
services
UNIVERSITY OF
OXFORD
Protecting VMware vSphere with
Tivoli Storage Manager
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delivering responsive, innovative IT
6 July 2015

TSM for Virtual Environments

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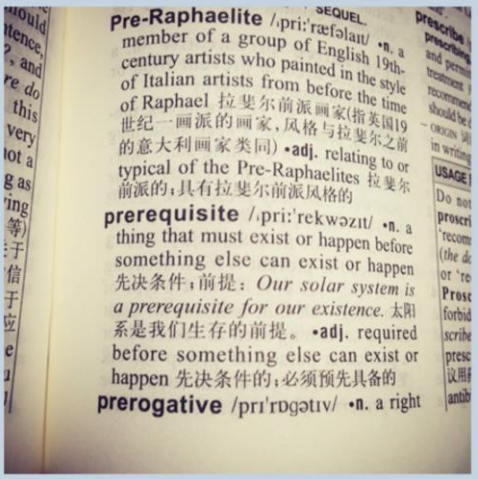
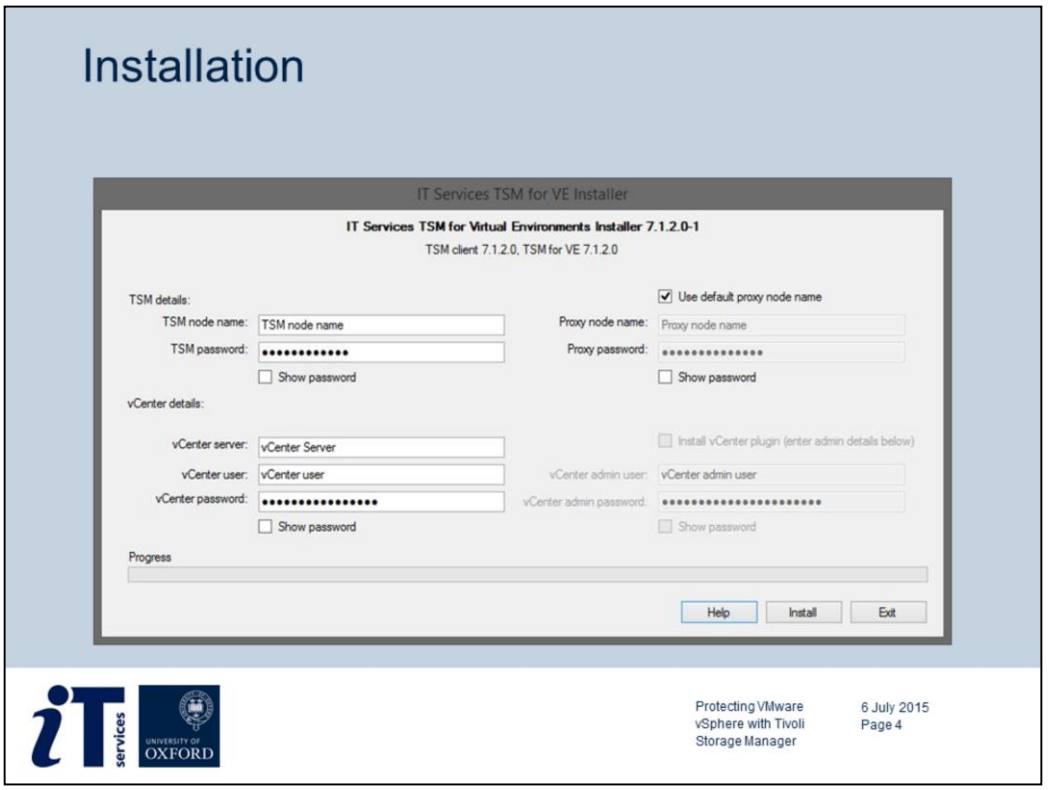
- Block level VM backups
- Restore whole VM or individual files
- Instant restore of VMDKs
- Instant restore of whole VMs (requires “Standard vSphere license)
- Two weeks of daily incremental backups
- Three months of weekly full backups (rolling out now)
- Free for University units subject to us being able to accommodate the client – assessed on a case by case basis.
- Designed for a small to medium installations (20-50 VMs, 2-5 TB)

Prerequisites



- Paid-for vSphere license (“vSphere Essentials” is sufficient for most functionality)
    - Full VM instant restore not possible without a storage vMotion license.
- Proxy machine, Windows 7 or similar
    - To communicate with both the vCenter and TSM servers
    - Resources required depends on the number and size of VMs being backed up
- Firewall holes for certain ports
- Backup user on vSphere infrastructure with appropriate permissions (can use a vSphere admin user but not recommended) – useful for auditing



- Custom HFS installer that wraps around the IBM installer and provides a default configuration.
- Entering the node name given to you by the HFS team should automatically fill in the “proxy node” name and password
- Cannot currently install the vCenter plugin
- Takes enough time that you should get a coffee/tea/beverage of choice

Configuration

```
DOMAIN.VMFULL all-vm;-VM=vm1,vm2,vm3
EXCLUDE.VMDISK vmname "Hard Disk 2"
INCLUDE.VMDISK vmname "Hard Disk 1"

VMMAXPARALLEL 2
VMLIMITPERHOST 2
VMLIMITPERDATASTORE 2

VMSKIPMAXVMDKS yes
VMPROCESSWITHPRDM yes
VMPROCESSWITHINDEPENDENT yes
```


- DOMAIN.VMFULL has options for:
  - VM folders
  - ESXi hosts
  - Clusters
  - Datastores
- Demo will show how to determine the disk names for the *.VMDISK options
- INCLUDE.VMDISK implicitly excludes all other VMDKs from the backup of the VM

Implementation

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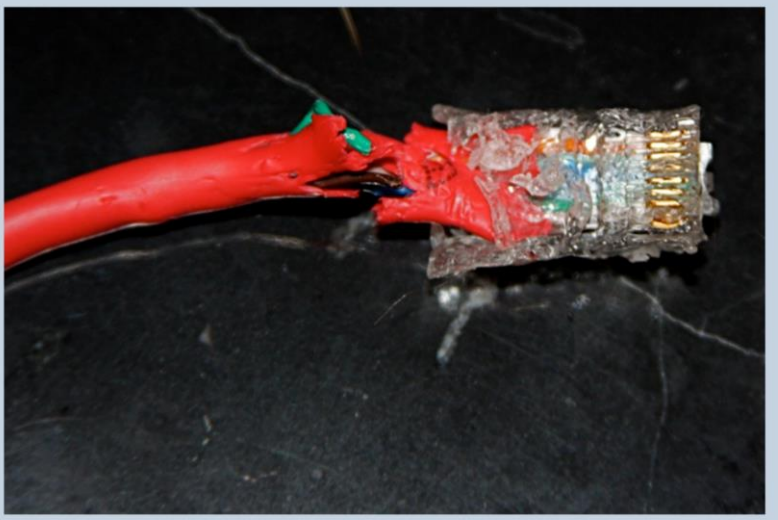
- VMware changed block tracking (CBT)
- Client side deduplication
- Copies
  - Two weeks of daily incremental backups
  - Implementing 3 months of weekly full backups
- Forever incremental backup strategy
  - Incremental backups just back up changed blocks (using CBT via VMware API)
  - Full backups backup whole VM (used blocks only, empty blocks are ignored)
  - Weekly full backups mean that we only need to use at most the incremental backups performed since the last full to restore

Common problems and limitations



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- vSphere 5.1, 5.5 and 6.0 (untested) are supported (4.x and 5.0 supported by older clients if required)
- All VM names must be unique within a vCenter
- Network
- vCenter permissions
- 2 TB disk size limit (can use VMSKIPMAXVMDKS=yes to backup VM without large disk)
- Thick provisioned disks can take a long time to create and restore operations can time out before the disk is created
    - Use thin provisioning where possible
    - Restore these disks when resource utilisation is low
- Disk types
    - pRDM disks not backed up and VMs
    - Independent disks are not backed up
    - VMs with either of the above are skipped by default
- Snapshot problems

Demonstration

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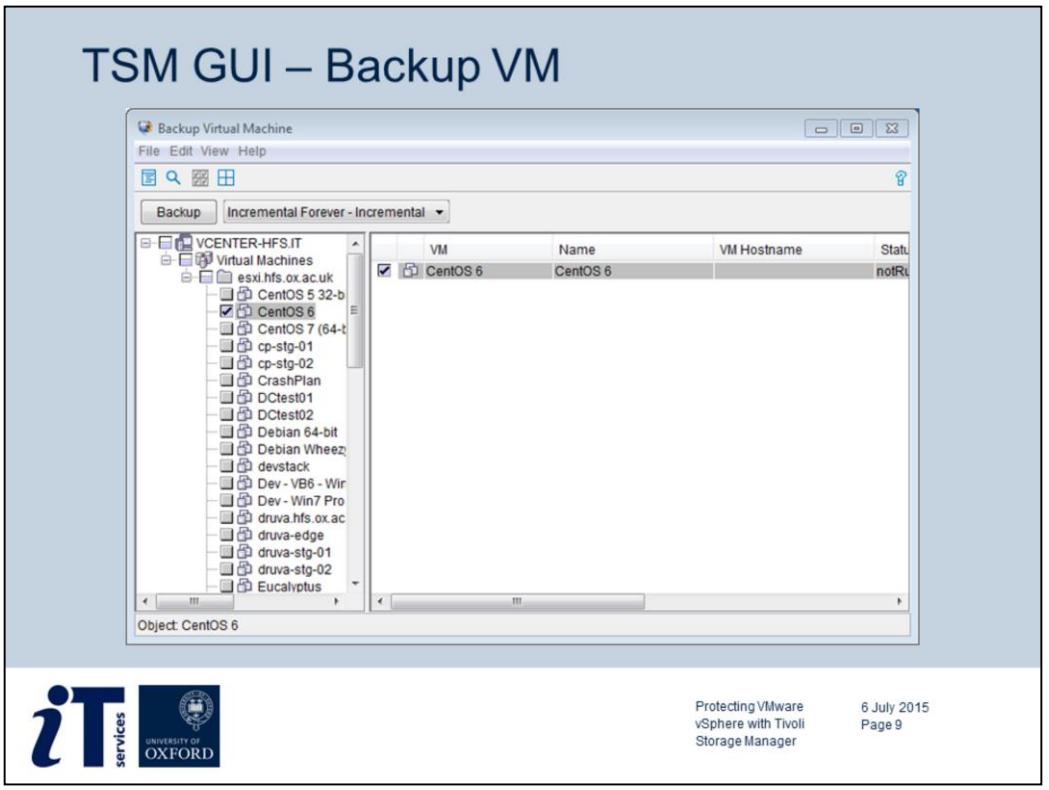
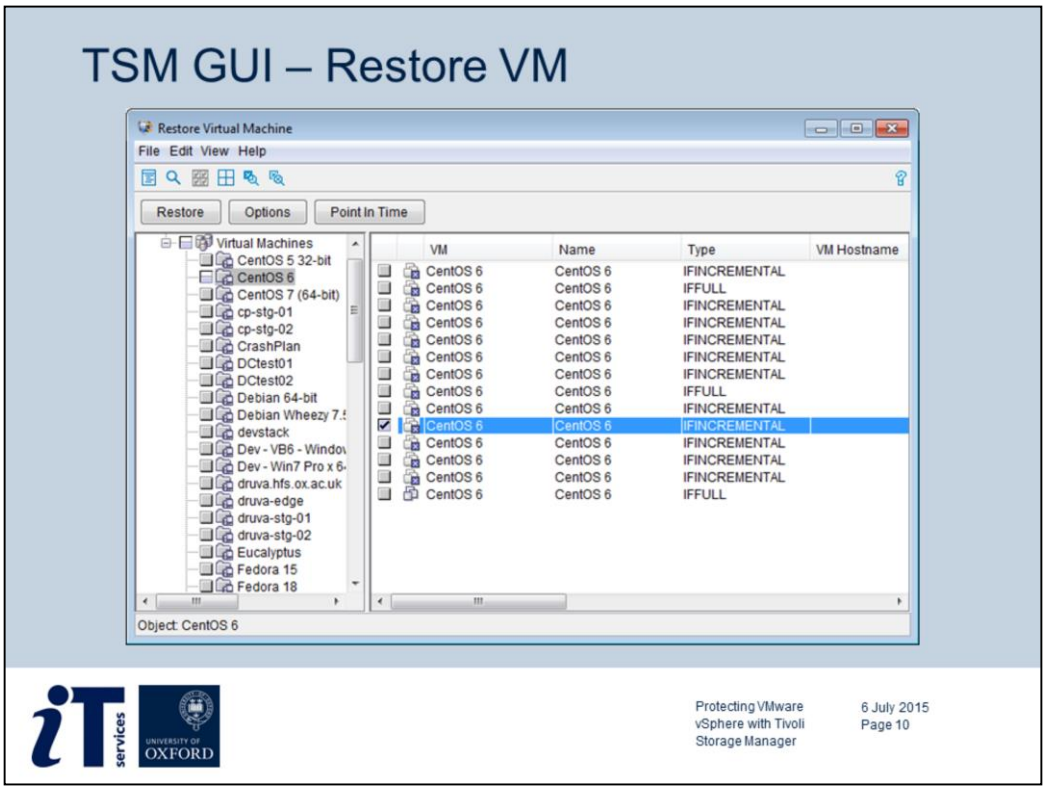
This is where I could slip up hence the picture. ☺



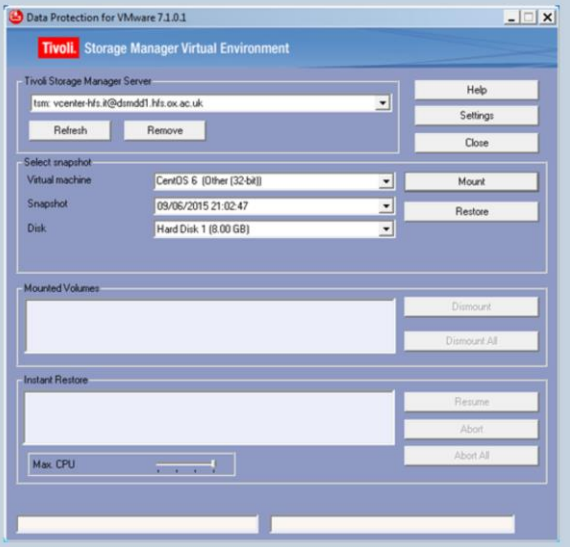
Always use “Incremental Forever – Incremental”

- The scheduled backups use that backup type
- If a different type is used, the backup will be converted to incremental forever at the next scheduled backup
- Select one or more machines and click “Backup”



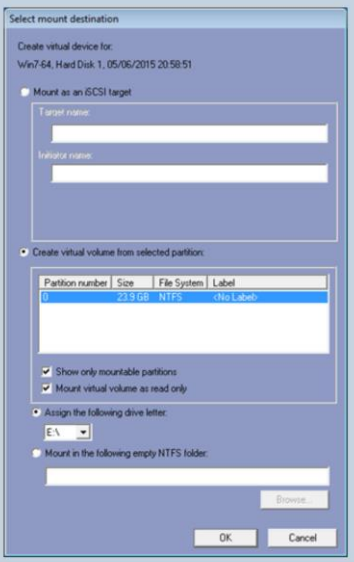
- Cannot tick the VM in the left-hand pane. Must highlight the VM on the left and then select a backup in the right-hand pane.
- Default is to restore to original location
- Can specify as many of the destination options required to define the new location. Any that are unspecified are left as the original.
- Caveats:
    - Thick provisioned disks may cause problems
    - The VM must either not exist in the restore location or be renamed.
    - The VM will be restored with a new MAC address if the previous version of the VM has been renamed. Networking configuration may change on booting the VM. Manually adjust the MAC addresses if required. Mostly a problem for Linux VMs.

File level restore

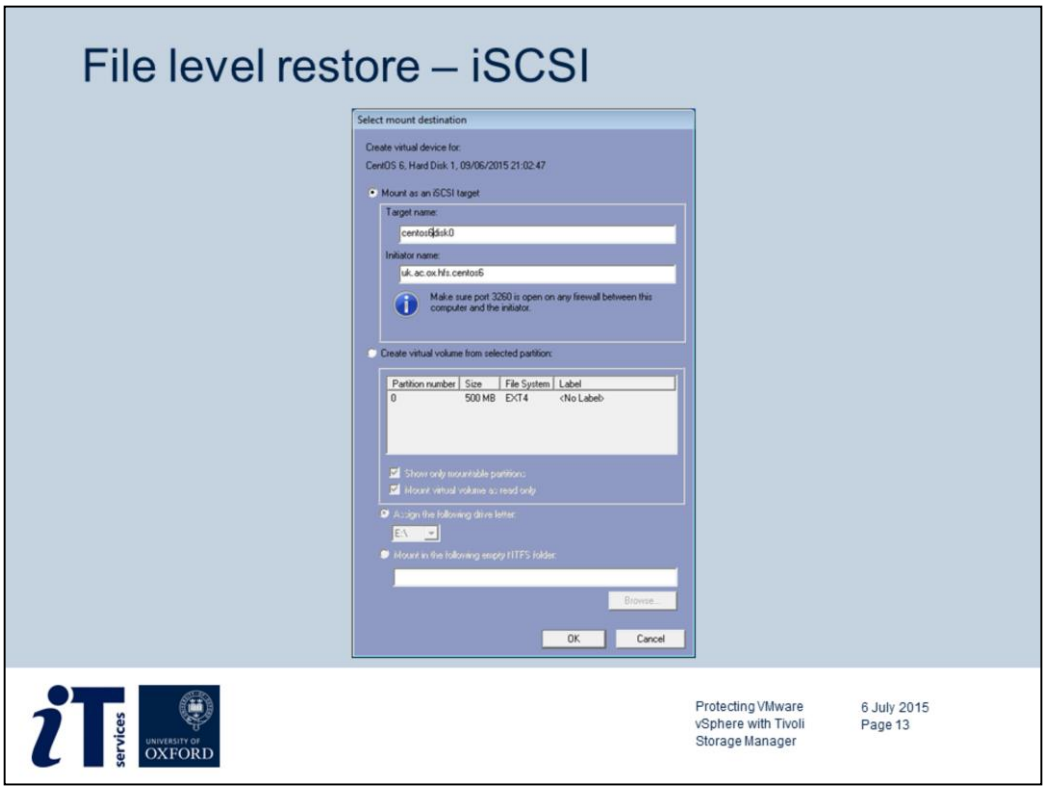


- File level restore is done using the “Data Protection for VMware Recovery Agent”
- Choose a TSM server to connect to
- Choose VM, backup version and disk

File level restore – Windows mount



- Allow you to mount the backup either as a virtual drive or in an empty NTFS folder.
- Can share across the network to avoid installing the agent on the client VM.



- Allows you to export the backup disk as an iSCSI target
  - Restore files directly on any VM
  - Avoids the need for VM admins to have access to backups
  - Restore to non-Windows Oses
  - Avoids the need to install any TSM software on the VM on which you are restoring.
- Choose a target and initiator name and click “OK”
- Use the iSCSI initiator on the host on which you wish to restore to connect to the target, e.g. for CentOS/RedHat:
  - iscsiadm -m discovery -t sendtargets -p *<proxy node IP>*
  - iscsiadm -m node -o show [optional]
  - iscsiadm –m node --login
  - iscsiadm -m session -o show [optional]
  - cat /proc/partitions
  - fdisk -l
- For a standard Linux volume:
  - mount -o ro /dev/sdb1 /mnt
  - mount

    - ls /mnt
    - Copy files as required
    - umount /mnt
- For an LVM volume:
    - vgimportclone --basevgname /dev/restoreVG /dev/sdb2
    - vgchange -a y restoreVG
    - mount -o ro /dev/restoreVG/lv_root /mnt
    - perform restore copies as required.
    - umount /mnt
    - vgchange -a n restoreVG
- To logout:
    - iscsiadm -m node --logout
    - iscsiadm -m node -T ogof001 -p <*proxy node IP*> -o delete

TSM command line - backup

```
backup vm myvirtualmachine -mode=ifincr
```

- Without a VM name, will backup everything according to the rules in the configuration file.

```
backup vm myvirtualmachine -mode=ifincr
     -preview
```

- Shows what will be backed up and the status of the VM

- Default is to restore to original location
- Can specify as many of the destination options required to define the new location. Any that are unspecified are left as the original.

The future

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- Whole VM instant restore - should work now but not tested due to vSphere license requirements.
- Get the TSM for VE vSphere plugin / web GUI working (currently restricted by requirement for admin accounts)
- Possibility of Linux-based TSM for VE appliance
- Microsoft Hyper-V support – currently insufficient interest

http://help.it.ox.ac.uk/hfs/help/tsm4ve