

Partitioning – Why do I need it

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Outline of what we will cover

- What is a disk drive
 - Platters, Sectors and tracks
- How disk data is organised
- What are Partitions
- What do they do for me
 - Data separation
 - Backup
 - Performance

What is a disk drive

- A disk contains platters each coated with magnetic coating
 - Tracks – concentric circles
 - A track contains Sectors –
 - Each contains a contiguous set of bytes - fixed length
 - Number of sectors varies with the track position
 - Read heads to read data
 - Head per surface, 2 per platter, concept of cylinder
 - Heads move together to a track and read data serially
 - Heads are close to disk surface but don't touch

Disk data structure

- A disk could (and once did) just contain data as tracks and sectors
- Usually contains some header information that defines the size of the drive
- Contains a Boot sector
 - First stage of booting a computer – small program
 - Design also enables disk to be divided into a number of logical areas
 - Partitions

Partitions

- Original design (1983) envisaged multiple operating systems hence multiple partitions
 - Partitions can also be used for data
- Original concept only allowed four partitions
 - Design then enhanced to enable one partition to be subdivided
 - Now called Extended partition
 - Partitions in Extended Partition are Logical Partitions
 - Original partitions called Primary Partitions
 - Primary partitions can be booted
 - Logical partitions cannot be booted

Windows Use of Partitions

- Up until W7 Windows installed into a single Primary Partition
- Windows 7 by default installs in two Partitions
 - One is the one which the bootstrap enters
 - Initial code contains the OS loader
 - The other contains the main windows OS
- The two partitions are described as
 - System – the boot process uses this one
 - Boot – contains the Operating System
 - Both are Primary Partitions

Why do I need more than one?

- There is a difference between the Operating System and Program code and User Data
- Operating system requires
 - Relatively static computer programs – mainly Read Only
 - Operating system log files
 - Page file – extends the computer memory
- User Data
 - Growing list of files that are created and changed
- (Ignoring transient/temporary files)

What do these differences mean

- In a word the backup strategy is different
- To recover user data you back up files
 - Files are frequently added edited or deleted
 - Changes are frequent and all are important
- To recover the Operating system it is much easier to backup from an IMAGE of the disk
 - There are a lot of files that depend on each other
 - The essential changes are relatively rare
 - An image needs to be as small as possible to reduce the time it takes to back up

Types of Format

- Original BIOS (being replaced on newer 64 bit machines)
 - MFT = Master file table
 - 4 Partitions only
- New style (U)EFI – Needs Windows 7 or 8
 - GPT = GUID Partition Table
 - 256 Partitions
 - Note that this type of formatting is very secure and it may not be possible to replace your Operating System

Create a new partition

- We need to make some space first
 - Method 1
 - Use the Shrink function in Disk Manager
 - Will only shrink space unused from end of disk
 - A new install will often have system files towards the end of the disk
 - Often this is not enough
 - Create a new partition
 - A Logical partition
 - Assign it a drive letter – I use U:
 - Label it e.g. Data
 - Reboot to ensure that new drive is properly registered into the Operating System

Create New Partition - 2

- Use a specialised partitioning tool
- Run in Windows
 - Needs to reboot and run before most of Windows loads
 - Needs to move files and adjust file pointers
 - Does not need to optimise placement of files
- Options
 - Partition Wizard – also can run from a CD
 - Easeus

Delivery Partitions

- Windows uses two partitions
 - System – entered by bootstrap
 - Operating system – identified as Boot!
- Manufacturers tend to add a
 - Recovery partition allowing the OS to be reloaded to factory default
 - Tools partition for diagnostics
- By default ALL of these are Primary Partitions
 - Four primary partitions mean no additional partition possible

Options

- If you have three partitions – no problem
- If you have four partitions delete one of the partitions
 - Recovery partition could be removed
 - As long as you make sure you create the recovery media first
 - Tools partition could be removed
 - but may have problems getting support if something goes wrong
 - Change one of the partitions to a Logical Partition
 - The C Drive is NOT bootable despite its identity

Convert partition to Logical

- Only one program can do this
 - Partition Wizard
- To use
 - Take an image backup of the drive
 - this is a dangerous operation
 - Use a bootable CD version
 - in theory should also work from the Windows version
 - Make the changes via the GUI
 - Reboot the OS and verify is still works

Repartitioning

- Take it slowly
 - Tools will allow all changes to be chained together
 - Don't do this
 - Reboot between each step
 - Make the C (OS) drive smaller
 - Size needs to be 25-50 Gbyte
 - Create a new partition as Logical drive
 - Usually use rest of disk space
 - Can create more logical drives (up to 256)
 - Use Windows Drive Manager to assign drive letter and Volume label

Windows – User Data

- Windows creates (Vista onwards)
 - A folder for each User account within standard folder
 - C:\Users
 - A set of standard folders within that folder
 - Documents
 - Application data
 - etc.
 - A Public folder
 - Shared between all users of the computer

Making use of new partition

- Need to know how Windows finds
 - User folder
 - Public folder
 - Windows Registry
- How to change the location
- How to create the User folder on a new drive

Step One – need to be Admin

- Copy C:\Users\Public to U:
 - Use xcopy to copy permissions and Public Folder
 - xcopy c:\users\Public U:\Users\public\ /x /e /i /h /k /c
- Edit the registry
 - HKLM\Software\Microsoft\Windows NT\CurrentVersion\ProfileList
 - Public: %SystemDrive%\Users\Public
 - → U:\Users\Public
 - ProfilesDirectory: %SystemDrive%\Users
 - → U:\Users
- Reboot

Using new partition

- Public folders are now on the U drive
 - U:\Users\Public
- New user accounts will be created in
 - U:\Users\<<accountname>
- Existing User accounts are unchanged
 - and are very difficult to move
 - Try
 - File and transfer wizard to back up account
 - Delete account
 - Import backed up account back

Links to software mentioned

- Partition Wizard
 - Windows install
 - <http://partitionwizard.com/free-partition-manager.html>
 - Bootable CD
 - <http://partitionwizard.com/partition-wizard-bootable-cd.html>
- Easeus
 - Windows install (no Bootable CD version)
 - <http://www.partition-tool.com/landing/home-download.htm>