Lab Exercises #5 – *Drives and Operating Systems*

No submission required.

Introduction

A computer is a wonderfully advanced piece of technology. Within the nice plastic and metal shell are a number of important and integral components, with some seemingly more important than others.

Of the items in the system, the *internal hard disk drive* is near the top of the "important list." Along with holding the application programs required by the user(s), and the some of the data created (data is also stored on removable media), the hard disk drive (or just, hard disk) stores the operating system files.

The operating system (OS) is the software that sits between the computer's hardware (CPU, drives, RAM, etc.) and firmware (BIOS, ROM), and applications and user.

But before the computer can be used, the hard disk needs to be prepared and an operating system installed.

References

Reference books are available during the lab (ask your instructor).

Also, available before, during, and after the lab, the following Internet links can provide useful information in identifying the various internal areas of the computer system,

- PC Tech Guide (technically, everything you need to know): http://www.pctechguide.com/index.htm

- PC Mechanic, "Build Your Own PC" (a good, "hands-on" guide): http://www.pcmech.com/byopc/index.htm

- Build Your Own PC, "Build Your Own PC" (check right hand index): http://www.buildyourown.org.uk/info.asp

The important topics to look for are: <u>partitions</u> (primary, extended, and logical), using <u>fdisk</u>, and <u>installing Windows 98</u>.

Exercises

Follow the instructions in the **Tasks** section below.

Although the instructions are detailed, you are still encouraged to reference material on the internal (see links above), use the manuals and books in the lab, and ask questions of both your neighbour groups and instructor.

CAUTION*: You are working with very delicate electrical equipment.*
The electronics in the computer are not designed to survive rugged force or trauma.
Take care of the equipment and yourself.

Conclusion

At the end of the lab, you are expected to be familiar with the concepts for the subsequent labs. And, although there is nothing to submit for these lab exercises, you are strongly encouraged to make and notes of procedures and topics that are new and interesting. To reinforce the concepts, questions have been provided at the end.

Tasks

A. Before getting started

1. After being assigned a station (that has both server and workstation computers), turn on only the workstation—use this for online reference.

2. Obtain a toolkit and ask which worktable is assigned to your group.

B. Installing the hard disk – physically

1. Using the server computer, examine the ports on the rear of the system (note the ones with cables connected—you will need to reconnect them!)

2. Detach all the cables (keeping them organised). Move it to the worktable.

3. Remove the access panel and locate the,

   – CPU and RAM

   – hard disk drive, floppy disk drive, and CD-ROM drive

   – data cables (ribbons) for the drives above leading the mainboard, with particular attention to the IDE and SATA ports

   – power connector types for hard disk/CD-ROM and floppy disk

4. For the existing hard disk, disconnect the power connector and the red SATA cable (from the mainboard). This will prevent the existing hard disk from being used, and possibly, damaged.

5. Obtain an experimental hard disk and 80-pin high-speed IDE/ATA data cable. Ensure that the drive has the correct "master" setting (ask your instructor).

6. Examine the disk for the following information:

   – model name/number

   – capacity (in megabytes or gigabytes)

   – dimension/geometry: CHS (cylinders, heads, sectors per track)

   – jumper setting diagram (for master, slave, or cable select)

7. Using two course-thread screws, secure the experimental hard disk near the existing hard disk.

8. Connect the IDE/ATA data cable to the mainboard and hard disk. Ensure that the red wire on the cable is connecting to pin 1 (consult an online reference or ask your instructor).

9. Connect the power cable previously connected to the original hard disk, and ask your instructor to verify the connection.

10. Return the system to the station and reattach all the external cables.

C. Installing the hard disk – logically

1. Obtain a DOS/Win98 System boot disk and insert it into the floppy drive. Boot the computer.

2. As the system boots up, examine the screen for any information regarding the hard disk you just installed—specifically, *model* and *capacity*.

3. To remove any strange multi-OS configurations that may be in the hard disk, at the DOS prompt, type: **fdisk /mbr**

4. With the *master boot record* (mbr) set to normal, it is time to setup the logical structure of the hard disk (the physical structure is indicated by the CHS), type: **fdisk**

5. If asked about whether FAT-32 is to be used, indicate 'Yes'.

6. From the menu, select **4** to view the partition table.
   If no table exists, jump ahead to Creating the Partition Table
   If it exists, continue with Removing (Deleting) the Partition Table.

Removing (Deleting) Partition Table

7. Remove the information in the partition table following the opposite sequence to how the partitions are created; delete partitions in this order:

   – 1st: logical partitions (these are within the extended partition)

   – 2nd: the extended partition

   – 3rd: the primary partition

8. With the partition table now blank, restart the computer.
   Let it boot from the floppy and run **fdisk** again; continue to creating.

Creating the Partition Table

Fdisk is not a very flexible program, as it is only understands DOS/Win9x-type file systems (FAT-12, FAT-16, and FAT-32).
Windows 2000/XP introduces NTFS (NT File System), and Linux introduces ext2fs and ext3fs (Extended File System)).

9. For this lab, create the following partition structure in this order,

   – Primary: 400 MB (becomes **C:**)

   – Extended: 300 MB, then a single Logical: 300 MB (becomes **D:**)

10. To make the hard disk bootable, the primary partition needs to be made active.
    From the main menu, select **2**. and make the primary partition active.

11. Once finished, exit fdisk.
    Restart the computer to load the new partition structure into the computer's memory on bootup, and let it boot from the primary partition.

12. With the partition structure created, the drives that correspond to the partitions must be prepared to index and store files—this is called formatting the drive.

    To format the primary partition with a copy of the basic DOS operating system, type: **format c: /u /s**

    To format the logical partition, type: **format d: /u**

D. Installing the operating system – Windows 98

1. Insert the boot floppy and restart the computer.
   The reason is that the CD-ROM driver needs to be loaded (the floppy has the proper configuration in the Config.Sys and Autoexec.bat files).

2. Obtain a Windows 98 install CD and write down the install key code.

3. Insert the disk into the CD-ROM drive and follow the instructions below,

   – make a directory to store install files, type: **md d:\win98cd**

   – copy the installation files from the CD to the directory, type:
     xcopy e:\win98*.* d:\win98cd

   – once copying is finished, remove the CD and return to your instructor

4. Restart and boot from the hard disk.

5. After booting, jump to the D: drive, type: **D:**
   and change to the win98cd directory, type: **cd win98cd**

6. Begin the installation, type: **setup /ie /im /is /iv /nr**
   (to see what each switch (/) means, instead type: **setup /?**)

7. To reduce install time, select a Compact or Minimal install, and take all the default values when asked.
   If asked for any special disks or drivers, select Cancel and continue.

E. Checking the installation

1. After the installation is finished, and Windows has restarted a number of time (do not download any updates or patches), it is time to see what is installed.

2. Open Device Manager and examine which default devices have been installed, select from: START→Settings→Control Panel→System

F. Completion

1. Sadly, the system that has just been assembled will be undone.

2. Insert the DOS/Win98 System Boot disk and restart the computer.
   Using fdisk, remove all the partitions (see part **C.** step **7.**)

3. Move the system to the work table and remove the experimental disk and IDE cable. Reconnect the SATA connection and power to the original hard disk.

4. Have your instructor verify the connections.
   Return the system to the station, reattach all cable connections, and test the system by booting to Windows 2000 Pro and connecting to the Internet.

G. Questions

The following questions are expected to be researched outside of class time.

1. What are the differences between the following (physically and technically)?

   – Standard 40-pin IDE/ATA data cables

   – Modern 80-pin IDE/ATA data cables

   – SATA (Serial ATA) data cables

2. What is the reason of setting a hard disk to: *master, slave,* or *cable select?*

3. Describe each of the following partitions: *primary, extended*, and *logical*.

4. How many <u>primary</u> partitions are possible on a hard disk?

5. Which file system types does each of the following operating systems understand?
   (research is required here),

   – Windows 9x (Win95/98/Me)

   – Windows 2000/XP

   – Mac OS X

   – Linux (kernal 2.4+), such as Red Hat 9+ or SUSE 8+

6. The Windows 98 Install CDs used in the lab are bootable and therefore available for installation directly from the CD.
   But describe at least two (2) advantages of copying the installation files and installing windows from the hard disk.