Session 1

Introduction to Computers

Objectives

❑ Define a computer system

❑ Describe parts of a computer

❑ Explain the computer system startup process

❑ List new technologies in computer

Introduction

❑ A computer can be defined as a system that responds to a set of instructions in a well-defined manner

❑ The computer system consists of different parts namely:

- ➢ Central Processing Unit (CPU)
- ➢ Motherboard
- ➢ Random Access Memory (RAM)
- ➢ Hard disk
- ➢ Main cabinet with all the peripheral devices connected to the motherboard
- ➢ Operating System (OS)

Types of Computers

❑ Computers can be classified based on their size and processing power

❑ The different types of computers are as follows:

> Personal Computers

> WorkStation

> MiniComputer

> SuperComputer

Personal Computers or Microcomputers 1-10

They are relatively small as compared to supercomputers and mainframes

They are inexpensive and designed for individual users

They are used in business, homes, and schools for surfing Internet, playing games, listening to music, and so on

They come in different forms such as desktop computers, laptop computers, tablet PCs, Personal Digital Assistants (PDAs), and so on

❑ Desktop Computers

➢ These computers are not portable and are designed to fit on desk

➢ They are much smaller in size, easy to use, and cheap as compared to other types of PCs

➢ They are most commonly used in offices, homes, cyber cafe, and so on

❑ Laptop Computers

➢ Laptop computers are light-weight and portable

➢ The physical size of a laptop is the primary factor that determines the cost of a laptop

➢ Laptops that are smaller in size are known as notebooks

Personal Computers or Microcomputers 5-10

❑ Tablet PCs

➢ Tablet PCs are similar to notebook PC and have a touch screen or pen enabled interface

➢ They are very useful and popular for writing notes in the fields of law, education, and medicine

➢ This type of computer offers mobility for a user who does not have enough space to work with a desktop, laptop, or notebook PC

❑ Handheld Computers or PDA

➢ A PDA also known as a palmtop computer or a pocket PC, is a handheld miniature computer

➢ They are smaller and lighter in weight and can be carried in a pocket

➢ These devices hold data such as schedules, notes, appointments, address book, and many more

❑ Handheld Computers or PDA

❑ Handheld Computers or PDA

➢ Mobile phones that are integrated with PDA functionality are called Smartphones

Workstation

A workstation can be defined as a type of computer that is mainly used for technical and scientific applications, desktop publishing, and so on

They are used by a single person and are connected to a local area network (LAN)

It has a moderate computing power and a high quality graphic capability

Workstations have built-in network support, mass storage device, graphical user interface, and so on

MiniComputer

Minicomputer is a multi-user computer and supports hundreds of users concurrently

They are smaller to mainframe computers as far as speed, performance, and storage capacity are concerned

When compared with mainframes, they are less expensive

SuperComputer

SuperComputers are fast computers that can execute trillions of instructions per second

They are used by applications that require intensive numerical computations such as weather forecasting, nuclear energy research, oil and gas exploration, and so on

Mainframe is a large computer that can support hundreds or thousands of users simultaneously

❑ The different mandatory components of a computer system are as follows:

Processor
• The main component of a computer that executes all processes and instructions supplied by memory unit.

RAM

- This area in the computer stores all the instructions (processes) and information of system. It is a volatile memory.

ROM

- ROM is a memory chip, which contains in-built programs written into it by manufacturers. It is a non-volatile memory.

HDD

- It is a non-volatile memory because it retains information, unless the information itself is deleted or overwritten. It can store large amount of data.

Various Components of Computer System 5-12

Monitor
• The most commonly used output device is the monitor. It is used to display a variety of information.

Monitor

❑ The different types of monitors are as follows:

➢ **CRT Monitor** - CRT monitors are square-shaped, heavy boxes, typically placed on a desktop.

Monitor

➢ **LCD monitor -** LCD monitors are flat portable monitors. LCD monitors are capable of displaying images with more color and better clarity

Monitor

➢ **Plasma monitor -** Plasma monitors are less commonly used with computers due to their high operating temperatures, high power consumption, and fixed resolution.

Monitor

➢ **Touchscreen monitor -** Touchscreen monitors provide a touch-sensitive screen. This allows users to interact directly with the application on screen.

Monitor

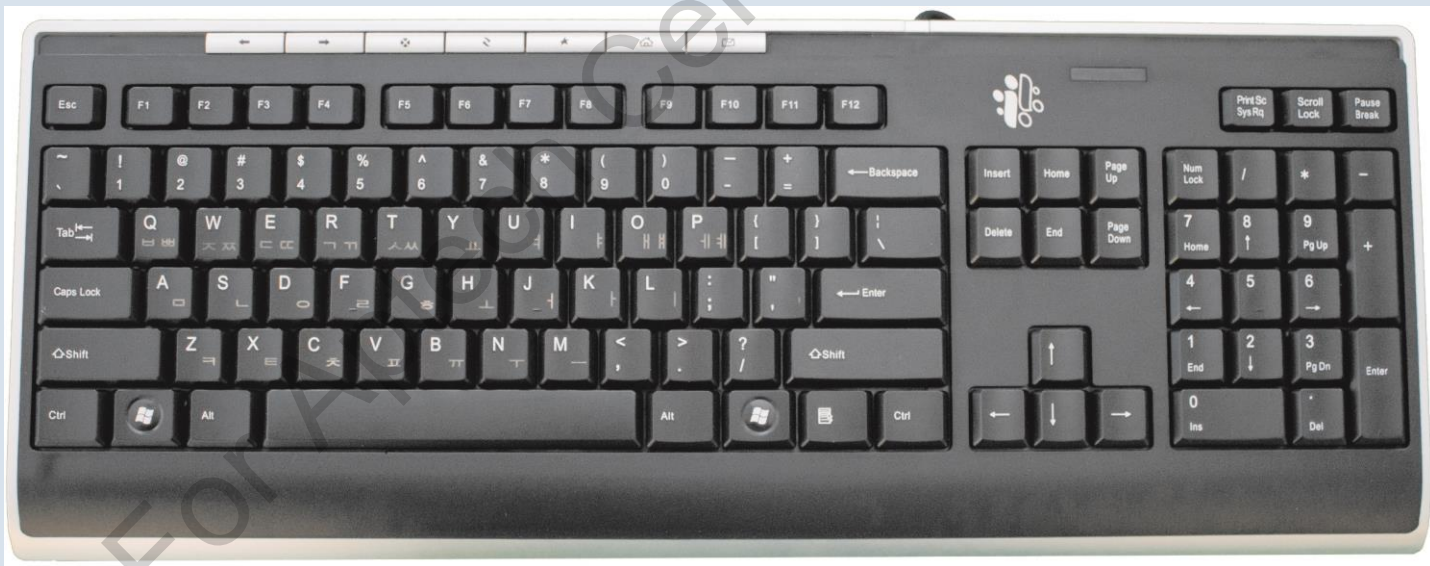➢ **OLED monitor -** OLED computer monitors are much thinner and brighter than LCD or Plasma screens. OLED monitors can also be placed on transparent surfaces, such as glass, allowing the user to see through them when not active.

Keyboard

- The keyboard is one of the most common input devices. Keyboard convert numbers, letters, and other special characters into digital signals, which the system understands.

Mouse

- A mouse is an input device that controls a pointer, which is displayed on the monitor. The mouse is used to click and drag objects on the graphical interface as well as to select or activate options.

Computer Software and its Types 1-3

Software is a generic term for organized collections of computer data and instructions

A sequence of instructions is specified to a computer to solve a problem

These sequence of instructions are written in a language, which can be comprehended by a computer and they form a computer program

The program controls the processing of the computer, which performs specifically as the program instructs

Computer Software and its Types 2-3

❑ There are two types of software, namely:

System Software

Application Software
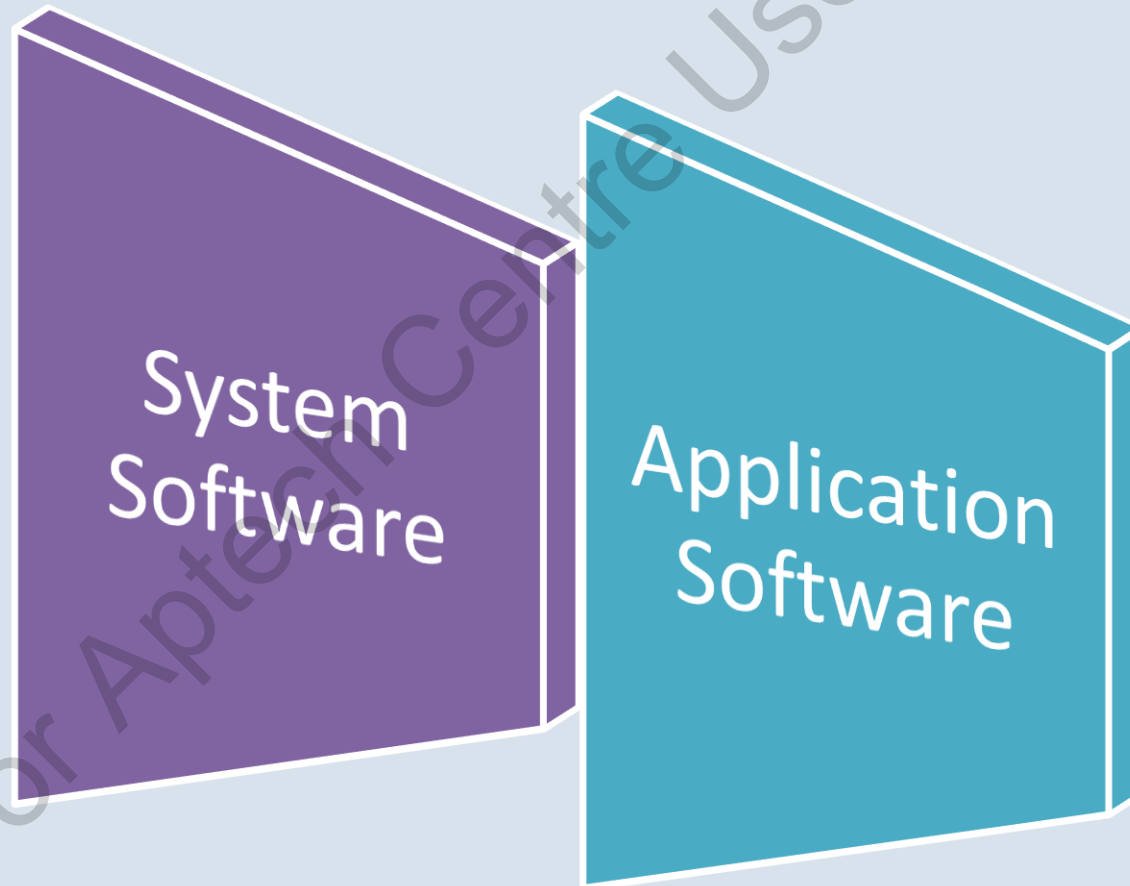
Computer Software and its Types 3-3

System Software

- Device drivers
- Operating systems
- Servers
- Utilities

Application Software

- Business software
- Computer games
- Medical software
- Military software
- Photo-editing software
- Spreadsheets
- Word processors
- Decision making software

Computer System Boot Process 1-2

❑ In order to boot a computer successfully, its Basic Input Output System (BIOS), operating system and hardware components must work properly

❑ Failure of any one of these three elements will likely result in a failed boot sequence.

❑ BIOS is a microchip that stores instructions such as POST in a predetermined memory address.

❑ Once the POST determines that all components are functioning properly and the processor has successfully been initialized, then the BIOS look for an OS and its boot sequence in the MBR.

❑ The MBR shows the BIOS where to find the OS as well as the subsequent program file that will initialize the OS.

❑ After OS initialization, the files are copied into memory by the BIOS and the OS takes over the control of the boot process.

Computer System Boot Process 2-2
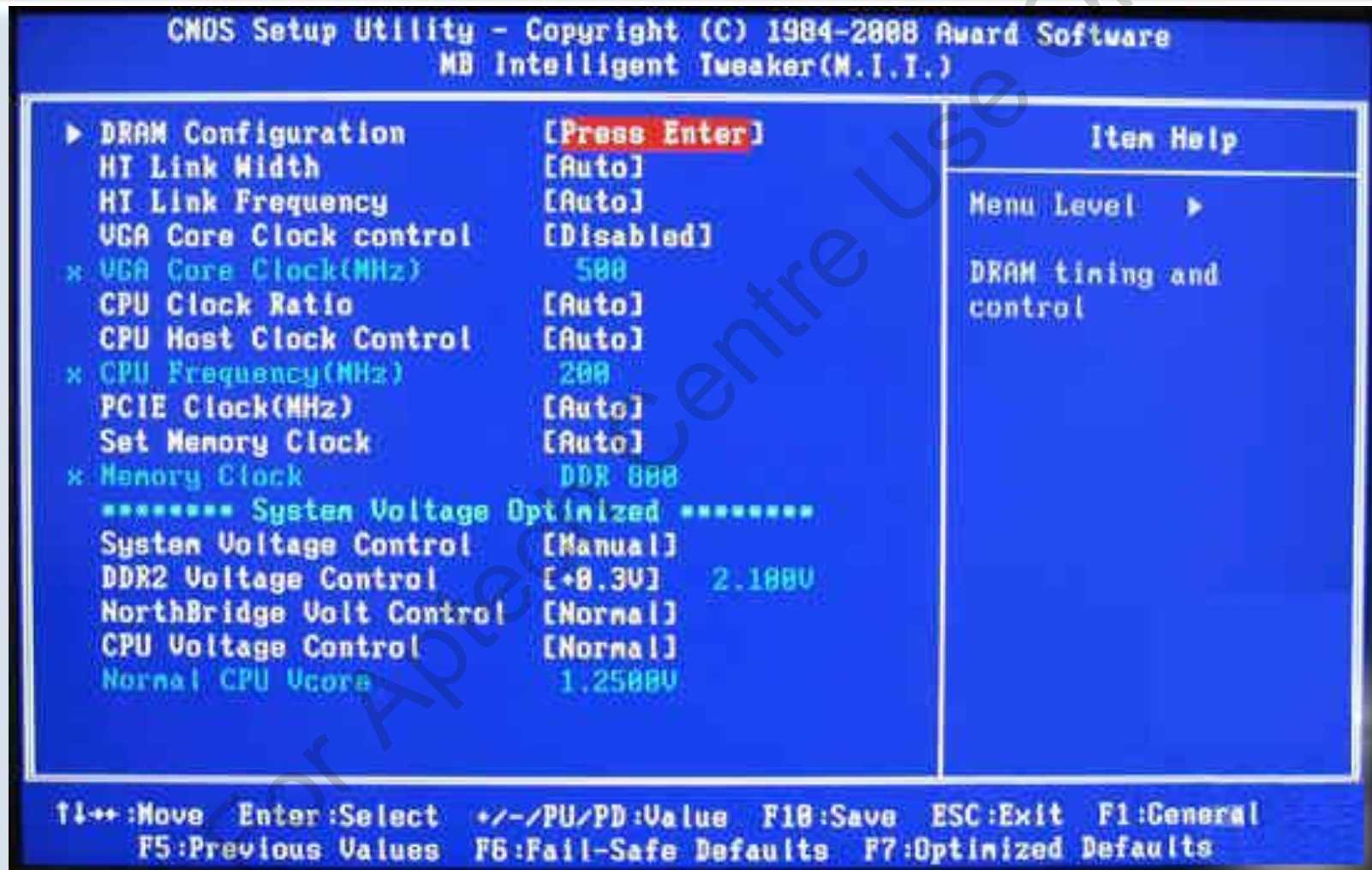
New Technologies in Computer

Cloud Computing

- Cloud computing evolved from a concept called virtualization
- Using virtualization, you can host multiple Operating Systems at the same time on a single machine
- A traditional application server may have just 5-10% utilization, whereas virtualized servers can reach 50-80% utilization
- By hosting more virtualized instances on fewer physical servers, you can lower costs for hardware acquisition, maintenance, energy, and cooling system usage

Grid Computing

- Grid computing is defined as an interconnected computer system where the machines utilize the same resources collectively for solving a problem or reaching a common goal
- Grid computing usually consists of one main computer that distributes information and tasks to a group of network computers to accomplish a common goal

Utility Computing

- In utility computing, the computing resources and infrastructure is provided to the customer by the service provider
- The customer is charged according to the service usage

Cloud Computing 1-2

❑ Cloud computing is divided into three major cloud structures:

Public Cloud
- A public can be accessed by anyone using the Internet
- The client manages their normal resources that operate within the cloud and provide appropriate remuneration for the services used

Private Cloud
- A private cloud is cloud technology which uses a private data center to which only one organization has access
- The organization maintains its own data center and staff, but IT resources within the cloud are available on-demand

Hybrid Cloud
- Hybrid clouds are a combination of private and public clouds
- Sometimes an application in a private cloud extends to use resources present in a public cloud

Cloud Computing 2-2

❑ The different types of services provided in cloud computing platform are:

➢ **Infrastructure as a service (IaaS)** - In this model, computers and other resources are provided to the users

➢ **Platform as a service (PaaS)** - In this model, OS, program execution environment, database, and Web server are provided as a service

➢ **Software as a service (SaaS)** - In this model, cloud providers install and operate the application software in the cloud and the users access it

➢ **Storage as a service (STaaS)** - In this model, large service providers rents out storage infrastructures

➢ **Security as a service (SECaaS)** - In this model, large service providers integrates into the corporate infrastructure's security services

➢ **Data as a service (DaaS)** - In this model, data is provided to the user as and when required irrespective of geographic location or organization separation between the provider and the consumer

➢ **Test Environment as a service** (TEaaS) - In this model, software and its data are hosted to be accessed by users using a Web browser over the Internet

➢ **Desktop as a service** (DaaS) - In this model, desktop is virtualized

➢ **API as a service** (APIaaS) - It enables the creation and hosting of APIs

Grid Computing 1-2

❑ Advantages of grid computing are:

Large six figure Symmetric Multiprocessing (SMP) servers for application processing are not required

Idle resources can be utilized much more efficiently by distributing jobs to idle servers or idle desktops

A grid environment has modular structure and does not have single points of failure

Systems can be upgraded without scheduling downtime

Jobs are executed in parallel speeding performance

Grid Computing 2-2

❑ Disadvantages of grid computing are:

Large SMP are still used when applications that require high memory do not take advantage of MPI

A fast connection in between the computer resources is required

Some applications are required to be fine-tuned to take full advantage of the new model

Utility Computing 1-2

❑ Advantages of utility computing are:

The client is not required to buy all the hardware, software and licenses, instead, the client depends on the utility computing company to provide these services

It gives companies the option to subscribe to a single service and use the same software suite for the entire client organization.

Utility Computing 2-2

❑ Disadvantages of utility computing are:

> If a utility computing company has financial difficulty or has frequent equipment problems, clients could get discontinued from the services even after paying.

> Utility computing systems are always targets for hackers. A hacker can access services without paying and sneaking around and exploring client files.

Summary

❑ The computer consists of different parts namely, CPU, Motherboard, RAM, hard disk, main cabinet with all the peripheral devices connected to the motherboard, and an OS.

❑ A workstation can be defined as a type of computer that is mainly used for technical and scientific applications, desktop publishing, and so on.

❑ Booting is the process of loading the operating system when the user switches ON the computer system.

❑ Cloud computing is an approach enabling convenient and on-demand access through the Internet to resources such as networks, servers, storage, applications, and services.

❑ Grid computing usually consists of one main computer that distributes information and tasks to a group of network computers to accomplish a common goal.

❑ Utility computing is a service-provisioning model. In this model, the service provider makes computing resources and infrastructure management available to the customer as needed, and charges them for specific usage rather than a specific rate.