Namal Institute Mianwali

Lab Manual

Introduction to Computer Science

CS 130 (3+1)

Department of Computer Science

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Department Of Computer Science

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Lab 1

Look inside the box (Hardware)

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Lab 1: Look inside the box (Hardware)

1. Introduction

In this lab, we will learn about computers, the components of computers, and different parts of computers. Most of you use computers for different purposes but most probably you haven't tried to look inside the computers. You are provided with a lab manual before lab so that you should read it and have the idea about the things that we will do in the lab. Every activity with its time is also provided. At the start of this lab, there will be informal activity in which Instructor and every student will introduce himself. Then, in the second part of the lab, you will be given an overview of computers and its structure and parts. Then in the third section, we will do some practical work we will make the groups of students and will open the computer box in front of each group one by one and then everyone from the group will do the practice to open every part of the computer and then fix each part to its right place.

2. Activity Timeboxing

Task No	Activity Name	Activity Time	Total Time
	Introduction	30 minutes	30 minutes
4	Lab Outline	15 minutes	45 minutes
5	Grading	10 minutes	55 minutes
8.1	Group Formation	5 minutes	60 minutes
8.2	Walkthrough task	50 minutes	110 minutes
9	Quiz	40 minutes	150 minutes

Table 1: Activity Timeboxing

3. Objective

- To get a basic understanding of Computers
- To get a basic understanding of the structure of Computers
- To get a basic understanding of parts of Computers
- To practice to identify any part and how to replace it.

4. Outline for ITC Labs

The outline for labs of this course is uploaded on LMS. You can download and see it. We will discuss it in the lab.

5. Grading Criteria

ITC course has 25% Lab work. Every lab has its marks. In every lab, you can see the contribution of that lab towards a total of 25% of Lab work. So every Lab is equally important.

6. Homework before Lab

Watch these videos before coming to the lab

1. How To Identify The Components Inside Your Computer
2. What does what in your computer? Computer parts Explained
3. How Computers Work: What Makes a Computer, a Computer?

7. Concept Map

In this lab, we will look inside the computer box and familiarize with the components of the computer and their functionalities.

7.1. Computer

A computer is an electronic device that accepts some data, perform mathematical and logical operations or process information at high speed and displays or store the results of these operations.

7.2. Components of a Computer System

All types of computers have three basic types of components to perform operations for converting input data into useful information. These components are the Input Unit, CPU, Output Unit as shown in Figure 1.

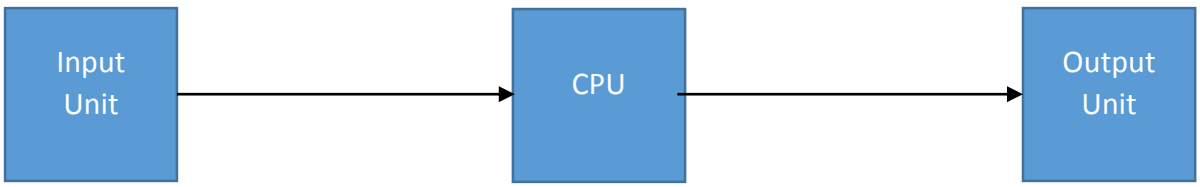

Figure 1: Components of a computer

7.2.1. Input Unit

The input unit contains those devices that help the user to enter data and commands into a computer. In other words, we can say that this unit links users and computers. Few input devices used in computers are given below and we explain them one by one.

- Keyboard
- Mouse
- Microphone
- Scanner
- Bar Code Reader
- Optical Character Reader

7.2.1.1. Keyboard

Figure 2: Keyboard

A keyboard shown in Figure 2 is a very common input device. It is used to input data to the computer. Using a keyboard, a user can type a document, play games, and use keyset shortcuts. Most keyboards have between 80 and 110 keys.

7.2.1.2. Mouse

Figure 2: Mouse

A mouse is also an input unit for entering directions and commands (Figure 2). It is a small palm-size box. Generally, it has two buttons i.e. left and right button and a scroll bar that is present at mid. It can't be used to enter the text rather it is used to control the position of the cursor on the screen. It makes it easy to use a computer and moves the cursor faster than the arrow keys of the keyboard.

7.2.1.3. Microphone

Figure 3: Microphone

It is an input device to input sound to computers (Figure 3). There are two types of computer Microphones: **Internal** and **External**. Microphones can be used for voice recording and online chatting. These are also used for computer gaming.

7.2.1.4. Scanner

Figure 4: Scanner

It is also an input device, shown in Figure 4, which is used when some information is available on a paper and we want to save it on the computer's hard disk. It works like a photocopy machine. It captures the images of paper and then converts into a digital form that can be stored on a computer.

7.2.1.5. Barcode Reader

Figure 5: Barcode Reader

It is an input device capable of reading a bar code using a laser (Figure 5). The most common use of barcode reader is in supermarkets where it is used to read the bar code and logs the price of a product.

7.2.2. Central Processing Unit (CPU)

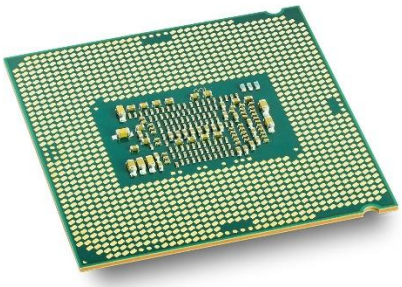

Figure 6: CPU

CPU is also known as the brain of the computer (Figure 6). After receiving data or commands from the user through the input unit, the computer has to process it according to the instructions provided. So

CPU is the component of the computer that does this job. It controls the operations of all parts of a computer. It has three components: (1) Memory Unit (2) Arithmetic Logic Unit (3) Control Unit

7.2.2.1. Memory Unit

Figure 7: Memory Unit

This unit can store data, instructions and results. All inputs and outputs are transmitted through the main memory (Figure 7). Once a user inputs data the computer stores this data in its memory unit then CPU process data. Internal Storage Unit, Random Access Memory (RAM), Main memory are also used for this term and all of them are the same thing.

Its main functions are:

- It stores the data to be processed and required instruction to process data.
- It stores intermediate results for processing.
- Final results are also stored on it before transmitting to the output device.
- All inputs and outputs are transmitted through the memory unit.

7.2.2.2. Control Unit

Control Unit is also known as the backbone of computers. Coordination of tasks of different components of a computer is done by the Control Unit.

Its main functions are:

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It is responsible for the coordination of all units of a computer.
- It gets instructions from the main memory, interprets instructions and directs the operation of the computer.
- It is also responsible to communicate with output devices for the transfer of results from memory.
- It does not store data, it just controls the operations of all parts of the computer.

7.2.2.3. Arithmetic Logic Unit (ALU)

It is that part of the CPU that performs arithmetic and logical operations. Based upon its functionality it is further categorized into two subsections: Arithmetic and logic section.

Arithmetic Section:

As the name suggests, this section performs arithmetic operations like addition, subtraction, multiplication and division. All other complex operations are done by making repetitive use of the above operations.

Logic Section:

This section performs logic operations such as comparing, matching, selecting and merging of data.

7.2.3. Output Unit

The output Unit contains those devices that help the user to get information or result from the computer. As we studied earlier in the input unit section the Input unit was a link between user and computer, here the output unit is the link between computer and user. These devices translate the output and results of a computer into human-readable. . Few output devices are given below and we explain them one by one.

- Monitor
- Printer
- Speakers
- Headphones
- Projector
- Video Card

7.2.3.1. Monitor

Figure 8: Monitor

A monitor, as shown in Figure 8, is the most common and main output device. It is also known as the Visual Display Unit (VDU). It creates a visual display in front of the user by taking data from the computer.

7.2.3.2. Printer

Figure 9: Printer

It is also an output device to print the processed data/result on paper (Figure 9). It creates a hard copy from the electronic data sent from a computer.

7.2.3.3. Speakers

Figure 10: Speakers

These are the devices that transform signals from the computer's sound card into audio (Figure10)

7.2.3.4. Headphones

Figure 11: Headphones

These are also the output device that output audio from computers (Figure 11). They are also known as an earphone. Similarly, Headset is the combination of speakers and mic that are used for communication with family and friends over the internet.

7.2.3.5. Projector

Figure 12: Projector

This output device projects computer video or image onto another surface (Figure 12). That surface is usually a whiteboard, screen, or a wall. Video or image data is transmitted by the computer to its video card, which then sends it to the projector. It is used for presentations, teaching, watching movies because it enables all the people in a room to see the image or video.

7.2.3.6. Video Card

It generates output images to display. This is also known as a graphic card.

7.3. Some other Components of Computer

7.3.1. Motherboard

Figure 13: Motherboard

A motherboard, as shown in Figure 13, is the computer's main circuit board. It holds the CPU, memory, connectors for the hard drive, expansion cards to control audio and video and all other connections to computer ports such as USB ports. It is connected directly or indirectly with every other part of the computer.

7.3.2. Hard Drive

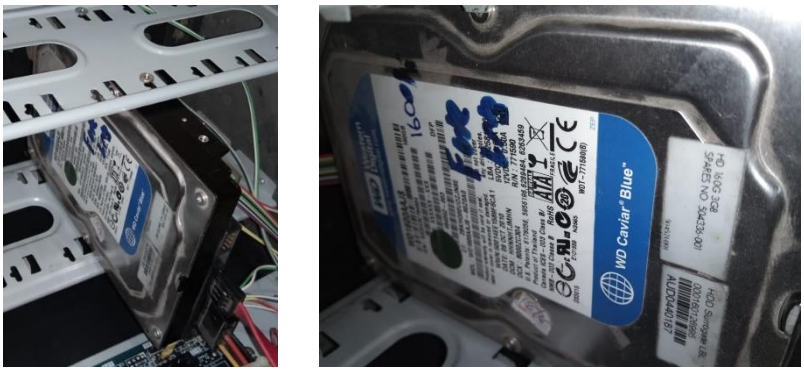

Figure 14: Hard Drive

A hard drive is a data storage device in a computer where operating system, software, and other documents and files are stored (Figure 14). Unlike Main Memory (RAM) the data is still saved even if you restart your computer.

7.3.3. Power Supply Unit

Figure 15: Power Supply Unit

A power supply converts the main AC electricity to low voltage DC voltage to provide power to the motherboard and other components in the computer (Figure 15).

8. Practice Tasks in Lab

8.1. Group Formation

It is an activity in the lab in which groups will be formed depending upon the computer boxes that will be provided for this lab. All the students will work in groups for this lab.

8.2. Walkthrough task

After this activity, the lab instructor will discuss the components and different parts of the computer by opening the box in front of every group. After that students will discuss it in their group.

9. Quiz

In the last part of this lab, there will be a quiz you can see its contribution to this lab in the Evaluation criteria heading.

10. Evaluation Criteria

The evaluation criteria for this lab will be based on the completion of the following things. Each task is assigned the marks percentage which will be evaluated by the instructor in the lab whether the student has finished the complete/partial task(s).

Sr. No.	Task No	Description	Marks
1	9	Quiz	10

Table 2: Evaluation of the Lab

11. Contribution of this Lab towards 25% Lab Work

This lab has 4% weightage of 25% lab work