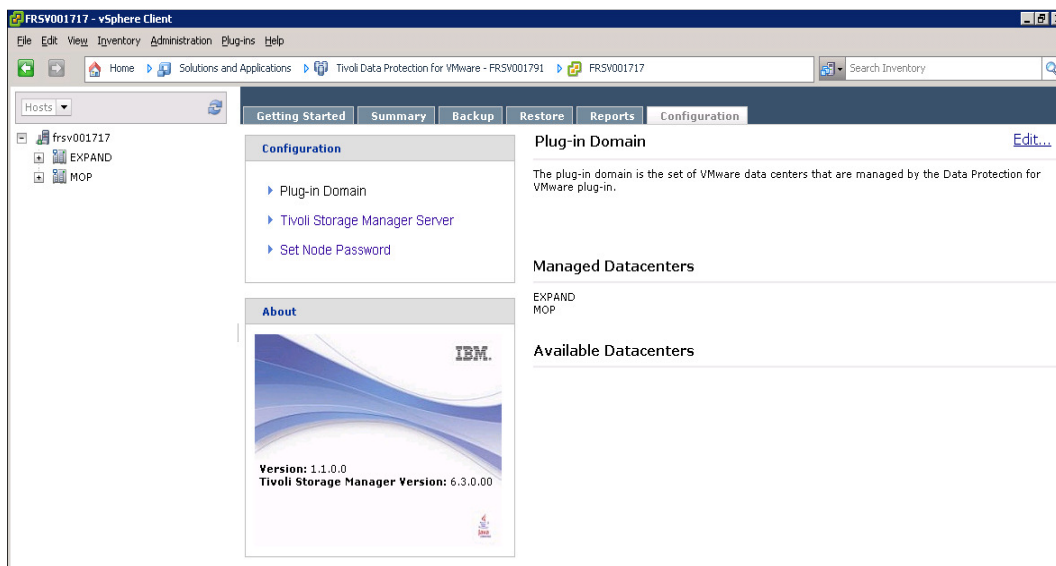


Figure 4.g: vCenter Plug-in - Welcome page

# Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide

Go to the TSM connection panel and enter the credentials required to interact with the TSM server.  
Notice that this account must have sufficient privilege to create schedules onto TSM server.

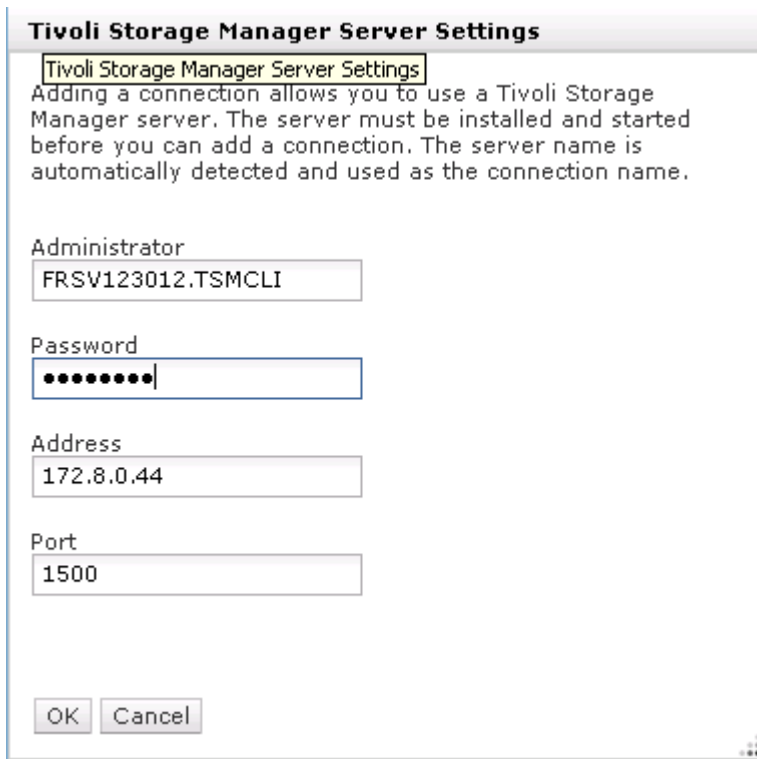
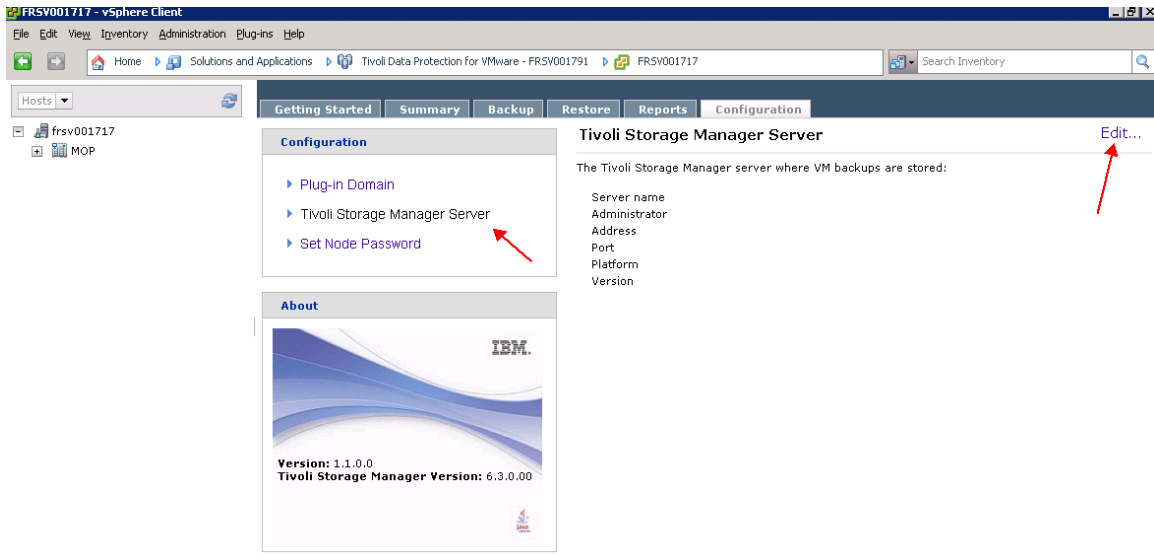


Figure 4.h: vCenter Plugin – TSM server connection panel

## 6 Full VM image backup

VM Image Backups and Restores can be performed several ways with Tivoli Storage Manager for VE:

- Backup/Archive Client GUI
- Backup/Archive Command Line
- vCenter Plug-in

### 6.1 Performing backup with the Backup-Archive GUI client

Open the Backup-Archive client with the appropriate dsm.opt file. Note the use of the “-asnodename” option to ensure that the backups occur under the correct nodename

```
dsmc -asnodename=FRSV123012.DC1
```

The “Backup VM” function is found under the “Actions” pull down menu of the GUI client.

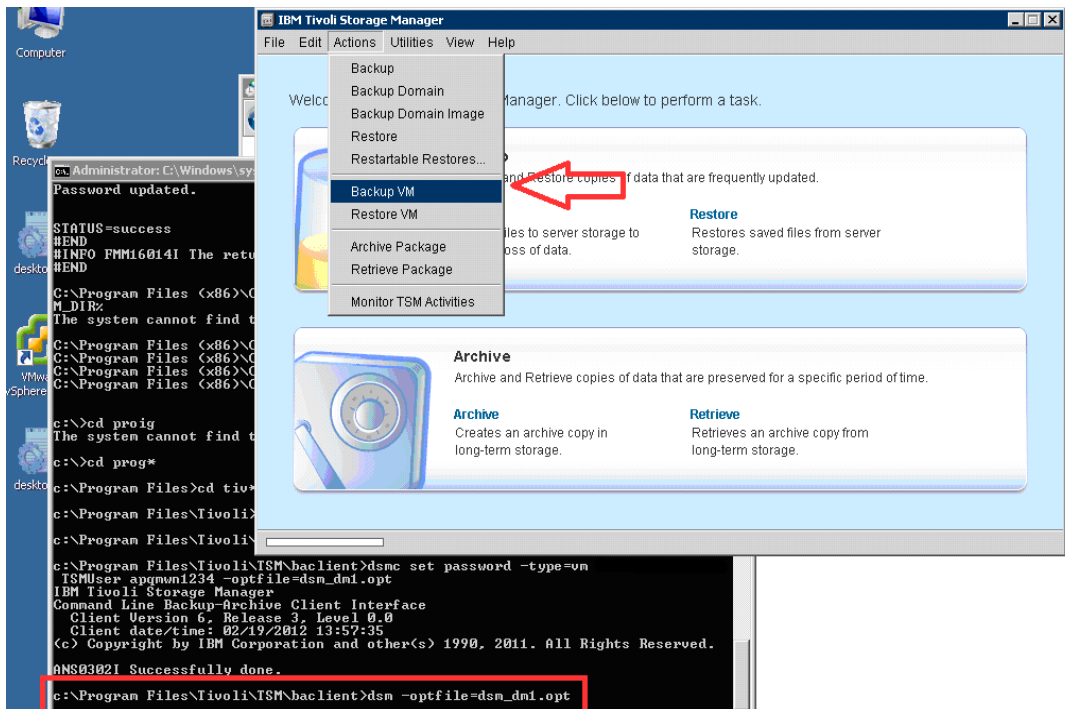
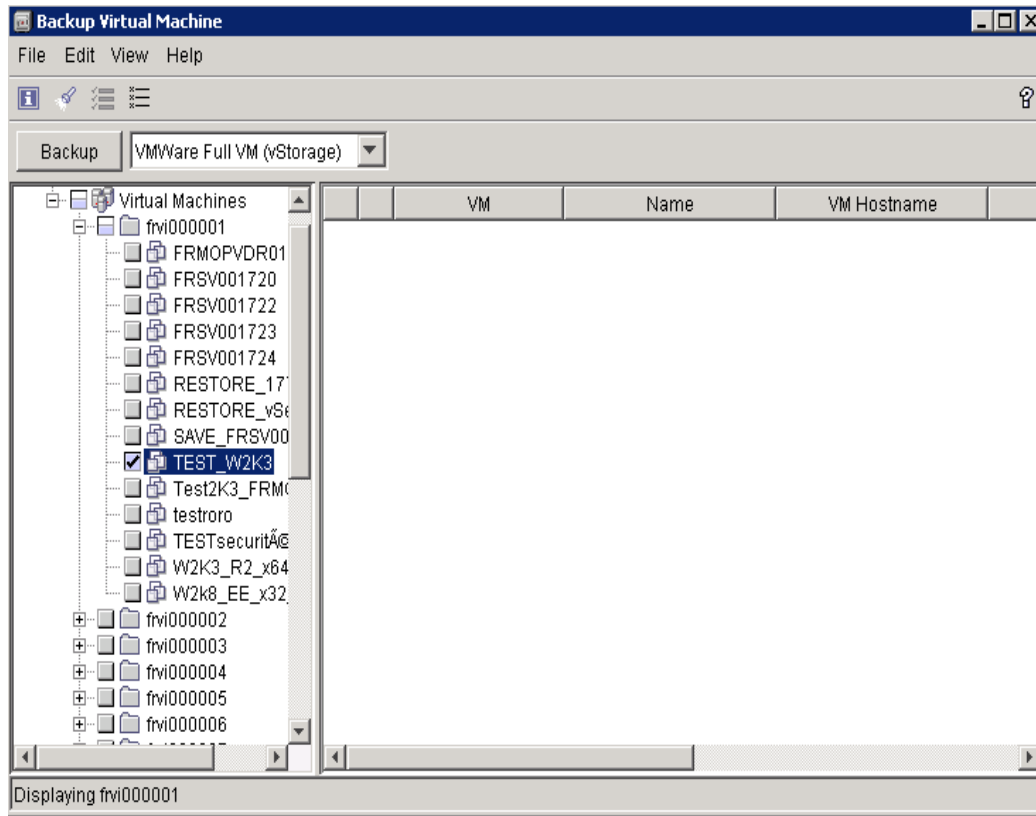


Figure 5.a: BA Client interface – loaded with appropriate profile (DM profile)

Then choose the VM and select the backup Type (FULL or INCR)



### 6.2 Performing backup with the Backup-Archive client CLI

Here is the command required to start a Full VM backup using the baclient command line interface. Pay attention on the `-asnodename` option you specified, regarding your setup.

Note: The `ds_SP1.opt` file contains the right config (datamover node as agent+ datacenter node as target)

```

Administrator: Command Prompt
C:\Program Files\Tivoli\TSM\baclient>dsmc backup vm test_w2k3 -mode=full -vmctm
c=B4-UMCTLD -vmmc=B4-UM35D -optfile=dsm_SPI.opt
IBM Tivoli Storage Manager
Command Line Backup-Archive Client Interface
Client Version 6, Release 3, Level 0.0
Client date/time: 05/02/2012 22:28:52
(c) Copyright by IBM Corporation and other(s) 1990, 2011. All Rights Reserved.

Node Name: FRSU123012.PROXYSP1
Session established with server SP1MOPB2TSMCL1: AIX
Server Version 6, Release 2, Level 3.0
Server date/time: 05/02/2012 22:26:30 Last access: 05/02/2012 22:26:15

2012-05-02T22:28:53.815+02:00 [12820 info 'Default'] Initialized channel manager
2012-05-02T22:28:53.815+02:00 [12820 info 'Default'] Current working directory:
C:\Program Files\Tivoli\TSM\baclient
2012-05-02T22:28:53.815+02:00 [12820 verbose 'ThreadPool'] TaskMax=10, IoMin=1,
IoMax=21
Full BACKUP UM of virtual machines 'test_w2k3'.

Backup UM command started. Total number of virtual machines to process: 1
2012-05-02T22:29:44.939+02:00 [12820 trivia 'ThreadPool'] PrepareToWait: Startin
g new thread
2012-05-02T22:29:44.939+02:00 [06784 trivia 'ThreadPool'] PrepareToWait: Startin
g new thread
2012-05-02T22:29:44.939+02:00 [04316 trivia 'ThreadPool'] PrepareToWait: Startin
g new thread

Starting Full UM backup of VMware Virtual Machine 'TEST_W2K3' mode=Full, target
node name='FRSU123012.PROXYSP1', data mover node name='FRSU123012.PROXYSP1'

Backing up Full UM configuration information for 'TEST_W2K3'
13.959 UM Configuration [Sent]
Processing snapshot disk [INF_MP_B2_0512_001] TEST_W2K3/TEST_W2K3.vmdk (Hard Dis
k 1), Capacity: 21,474,836,480, Bytes to Send: 15,167,651,840 (san)[sending]
Volume --> 21,474,836,480 [INF_MP_B2_0512_001] TEST_W2K3/TEST_W2K3.vmdk (Hard Di
sk 1) [Sent]
Processing snapshot disk [INF_MP_B2_0512_001] TEST_W2K3/TEST_W2K3_1.vmdk (Hard D
isk 2), Capacity: 53,687,091,200, Bytes to Send: 14,646,509,568 (san)[sending]
Volume --> 53,687,091,200 [INF_MP_B2_0512_001] TEST_W2K3/TEST_W2K3_1.vmdk (Hard
Disk 2) [Sent]

Successful Full UM backup of VMware Virtual Machine 'TEST_W2K3' mode=Full, targe
t node name='FRSU123012.PROXYSP1', data mover node name='FRSU123012.PROXYSP1'

Backup processing of 'TEST_W2K3' finished without failure.
    
```

Figure 5.b: BA-Client command line – loaded with appropriate profile (DM profile)

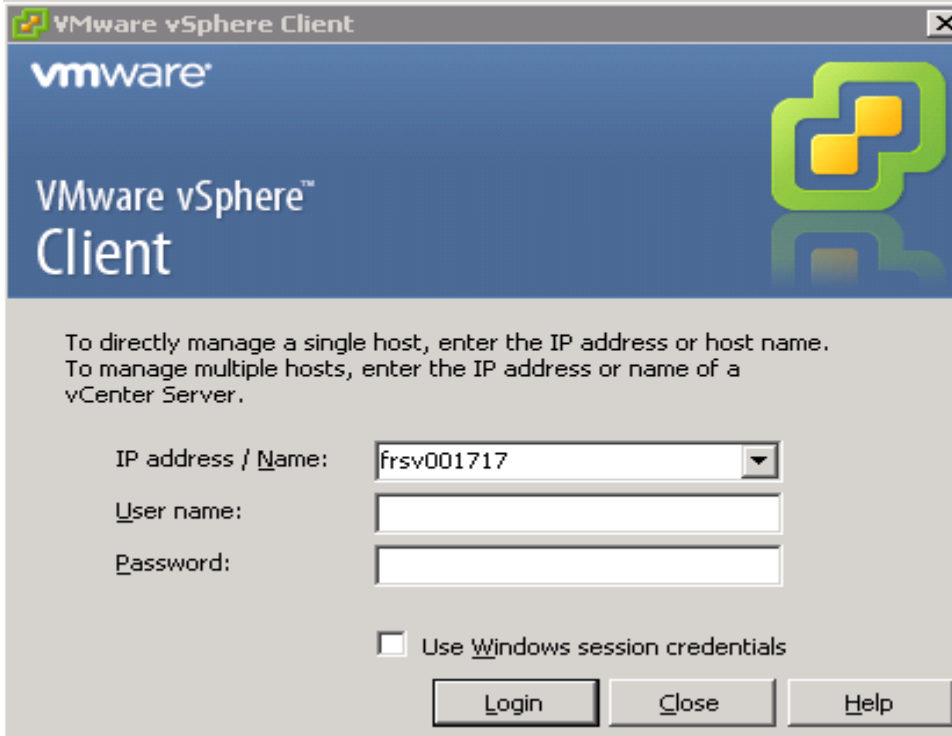
```
Backup processing of 'TEST_W2K3' finished without failure.

Total number of objects inspected:          1
Total number of objects backed up:         1
Total number of objects updated:           0
Total number of objects rebound:          0
Total number of objects deleted:           0
Total number of objects expired:           0
Total number of objects failed:            0
Total objects deduplicated:                231
Total number of bytes inspected:           70.00 GB
Total number of bytes processed:           27.78 GB
Total bytes before deduplication:          27.76 GB
Total bytes after deduplication:           13.94 GB
Total number of bytes transferred:         13.96 GB
Data transfer time:                        1,974.01 sec
Network data transfer rate:                14,749.31 KB/sec
Aggregate data transfer rate:              13,756.53 KB/sec
Objects compressed by:                     0%
Deduplication reduction:                   49.77%
Total data reduction ratio:                 80.06%
Elapsed processing time:                   00:35:16
Unmount virtual machine disk on backup proxy for UM 'TEST_W2K3'
Deleted directory C:\Users\fr045893.CE\AppData\Local\Temp\3\vmware-fr045893\4228ed68-9bae-e77b-b615-33d31defbeb6-vm-3536\san

Backup UM command complete
Total number of virtual machines backed up successfully: 1
  virtual machine TEST_W2K3 backed up to nodename FRSU123012.PROXYSP1
Total number of virtual machines failed: 0
Total number of virtual machines processed: 1
```

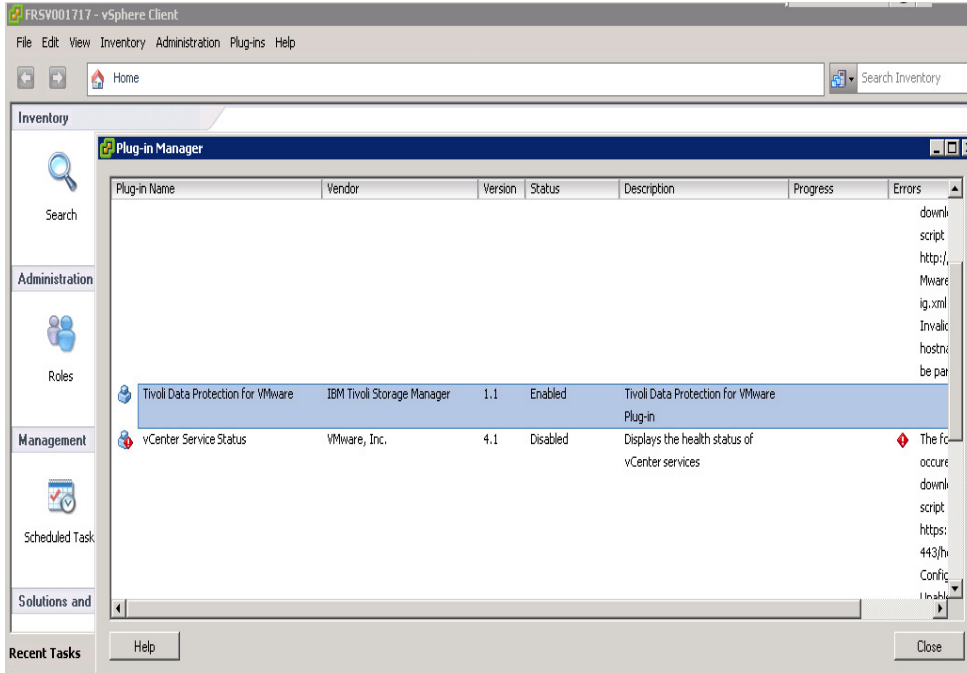
### 6.3 Starting the TSM DP for VMware vCenter plug-in

To use the vCenter plug-in, use the VMware VI Client interface.

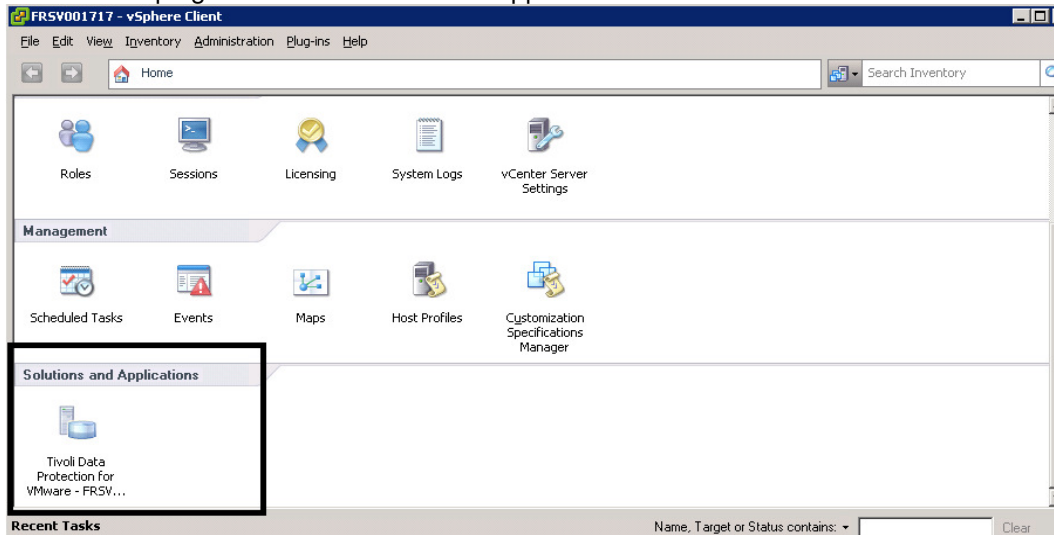


If this is the first time you use the plug-in in the VI interface, you may have to install it using the vCenter Plug-in Manager





You find the plug-in on the Solutions and Applications



## 6.4 Performing backup with the TSM DP for VMware vCenter plug-in

Tip: This task creates a scheduled job on the Tivoli Storage Manager Server. As a result, the Tivoli Storage Manager scheduler service must be configured.

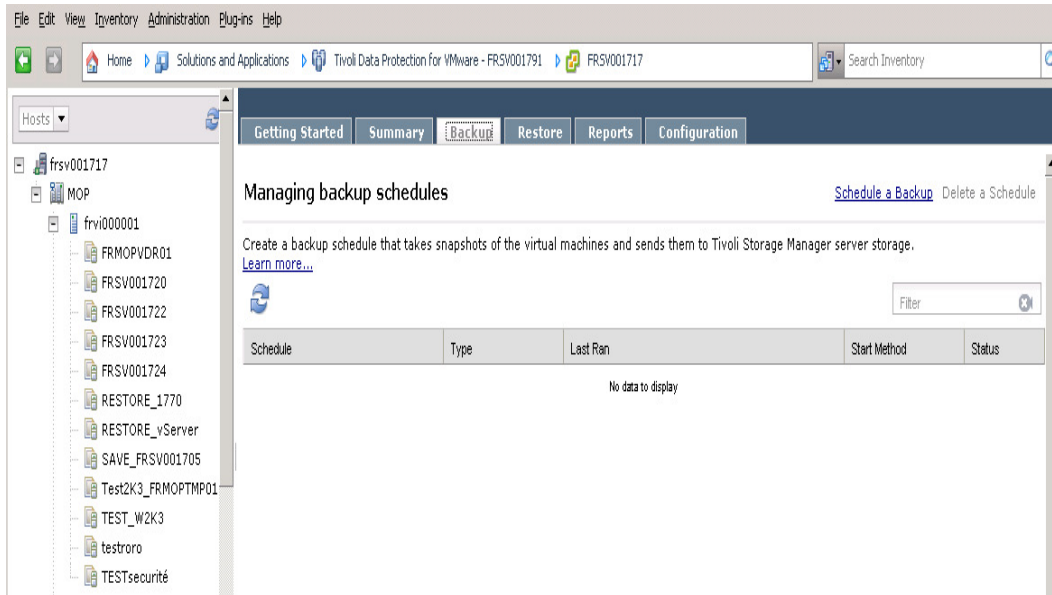
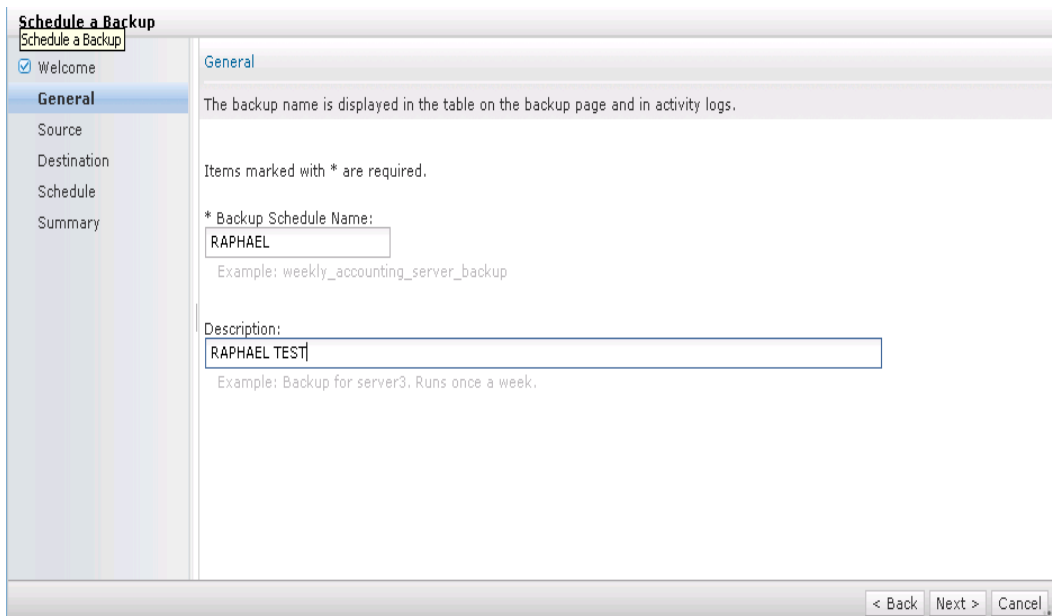
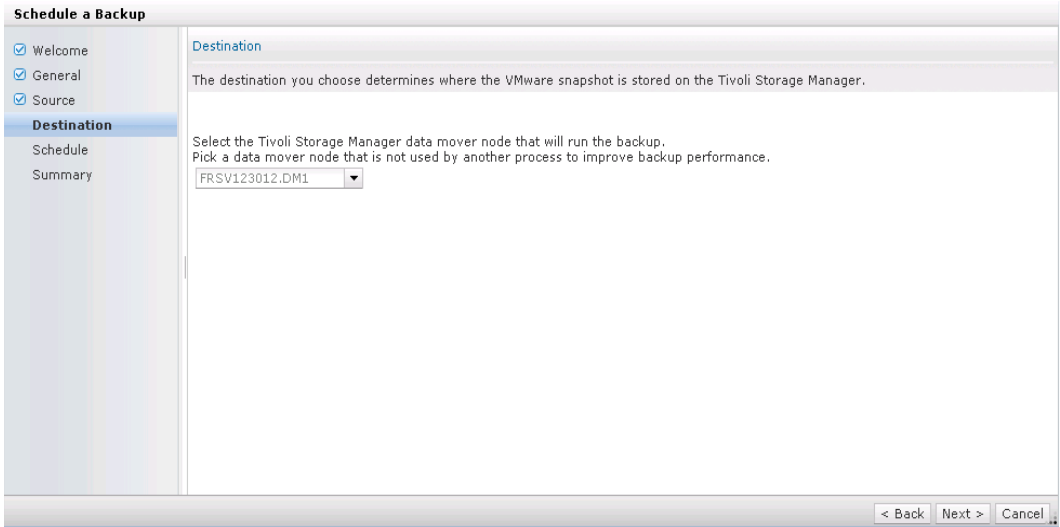
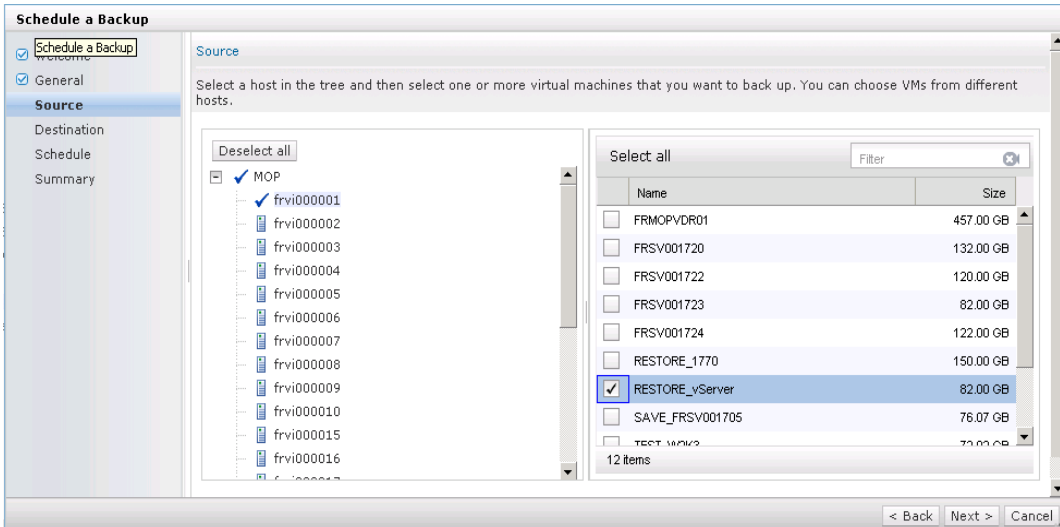
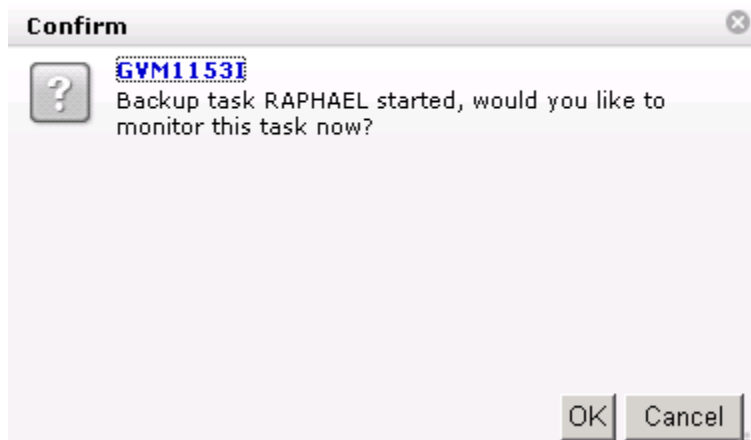
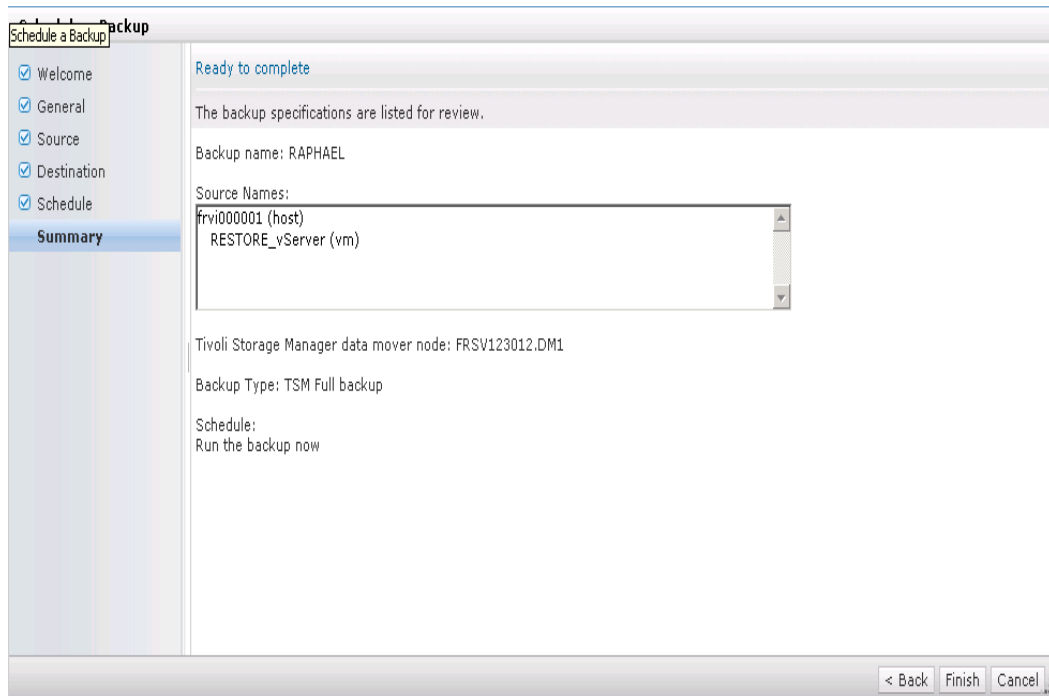
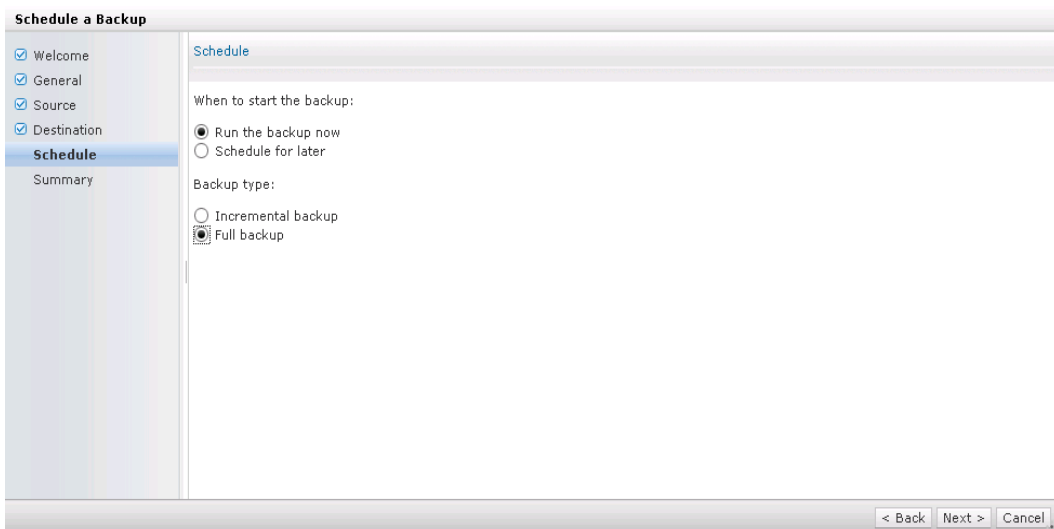


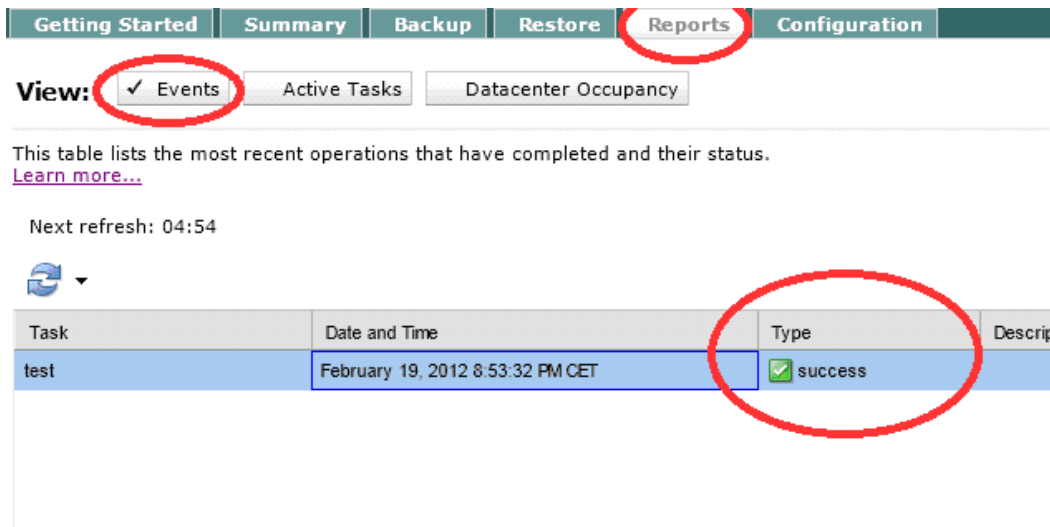
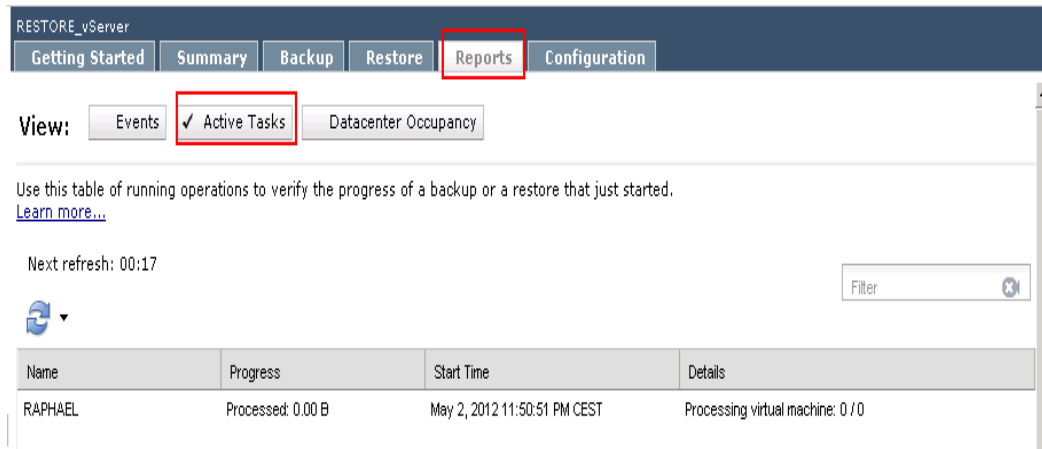
Figure 5.c: vCenter Plugin interface – Backup Tab





Select how you want to schedule it. Choose 'Run now' if you want an instant backup (one time backup)





## 6.5 Scheduling backups

In addition to setting up backup schedules with the vCenter Plug-in wizard, schedules can be defined via the Tivoli Storage Manager administrative interface (command line or administration center GUI). The scheduling of backups should be carefully planned. Schedules created with the vCenter Plug-in can be viewed through the Tivoli Storage Manager Server admin interface. However, schedules that are created directly via the Tivoli Storage Manager Server admin interface will not be shown on the VCenter Plug-in. If a schedule is created for a backup within the next 24 hours, the Tivoli Storage Manager scheduler service (or daemon) must be restarted. The most important things to consider when you define your backup policy is: how to meet the RTO and RPO defined. Given that, you will define the schedule plan and backup policy. You have to take in consideration also the infrastructure already in available to backup your virtual environment – number of VBS, number of VMs, path to backup storage.

Here are two methods to automate your VE backups:

“Batched full”

Full VM backups during extended time (e.g., weekend), incremental during weekdays.

Easiest approach to configure / minimizes schedule definitions.

Backup window considerations / does not optimize usage of vStorage backup server.

“Rotating full”

Full and incremental backups are interleaved each day

Distributes backup workload/window throughout the week

More complex scheduling

For additional information, refer to Recommendations for Scheduling with Tivoli Storage Manager for Virtual Environments:

<https://www.ibm.com/developerworks/wikis/display/tivolistorage/Recommendations+for+Scheduling+with+TSM+for+Virtual+Environments>

## 7 Full VM image restore

### 7.1 Overview of restore procedures

TSM for VE : which interface to use and where ?			
	VBS	guest (VM)	vCenter plug-in
<b>Task to be done</b>			
FULL VM Restore	using Baclient	N/A	using plug-in interface
File Level Restore	DP for Vmware recovery Agent	DP for Vmware recovery Agent	N/A
Instant Restore	N/A	DP for Vmware recovery Agent	N/A
FULL VM Backup	using Baclient	N/A	using plug-in interface
FULL VM INCRemental Backup	using Baclient	N/A	using plug-in interface

### 7.2 Preserving VMware configuration attribute information

Tivoli Storage Manager for Virtual Environments / Data Protection for VMware do not directly access, modify, or back up the .vmx file. Instead, Tivoli Storage Manager for Virtual Environments uses the sanctioned VMware method to preserve the information contained within the .vmx file during backups. The main objective of Tivoli Storage Manager for Virtual Environments Version 6.3 is to recover the virtual machine to a usable (or startable) state.

Refer to <http://www-01.ibm.com/support/docview.wss?uid=swg21578739> for a description of the attributes maintained by full VM restore.

### 7.3 Full VM restore using the Backup-Archive client

Connect to your vStorage Backup Server. Information needed to start Tivoli Storage Manager GUI interface for restore: You might have to specify an alternate option file to start the Tivoli Storage Manager interface on the right context, to do so, use the `-optfile` parameter in the `dsmc` command. Check that VM is stored using this proxy:

Open a command line, and go to `C:\program files\tivoli\tsm` or enter `cd %DSM_DIR%`

Then enter the command below: Enter the VMNAME in upper case

```
C:\Program Files\Tivoli\TSM\baclient>dsmc query vm TEST_W2K3 -inact -optfile=dsm
.opt
IBM Tivoli Storage Manager
Command Line Backup-Archive Client Interface
Client Version 6, Release 3, Level 0.29 110516B
Client date/time: 06/29/2011 14:15:46
(c) Copyright by IBM Corporation and other(s) 1990, 2011. All Rights Reserved.

Node Name: FRSU123015.PROXYSP1
Session established with server SP1MOPB4TSMC1: AIX
Server Version 6, Release 2, Level 2.30
Server date/time: 06/29/2011 14:16:08 Last access: 06/29/2011 14:02:37

Query Virtual Machine for Full VM backup

#      Backup Date      Mgmt Class      Type      A/I  Virtual Machine
-----
1      06/29/2011 10:45:43  TEST           <USTOR>FULL  I    TEST_W2K3
2      06/29/2011 11:34:02  TEST           <USTOR>FULL  A    TEST_W2K3

C:\Program Files\Tivoli\TSM\baclient>_
```

You see that there are 2 versions of this VM, available for restoration

### 7.3.1 FULL VM restoration – same location

Open a command line DOS, go to %DSM\_DIR% and open GUI interface:  
You might have to configure a specific option file regarding the DataCenter Node you have to restore data from

```
C:\ Command Prompt
C:\Program Files\Tivoli\TSM\baclient>cd %DSM_DIR%
C:\Program Files\Tivoli\TSM\baclient>dsm -optfile=dsm_SP1.opt _
```

Choose RESTORE VM menu



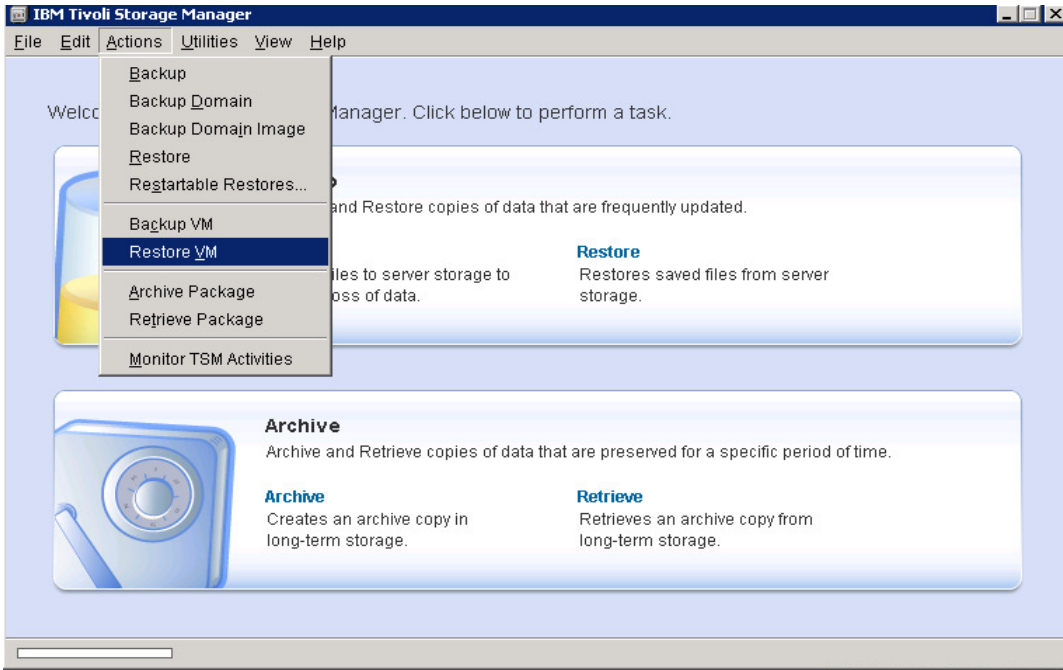
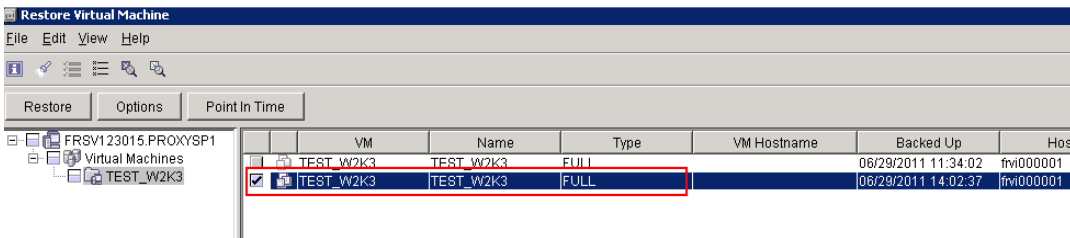


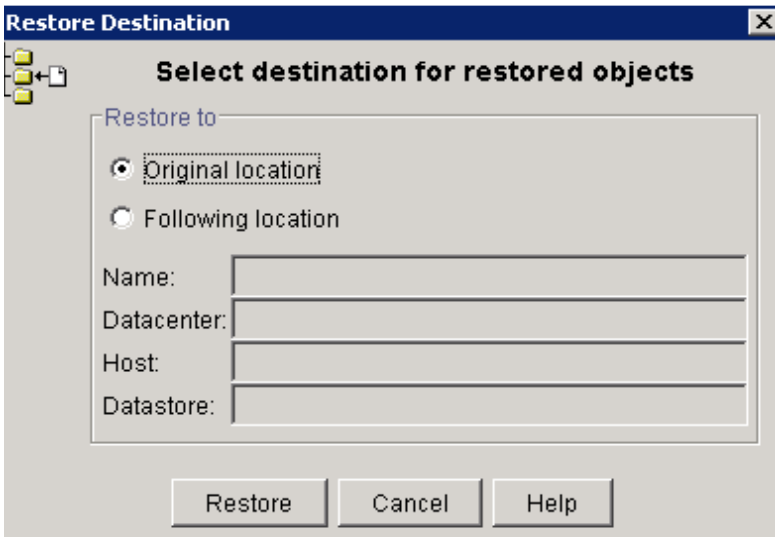
Figure 6-a: BClient interface – Restore VM operation

Choose your VM and select the version you need to restore



Then click Restore

Let option by default and click Restore



It will recreate the VM on the original location (if the VM exists it must be deleted).

### 7.3.2 FULL VM restoration - alternate location

Prepare following needs:

Name of restored VM (f you need to restore in alternate place)

Name of ESX to restore onto

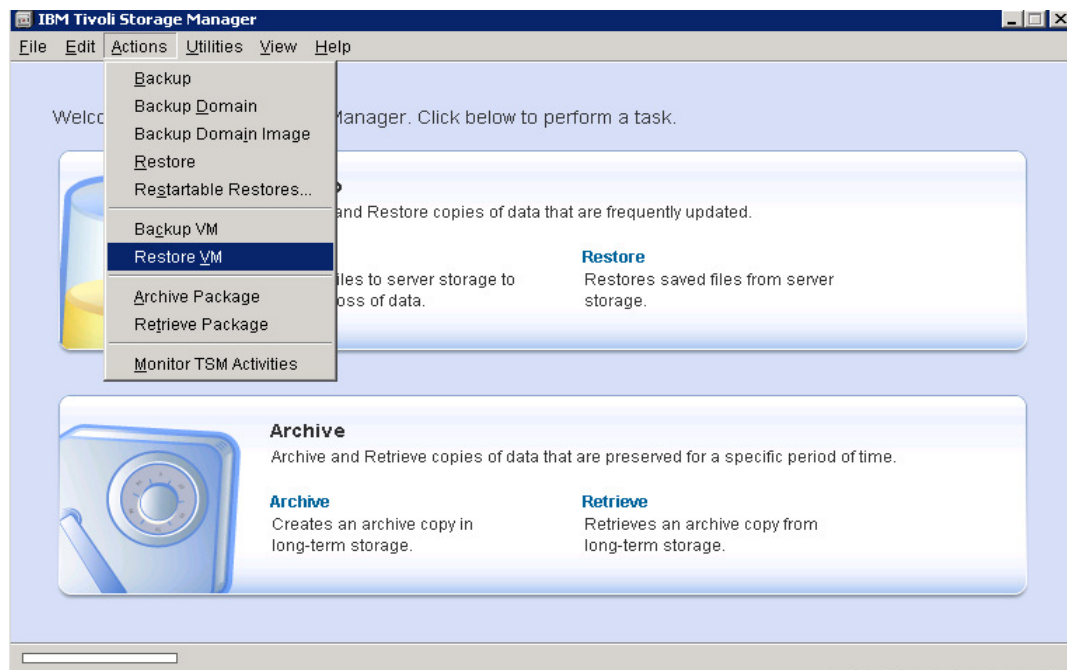
Name of datastore to restore onto (with sufficient space!)

Name of the datacenter

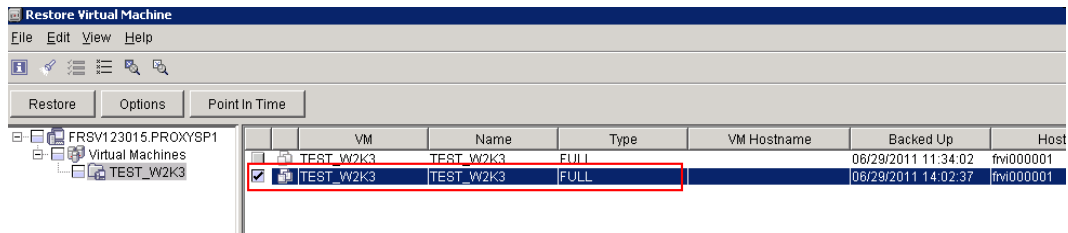
Open a command line DOS, go to %DSM\_DIR% and open GUI interface:

```
C:\ Command Prompt
C:\Program Files\Tivoli\TSM\baclient>cd %DSM_DIR%
C:\Program Files\Tivoli\TSM\baclient>dsm -optfile=dsm_SP1.opt _
```

Choose RESTORE VM menu

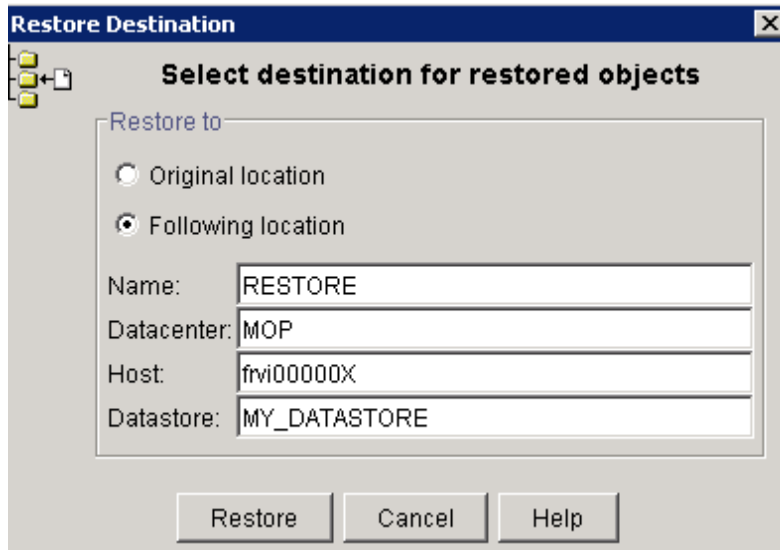


Choose your VM and select the version you need to restore



Then click Restore

Choose Following location and fill all the boxes



RESTORE is the displayed name of my VM  
MOP is the datacenter  
Frvi00000x is the ESX host used to host the VM  
MY\_DATASTORE is the datastore used to store VM data.

Then click Restore ... and wait for completion ...

### ***7.4 Full VM restore using the DP for VMware vCenter plug-in***

First, be sure that the vCenter user you are logged with has sufficient privileges to restore a VM. Check this out with the VMware administrator.

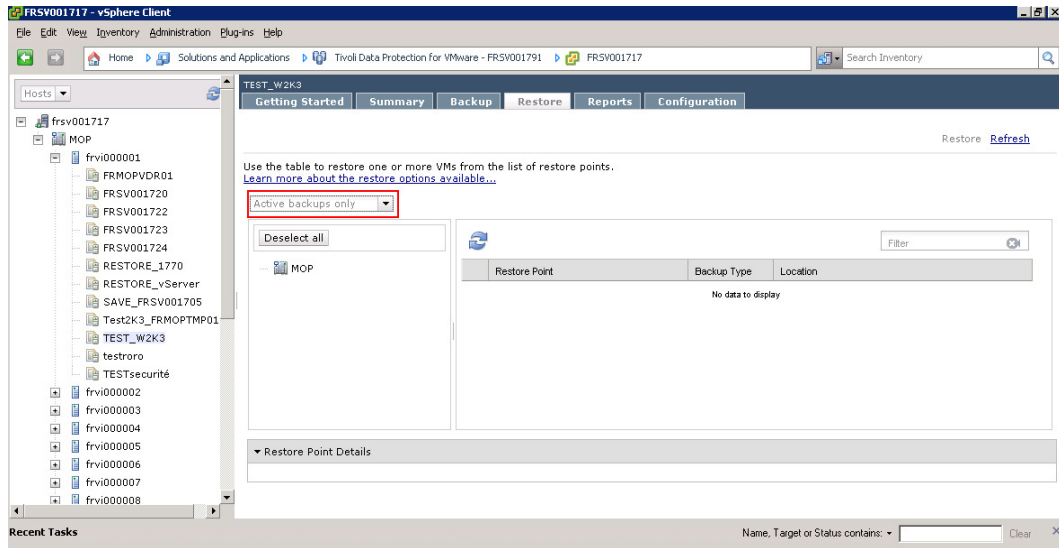
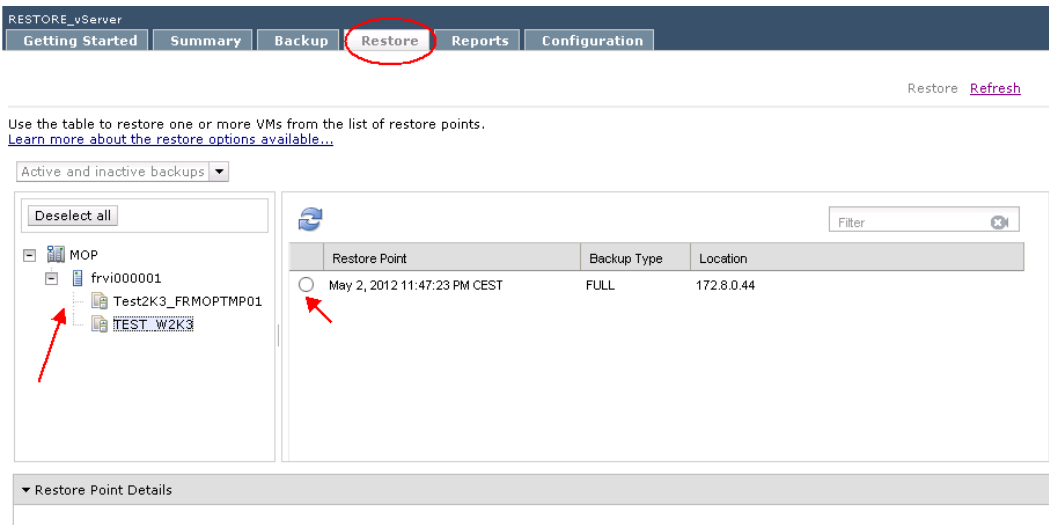
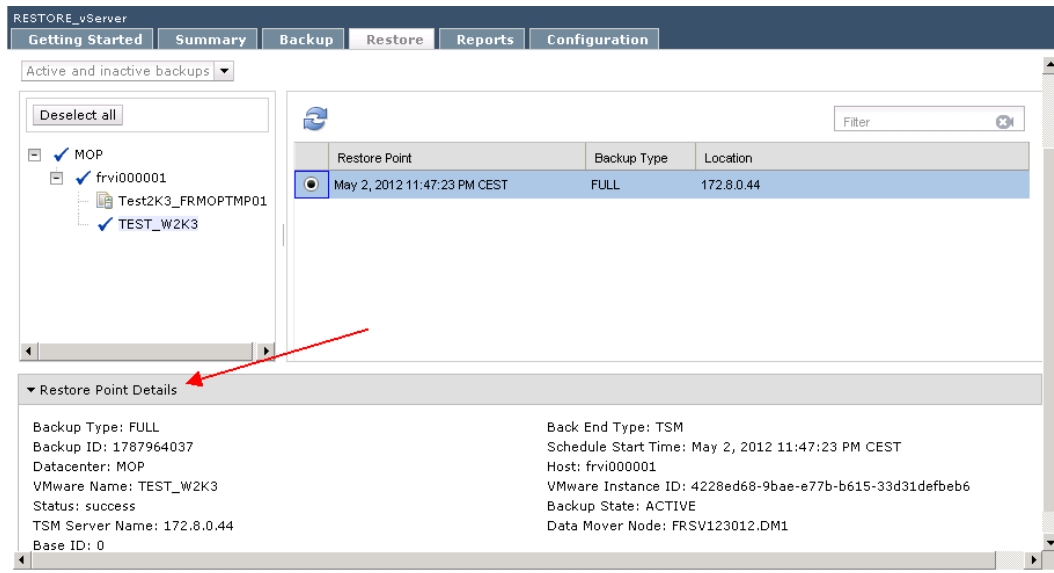


Figure 6-b: vCenter plugin – Restore tab

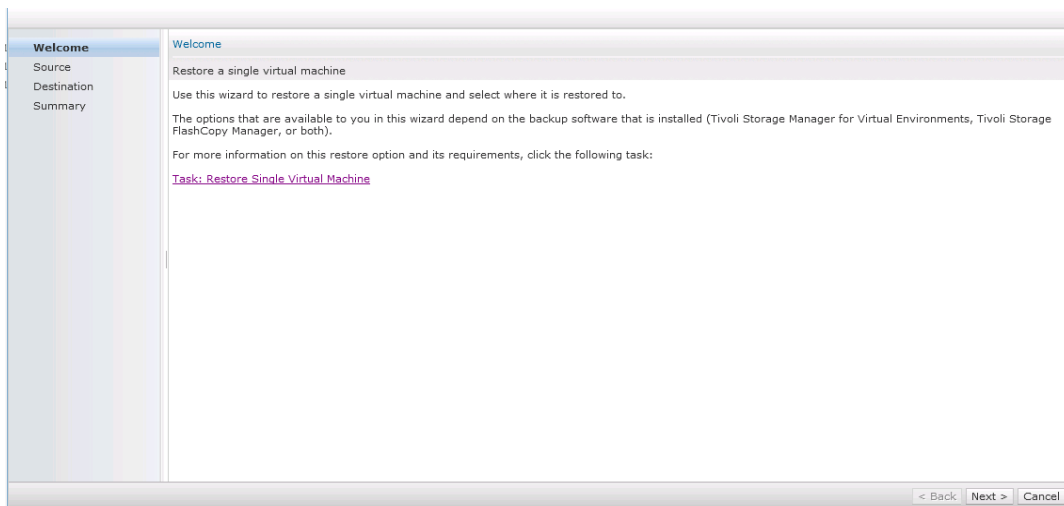
Choose the ESX host, the VM you want to restore and the date of restore.

Tip: use the drop down list (Red square) to display all backups, and not only last backup which is the default.

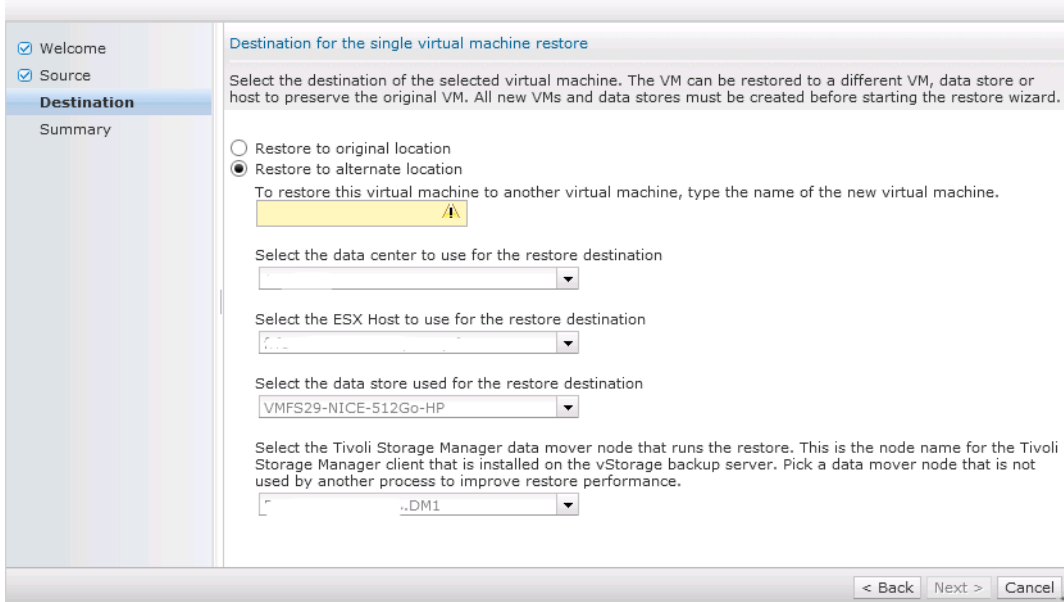




Finally click restore link (at the bottom of the page) and follow the wizard.

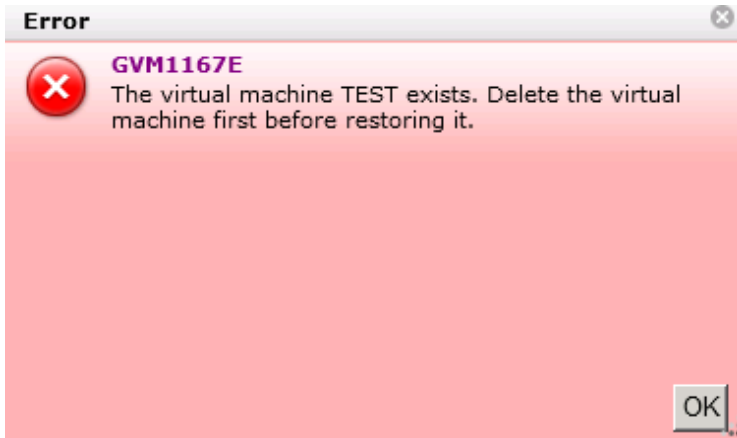


As for Backup/Archive Client restoration, you can choose the destination or let it as original



Once you have selected all the required information, click on next and finish, and then monitor the completion through the Reports Tab.

Tip: if the VM is still defined, the restoration will failed, and report this error:



## 8 File restore

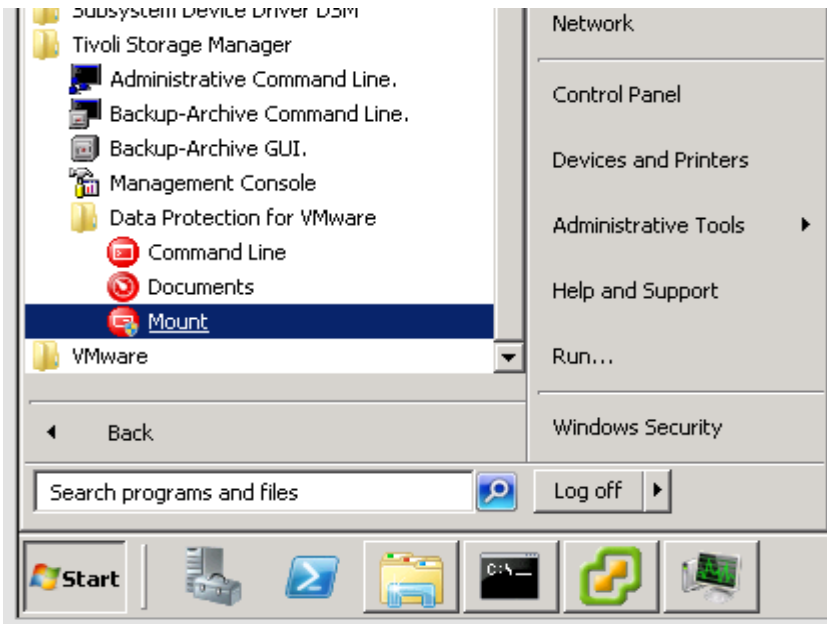
### 8.1 Windows file restore

First, connect to a VBS in CONSOLE mode.

If the proxy is a Win2003, only console mode allows you to use the TDP for VE mount utility. In that case, the TDP for VE mount is in the system tray icon (the red one).



If the proxy is a Win2008, both console and normal session provides the icon



Open the interface of TDP for VE restoration

First take care of the “MODE” of the TSM for VE interface. In case of such message while trying to mount a snapshot, check where are stored the snapshot before trying to mount them:

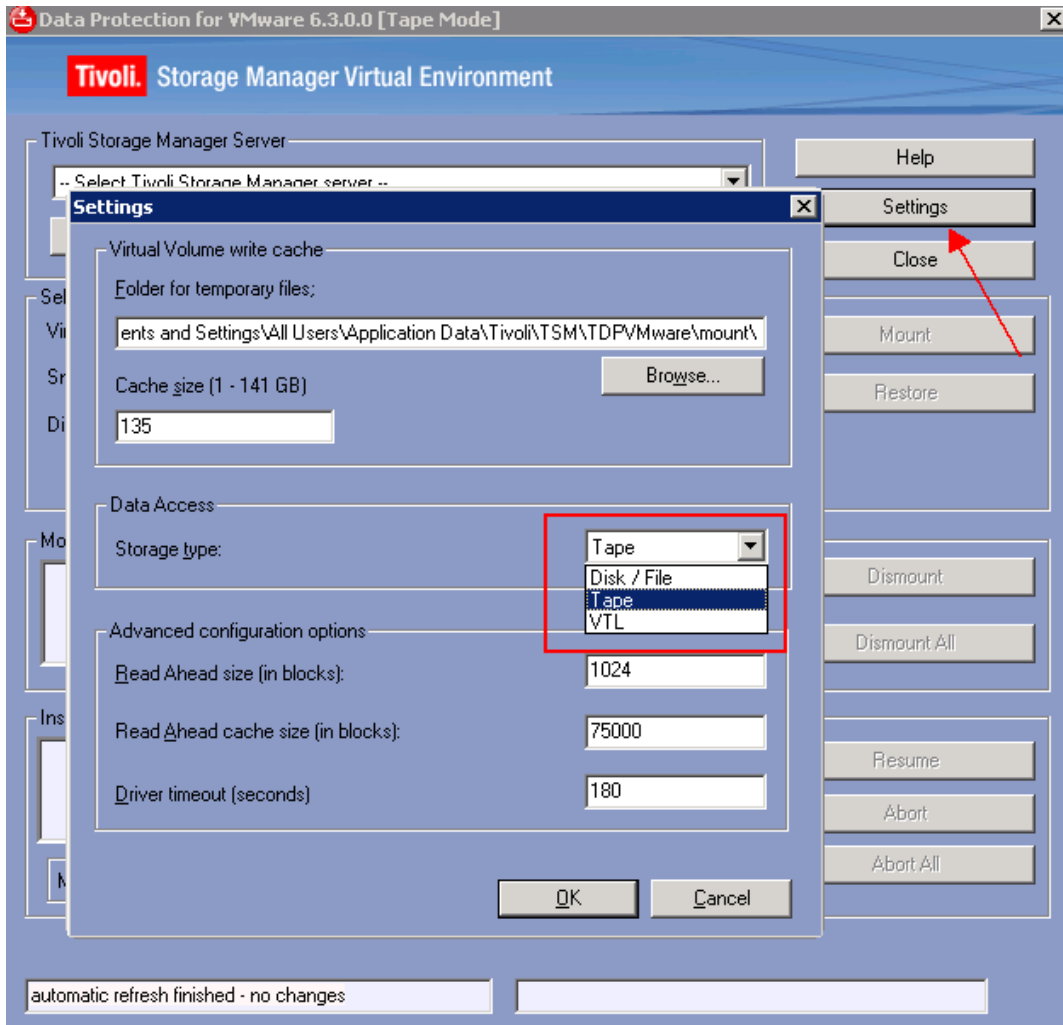
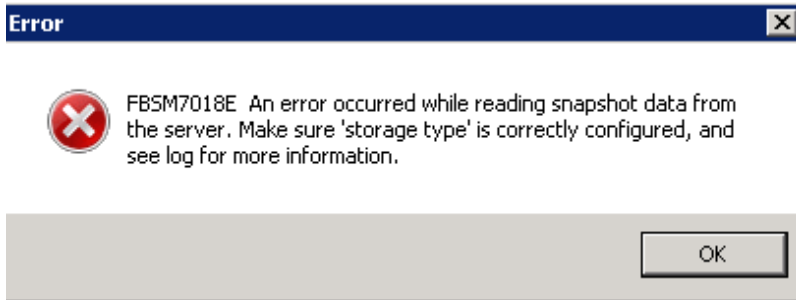


Figure 7-a: TDP for VE mount interface – Settings Panel

If connection information is already specified in the interface, click on the REMOVE button. Fill all the mandatory boxes with:





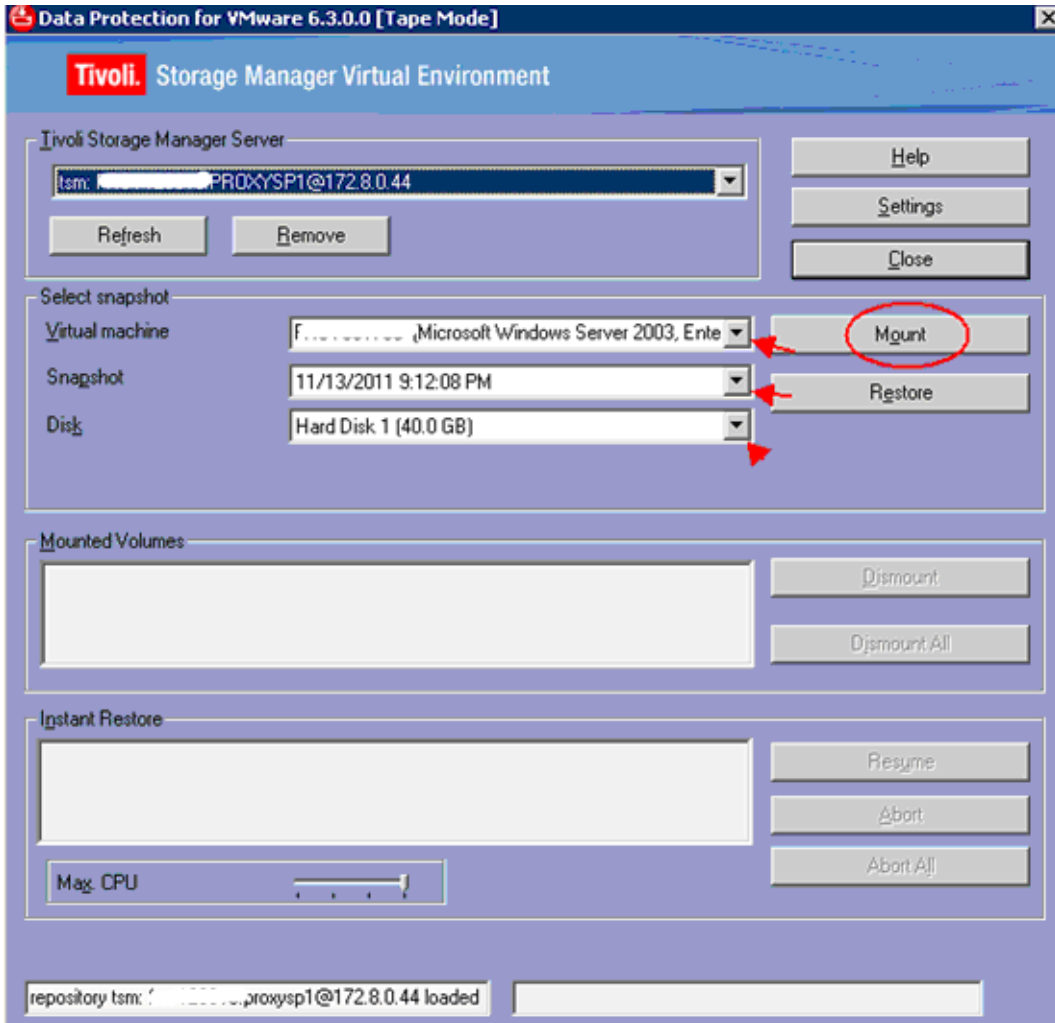


Figure 7-c: TDP for VE mount interface – main panel – mount operation

Then select the date of the snapshot you want to restore, and select the disk in which the file is stored:

For Windows, you can determine the disk # based on the disk manager of the VM you want to restore. Once the disk has been selected you are able to see the label of the partitions defined on this disk.

Finally, select the mount operation to mount the image on your proxy. At this point, if the volume you want to restore is a Windows Basic disk, the snapshot will be automatically mounted as a new volume on your VBS:

**Select mount destination**

Create virtual device for:  
Disk 2, 26/02/2012 13:15:12

Mount as an iSCSI target

Target name:

Initiator name:

Create virtual volume from selected partition:

Partition number	Size	File System	Label
0	59,9 GB	NTFS	Sauvegarde

Show only mountable partitions  
 Mount virtual volume as read only

Assign the following drive letter:  
D:\

Mount in the following empty NTFS folder:

Browse...

OK Cancel

Click Ok and browse the disk using the letter you have specified.

On the other hand, if you have such error:


**Select mount destination**

Create virtual device for:  
[redacted] Hard Disk 1, 26/02/2012 13:15:12

Mount as an iSCSI target

Target name:

Initiator name:

 Make sure port 3260 is open on any firewall between this computer and the initiator.

Create virtual volume from selected partition:

Partition number	Size	File System	Label
FBSM7020E None of the partitions in the selected disk is formatted using a supported File System.			

Show only mountable partitions  
 Mount virtual volume as read only

Assign the following drive letter:  
D:\

Mount in the following empty NTFS folder:

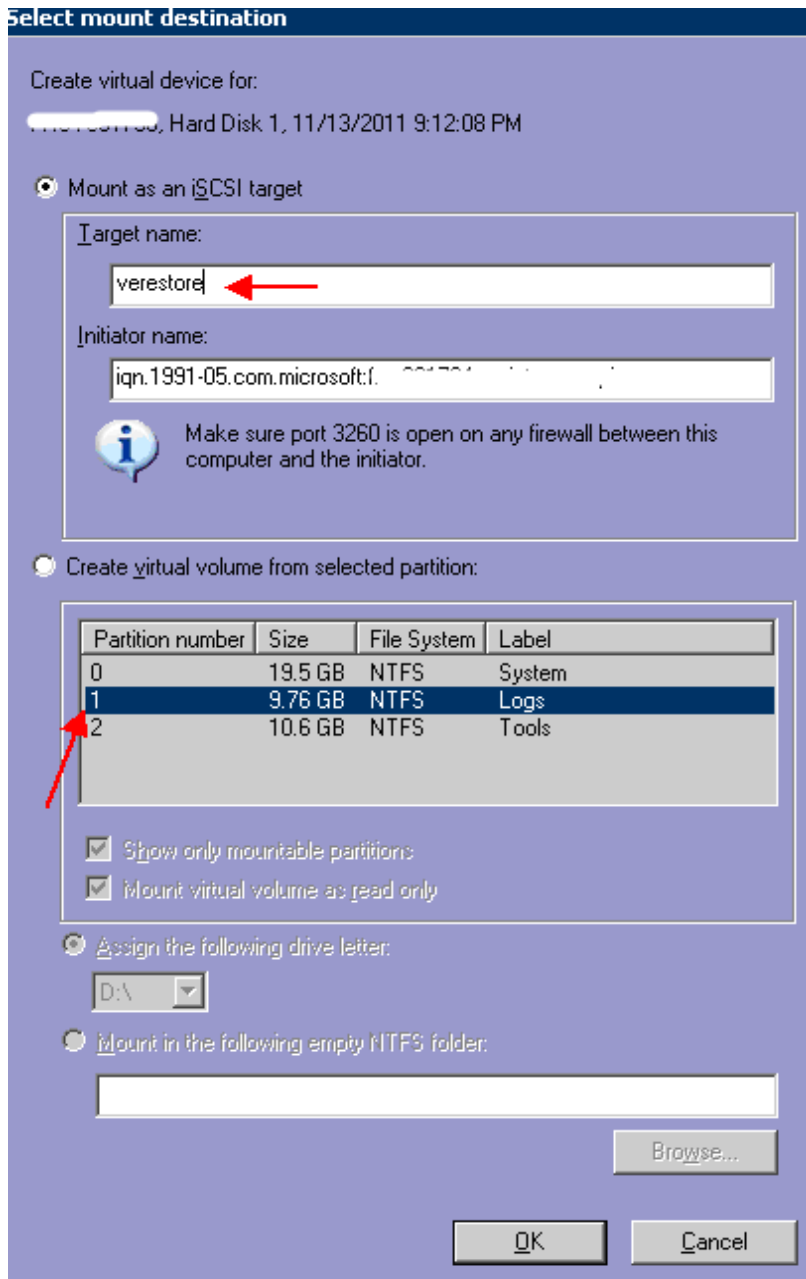
Browse...

OK Cancel

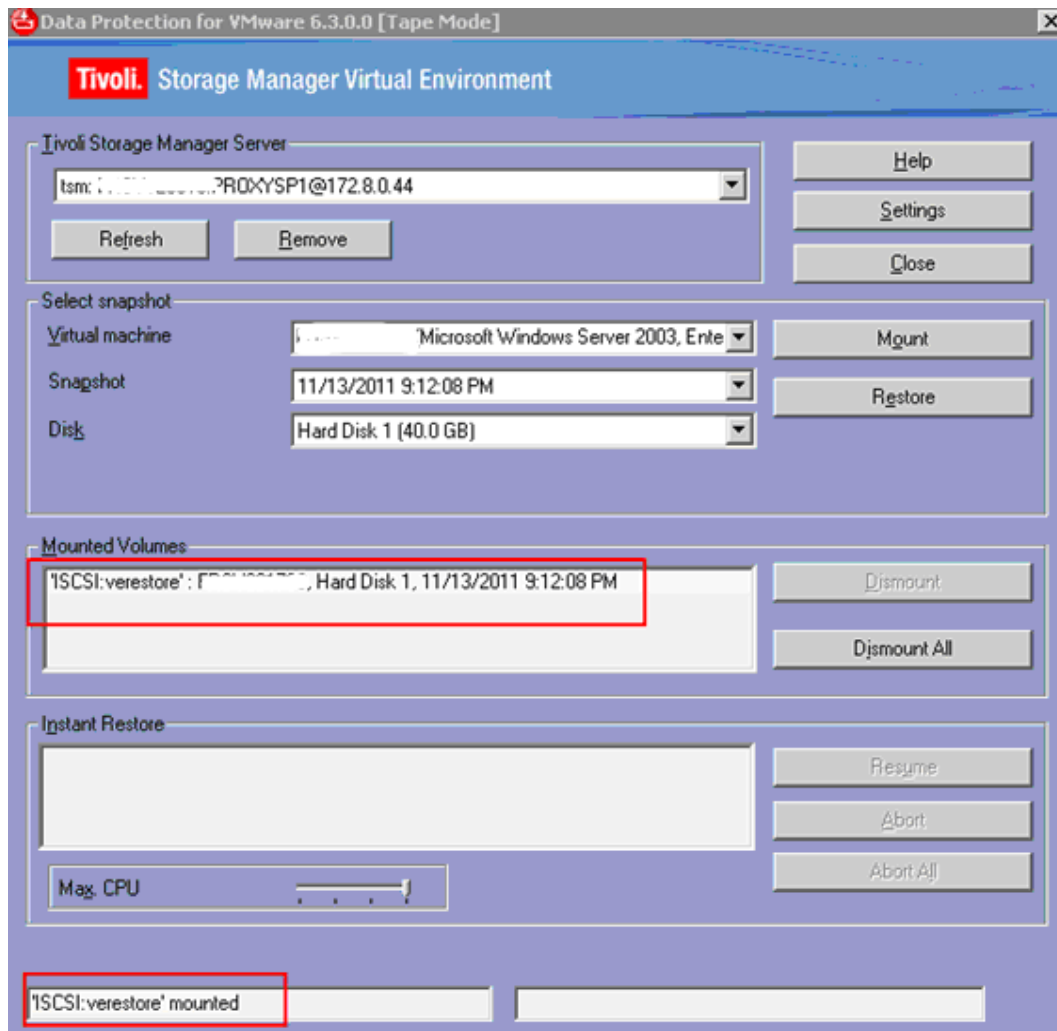
You have to mount the snapshot through the iSCSI menu.

## 8.2 Windows file restore using iSCSI

Select options as describes below, and enter the iSCSI initiator information. Eventually, choose the label name of the partition you want to mount (if there is more than one windows partition on the selected disk)



Click OK here.



Once the dialog box close, you will have the main one, with a message which indicates that volume is mounted, open the iSCSI Menu. Click on the Target tab, then click refresh button.

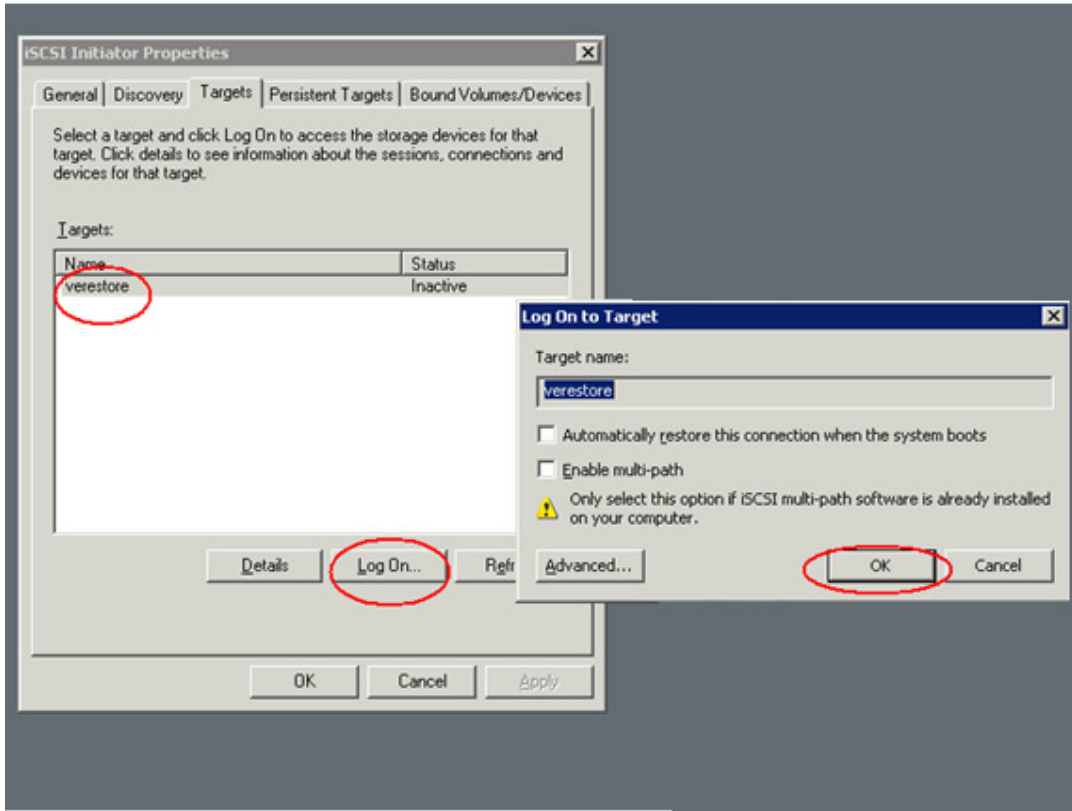
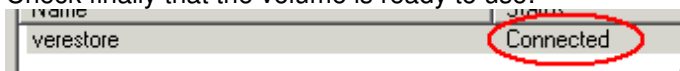


Figure 7-d: Windows iSCSI Properties Panel

Check finally that the volume is ready to use:



Open the device manager to assign letter to the discovered disk, then open the disk management tab.

If a popup window appears asking to initialize the disk click cancel!

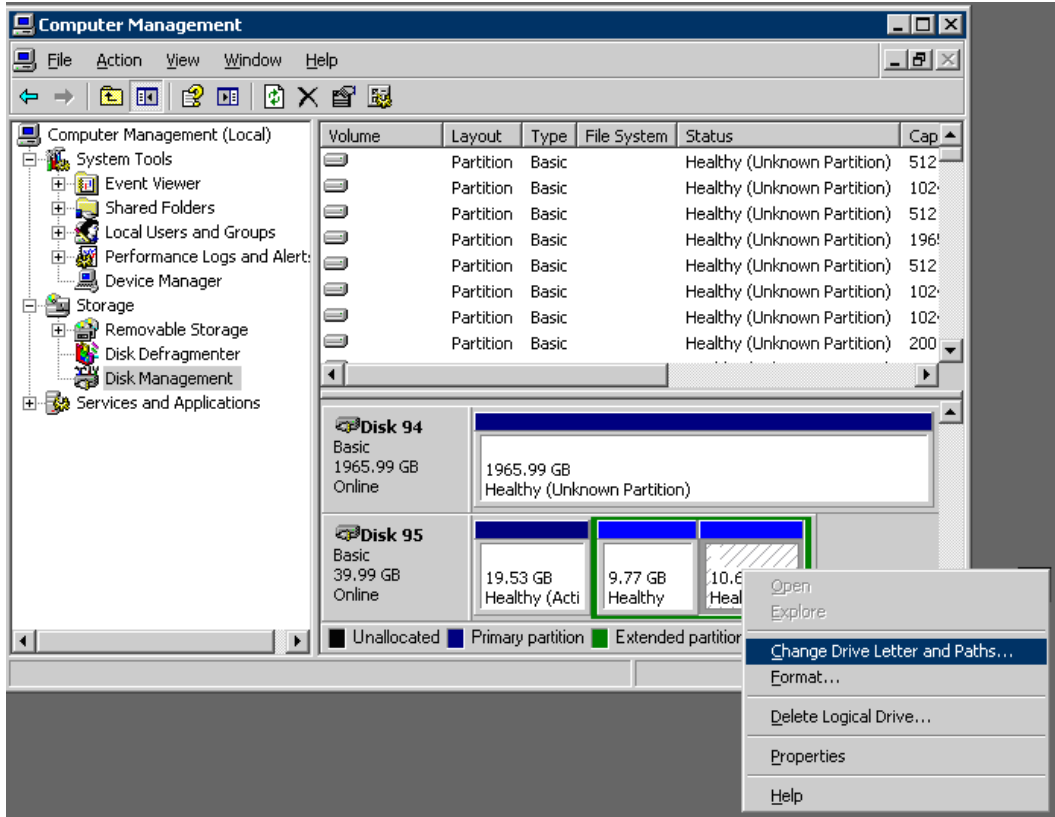


Figure 7-e: Windows Computer Management – Disk management

Choose the letter and assign it to volume

Wait for the LETTER TO BE DISPLAYED in the disk manager .... It can take about 1 minute (because Tivoli Storage Manager retrieves some data in this timeframe).

Then open a browser and browse the content:

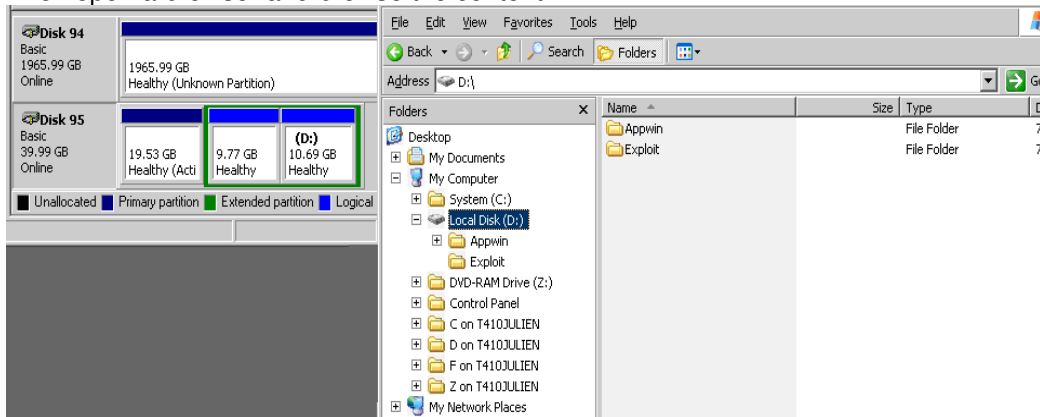


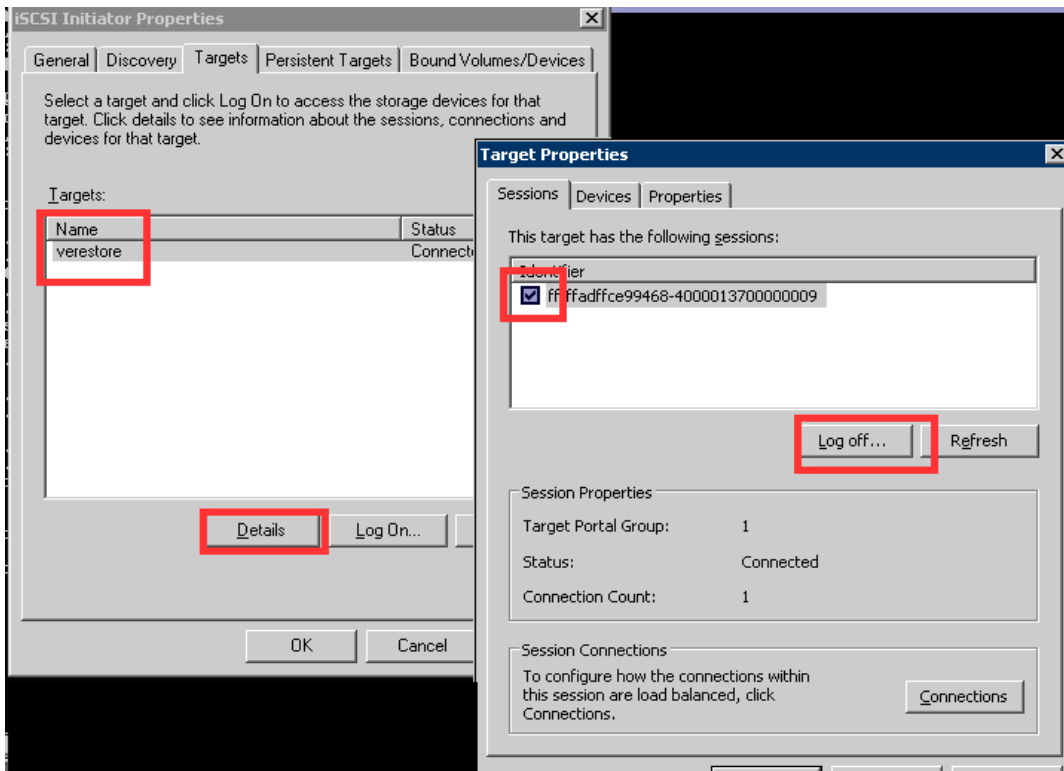
Figure 7-f: Windows Explorer – Browse logical drive content

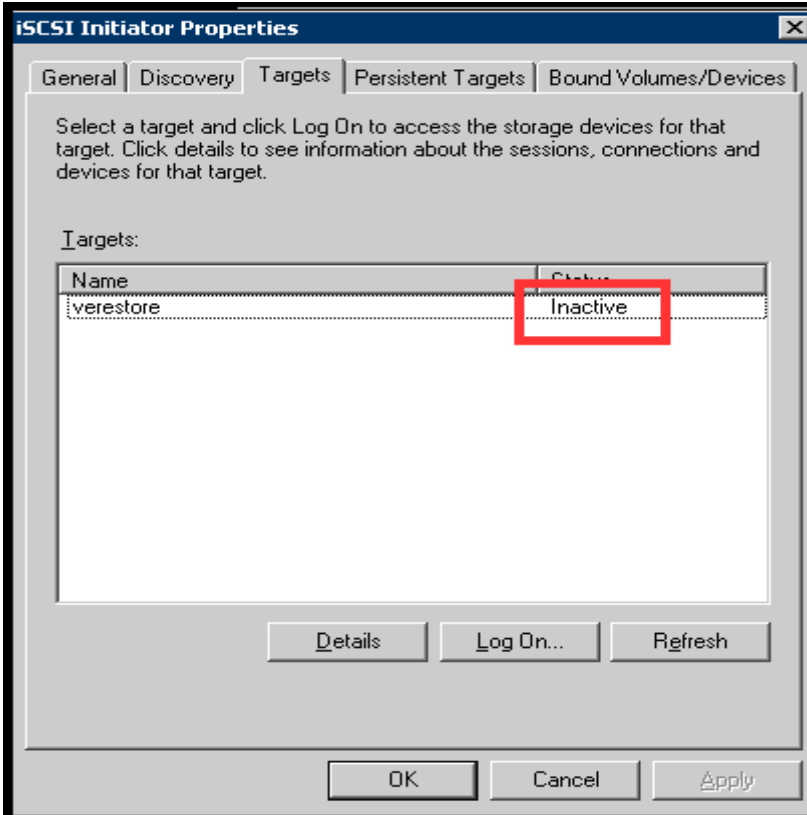
Find the file(s) requested and copy/paste in a local folder later sent to target VM, or past it directly in a CIFS mount of the VM storage.

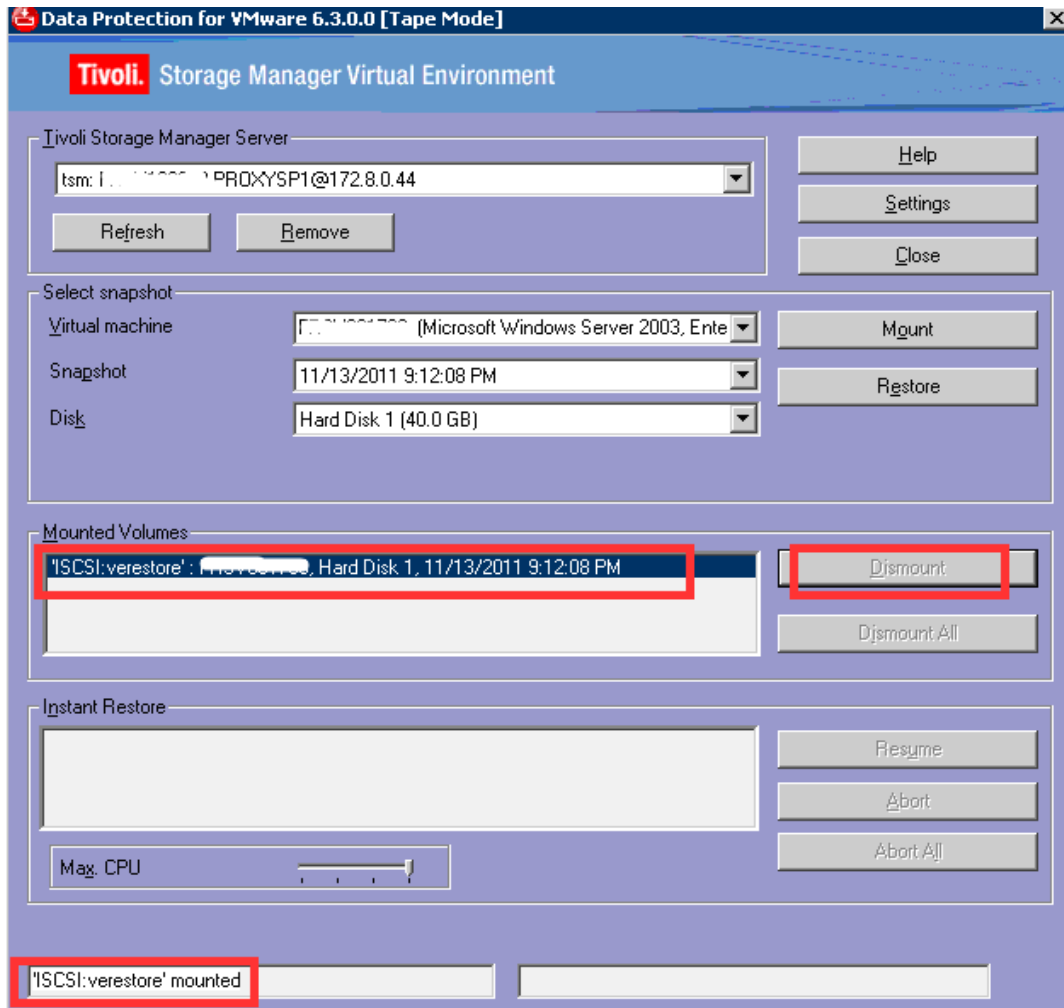


## Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide

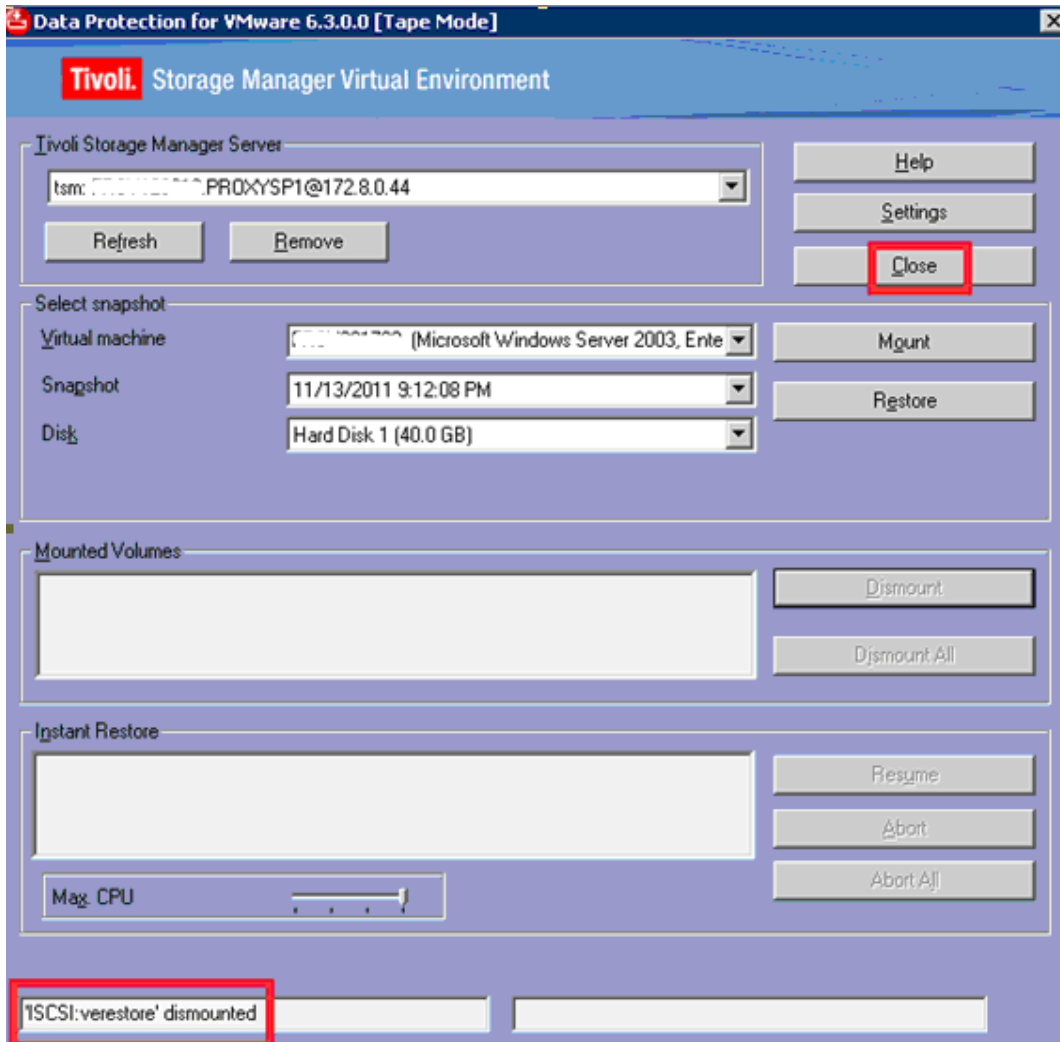
Once the file is on the directory on proxy, you can access it from the VM, and can copy it from the proxy to the VM in the required place. When finished, close the browser, logoff from the iSCSI and dismount the snapshot.







Click on DISMOUNT, REMOVE and finally CLOSE

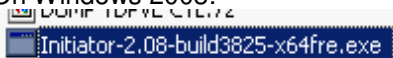


### 8.2.1 Windows dynamic disk considerations

An example of using the following approach would be for Windows Dynamic Disks that are not supported using the DP for VMware volume mount function. First be sure that the iSCSI initiator tools are installed on your vStorage Backup server.

Connect to the vStorage Backup server using console mode session

On Windows 2003:



Install the package (non installed by default), Default install, Click on the desktop icon



Determine the initiator name clicking this link

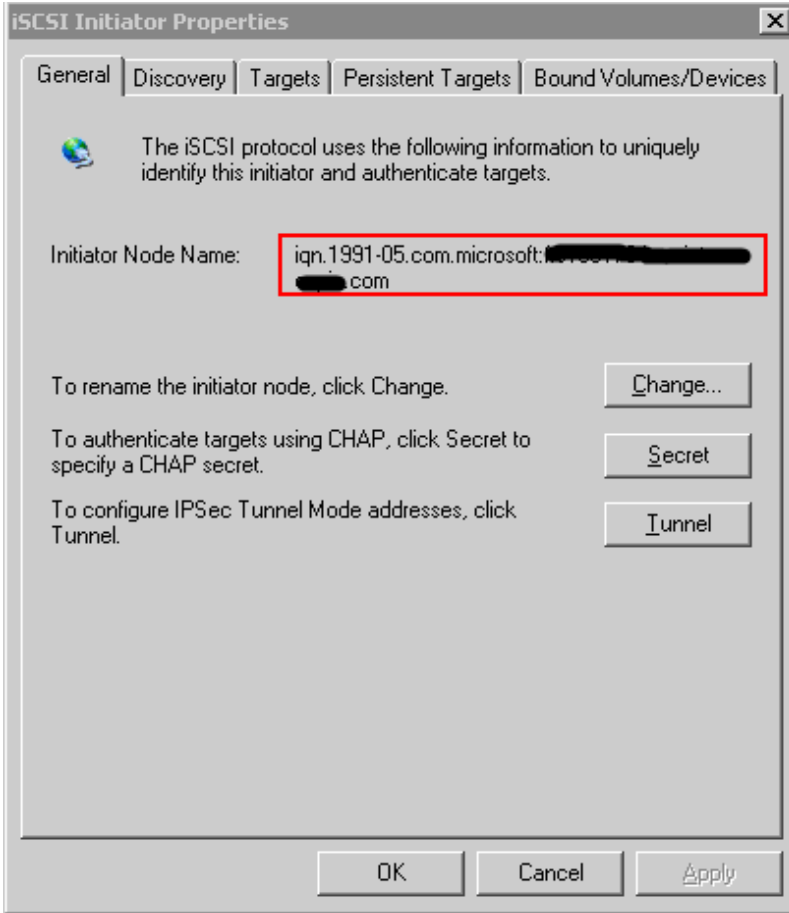
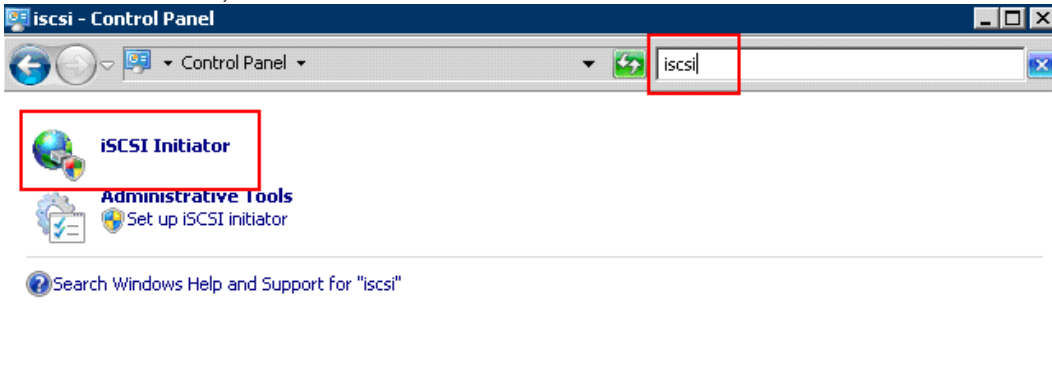
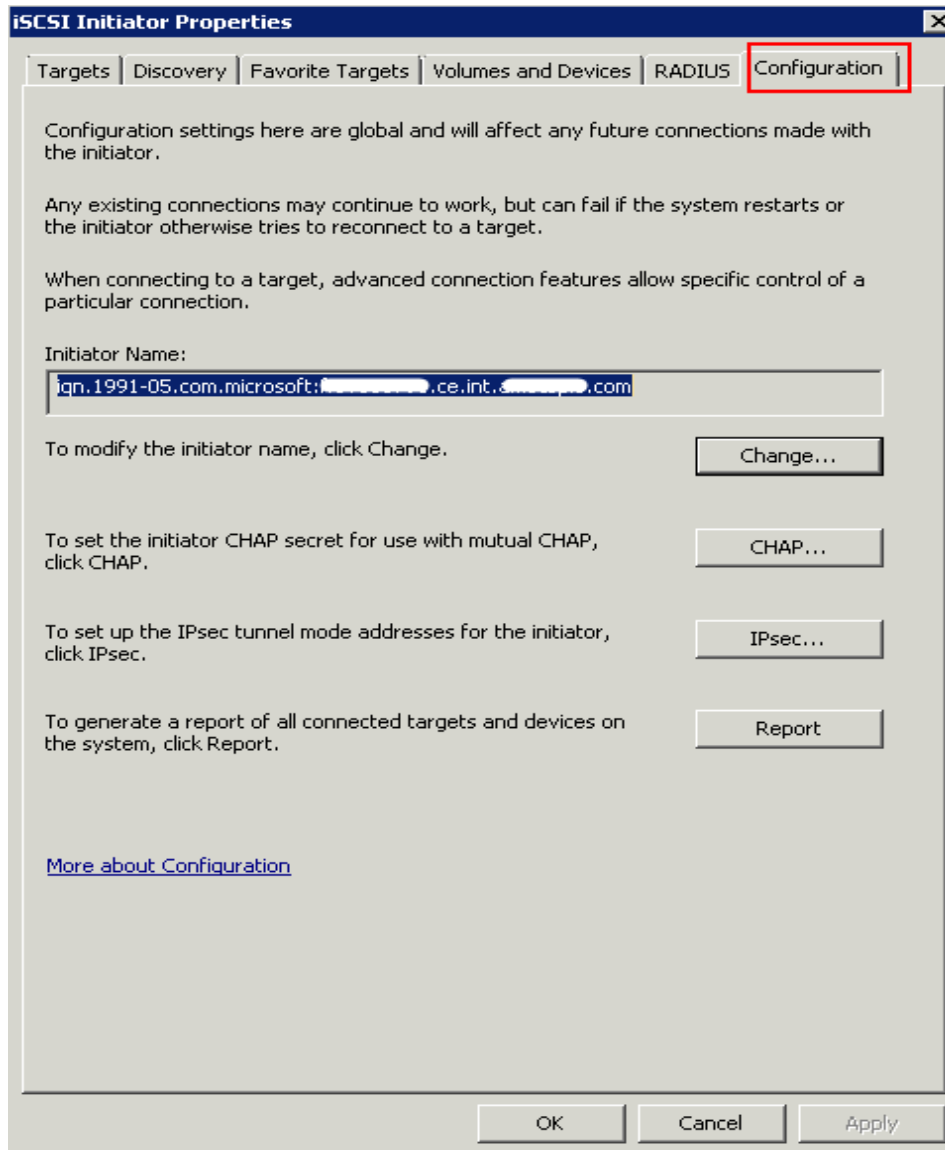


Figure 8-a: Windows iSCSI Properties – Initiator name info

On Windows 2008, the iSCSI menu is located in the Control Panel:



Get the iSCSI name in the Configuration tab



### 8.3 Preserving ACLs when copying files in Windows

File permissions are captured during backup and Tivoli Storage Manager always has a copy of the permissions with the data. Windows Explorer does not copy permissions, nor do the DOS copy command or the DOS xcopy command by default (you need to use xcopy /O to copy permissions; see the xcopy help for more information).

Typically file permissions are assigned at the root of a volume or at one of the lowest level directory structures and file permissions are inherited, e.g. if you have a directory c:\dir and copy a file into c:\dir; the file will inherit the permissions of c:\dir. Typically the use cases that a customer would use (restore a user's lost file) would fall into this type of scenario, i.e., a) use TSM mount b) use Windows Explorer c) although file permissions are not copied back the file would inherit permissions from the target directory.

## 8.4 Linux file restore

For further details, check this link:

<http://www-01.ibm.com/support/docview.wss?uid=swg21473127>

## 8.5 Linux file restore using iSCSI

The following example demonstrates the use of iSCSI initiator for file recovery from a Windows vStorage Backup Server (note that an iSCSI initiator can also be used from within a VM guest).

For a general overview of this procedure refer to:

<http://www-01.ibm.com/support/docview.wss?uid=swg21473127>

For the best effort support statement using iSCSI refer to:

<http://www-01.ibm.com/support/docview.wss?uid=swg21474116>

### 8.5.1 Procedure

Connect to a VBS in CONSOLE mode

First, determine the iSCSI initiator name of the Linux VM where you want to restore:

On the target LINUX VM, issue command :

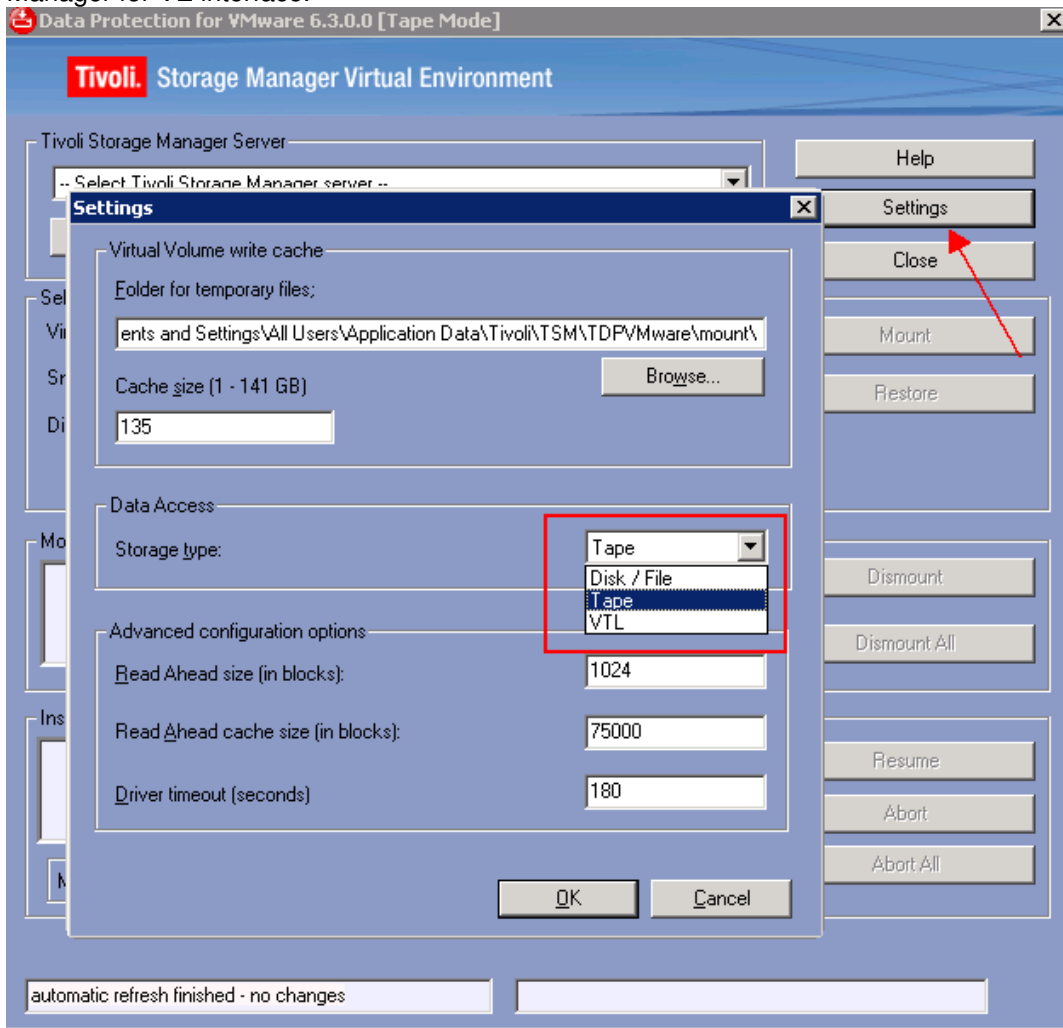
```
[root@FRSUO221 iscsi]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1994-05.com.redhat:2a6b44f921af
```

Second step is to determine on which IP the VBS is listening for the iSCSI protocol (port 3260)

On the VBS issue the command

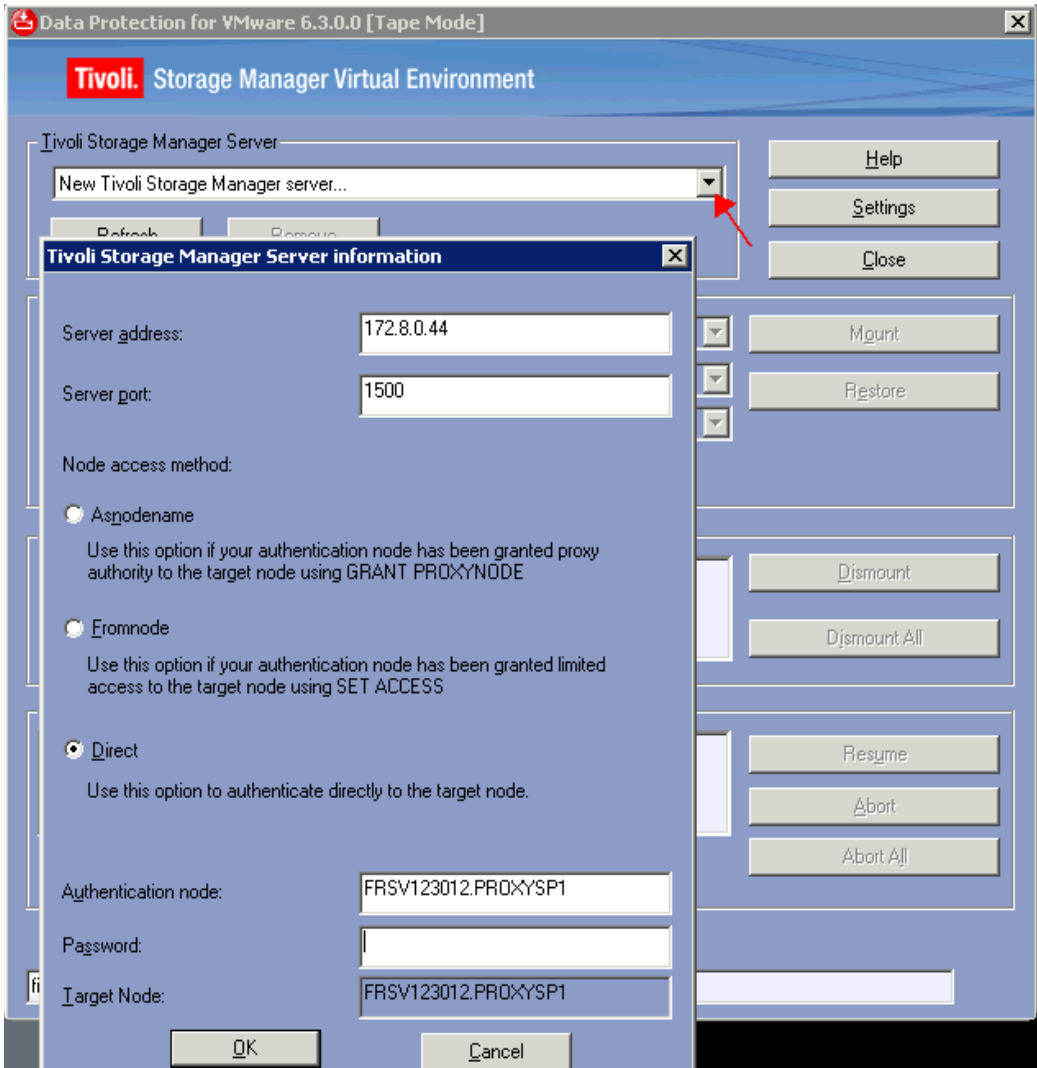
```
C:\Documents and Settings\supadmsauvanet.ibm>netstat -an | grep LIST
TCP    0.0.0.0:80          0.0.0.0:*        LISTENING
TCP    0.0.0.0:135       0.0.0.0:*        LISTENING
TCP    0.0.0.0:445       0.0.0.0:*        LISTENING
TCP    0.0.0.0:1029      0.0.0.0:*        LISTENING
TCP    0.0.0.0:1093     0.0.0.0:*        LISTENING
TCP    0.0.0.0:1102     0.0.0.0:*        LISTENING
TCP    0.0.0.0:1500     0.0.0.0:*        LISTENING
TCP    0.0.0.0:1581     0.0.0.0:*        LISTENING
TCP    0.0.0.0:1950     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3389     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3732     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3733     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3734     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3735     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3736     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3737     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3738     0.0.0.0:*        LISTENING
TCP    0.0.0.0:3739     0.0.0.0:*        LISTENING
TCP    0.0.0.0:5666     0.0.0.0:*        LISTENING
TCP    0.0.0.0:12489    0.0.0.0:*        LISTENING
TCP    0.0.0.0:23333    0.0.0.0:*        LISTENING
TCP    0.0.0.0:47001    0.0.0.0:*        LISTENING
TCP    10.217.239.246:139 0.0.0.0:*        LISTENING
TCP    10.217.239.246:1953 0.0.0.0:*        LISTENING
TCP    10.217.239.246:3260 0.0.0.0:*        LISTENING
TCP    10.217.239.246:30051 0.0.0.0:*        LISTENING
TCP    172.8.0.160:139   0.0.0.0:*        LISTENING
TCP    172.8.0.161:139   0.0.0.0:*        LISTENING
TCP    172.9.0.194:139   0.0.0.0:*        LISTENING
```

Now, let's mount the snapshot from Tivoli Storage Manager Server, needed for the restoration. Open the interface of TDP for VE restoration. First take care of the "MODE" of the Tivoli Storage Manager for VE interface.

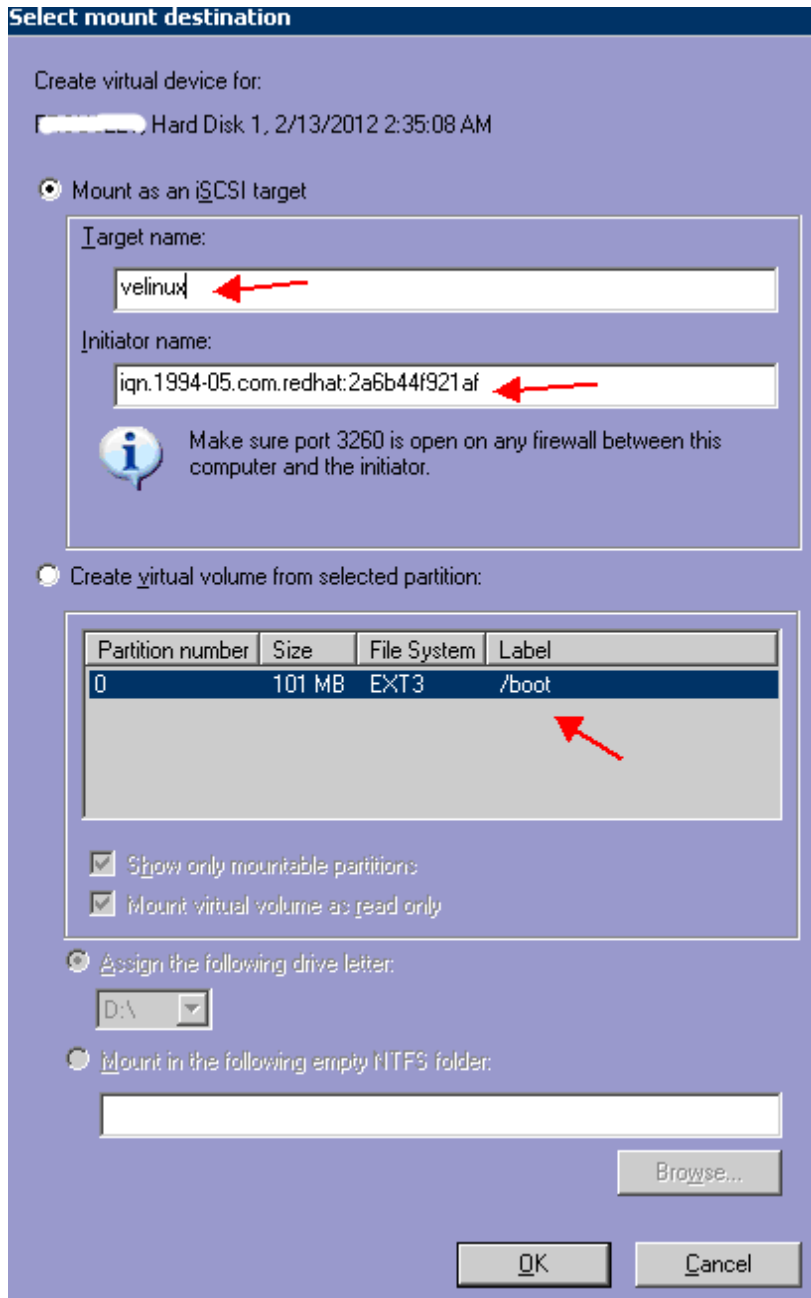


If connection information is already specified in the interface, click on the REMOVE button  
Fill all the mandatory boxes with:

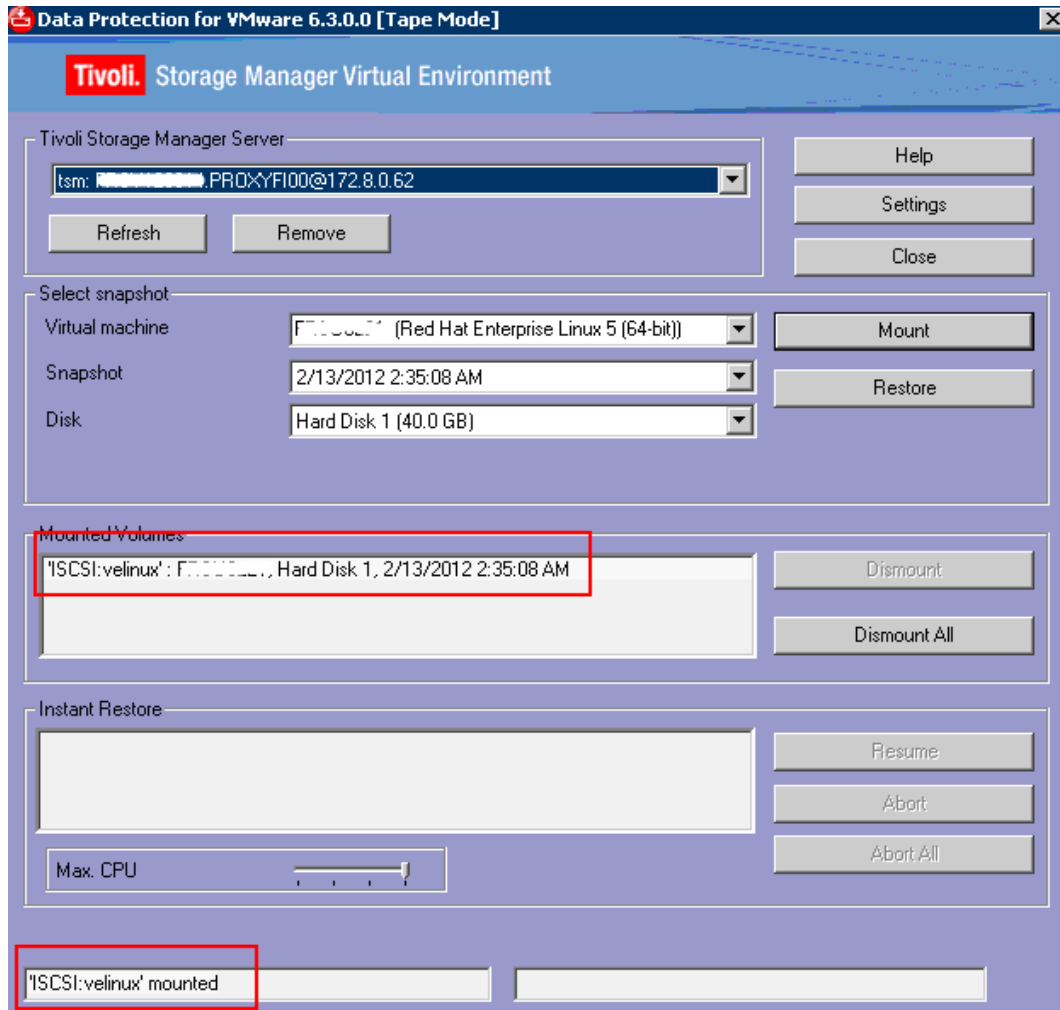




Server Address is the Tivoli Storage Manager Server address. Server Port is 1500 by default, update if it's not your case (Tivoli Storage Manager Server TCP PORT).  
Authentication node is the Name of the Datacenter Node used to backup/store the VM backed up data. Password is Datacenter Node password  
Then Select the VM you want for your file restoration, the snapshot date and choose the disk you want to mount. Select the mount operation to mount the image on your proxy. Select options as describes below, and enter the iSCSI initiator information. The iSCSI initiator name will be the Linux iSCSI ID and the target name is a name of you choice (fitting iSCSI restriction).



Click OK and wait for the snapshot to be mounted. Then you will have an interface like following:



Once the VBS has mounted the snapshot, go to Linux to see the iSCSI device:

```
[root@FRSU0221 iscsi]# iscsiadm -m discovery -t sendtargets -p 10.217.239.246
10.217.239.246:3260,1 velinux
```

Take care of the IP you specified. If you have message like following:

```
[root@FRSU0221 iscsi]# iscsiadm -m discovery -t sendtargets -p 172.8.0.160
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: cannot make connection to 172.8.0.160: Connection refused
iscsiadm: connection login retries (reopen_max) 5 exceeded
iscsiadm: Could not perform SendTargets discovery: encountered connection failure
```

- Check that you are connecting to the right IP
- Check that there is no firewall between the VM and the VBS

At this point your Linux is able to see the snapshot exposed by the VBS.

### 8.5.2 Special steps to read the data from the exposed snapshot

Once an image of a backup disk is exposed using the iSCSI protocol, the process of mounting the logical partitions contained on the exposed disk to the operating system is outside of the scope of this document. IBM does not support mounting logical partitions that are managed by the Linux logical volume manager (LVM); the following information is provided as informational on an "as-is" basis:

To mount a snapshot of an LVM volume on the same machine from which the snapshot was created, you will need to manually modify the snapshot disk as to not introduce duplicate physical and logical volume ids:

You will need to ensure that the script "vgimportclone" is available on the Linux machine. Note that this script is not shipped in the base (default) lvm package and you may have to update the lvm package to a level which provides this script.

Before mounting a snapshot of the volume, note the disk layout (e.g., fdisk -l)

Follow the procedures above to expose a snapshot from the iSCSI target (Data Protection for Windows Mount) and create a connection to the iSCSI initiator in the Linux virtual machine guest.

On the Linux virtual machine guest, check the new disk layout (e.g., fdisk -l) to see which disks have been attached; in this example assume that /dev/sdb1 and /dev/sdb2 have been made available. On the Linux guest, issue the vgimportclone command, providing a new base volume group name, for example:

```
vgimportclone --basevgname /dev/VolGroupSnap01 /dev/sdb2
```

On the Linux guest, mark the logical volume as active:

```
lvchange -a y /dev/VolGroupSnap01/LogVol00
```

On the Linux guest, mount the volume (in this example the volume will be mounted on an existing mount point named /snapmnt):

```
mount -o ro /dev/VolGroupSnap01/LogVol00 /snapmnt
```

To mount a snapshot of an LVM volume to a different machine, you will potentially need to manually modify the snapshot disk to mark the logical volume as active using the "lvchange" command documented in Step 6 above. Note that some Linux distributions will automatically mark the volume as active.

## 8.6 Security considerations

Accessing VM backups saved in a TSM server

A TSM data mover backs-up a number of VM's under the same target / data center nodename (each VM is a separate filesystem). The Data Protection for VMware recovery agent can authenticate to the TSM server using one of three access modes:

- **Asnodename:** In this mode the user authenticates using a TSM data mover node name and also specifies the target / data center node name. The user will have access to all

VMs that are part of the target / data center node name.

- **Fromnode:** This mode is used to provide fine grained security controls related to who can access what VMs:

The `dsmc set access` command can be used to control what VM's can be restored by what mount / instant restore nodename. Note, that set access does not restrict that ability to see what VM's have been backed up. But, it does restrict the ability to restore a VM.

Mount / IR processing will use the `-fromnode` option to gain access to VM's they have been authorized to

- **Direct:** In this mode the authentication node is the target / data center node name. The user will have access to all VMs that are part of the target / data center node name.

### 8.7 Deployment considerations

The two typical deployments that are envisioned are:

- Mount installed on an off-host machine (e.g. vStorage Backup Server). In this model, the TSM administrator or help desk operator is responsible for mounting a snapshot and exporting it to the VM of interest. The `grant proxynode` command is issued to authorize the mount node to all VM's associated with the target node / data center node.
- Mount / instant restore installed in-guest. In this model, the VM user is responsible for restoring the data. The `set access` command is issued from the B/A client node that owns the VM's to authorize the mount / instant restore node to the specific VM (`set acc backup "{\\VMFULL-vmdisplayname}\*\*" * mountnodename`).

The following chart summarizes deployment considerations for the recovery agent. Refer to the IBM Tivoli Storage Manager Data Protection for VMware Installation and User's Guide for detailed explanation



## Summary of Deployment Considerations

### Centralized File Restore using Partition Mount for Windows and Linux

**DP for VMware Agent Deployment:** Agent installed on central off-host Windows (e.g. host where B/A client installed) or Linux host. Note - Linux deployment requires DP for VMware Windows Agent.

**Function:** Mount exposes local virtual volume and volume shared with VM requiring file

**Who initiates mount process?** VMware administrator, TSM administrator or help desk personal

**Security:** Native NFS / CIFS security to control who access exposed share

**Platform Support:** Compare specific OS requirements for centralized host with supported levels where DP for VMware agent can be installed. If required OS level is not supported, determine whether iSCSI target mount can be used

### Self Service File-Level Restore and Instant Volume Restore (VM guest user initiates request)

**DP for VMware Agent Deployment:** Agent installed in Windows or Linux VM guest machines

**Function:** Mount and instant restore

**Who initiates mount / IR process?** User logged into the VM guest machine

**Security:** VE 6.2 access controls are at node (vs. VM / filesystem ) level

**Platform Support:** Compare specific OS requirements for VM guests with supported levels where DP for VMware agent can be installed. If required OS level is not supported, determine whether iSCSI target mount can be used

### Centralized File Restore using iSCSI Target Disk

**DP for VMware Agent Deployment:** Agent installed on central off-host (or in-guest) Windows machine (e.g. host where B/A client installed)

**Function:** Windows mount exposes Windows or Linux iSCSI target. iSCSI initiator in VM guest discovers exposed target

**Who initiates mount / IR process?** VMware administrator, TSM administrator or help desk personal

**Security:** iSCSI target exposed to specific iSCSI initiator

**Platform Support:**

Supported levels where Windows DP for Agent can be installed

Reference tech note for OS platforms where iSCSI initiator can be used

## 9 Limitations of Tivoli Storage Manager for Virtual Environments

### Change Block Tracking:

Pay close attention to the VMware environment being backed up. When possible, use VMware vSphere 4 (ESX / ESXi 4.0 or later) and VMs at Hardware level 7 or later (required to use Changed Block Tracking).

Virtual Disk limitations:

Tivoli Storage Manager for VE cannot backup the following types of disk

Virtual disk in 'physical compatibility RDM'

Virtual disk attached to a shared virtual SCSI bus.

### VMware Backup Issues and Limitations

VMware's integration with Windows VSS support has the following limitations:

Does not support log truncation.

VMware 4.0 Update 2 and earlier does not support application consistent backup in Windows Vista and 2008 guest operating systems.

The back of Linux guests does not automatically quiesce the file system or application.

For a description of VMware's snapshot processing, see this VMware Knowledge Base article:

[http://kb.vmware.com/selfservice/microsites/search.do?language=en\\_US&cmd=displayKC&externalId=1015180](http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1015180)

Tivoli Storage Manager for Virtual Environments backup operations are performed by the data mover. This functionality is enabled by the separately installed prerequisite: Tivoli Storage Manager Backup-Archive Client 6.3. The Known Issues and Limitations for this product are documented in the following tech notes by platform:

Windows: <http://www.ibm.com/support/docview.wss?uid=swg21508259>

Linux: <http://www.ibm.com/support/docview.wss?uid=swg21508174>

See the section titled "VMware backup known problems and limitations" in each technote for information specific to this data mover function. Also, because the Backup-Archive client is using the VMware VADP API interface, all the VMware limitations when performing snapshot also apply to Tivoli Storage Manager. See VMware documentation to review these limitations.

### Tape Support Limitations

Information regarding backups to tape is documented in this Tape Support Statement:

[https://www-](https://www-304.ibm.com/support/docview.wss?uid=swg27021081&wv=1#Tape%20configuration%20guidelines)

[304.ibm.com/support/docview.wss?uid=swg27021081&wv=1#Tape%20configuration%20guidelines](https://www-304.ibm.com/support/docview.wss?uid=swg27021081&wv=1#Tape%20configuration%20guidelines)

### Known Issues and Limitations Version 6.3 Tivoli Storage Manager for Virtual Environments:

Information regarding known issues and limitations is documented in this technote:

<http://www-01.ibm.com/support/docview.wss?uid=swg21507325>

Limitations of 'from node' mode:

The 'set access' command grants read-only access to the target node. As a result, it is not possible, when using 'from node' option, to create the lock object required ensuring that snapshot data does not expire.

More information about lock objects is provided later in the presentation.

Once a snapshot expires, it can no longer be used by Mount. This is especially dangerous for Instant Restore, where a failed session might result in the loss of production data.

To avoid the risk, Instant Restore is not allowed (by default) when using the 'from node' option.

You can override this default behavior, by doing the following:

Windows:

1. Add the following parameter to the configuration file, under the 'general config' section:  
Enable IR without lock = 1
2. Restart the Mount service.

Linux:

1. Open TDPVMwareMountRestore.sh.
2. Edit the command line by adding a flag as shown below:  

```
$JAVA_HOME/bin/java -splash:Splash.png -Dscript.path="./engine"
-Dstatus.refresh.rate=60 -Dtimeout.task=120 -Dkeep=true
-DenableIR_NoLock=true -classpath $MOUNT_HELP/*:$MOUNT-NLS/*:$MOUNT_HOME/*
com.ibm.tivoli.tsm.ve.mountrestore.TDPVMwareApp
```
3. Restart the Mount executable.

## 9.1 VM vmdk file size and snapshot overhead

The maximum vmdk file size differs among versions of ESX/ESXi, and among versions of VMFS. If snapshots are to be used for backup purpose (or any other utilization), you must pay attention to the VMware maximums described below when you setup your VMs storage.

Here are the tabs describing the maximums:

On ESXi 5.0 and newly formatted VMFS5, a standard 1MB block size is available. The maximum file size is 2TB - 512Bytes.

Block Size	Maximum File Size
1MB	2TB - 512Bytes

On ESX/ESXi 4.1 and ESXi 5.0 using a VMFS3 datastore, the maximum file size corresponds to the block size of the VMFS datastore:

Block Size	Maximum File Size
1MB	256GB
2MB	512GB
4MB	1TB
8MB	2TB - 512Bytes

On ESX/ESXi 4.0, the maximum file size corresponds to the block size of the VMFS3 datastore:

Block Size	Maximum File Size
1MB	256GB - 512Bytes
2MB	512GB - 512Bytes
4MB	1TB - 512Bytes
8MB	2TB - 512Bytes

Overhead for the snapshot is approximately 2GB for a disk size of 256GB. If snapshots are to be used, consider the overhead while deciding the size of the disks:

Maximum VMDK size	Maximum Overhead	Maximum size less overhead
256GB - 512B	~ 2GB	254GB
512GB - 512B	~ 4GB	508GB
1TB - 512B	~ 8GB	1016GB



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2TB - 512B	~ 16GB	2032GB
------------	--------	--------

VMware recommends that you create virtual disks that are smaller than the maximum size minus the overhead, to enable the use of features like snapshot, cloning, and independent-non-persistent disks.

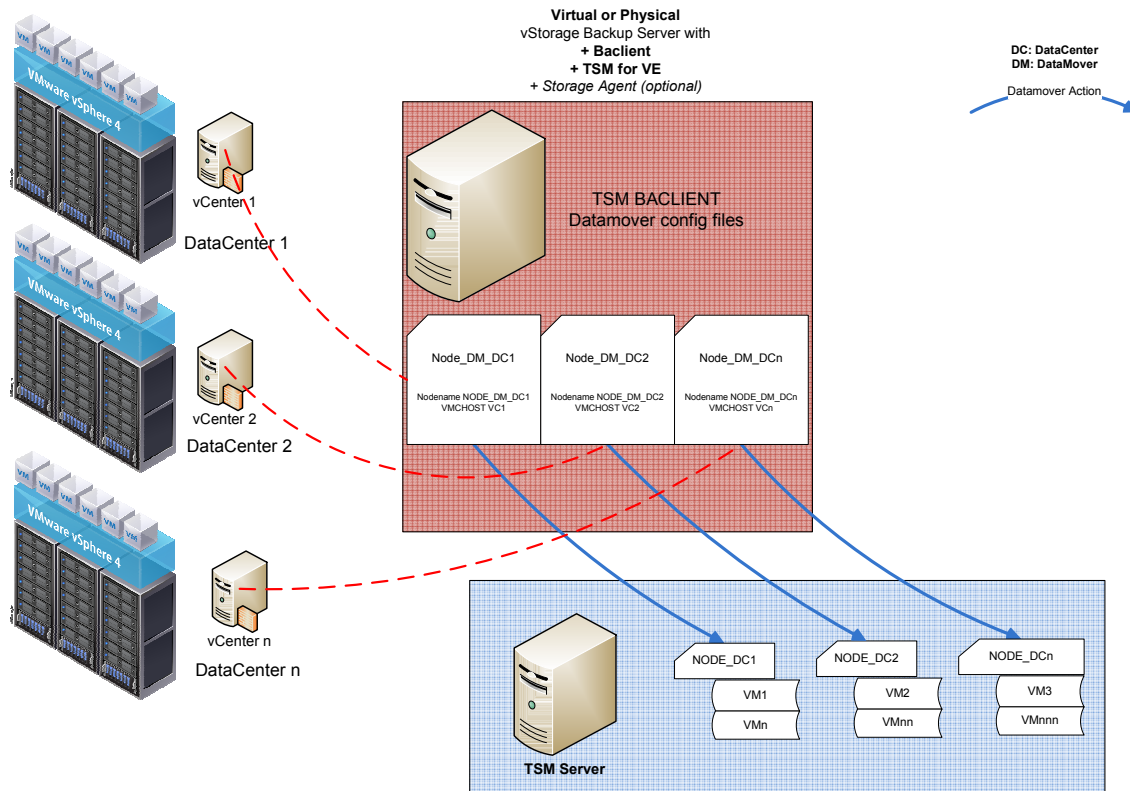
## 9.2 Multiple vCenter management - plug-in limitation

Because the plu-in is installed on the vCenter client, the plug-in will not allow you to support more than one vCenter. It leads to following limitation: You cannot manage backup or perform restore on multiple VMWare environment, managed by differents vCenter.

If you want to use plug-in, and only plug-in to manage your VMWare backup when using TSM For VE, you will need as many vBS as you have vCenter server, then each of your vBS will have a plug-in installed.

That being said, one vBS can manage more than one vCenter server, just by creating multiple client option file, that reference each of the vCenter server you might need (VMCHOST parameter). Indeed, the same proxy (vBS) can act as a DataMover for several vCenter, so several distinct VMware infrastructures.

The following figure depicts the option file configuration that you might have in a multiple vCenter configuration



## 10 Planning and sizing the vStorage Backup Servers

### 10.1 vStorage Backup Server - physical vs. virtual

There are a number of considerations when deciding whether to use a physical or virtual vStorage backup server.

#### Physical vStorage Backup Server

Off-loads backup workload from host

Supports either IP/LAN (“NBD Transport”) or SAN data transfers from ESX host/datastore to Backup Server (“SAN Transport”)

Supports either IP/LAN or LANfree (via SAN) data transfer from vStorage backup server to Tivoli Storage Manager Server

#### Virtual vStorage Backup Server

Backup workload on host

Supports Hotadd transport

Only supports IP data path to Tivoli Storage Manager Server storage

Risk of “protecting itself”

Here are some keys that might help you to find the best suitable implementation, based on your needs and environment

vStorage Backup Server location item	Virtual Backup Server	Physical Backup Server
End to end Virtualization (with all benefits: VBS flexibility, high availability, scalability)	X	
Off host the backup load (move the load from ESX to another machine)	X*	X
TSM LANFREE support (be aware of Tape limitation, prefer VTL storage)		X
10GE LAN bandwidth	X	
Use DISK/FILE only storage to store backups	X	
ESX Backend disks not on SAN (eg NAS)	X	
Plan to use the Flash Copy Manager for VMware	X	X

Notice that this choice and the vBS sizing are linked together

\* Off host is possible using virtual vBS by dedicating an ESX server that hosts virtual vBS

\* note: the vBS type (Physical/Virtual) may have effect on cost due to license. See license for details

Take into account this caveat as well if you plan to use Virtual VBS:

Limitation with Mismatched Block Size

HotAdd cannot be used if the VMFS block size of the datastore containing the virtual machine folder for the target virtual machine does not match the VMFS block size of the datastore containing the proxy virtual machine. For example, if you back up virtual disk on a datastore with 1MB blocks, the proxy must also be on a datastore with 1MB blocks.

The following diagram summaries features based on the type of vStorage backup server.

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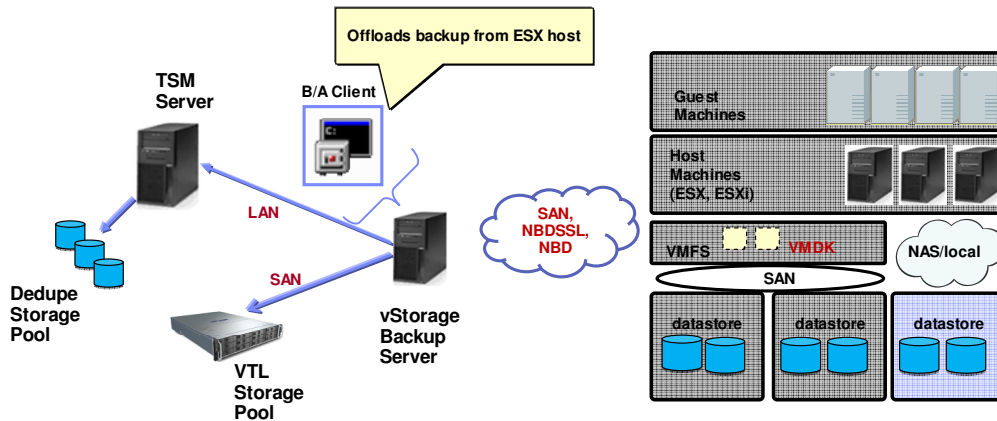
TSM for VE Available features based on VBS installation and storage location							
Features	VBS	PHYSICAL			Virtual(VM)		
	Storage location	DISK/FILE	VTL	TAPE	DISK/FILE	VTL	TAPE
LanFree		NO	YES	YES	NO	NO	NO
TSM Dedup (client and/or server side)		YES (FILE only)	NO	NO	YES (FILE only)	NO	NO
Full VM Backup		YES	YES	YES	YES	YES	YES
FULL VM Restore		YES	YES	YES	YES	YES	YES
INCR VM backup		YES	YES	YES	YES	YES	YES
File Level Restore		YES	YES	YES with low performance	YES	YES	YES with low performance
Volume Instant Restore		YES	YES	NO	YES	YES	NO

The following illustrate examples of physical and virtual vStorage Backup Server Deployments.



## Example Deployments - Physical vStorage Backup Server

- |   |   |
|---|---|
| <p><b>LAN Data Path with Client Deduplication</b></p> <ul style="list-style-type: none"> <li>LAN data path (VMware → vStorage server → TSM server)</li> <li>Client side deduplication and compression</li> <li>Deduplicated storage pool</li> </ul> | <p><b>SAN Data Path to VTL</b></p> <ul style="list-style-type: none"> <li>SAN data path (VMware → vStorage server → TSM server)</li> <li>No Client side deduplication or compression</li> <li>VTL Storage with Deduplication</li> </ul> |
|---|---|



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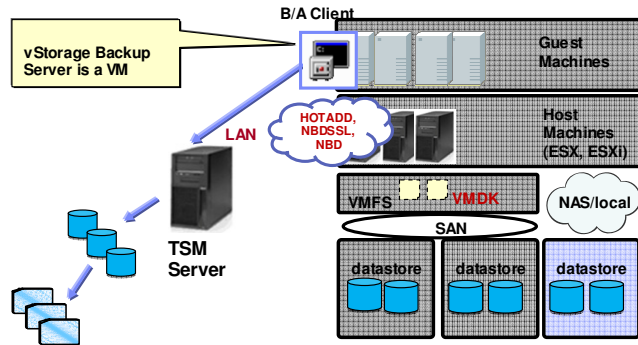
Example Deployments - Virtual vStorage Backup Server

**Hotadd Data Path with TSM Deduplication**

- Hotadd data path (VMware → B/A) / LAN data path (vStorage server → TSM server)
- Server deduplication or client side deduplication/compression
- Deduplicated storage pool

**LAN Data Path with Disk to Tape migration**

- LAN data path (VMware → vStorage server → TSM server)
- No Client side deduplication or compression
- VTL Storage



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**10.2 Maximums**

- A vStorage backup server can host one to number Backup Client instances. One to number vStorage backup servers can be connected to a Tivoli Storage Manager Server.
- Factors that can affect the throughput achieved with a vStorage Backup server include:
  - Datastore and Tivoli Storage Manager Server Storage Pool I/O speed and utilization
  - Backup / restore data path: SAN and LAN bandwidth speed and utilization
- vStorage backup server
  - Specific hardware: processor and adaptors
  - Number of cores / concurrent backup processes
  - I/O capacity (internal bus structure, NIC / HBA)
  - Physical vs. virtual
  - Restore activity
  - Tivoli Storage Manager Server activity / throughput available
  - Deduplication and compression

Let us discuss the maximum advised configuration. This is based on a production experience. The maximum VM size that can be processed is based on backup window and associated throughput for one data mover instance. Note that the volumes for an individual VM are processed one at a time. For a large VM, a separate schedule maybe a consideration. The maximum number of VM that can be processed depends on both the overall throughput for a vStorage backup server (including the maximum number of parallel data mover instances for a vStorage backup server) and the backup window available. This topic is described further in the following chapter.

### 10.3 Sizing

Here is the overview of the Tivoli Storage Manager for VE infrastructure sizing process.

Check this link if you want to have a complete explanation on how to proceed for your vBS sizing:  
<http://www.ibm.com/developerworks/wikis/display/tivolistoragemanager/Guide+to+vStorage+Backup+Server+%28Proxy%29+Sizing>

#### **Choose a backup plan.**

The backup plan can be one of the two defined previously in this document. It will give you direction in the next step when you estimate, the required aggregate.

Calculate required Aggregate Throughput (total data to backup / backup window)

The required aggregate is the (total amount of data / Per-process throughput). Take as assumption the total amount of data (i.e. summary of datastore size), even if you know that the CBT will optimize the space to be proceeded when you backup.

Calculate required Number of Concurrent Backup Processes (Aggregate Throughput / Estimated Per-Process Throughput)

The per-process throughput will depend on the way reading and writing data, how you plan to send/store the data on Tivoli Storage Manager Server? How fast your VMware backend disk subsystem is? You will have to take into account the client side de-duplication, Lan-Free path, VSTOR transport mode (NDB vs. HOTADD)

**Calculate the Number of vStorage Backup Servers** (Number of Concurrent Backup Processes / Processor cores per vStorage Backup Server). Note - assume 1 core used for each backup process, even with de-duplication enabled on client side.

Check for additional constraints / refine calculation

Check that you have enough adapters on the VBS to satisfy the estimated throughput. Aggregate of LAN adapter, enough SAN adapter... Ensure that in the given backup windows, the Tivoli Storage Manager Server is ready to receive the amount of data estimated, mainly if you plan to perform either client or server side de-duplication.

Sizing example:

# Tivoli Storage Manager for Virtual Environments Version 6.3 Deployment Guide

Total Concurrent Backup Processes	
Aggregate Throughput (batched fulls each week)	3,000 GB / HR
Aggregate Throughput (rotating fulls – 7 day)	1,372 GB / HR

Calculate required **Aggregate Throughput**  
*(total data to backup / backup window)*

Calculate required **Number of Concurrent Backup Processes**  
*(Aggregate Throughput / Estimated Per-Process Throughput)*

Calculate the **Number of vStorage Servers**  
*(Number of Concurrent Backup Processes / Processor cores per vStorage Backup Server)*  
 Note - assume 1 core used for each backup process

Estimated Number of vStorage Backup Servers Hosts Per 1000 VM's			
<i>*NOTE: Throughput estimate for illustrative example only</i>			
Per Process Throughput	*50 GB/Hour (e.g. client dedupe / LAN)	*100 GB/Hour (e.g. no client dedupe / LAN)	*150GB/Hour (e.g. SAN / VTL)
Schedule Method			
Batched Full – 4 cores	# Processes / cores = 60 # vStorage backup servers = 15	# Processes / cores = 30 # vStorage backup servers = 8	# Processes / cores = 20 # vStorage backup servers = 5
Rotating Full – 4 cores	# Processes / cores = 28 # vStorage backup servers = 7	# Processes / cores = 14 # vStorage backup servers = 4	# Processes / cores = 10 # vStorage backup servers = 3
Batched Full – 8 cores	# Processes / cores = 60 # vStorage backup servers = 8	# Processes / cores = 30 # vStorage backup servers = 4	# Processes / cores = 20 # vStorage backup servers = 3
Rotating Full – 8 cores	# Processes / cores = 28 # vStorage backup servers = 4	# Processes / cores = 14 # vStorage backup servers = 2	# Processes / cores = 10 # vStorage backup servers = 2

### ***10.4 Tivoli Storage Manager node naming convention***

Because the setup of Tivoli Storage Manager Server for VE solution is complex, it is strongly recommend that a good node naming convention is used. Such a naming convention helps you to remember what the backup hierarchy looks like.

When implementing the vCenter plug-in, you will need to have the following node names:

Datacenter node name

Virtual Center node name

DP for VMware CLI node name

Tivoli Storage Manager data mover node name

In the below table we use the following node names for the <cust> environment.

VCnn = STO00VC001 (vCenter)

VCLInn = VCLI01 (Data Protection for VMware Client Interface)

cust = (Tivoli Storage Manager Servers with multiple customers on the same server)

sitex = STO01 (Kista)

sitey = STO02 (Solna)

DMnn = DM01 (First datamover for one site)

Node	Description	TSM node names
vCenter node	The virtual Tivoli Storage Manager node that represents the vCenter.	<cust>-VCnn
Data center node	Manager node that maps to a data center. The data center nodes hold the data	<cust>-VCnn_<sitex> <cust>-VCnn_<sitey>
Data Protection for VMware command-line interface node	The Tivoli Storage Manager Client node that connects, the Data Protection for VMware command-line interface, to the Tivoli Storage Manager Server and the data mover node.	<cust>-VCnn >_VCLInn
Tivoli Storage Manager data mover node	The Tivoli Storage Manager node name for, the Tivoli Storage Manager Backup-Archive Client that is installed on the vStorage Backup Server. These nodes perform the data movements. You can have multiple Tivoli Storage Manager data mover nodes for each vStorage Backup	<cust>-VCnn_<sitex>_DMnn <cust>-VCnn_<sitey>_DMnn



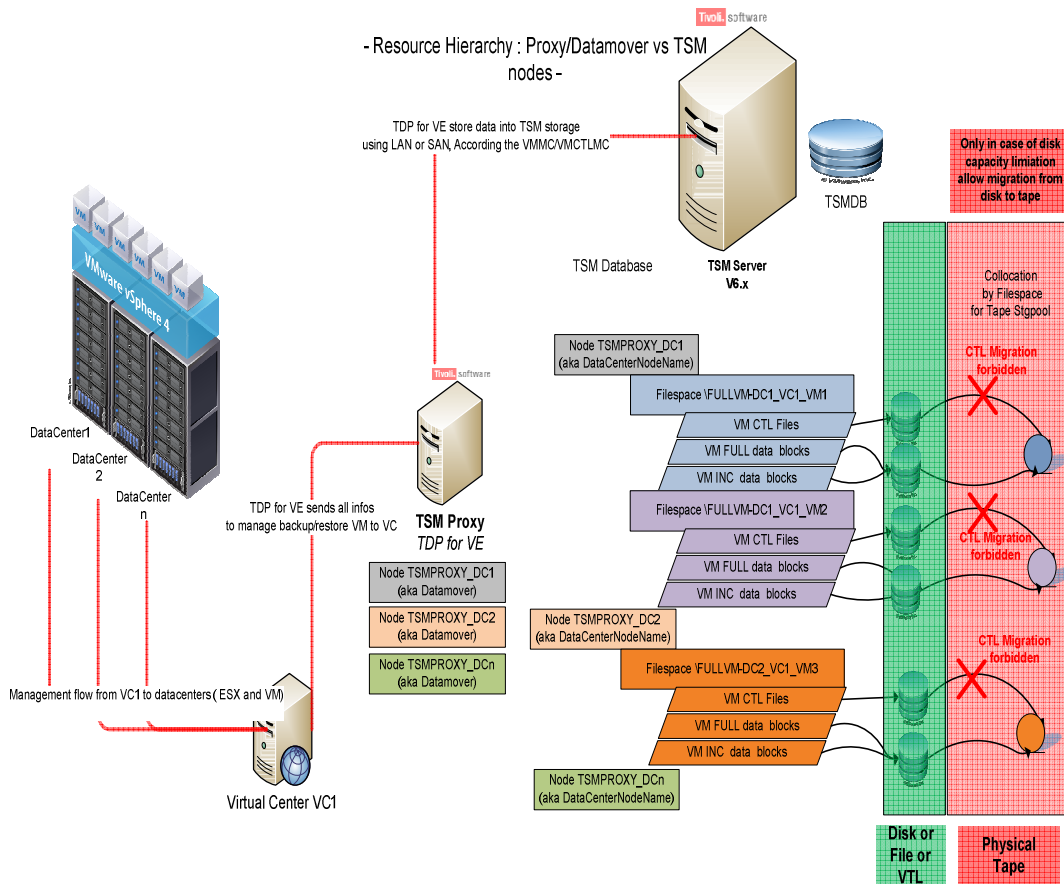
	Server. This feature is useful when multiple schedules run in parallel on a single server.	
--	--	--

Additional information about node names, see [Chapter 5](#) in the Tivoli Storage Manager for VE Version 6.3 Installation and User's Guide.

## 11 Tivoli Storage Manager Server Considerations

### 11.1 In order to fit Tivoli Storage Manager for VE, the design of Tivoli Storage Manager Server must be adapted.

Dedicated disk storage pool must be created to hold VM backup control files, those files are needed in a fast way for incremental backups and restore as well. Here is a backup hierarchy picture, describing how the data are organized in Tivoli Storage Manager Server.



## 11.2 Storage Disk/File/VTL considerations

What to consider when storing data on disk storage pool, File based volume or on a VTL.

Background: To use data stored on tape or VTL with Tape Mode in version 6.2, the user had to run Mount in Tape Mode. Setting 'Tape Mode' instructs Mount to wait for an offline media to be mounted upon request. Without setting this option, an attempt to read data from an offline device would fail immediately.

The following restrictions applied when running in Tape Mode:

Only one virtual device may be created at a time.

Instant Restore on Windows is not supported.

Tape Mode was controlled by a configuration parameter called 'Tape Mode'. Setting this parameter to '1' enabled Tape Mode, while a value of '0' disabled it. Service restart was required after modifying the parameter's value.

A stand-alone GUI tool called 'Tape Mode' was available to automate the configuration procedure. New in 6.3: VTL support starting in 6.3, the storage type configuration was extended to include a new option: VTL ('TapeMode=2')

Similar to Tape mode, VTL mode instructs Mount to wait for an offline media to be mounted.

Unlike Tape mode, VTL mode does not pose any restriction to the user. However, internally, all mounted volumes will share a single server session, so data retrieval may be slower.

The 'Tape Mode' stand-alone tool is deprecated, and its functionality has been merged into Mount's main GUI, under the 'Settings' dialog. Service restart is still required after modifying the storage type or any related parameters.

Do not attempt to change the storage-type and related parameter by editing the configuration file directly – the changes will be overridden by service restart!

Supported storage types:

Disk/File is the default setting:

Concurrent mounted snapshots are allowed

Instant Restore is supported

Cannot access data stored on offline device.

Tape - use this option when the data is stored on tape

Concurrent mounted snapshot are not allowed

Instant Restore is not supported (disabled)

An offline device will be brought online, and the data can be read

May be very slow!

VTL - this option when using a VTL:

Concurrent mounted snapshots are allowed

Instant Restore is supported

An offline device will be brought online, and the data can be read.

How to set storage type: Figure – Click on Settings

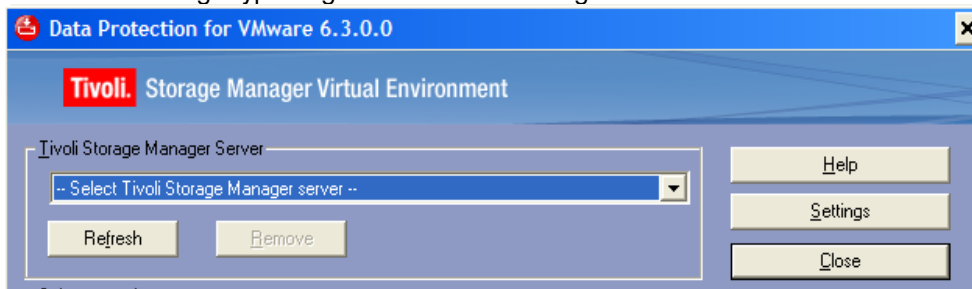


Figure – On Data Access Storage Type – Choose type

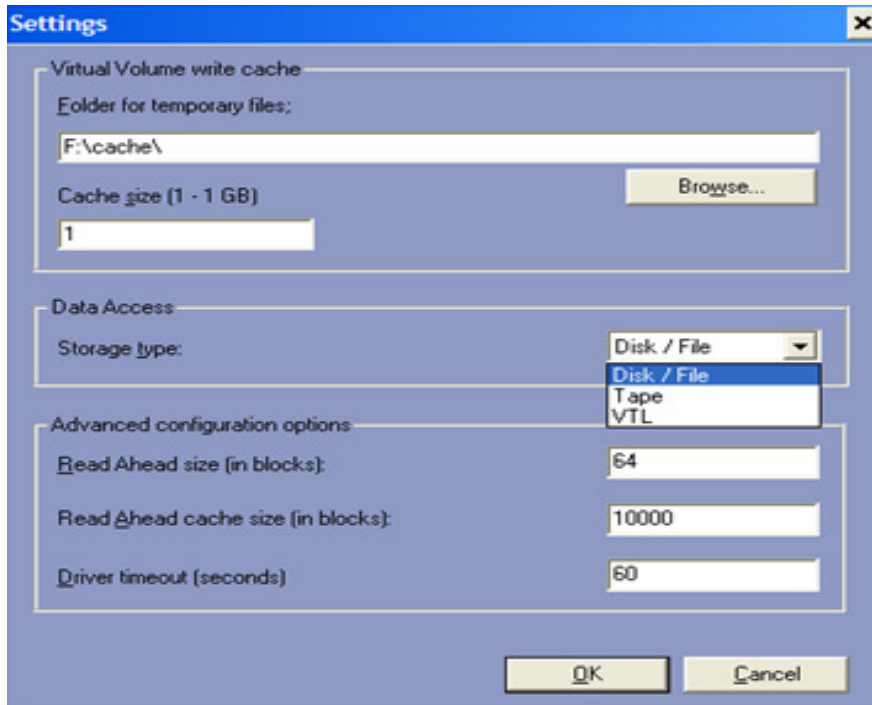
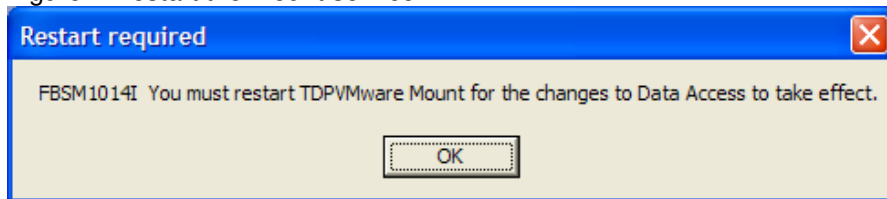


Figure – Restart the Mount service



Related parameters (read ahead size, read ahead cache size, kernel timeout).

Read Ahead size:

Number of 16kb-blocks to read from the server, in addition to the amount actually requested. The extra data is stored in the Read Ahead Cache

Default: 64 if using Disk/File or VTL, 1000 if using Tape

Read Ahead cache size:

The size (in 16kb blocks) of the cache used to store the data read from the server. Must be larger than the Read Ahead size

Maximum size is 75000 block

Each mounted volume uses its own cache. The total size (cache size \* number of mounted snapshots) should not exceed 75000.

Default value: 10000 if using Disk/File or VTL, 75000 if using Tape.

Kernel timeout:

The amount of time, in seconds, the FBVV driver will wait for Mount to read the data from the server. After this time has elapsed, Mount will return as error to the caller.

Increase this value if reading data from server takes long time (e.g.: when using tape, slow network, etc.)

Default: 180 seconds for Tape, 60 seconds otherwise.

### ***11.3 Storage tape considerations***

Use collocation by filespace for the proxy node so that each virtual machine will have its own set of volumes / tapes in the Tivoli Storage Manager storage pool hierarchy.

Do not store any CTL files on tape, in any cases. The storage pool used for VMware control files should reside on DISK and should not be migrated to tape or VTL.

If data de-duplication is used, be sure to have at least one copy storage pool that is not de-duplicated to be able to recover your snapshots in any case.

### ***11.4 Tivoli Storage Manager objects naming convention***

When defining names for hosts, Tivoli Storage Manager nodes, storage pools, management classes etc, it is highly recommended to use a naming convention without any special characters which might be missing in some local code pages.

Naming convention on management classes that will handle CTL and DAT files: It is highly recommended to implement separate management classes for VMware CTL and DAT files.

For the ease of use and to improve serviceability you should use meaningful names for the management classes, such as 'vmware\_ctl' and 'vmware\_dat'. The parameters to specify the different management classes within the client configuration are VMCMC and VMCTLMC.

Example:

VMCMC vmware\_dat

VMCTLMC vmware\_ctl

Naming convention of nodes :

The proxy node should have a speaking name as well, such as VMPROXY. If there are multiple VMware proxy nodes registered or planned, a more meaningful node name should be chosen, e.g. for describing the group of virtual machines, ESX servers or vCenters that are backup up under this proxy.

Naming convention of storage pools

It is recommended to separate VMware backup data from Backup / Archive Client data in different storage pools, regardless if de-duplicated or not. Also, it makes sense to use separate storage pools for full vm backups and incremental VM backups, including speaking names.

Example:

stg\_disk\_vmctl

stg\_tape\_vmfull

stg\_tape\_vmincr

## 12 Reporting

Since the VMware guests are represented as filespaces underneath a particular node, the conventional method of reporting on backup status (e.g., success or failure) for individual client nodes does not apply. This section describes recommendations for displaying backup status so an administrator can easily identify failed backup jobs and determine the most recent backup for any given VM guest.

This section focuses on Tivoli Storage Manager administrator queries. In addition to admin queries, there are other methods to obtain information on backups. For example, selection Action/Restore VM from the backup GUI client will show the backup times for VM's. If backups are done using the Data Protection for VMware vCenter plug-in, you can also obtain some status information from the reports tab.

### 12.1 Activity log messages

Activity log messages provide useful information for VM backup status. Activity log messages can be displayed either via a filtered "Query Actlog" command or by using a SQL SELECT command to the Tivoli Storage Manager Server database. The SQL SELECT method provides more capabilities since it allows more complex queries that pull data from multiple tables in the Tivoli Storage Manager Server database.

#### 12.1.1 Activity Log Messages with Database Queries

These commands will query the activity log for messages and returns the result.

Displaying successful and failed VM backups for the past 24 hours

This select command will show messages 4173 and 4174 for DATACENTER\_NODENAME during the past 24 hours. Message 4173 shows the name of each VM successfully backed up. Message 4174 shows the name of each VM which failed to back up.

```
select * from actlog where nodename='DATACENTER_NODENAME' and (msgno=4173 or msgno=4174) and date_time>=current_timestamp-24 hours
```

Using the sample names from the User's guide:

```
select * from actlog where nodename='VC1_DC1' and (msgno=4173 or msgno=4174) and date_time>=current_timestamp-24 hours
```

#### 12.1.2 Displaying additional information for a data center

```
Select * from actlog where nodename='DATACENTER_NODENAME' and message like '%VIRTUAL_MACHINE_NAME%' AND MSGNO<>4144
```

### 12.2 Database Queries

These queries will query the Tivoli Storage Manager Server database and return the results found

#### 12.2.1 Display backup date/time for virtual machines backed up for a data center node

Shows all virtual machines, as filespaces, backed up under DATACENTER\_NODENAME.

```
select node_name,filespace_name,backup_start,backup_end from filespaces where node_name='DATACENTER_NODENAME'
```

Shows all virtual machines, as filesystems, backed up under DATACENTER\_NODENAME more than 7 days ago.

```
select node_name,filesystem_name,backup_start,backup_end from filesystems where
node_name='DATACENTER_NODENAME' and backup_end<current_timestamp-7 day
```

Shows all virtual machines, as filesystems, backed up under DATACENTER\_NODENAME within the past 7 days.

```
select node_name,filesystem_name,backup_start,backup_end from filesystems where
node_name='DATACENTER_NODENAME' and backup_end>=current_timestamp-7 day
Report successful VM backup activity last day
select date(date_time),MESSAGE from actlog where msgno in ('4173') and
date_time>=current_timestamp - 1 days
Report failed VM backup activity last day
select date(date_time),nodename,MESSAGE from actlog where msgno in ('4148') and
date_time>=current_timestamp - 1 days
Report backup amount of data, elapsed time and performance related to VM backup activity
Tip: change the entity value to fit your datacenter node (in bold)
select ENTITY,sum(BYTES/1024/1024),'MB',sum(cast ((end_time - start_time) as
decimal(20))),'Second',SCHEDULE_NAME,cast(sum(BYTES/1024/1024)/sum(cast ((end_time -
start_time) as decimal(20))) as decimal (20,2)), 'MB/s' from summary where activity in ('BACKUP')
and start_time>=current_timestamp - 1 days and entity like '%FRSV123012.PROXYFI00%' and
bytes>0 group by entity,SCHEDULE_NAME,start_time,end_time
Report the last VM backup elapsed time in second , longest first:
select NODE_NAME,FILESPACE_NAME, date(BACKUP_END), cast ((BACKUP_END-
BACKUP_START) as decimal (12)) from FILESPACES where filesystem_name like '%VMFUL%'
order by 4 desc
```

Report VM without backup since x days, x=2 days hereafter :

```
select NODE_NAME,FILESPACE_NAME,date(backup_end) from FILESPACES where
filesystem_name like '%VMFUL%' and backup_end<=current_timestamp - 2 days order by
backup_end asc
```

### **12.3 Reporting tools**

As discussed before in this chapter, the reporting is different than usual; because there is no need to have registered nodes for each VM you backed up.

You find some tools about scheduling and reporting VM backup activities using this link:

<https://cattail.boulder.ibm.com/cattail/sdownload/77E0A1F0A19E3DDC86348037093F23B6/1/TSM+for+VE+Scheduling+tools+1.0.pdf>

## 13 Problem Determination

### 13.1 Common errors

First have a look to the Tivoli Storage Manager limitations described hereafter:

<https://www-304.ibm.com/support/docview.wss?uid=swg21417529>

Check the chapter VMware backup known problems and limitations in version 6.2.3

Error message:

ANS9365E VMware vStorage API error.

TSM function name : visdkWaitForTask

TSM file : vmvisdk.cpp (2933)

API return code : 78

API error message : A general system error occurred: Protocol error from VMX.

ANS4151E Failure mounting Virtual Machine xxxxxxx. RC=115

➔ Check the NTPD service on ESX host

Error message

ANS9365E VMware vStorage API error.

TSM function name : visdkWaitForTask

TSM file : vmvisdk.cpp (2933)

API return code : 78

API error message: Cannot create a quiesced snapshot because the create snapshot operation exceeded the time limit for holding off I/O in the frozen virtual machine.

➔ Check the VSS messages on Host + check free space on C: + check VMtools installation on VM guest

Error message

ANS9365E VMware vStorage API error.

TSM function name: VixDiskLib\_Open

TSM file : vmvddksdk.cpp (1428)

API return code : 13

API error message: You do not have access rights to this file

ANS4148E Full VM backup of Virtual Machine 'xxxxxxx' failed with RC -1

➔ Check that your proxy has ping/network access to the ESX who is hosting the VM at the backup time.

Error message

ANS1403E Error loading a required Library: vixDiskLib.dll, Win32 rc=126 DLL

ANS4152E Failure initializing VMware virtual machine environment. RC=-303. Refer to client dsmerror.log for detailed error messages.

➔ During Backup/Archive Client installation, VMware backup tools must be selected in the custom installation path to allow TSM VMware backups to take place.

Error message

ANS9365E VMware vStorage API error.

TSM function name : vddksdkWrite

TSM file : vmvddksdk.cpp (2271)

API return code : 16007

API error message : You have requested access to an area of the virtual disk that is out of bounds

ANS0361I DIAG: ANS1111I VmRestoreExtent(): VixDiskLib\_Write FAILURE startSector=1



sectorSize=1 byteOffset=512, rc=-1  
ANS5283E The operation was unsuccessful.

➔ The datastore resides on NetApp or Nseries NAS storage and was aligned using the mbralign utility of the storage vendor. APAR IC84544 was opened for this issue. Contact IBM support if the fix is not yet available. Check IBM TSM support website for news.

Error message

ANS9365E VMware vStorage API error.

TSM function name : VixDiskLib\_Write

TSM file : vmvddksdk.cpp (2485)

API return code : 1

API error message : Unknown error

ANS0361I DIAG: ANS1111I VmRestoreExtent(): VixDiskLib\_Write FAILURE startSector=512  
sectorSize=512 byteOffset=262144, rc 4398

ANS5226E The virtual machine backup operation failed

or

ANS9365E VMware vStorage API error.

TSM function name : vddksdkWrite

TSM file : vmvddksdk.cpp (2271)

API return code : 1

API error message : Unknown error

ANS0361I DIAG: ANS1111I VmRestoreExtent(): VixDiskLib\_Write FAILURE startSector=512  
sectorSize=512 byteOffset=262144, rc=-1

ANS5226E The virtual machine backup operation failed

➔ This points to an incorrect configuration of the Windows 2008 or Windows 2008 R2 proxy where the SAN POLICY setting was not set to OnlineAll. See TSM DOC APAR IC77216 as well as VMware KB 1035096 for reference.

### Snapshots Locking - What is Snapshot Locking

Tivoli Storage Manager Server keeps a limited number of (full) snapshots. Every time a new full snapshot is created, the oldest full snapshot is expired, and can no longer be restored. Since backup and file-level restore operations are independent, it's possible for a snapshot to expire while being used by Mount, causing file-level restore or Instant Restore to fail.

To avoid this situation, Mount creates a lock object before mounting or restoring a snapshot. The lock object ensures that the snapshot is not deleted, as long as the lock exists. When the virtual volume is dismounted, or Instant Restore completes, the lock is removed.

### The orphaned locks problem

Mount does its best to ensure it deletes the lock objects when they are no longer needed. It keeps track of the locks, so even after a crash it can identify and delete the old locks.

However, there are rare cases where a lock is not deleted. This will happen, for example, if while Mount is recovering from a crash, the Tivoli Storage Manager Server is unavailable. In this case, the locks are not removed, and as a result, expiration cannot delete the old snapshots, causing snapshots to accumulate forever.

To enable manual deletion of orphaned locks, new set of shell commands was added:

'list locks' displays a list of locks in a specified node

'del lock' deletes a specified lock.

Note: List locks return a full list of all locks. It is the user's responsibility to determine if any of the locks is orphaned.

Note: It is strongly recommended that this operation is done by a support person since removing the wrong lock may result in restore operation failure and loss of data.

➔ FULL VM restoration using LANFree path may silently failed, due to write error. Consequence is that the VM will not found the operating system at restart

You may have trouble when restoring a FULL VM using the Lanfree Path. This is documented in the APAR IC80972

(<https://www-304.ibm.com/support/entdocview.wss?uid=swg1IC80972>)

### ***13.2 Analyzing error situations and getting support***

If you are experiencing problems with your Tivoli Storage Manager for Virtual Environments installation, go the Tivoli Storage Manager Support website and search the knowledge base. There are a number of good technotes which might give you some hints to solve the issue on your own.

<http://www-01.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html>

There is also a dedicated Tivoli Storage Manager for Virtual Environments support website:

<http://www->

[947.ibm.com/support/entry/portal/Overview/Software/Tivoli/Tivoli Storage Manager for Virtual Environments](http://www-947.ibm.com/support/entry/portal/Overview/Software/Tivoli/Tivoli%20Storage%20Manager%20for%20Virtual%20Environments)

If you do not find a solution right away and you are entitled to support, go ahead and collect information as documented here:

<https://www-304.ibm.com/support/docview.wss?uid=swg21497489>

You can activate tracing for your VMware backups or restores by doing the following:

Edit and save your dsmvddk.opt file to enable VMware trivia tracing by changing loglevels from 1 to 6:

```
# 0-quiet, 1-panic, 2-error, 3-warning, 4-info, 5-verbose, 6-trivia
```

```
vixDiskLib.transport.LogLevel = "6"
```

```
vixDiskLib.nfc.LogLevel = "6"
```

Edit your dsm.opt file to activate tracing in the TSM client:

```
TRACEFLAGS VM
```

```
TRACEFILE vmtrace.out
```

Now rerun the failing backup or restore. Make sure to revert changes after the issue was recreated.

See below for more detailed information before contacting support:

Contacting IBM Software Support

You can contact IBM Software Support if you have an active IBM subscription and support contract and if you are authorized to submit problems to IBM.

To obtain help from IBM Software Support, complete the following steps:

1. Ensure that you have completed the following prerequisites:

a. Set up a subscription and support contract.

b. Determine the business impact of your problem.

c. Describe your problem and gather background information.

2. Follow the instructions in "Submitting the problem to IBM Software Support" on page xviii.

Setting up a subscription and support contract

Set up a subscription and support contract. The type of contract that you need depends on the type of product you have. For IBM distributed software products (including, but not limited to, IBM Tivoli, Lotus®, and Rational® products, as well as IBM DB2® and IBM WebSphere® products that run on Microsoft Windows or on operating systems such as AIX or Linux), enroll in IBM Passport Advantage® in one of the following ways:

- Online: Go to the Passport Advantage website at

<http://www.ibm.com/software/lotus/passportadvantage>, click How to enroll, and follow the instructions.

- By telephone: You can call 1-800-IBMSERV (1-800-426-7378) in the United States. For the telephone number to call in your country, go to the IBM Software Support Handbook web page at <http://www14.software.ibm.com/webapp/set2/sas/f/handbook/home.html> and click Contacts.

Determining the business impact

When you report a problem to IBM, you are asked to supply a severity level. Therefore, you must understand and assess the business impact of the problem you are reporting.

Severity 1 Critical business impact: You are unable to use the program, resulting in a critical impact on operations. This condition requires an immediate solution.

Severity 2 Significant business impact: The program is usable but is severely limited.

Severity 3 Some business impact: The program is usable with less significant features (not critical to operations) unavailable.

Severity 4 Minimal business impact: The problem causes little impact on operations, or a reasonable circumvention to the problem has been implemented.

Describing the problem and gathering background information

When explaining a problem to IBM, it is helpful to be as specific as possible. Include all relevant background information so that IBM Software Support specialists can help you solve the problem efficiently. To save time, know the answers to these questions:

- What software versions were you running when the problem occurred?
- Do you have logs, traces, and messages that are related to the problem symptoms? IBM Software Support is likely to ask for this information.
- Can the problem be re-created? If so, what steps led to the failure?
- Have any changes been made to the system? For example, hardware, operating system, networking software, and so on.
- Are you using a workaround for this problem? If so, be prepared to explain it when you report the problem.

Submitting the problem to IBM Software Support

You can submit the problem to IBM Software Support online or by telephone.

Online

Go to the IBM Software Support website at

[http://www.ibm.com/support/entry/portal/Open\\_service\\_request/Software/Software\\_support\\_\(general\)](http://www.ibm.com/support/entry/portal/Open_service_request/Software/Software_support_(general)). Sign in to access IBM Service Requests and enter your information into the problem submission tool.

By telephone

For the telephone number to call in your country, go to the IBM Software Support Handbook at <http://www14.software.ibm.com/webapp/set2/sas/f/handbook/home.html> and click Contacts

### ***13.3 Procedure to manually register the vCenter plug-in***

If you have trouble when installing the plug-in, for some reason, you can do it manually by following these steps:

Go to directory on x86 windows machine:

C:\Program Files\Common Files\Tivoli\TDPVMware\VMwarePlugin

or directory on x64 machine:

C:\Program Files (x86)\Common Files\Tivoli\TDPVMware\VMwarePlugin

and run command

```
register_vcenter.cmd <vcenter hostname or IP address> <vcenter username> <vcenter password>  
<ewas default port 9080 or the port you specified during installation>
```

you can check the ewas port in

```
C:\IBM\tivoli\tsm\tdpvmware\ewas\profileTemplates\default\actions\portsUpdate\portdef.props  
WC_defaulthost=9080
```

and then copy the generate file config.xml to

```
C:\IBM\tivoli\tsm\tdpvmware\ewas\profiles\TSMProfile\installedApps\tsmCell\TsmVMwareUIEAR.ea  
r\TsmVMwareUI.war\plugin\config.xml
```

# 14 Example Deployment

The following summarize use cases and statistics regarding a production environment

## 14.1 Sizing example

Three vStorage Backup Servers handle 147 VMs, 75 TB of data storage, with up to five simultaneous processes per VBS in the backup windows.

If you don't have a VTL available in your environment, you can use at least DISK or FILE device class to store backups on disks. To store the CTL files, we are using a dedicated DISK storage pools.

To store the data blocks, we are using a FILE based storage pool (instead of DISK, because the available space is shared over different storage pools). In this case we had limited disk storage, not able to keep 35 days of backup on disk; we setup a migration from DISK to TAPE after 7 days. 10 TB of disks is enough to keep those 7 days backup, with de-duplication enabled.

## 14.2 Backup scheduling

The method we choose is the Batched full.

Mainly to reduce impact on production, we have not other choice that run the FULL VM backup over the week end. It's also due to our storage constraints, because we are able to keep only 7 days on FILE storage pools, we chosen the schedule the full every 7 days to keep the "full + incremental" sets in the same way.

Because our reporting method is based on Tivoli Storage Manager event, we have to define a node per VM on Tivoli Storage Manager side, and to associate a specific schedule to each VM. This will impact the way of scheduling and how we can spread the backup over the ESX hosts to obtain the best performance.

We have a script that creates dynamically the scheduler services for each VM on the vStorage Backup Server. The parallelism of backup processes is managed through the Tivoli Storage Manager scheduler plan.

Here are the steps:

- Datacenter node (on VBS) scheduler start a main script to retrieve information about the proxy relationship of the running datacenter node. Also to retrieve the event plan to determine which VM has to be backed up.
- Create Tivoli Storage Manager scheduler service for each VM to backup. Tivoli Storage Manager Servers acts as usually and contact the scheduler service (on the VBS) to start the VM backup job. Once all backup jobs are done, the main script stop and delete all the scheduler services. With this method you have an event report for each VM you have backed up.

Note: this method enforce you to create a node for each VM just for scheduling purpose. No data are stored on those node, all are stored within the datacenter node name.

A complete scheduling explanation, method and tooling is provided out there:

<https://cattail.boulder.ibm.com/cattail/sdownload/77E0A1F0A19E3DDC86348037093F23B6/1/TSM+for+VE+Scheduling+tools+1.0.pdf>

### ***14.3 Performance considerations***

#### **14.3.1 Do not compare performance to plain file copies**

Looking at performance statistics for Tivoli Storage Manager for VE backups and restores, one should not compare to plain file copies. Also a comparison to Ba-client file level backups is not valid as there is communication overhead with the VMware environment.

Example:

Multiple backups of approximately 12 GB of data take about 11 minutes each resulting in a throughput of 20 - 25 MB/s. Those figures appear to indicate bad performance, but in fact Tivoli Storage Manager for VE only counts the data transfer between the Tivoli Storage Manager Server and client - while the same amount of data is transferred at the same time during communication between the Tivoli Storage Manager client (backup proxy) and the vCenter / ESX server. So actually an amount of approximately 24 GB was transferred, resulting in a network transfer rate of around 50 MB/s which is an expected rate.

Client backups of local drives do not have this communication overhead as all data is already stored on the target machine.

To verify your performance statistics are good or not it can make sense to do a small test with a Backup/Archive Client machine and a network share, backing up data from that share. Here, a similar overhead will be observed as the Tivoli Storage Manager Client has to transfer all data from the share-hosting machine to itself and then over to the Tivoli Storage Manager Server. This will roughly show performance statistics similar to those of the Tivoli Storage Manager for VE backup/restore.

The use of Client de-duplication and compression will also have an impact on the network throughput of VMware backups using Tivoli Storage Manager for VE. While the amount of data to be transferred will be reduced, the processing time per GB will be lower due to the computing overhead.

#### **14.3.2 Separate VMware data files from control data**

When performing backups of your virtual machines, these are stored in the Tivoli Storage Manager Storage pools as DAT and CTL files. While this separation into 2 file types does not have a performance impact on the backup, it may have significant impact on the restore, depending on the storage pool layout.

You can control the target storage pool for data and control files by specifying the parameters VMCM and VMCTLMC on the backup proxy. Those parameters point to a management class:

Example:

```
VMCM vmware_dat
```

```
VMCTLMC vmware_ctl
```

While the VMware data files can be stored in your normal storage pool hierarchy, e.g. first in a disk pool and then migrate to tape or virtual tape, it is highly recommended (for performance reasons) to store the VMware control data in a DISK storage pool that never migrates to tape. Setting a migdelay of a certain number of days can still impact the restore performance. So, when experiencing good performance during the backup but very bad performance during the restore, it is a good idea to verify your client configuration.

Often it can be seen that DAT and CTL data in the same (e.g. tape) storage pool cause the restore to take place in 128MB chunks, and storage pool volumes being opened and closed frequently. To avoid this situation, be sure to store these files as described above.

#### **14.3.3 VMFS blocksize affects restore performance**

With the change from vSphere 4 to vSphere 5 along with the new VMFS version 5, VMware implemented a new hard coded block size for their datastore filesystem. With version 4 and earlier versions one could configure a blocksize between 1 and 8 MB. The new VMFS 5 has a hard

coded value of 1MB. From a restore performance perspective, IBM support and development determined it is recommended to use a small block size, keeping in mind that this will limit the possible vmdk size within the datastore. See VMware KB 1003565 for further details.

### 14.3.4 Transport methods for backup and restore

While it can make sense to use the hotadd method (in case of a virtual proxy) or san for backups, it has been observed that NBD transport often shows much better performance for restores. In general we can say that not necessarily backups require the same transport method for good performance as restores do. The transport method which best suits your environment should be determined by testing backups and restores with each available transport method

### ***14.4 Tivoli Storage Manager Server sizing: CTL disk space estimation***

Because the recommendations are to store the CTL files on disk, here is an estimation of the DISK space you will need to store CTL files, based on the amount of data you will back up

The theoretical ratio is based on following:

CTL size: 73K

DAT size: 128 MB

1 CTL per DAT file .

Theoretical value is:  $73K/128MB * 100 = 0,05\%$  . so 0,05% of total amount of data should be prepared for CTL storage.

### 14.4.1 The role of TCPWINDOWSIZE

The TCPWINDOWSIZE affects both, send and receive buffers, thus backup and restore processing is affected by this parameter. While a certain value can result in good backup performance, that does not necessarily mean that the same value also shows good restore performance. As the TCPWINDOWSIZE does not have a one-size-fits-all value for any environment, this should be carefully evaluated and tuned. In general, the TCPWINDOWSIZE on the client should not exceed the value configured on the server. Also, poor performance was observed once the TCPWINDOWSIZE was configured very large - while values close to the server's TCPWINDOWSIZE resulted in good performance for both, backup and restore. Again, this is a tunable which needs to be adjusted according to certain factors. There is not one correct value which fits to all environments.

### 14.4.2 Evaluate the available transport methods

For VMware backups and restores there is a number of different transport methods available. Per default, there is a certain sequence in which these methods are selected. Using VMVSTORTRANSPORT parameter you can select one and more transport methods to be used. It makes sense to evaluate the best transport method according to both, performance and security. Not all environments require encrypted data transfer but may require fast restores, so NBDSSL will not be the right transport method for these environments. Instead, depending on the environment, SAN, HOTADD or NBD should be evaluated.

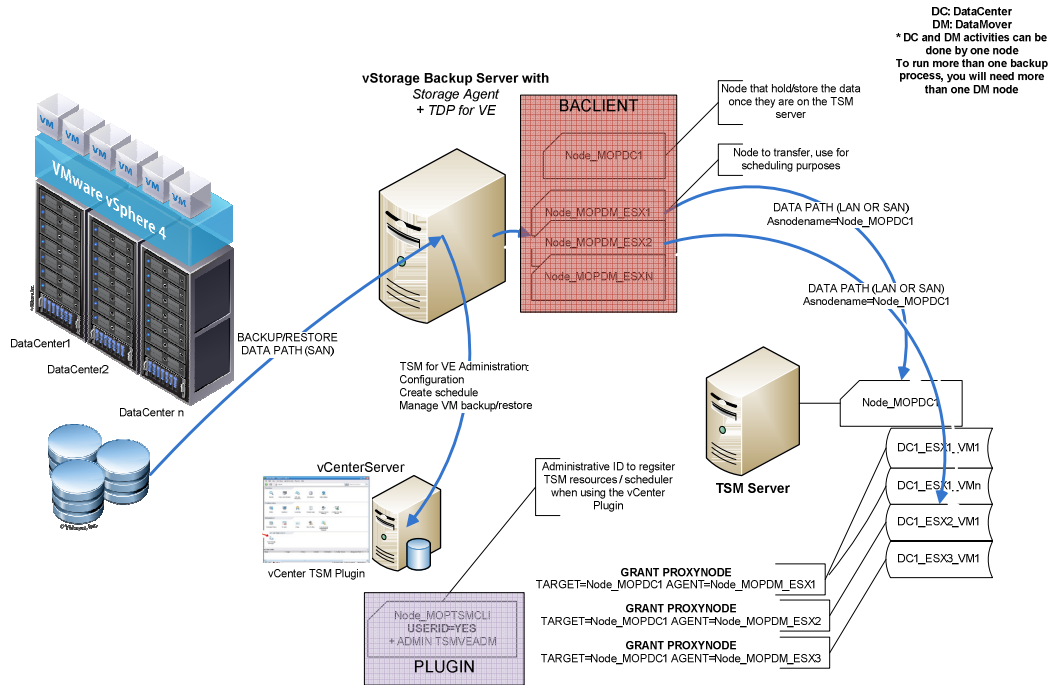
### 14.4.3 Thin vs. thick disk provisioning in terms of restore performance

The block allocation overhead during disk write for a thin provisioned vmdk is bigger than for thick provisioned disks, which causes the restore operation to take longer. So, when determining if thin or thick disks should be used in your environment, you should not only consider the benefit of allocating storage space on demand, but also evaluate the price this costs on restore times.

## 15 Installing Data Protection for VMware

In this chapter we show the step-by-step installation of the Data Protection for VMware on the Windows platform. Before installing or upgrading Data Protection for VMware, verify that your system meets all operating system, hardware, and software requirements.

### 15.1 Tivoli Storage Manager for Virtual Environment Blueprint



### 15.2 Data Protection for VMware vCenter plug-in

The vCenter plug-in has been installed as part of the baclient installation. See chapter 5.5 TSM for Virtual Environments installation for more details

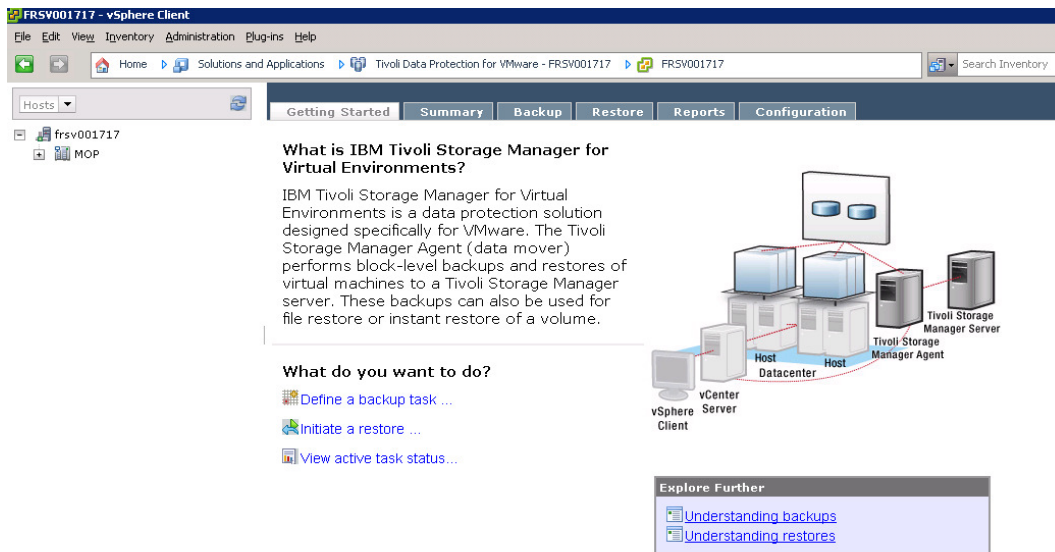
### 15.3 Tivoli Storage Manager account privileges vs. activity matrix

The table below shows the vSphere Client plug-in user interface operations which can be used based on the privilege class assigned to the TSM administrator ID.

Plug-In UI Operations	TSM Administrator ID with system privilege, unrestricted policy privilege, or restricted policy privilege for the policy domain to which the client node	TSM Administrator ID with any other privilege classes (e.g., node privilege, operator privilege, no
-----------------------	--	---



	is assigned	privilege, etc.)
Backup and Restore Tasks		
Backup, Run Now	Yes	Yes
Backup, Scheduled	Yes	No
Backup - Managing Backup Schedules - View Only	Yes	Yes
Backup - Managing Backup Schedules - Delete a Schedule	Yes	No
Restore	Yes	Yes
Reports Tasks		
Reports - Active Tasks	Yes	Yes
Reports - Events	Yes	Yes
Reports - Datacenter Occupancy	Yes	Yes
Configuration Tasks		
Configuration	Yes	Yes



## 16 VMware for the Storage Administrator

### 16.1 Introduction to VMware vSphere

VMware vSphere is a virtualization platform capable of transforming a traditional data center and industry standard hardware into a shared mainframe-like environment. Hardware resources can be pooled together to run varying workloads and applications with different service-level needs and performance requirements. VMware vSphere is the enabling technology to build a private or public cloud infrastructure.

The components of VMware vSphere fall into three categories: Infrastructure services, application services, and the VMware vCenter Server. The figure below shows a representation of the VMware vSphere platform.



VMware vSphere platform

### Infrastructure services

Infrastructure services perform the virtualization of server hardware, storage, and network resources. The services within the infrastructure services category are the foundation of the VMware vSphere platform.

### Application services

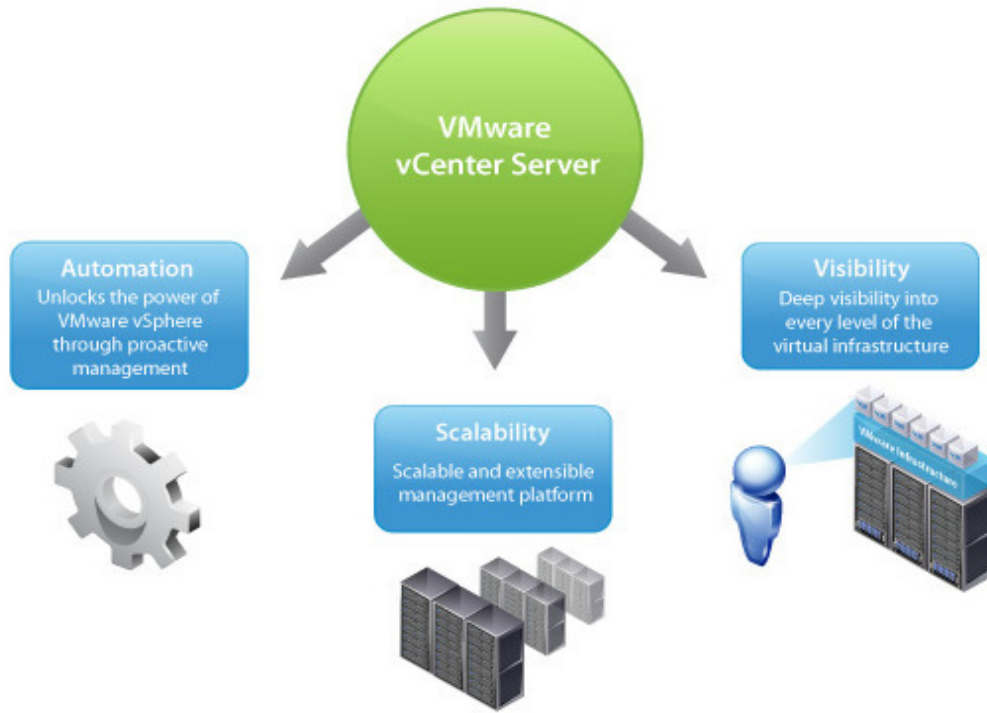
The components categorized as application services address availability, security, and scalability concerns for all applications running on the vSphere platform, regardless of complexity of the application.

### VMware vCenter Server

VMware vCenter Server, formerly known as VMware VirtualCenter, provides the foundation for management of the vSphere platform. VMware vCenter Server provides centralized management of configurations as well as aggregated performance statistics for clusters, hosts, virtual machines, storage, and guest operating systems. VMware vCenter Server scales to provide management of large enterprises, granting administrators the ability to manage more than 1,000 hosts and up to 10,000 virtual machines from a single console.

VMware vCenter Server is also an extensible management platform. The open plug-in architecture allows VMware and its partners to directly integrate with vCenter Server, extending the capabilities of the vCenter platform, and adding additional functionality.

Figure x shows the main pillars of functionality provided by VMware vCenter Server.



Pillars of VMware vCenter Server

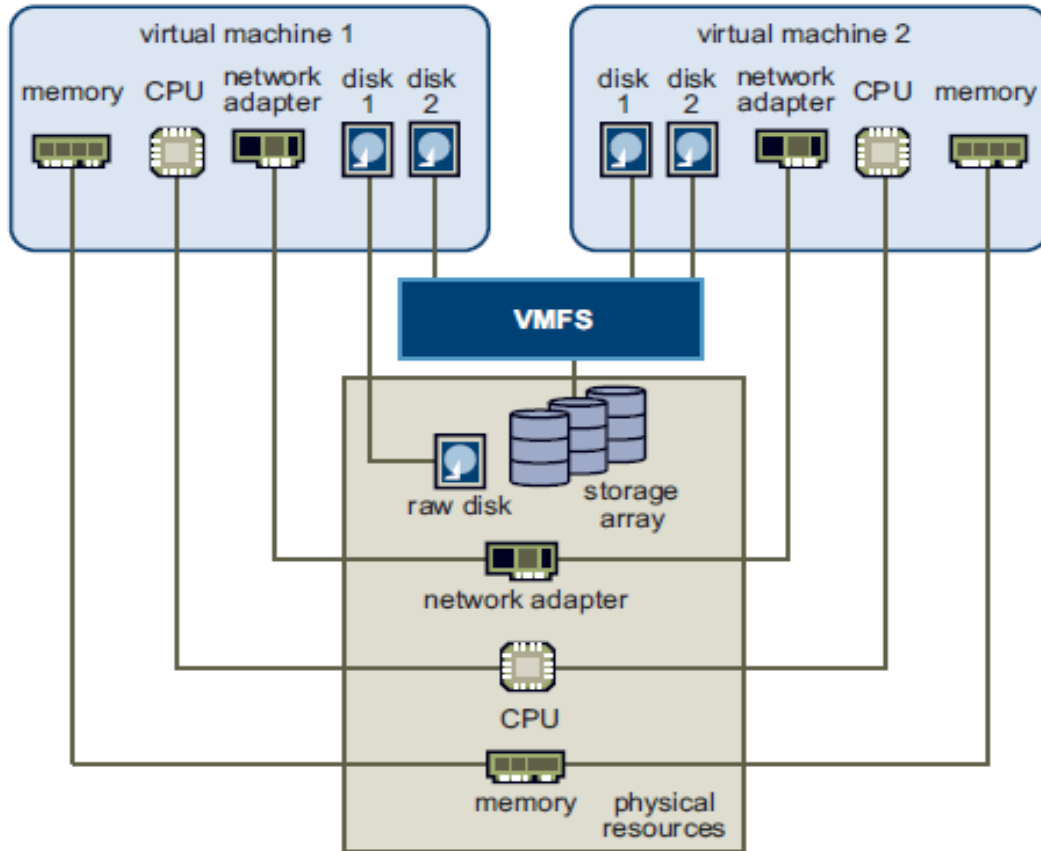
### ***16.2 Virtualization at a Glance***

An ESX Server virtualizes the resources of the physical system for the virtual machines to use. The following figure illustrates how multiple virtual machines share physical devices. It shows two virtual machines, each configured with the following:

- One CPU

- An allocation of memory and a network adapter (NIC)

- Two virtual disks (with one virtual machine directly attached to physical disk – i.e. physical raw device mapping)



The virtual machines each use one of the CPUs on the server and access noncontiguous pages of memory, with part of the memory of one virtual machine currently swapped to disk (not shown).

The two virtual network adapters are connected to two physical network adapters.

The disks are mapped as follows:

Disk 1 of virtual machine 1 is mapped directly to a raw disk. This configuration can be advantageous under certain circumstances.

Disk 2 of virtual machine 1 and both disks of virtual machine 2 reside on the VMFS, which is located on a SAN storage array. VMFS makes sure that appropriate locking and security is in place at all times.

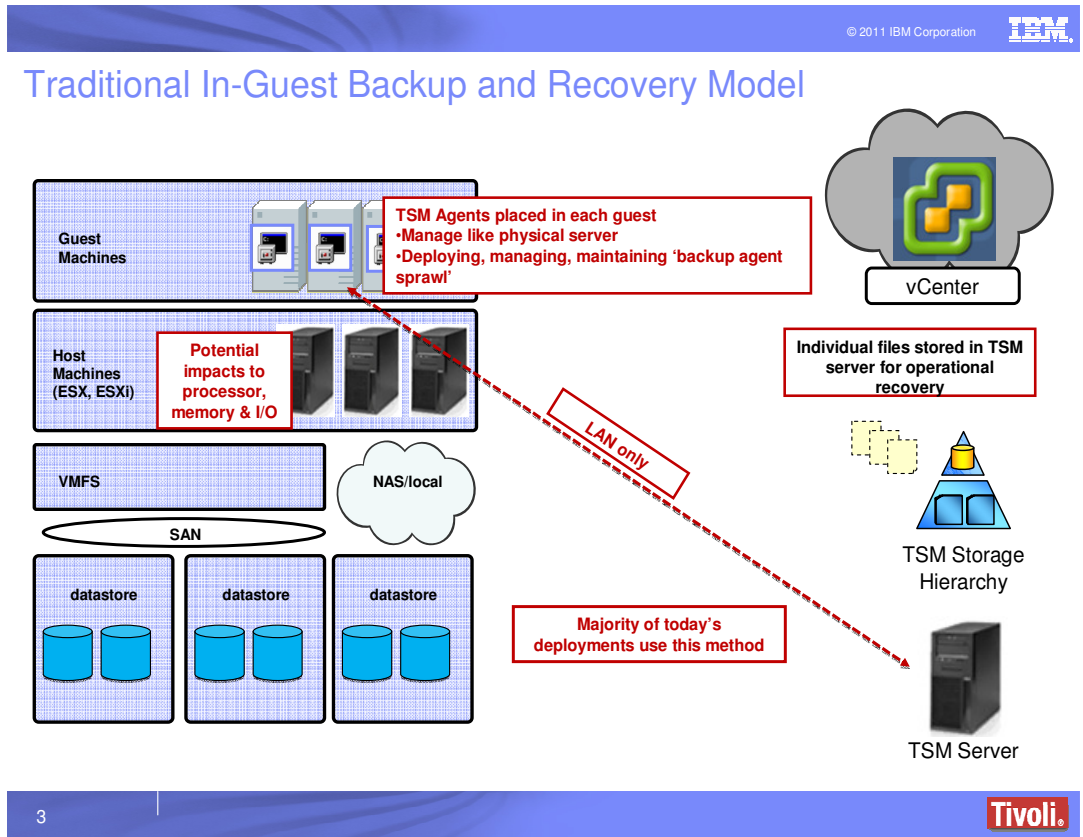
### ***16.3 Primary Backup Methods for VMware***

There are two primary methods to protect VMware virtual guests:

Traditional approach - Install a backup agent inside each VM guest machine (backup VM just like a physical machine).

Centralized backup approach - Use the B/A client (i.e. data mover) running on a vStorage Backup Server (i.e. VM guest machine or off-host physical machine) to centralize the backup of VMs.

The first method runs an agent inside of a guest machines and is illustrated below.



The Tivoli Storage Manager B/A client or Tivoli Storage Manager for \* application agent is installed in the guest. Tivoli Storage Manager Fastback utilizes a different technology for backups (block level incremental forever) which makes it a good fit for this approach since the Fastback client has a very low overhead.

The advantages of this method include:

- Simple, manage guest like they are physical machines
- No need to change backup processes
- Application awareness during backup and better recovery granularity

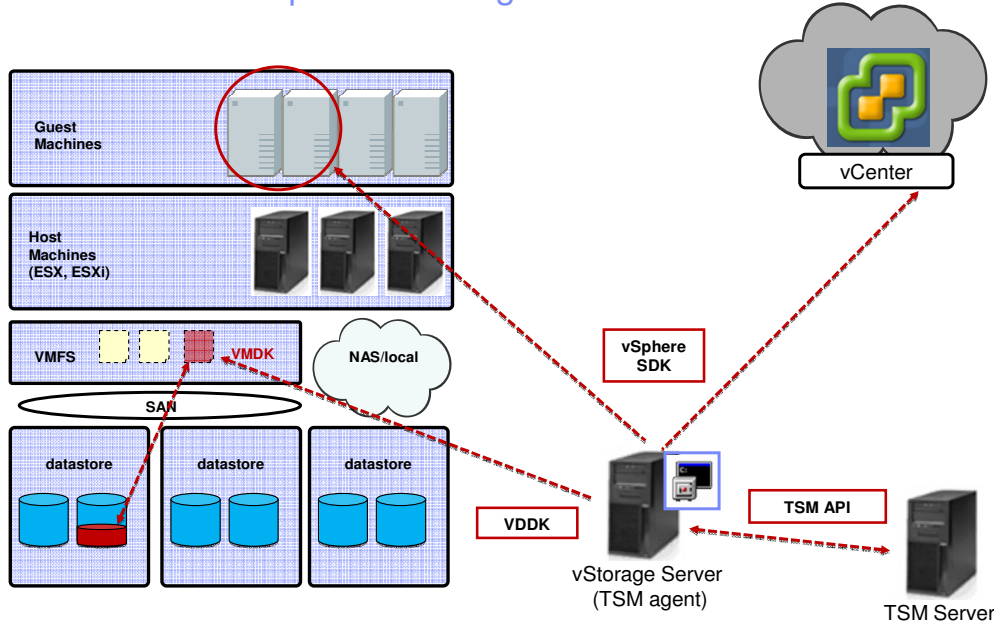
The disadvantages of this method include

- Leads to agent sprawl and more complicated management
- Concurrent backups put a load on the ESX server
- Data movement limited to LAN

The second method centralizes backup of VMs using an agent (i.e. B/A client) on a secondary machine (i.e. vStorage Backup Server) and is illustrated below.



## Centralized Backup with vStorage APIs for Data Protection



The goal of this approach is to provide the benefits of the traditional host based approach and use VMware's vStorage API for Data Protection (VADP) to create / access guest snapshots and move the data with a B/A client. This approach is recommended by VMware. The advantages include:

- Centralizes and simplifies management, one VM Backup Client supports backup of multiple VMs
- Agent on a secondary machine reduces the load on ESX Server
- Provides advanced features vs. running in a guest (e.g. change block tracking and single source backup)
- Faster backups and less redundant data
- Support LAN free data transfer from ESX server to vStorage backup server
- vCenter connection enables consolidated management of several ESX servers together (i.e. working at scalable virtual level), and not in physical (i.e. per client) level
- Supports both file level and image level backups

## 16.4 VMware Terminology

**vCenter Server** - The central point for configuring, provisioning, and managing virtualized IT environments. The vCenter Server unifies resources from individual hosts so that those resources can be shared among virtual machines in the entire datacenter. It accomplishes this by managing the assignment of virtual machines to the hosts and the assignment of resources to the virtual machines within a given host based on the policies that the system administrator sets. vCenter Server allows the use of advanced vSphere features such as VMware Distributed Resource Scheduler (DRS), VMware High Availability (HA), and VMware vMotion.

**Datacenter** - A datacenter is the primary container of inventory objects such as hosts and virtual machines. From the datacenter you can add and organize inventory objects. Typically you add hosts, folders and clusters to a datacenter. The vCenter server can contain multiple datacenters. For example, datacenters can be used to represent organization units or can map groups applications to things like development, test and production. Inventory objects can interact within

datacenters, but interaction across datacenters is limited. For example, you can move a virtual machine with vMotion technology across hosts within a datacenter but not to a host in another datacenter.

The recommended best practice is to have a Tivoli Storage Manager target node map to a VMware datacenter. During a vStorage based backup, each VM in the datacenter will be represented as a separate filesystem in the Tivoli Storage Manager target node.

**Datastore** – A datastore is a logical container that holds virtual machine files and other files necessary for virtual machine operations. Datastores can exist on different types of physical storage, including local storage, iSCSI, Fibre Channel SAN, or NFS. The datastore can be VMFS-based or NFS-based.

**Virtual Machine File System (VMFS)** - A high performance cluster file system for ESX / ESXi virtual machines

**Folder** – A folder is a container used to group objects and organize them into hierarchies. Folders provide a natural structure on which to apply permissions.

**Host** – A VMware host (also referred to as a just host) refers to the computer that uses virtualization software, such as ESX or ESXi, to run virtual machines. Hosts provide the CPU and memory resources that virtual machines use and give virtual machines access to storage and network connectivity.

**ESX** - Service Console is a standard Linux environment through which a user has privileged access to the VMware ESX kernel. This Linux-based privileged access allows you to manage your environment by installing agents and drivers and executing scripts and other Linux-environment code.

**ESXi** - VMware ESXi is designed to make the server a computing appliance. Accordingly, VMware ESXi behaves more like firmware than traditional software. To provide hardware-like security and reliability, VMware ESXi does not support a privileged access environment like the Service Console for management of VMware ESXi. To enable interaction with agents, VMware has provisioned CIM Providers through which monitoring and management tasks – traditionally done through Service Console agents – can be performed. VMware has provided remote scripting environments such as vCLI and PowerCLI to allow the remote execution of scripts.

**ESX Cluster** - A cluster acts and can be managed as a single entity. It represents the aggregate computing and memory resources of a group of physical x86 servers sharing the same network and storage arrays. For example, if the group contains eight servers with four dual-core CPUs each running at 4GHz and 32GB of memory. The cluster then has an aggregate 256GHz of computing power and 256GB of memory available for running virtual machines. An ESX cluster can be used for high availability and load balancing.

**vMotion** - enables the migration of running virtual machines from one physical server to another without service interruption. With vMotion, resources can be dynamically reallocated to virtual machines across physical servers.

**Storage vMotion** - storage vMotion enables the migration of virtual machines from one datastore to another datastore without service interruption. This allows administrators, for example, to off-load virtual machines from one storage array to another to perform maintenance, reconfigure LUNs, resolve out-of-space issues, and upgrade VMFS volumes.

**vSphere Client** – A client interface installed on a windows machine that allows users to connect remotely to vCenter Server or ESX/ESXi host. Note that VMware offers third-party developers and partners the ability to extend the vSphere Client with custom menu selections and toolbar icons that provide access to custom capabilities (re. Tivoli Storage Manager vCenter Plug-in for FCM and Data Protection for VMware).

**vStorage APIs for Data Protection (VADP)** - Next generation of VMware's data protection framework that was introduced in vSphere 4.0. VADP enables backup products to do centralized, efficient, off-host LAN free backup of vSphere virtual machines. VADP leverages the snapshot capabilities of VMware vStorage VMFS to enable backup without requiring downtime for virtual machines.

**Changed Block Tracking** - Provides the foundation for incremental or differential (Tivoli Storage Manager implementation uses incremental) backup of virtual disks and allows only active portions of a virtual disk (i.e. content aware) to be returned. Changed Block Tracking does not work in any of the following cases:

Virtual hardware version is 6 or earlier.

The virtual disk is a “physical compatibility RDM.”

The virtual disk is attached to a shared virtual SCSI bus.

In-guest – Refers to software installed within a VM guest machine

Off-host – Refers to physical machine that is not part of virtualized environment (i.e. not on the ESX / ESXi host)

**Snapshot** – A VMware snapshot is a copy of the state and data of a virtual machine at a specific point in time. The B/A client initiates a VMware snapshot of a virtual machine. Refer to: [http://kb.vmware.com/selfservice/microsites/search.do?language=en\\_US&cmd=displayKC&externalId=1015180](http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1015180) for additional information.



# 17 Frequently Asked Questions

What version of the VMware Virtual Disk Development Kit (VDDK) does Tivoli Storage Manager Data Protection for VMware and Backup-Archive client use?

The following table summarizes the levels of VDDK used by Tivoli Storage Manager:

TSM version	VDDK version	VDDK release notes
TSM V6.2.2	VDDK 1.2.1	<a href="#">VDDK 1.2.1 Release Notes</a> <sup>25</sup>
TSM V6.3	VDDK 5.0	<a href="#">VDDK 5.0 Release Notes</a> <sup>25</sup>

What TSM administrative privilege is needed to use the 6.3 TSM for Virtual Environments - Data Protection for VMware vSphere Client plug-in user interface?

More information about how can be found in this [IBM Technote](#)<sup>25</sup>

Does TSM for Virtual Environments protect virtual machine configuration information?

Yes. More information about how TSM for Virtual Environments protects virtual machine configuration that is stored in the .vmx file can be found in this [IBM Technote](#)<sup>25</sup>

Can TSM protect a virtual machine that is deployed in a vApp?

Yes. More information about how TSM for Virtual Environments protects virtual machines deployed in a vApp can be found in this [IBM Technote](#)<sup>25</sup>

Can I recover individual files from a VMware virtual machine backup from a machine located in a remote office over a WAN link?

Yes. The supported approach is to use the Data Protection for VMware Recovery Agent on a machine local to the Tivoli Storage Manager server to mount the backup data to a local Windows or Linux machine and then use Windows sharing (CIFS) or NFS on Linux to share the data to the remote office.

Is Change Block Tracking supported on RDM (raw device mapping) volumes?

Change Block Tracking is supported on RDM volumes that have been provisioned in the virtual compatibility mode (vRDM). RDM volumes provisioned in the physical compatibility mode (pRDM) neither support snapshots or change block tracking.

What's the difference between the TSM Backup-Archive Client and TSM for Virtual Environments - Data Protection for VMware?

The TSM Backup-Archive client can be used either stand alone to protect VMware virtual machines or be used in conjunction with Data Protection for VMware. Here is a summary of features of the different offerings:

Backup-Archive Client

Full virtual machine (full-vm) backup and recovery using the VMware vStorage APIs for Data Protection

Data Protection for VMware

Full virtual machine (full-vm) backup and recovery using the VMware vStorage APIs for Data Protection (via the Backup-Archive Client)

Incremental backup of virtual machines (via the Backup-Archive client)

Granular file level recovery

Near-instant volume recovery

For more information on Data Protection for VMware 6.2 features see [Data Protection for VMware 6.2 - IBM United States Software Announcement](#)<sup>25</sup>

## ***17.1 How does TSM policy retention work with full and incremental VM backups?***

Data Protection for VMware manages backup retention based on the full-vm backups and independently of the number of intermediate incremental backups.

For example, suppose you set-up a management class to retain three versions (*VERExists=3*) and that a full backup is scheduled on the weekend and incremental backups are scheduled on each of the five weekdays. The TSM Server will retain the three full-vm backups and their dependent incremental backups. When the fourth full-vm backup has been stored on the server, the first full backup and its five incremental backups will be marked for expiration.

In addition to *VERExists*, the retain extra versions attribute (*RETEExtra*) can be used to manage virtual machine backups.

Virtual machine backups will be assigned to the default management class unless the user specifies the **VMC** Backup-Archive client option to use a different management class.

Also note that you can specify the **VMCTLMC** Backup-Archive client option to control the storage pool destination for the virtual machine control files. This would be used in conjunction with backups stored to tape media. For more information on using tape media and the **VMCTLMC** option, see the Technote [Tivoli Storage Manager for Virtual Environments - Data Protection for VMware Tape Support Statement](#)<sup>®</sup>

### ***17.2 Should a vStorage server be a physical machine or VM guest?***

The vStorage server refers to a machine where the B/A client is installed. The vStorage server can be a VM guest machine or an off-host physical machine.

Considerations when installing the B/A client on an off-host physical machine:

Offloads backup from ESX / ESXi host.

Supports a SAN data path from VMware storage to B/A client and from B/A client to TSM server.

Typically direct SAN access is the best performing solution.

Considerations when installing the B/A client within a VM guest:

Potentially a more economical solution.

Typically best when a smaller number of VMs will be backed up.

Maybe practical if there are time periods where backup window is available and increased CPU workload from backup doesn't impact product workload. When the B/A client is running there will be an increased CPU workload (especially if de-duplication and compression are being performed). A virtual machine cluster may be able to absorb this workload. But, when there is a high consolidation ratio and host workloads are running 24/7, a VM guest deployment would not be recommended.

Can I use TSM Backup-Archive client compression with DP for VMware?

TSM Backup-Archive client compression can only be used in conjunction with client-side data deduplication. If you try to use Backup-Archive client compression without data deduplication, you will receive a warning and the backup will proceed without compression.

What are the options for using encryption with DP for VMware?

Encryption encompasses both the data path (in-flight) and data storage (at-rest). In the DP for VMware environment, data is transferred from the VMware storage to the TSM vStorage server (this is commonly referred to as the transport), then from the TSM vStorage Server to the TSM Server where the data is stored on disk or tape.

For the transport between the VMware storage and the vStorage server, the network block device (nbd) can be used in conjunction with SSL to protect the data in-flight. Refer to the TSM Backup-Archive client option **VMVSTORTRANSPORT** to set the transport to nbdssl.

For data sent between the Tivoli Storage Manager vStorage server to the Tivoli Storage Manager Server, SSL can be used to protect the data in-flight. Refer to the Tivoli Storage Manager product documentation on configuring SSL communication between the Tivoli Storage Manager agents and the Tivoli Storage Manager Server.

Data at-rest in the Tivoli Storage Manager Server storage repository can be protected with device encryption (e.g. tape encryption).

Note that Backup-Archive client encryption is not supported with Data Protection for VMware.

Does DP for VMware support a full-VM backup and restore of Windows 2000?

Yes. Full-VM backup and recovery is independent of the virtual machine operating system so any operating system configuration is supported. For other types of recovery operations such as near-

instant volume restore and individual file recovery, see the Tivoli Storage Manager Data Protection for VMware software requirements for supported operating systems and file systems.

## REFERENCES

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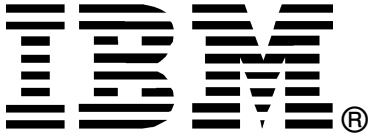
Tivoli Storage Manager for Virtual Environment 6.3 User Documentation

[Information Center](#)

[Installation and User's Guide](#)

Tivoli Storage Manager Wiki:

<http://www.ibm.com/developerworks/wikis/display/tivolistoragemanager/Home>



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