SINGAPORE POLYTECHNIC
SCHOOL OF ELECTRICAL & ELECTRONIC ENGINEERING
ET0023 OPERATING SYSTEMS

TUTORIAL 10 – File Systems (Suggested Solutions)

1. The 3 criterion for storage of files on an operating system are:

    a) Able to store very large amounts of data.
        Modern day file systems are able to use hard-disks of better than 4TB.

    b) Information must survive the processes.
        Hard-disks are able to store data for long periods of time. Data is only destroyed if the disk is low-level formatted or erased by writing 0s and 1s over the same location

    c) Able to provide concurrent access
        Hard-disk drives are able to allow multiple processes to read and write to them either simultaneously or sequentially from a queued process.
        The file access can be random or sequential depending on the application.

    The Operating System uses the File System to manage the files on storage media. It provides the necessary functions, operations, attributes and access independent of the Operating system.

2.

Properties of a File System	FAT32	EXT2
Operations	All	All
Naming	Drive:/path-to/name.ext	/path-to/name
Structure	Binary/Text	Binary/Text
Access	Sequential, Random	Sequential, Random
Attributes	Read, Write, Hidden,System	Read,Write,Execute User, Group or Others
Types	Using the file extension, OS recognises the file	File type embedded in the file

3. File attributes comprise of
    – Name – only information kept in human-readable form
    – Identifier – unique tag (number) identifies file within file system
    – Type – needed for systems that support different types
    – Location – pointer to file location on device
    – Size – current file size
    – Protection – controls who can do reading, writing, executing
    – Time, date, and user identification – data for protection, security, and usage monitoring

Attribute	FAT32	EXT2
Name	8.3 typical Up to 255 characters for LFN case insensitive	Up to 255 characters, case sensitive
Identifier	Fully-qualified filename	Fully-qualified filename
Type	Identified by extension	Identified by "magic number" stored near the beginning of a file
Size	4GB	2 TB
Protection	Read,Write, System,Hidden	Read,Write,Execute with user,group,others protection
Time date	Yes	Yes
Ownership	No	Yes, user, group, others

4.   Wikipedia: Fully Qualified File Name
(http://en.wikipedia.org/wiki/Fully_qualified_file_name)
The term **fully qualified file name** means a file on a computer whose exact name is completely specified such that it is unambiguous and cannot be mistaken for any other file on that system.
The alternative is an unqualified file name or a partially qualified file name.
Definitions:
Path: The traversal of a hierarchical file system starting from the root or drive, delimited by "/" or "\".
Filename: The identifier the names the file
Extension: A 3-letter acronym that informs the OS the type of data contained in the file

File extensions are used to identify the file to processes or applications which require the specific data or data format to operate on.

How Linux differentiates files: http://linux.die.net/man/1/file

5.

# chown –R user1:staff /srv/spare/common	Give ownership to the directory and space to the user and the group staff
# chmod –R 771 /srv/spare/common/*	Allow user1 to have full ownership Allow group staff to have full ownership Allow others only to list the directory

6.   Wikipedia: Symbolic Links (http://en.wikipedia.org/wiki/Symbolic_link)

7.

Command	Explanation
$ sudo mkdir /media/usb	Create the mount point for the drive
$ sudo mount /dev/sdc1 /media/usb	Mount the USB drive into the file system
$ cp –R ~/work /media/usb/	Copy the work directory to USB file system
$ sudo umount /dev/sdc1	Unmount the USB drive

The user will loose the owner permissions when copying from EXT2 to FAT32 because FAT32 does not support owner attributes.