**Linux directory tree**

**“Everything is a file”**

The full directory tree **(slide 5 of Lab presentation)** is intended to be breakable into smaller parts, each capable of being on its own disk or partition, to accommodate to disk size limits and to ease backup and other system administration tasks. The major parts are the root (/), /usr, /var, and /home file systems. Each part has a different purpose. The directory tree has been designed so that it works well in a network of Linux machines which may share some parts of the file systems over a read-only device (e.g., a CD-ROM), or over the network with NFS.

The roles of the different parts of the directory tree are described below:

**The root (/) file system** is specific for each machine (it is generally stored on a local disk, although it could be a ramdisk or network drive as well) and contains the files that are necessary for booting the system up, and to bring it up to such a state that the other file systems may be mounted. The contents of the root file system will therefore be sufficient for the single user state. It will also contain tools for fixing a broken system, and for recovering lost files from backups.

**The /usr file system** contains all commands, libraries, manual pages, and other unchanging files needed during normal operation. No files in /usr should be specific for any given machine, nor should they be modified during normal use. This allows the files to be shared over the network, which can be cost-effective since it saves disk space (there can easily be hundreds of megabytes, increasingly multiple gigabytes in /usr). It can make administration easier (only the master /usr needs to be changed when updating an application, not each machine separately) to have /usr network mounted. Even if the file system is on a local disk, it could be mounted read-only, to lessen the chance of file system corruption during a crash.

**The /var file system** contains files that change, such as spool directories (for mail, news, printers, etc), log files, formatted manual pages, and temporary files. Traditionally everything in /var has been somewhere below /usr, but that made it impossible to mount /usr read-only.

**The /home file system** contains the users' home directories, i.e., all the real data on the system. Separating home directories to their own directory tree or file system makes backups easier; the other parts often do not have to be backed up, or at least not as often as they seldom change. A big /home might have to be broken across several file systems, which requires adding an extra naming level below /home, for example /home/students and /home/staff.

**Although the different parts have been called file systems above, there is no requirement that they actually be on separate file systems. They could easily be kept in a single one if the system is a small single-user system and the user wants to keep things simple. The directory tree might also be divided into file systems differently, depending on how large the disks are, and how space is allocated for various purposes. The important part, though, is that all the standard names work!!!**

**The /bin directory** contains commands needed during boot up that might be used by normal users (probably after boot up).

**The /sbin directory** is like /bin, but the commands are not intended for normal users, although they may use them if necessary and allowed. /sbin is not usually in the default path of normal users, but will be in root's default path.

**The /etc directory** contains configuration files specific to the machine.

**The /root directory** is the home directory for user root. This is usually not accessible to other users on the system

**The /lib directory** contains shared libraries needed by the programs on the root file system.

**The /lib/modules directory** contains loadable kernel modules, especially those that are needed to boot the system when recovering from disasters (e.g., network and file system drivers).

**The /dev virtual file system** containsdevice files. Some of the more commonly used device files.

**The /tmp directory** contains temporary files. Programs running after boot up should use /var/tmp, not /tmp, since the former is probably on a disk with more space. Often /tmp will be a symbolic link to /var/tmp.

**The /boot files system** contains files used by the boot loader GRUB. Kernel images are often kept here instead of in the root directory. If there are many kernel images, the directory can easily grow rather big, and it might be better to keep it in a separate file system. Another reason would be to make sure the kernel images are within the first 1024 cylinders of an IDE disk.

**The /mnt mount point** for temporary mounts by the system administrator. Programs aren't supposed to mount on /mnt automatically. /mnt might be divided into subdirectories (e.g., /mnt/dosa might be the floppy drive using an MS-DOS file system, and /mnt/exta might be the same with an ext2 file system).

**The /proc virtual file system** contains information about the current state of running kernel. This information includes details on CPU, memory, partitioning, I/O addresses , DMA channels and running processes, and is represented by various files .This files do not actually store the information, rather, they point to the information in the memory. This file system is automatically maintained by the system.