**Chapter 4 Answers**

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| **Num** | **Multiple Choice Answers (Book)** | **Matching Answers (Book)** |
| 1 | D | H |
| 2 | D | J |
| 3 | B | F |
| 4 | B | G |
| 5 | D | E |
| 6 | A | I |
| 7 | B | A |
| 8 | A | B |
| 9 | B | D |
| 10 | D | C |

**Open Ended Questions:**

1. **Describe system software. Discuss each of the four types of system programs?**

System software works with end users, application software, and computer hardware to handle the majority of technical details. System software is not a single program. Rather it is a collection or a system of programs that handle hundreds of technical details with little or no user intervention.

System software consists of four types of programs:

* **Operating systems** coordinate computer resources, provide an interface between users and the computer, and run applications.
* **Utilities**, also known as service programs, perform specific tasks related to managing computer resources.
* **Device drivers** are specialized programs that allow particular input or output devices to communicate with the rest of the computer system.
* **Language translators** convert the programming instructions written by programmers into a language that computers understand and process.

1. **Define operating systems. Describe the basic features and the three categories of operating systems.**

An operating system is a collection of programs that handle many of the technical details related to using a computer. The operating system is considered the most important type of computer program. Without an operating system, your computer would be useless.

Every computer has an operating system and every operating system performs a variety of functions. These functions can be classified into three groups:

* **Managing resources:** Operating systems coordinate all the computer’s resources including memory, processing, storage, and devices such as printers and monitors. They also monitor system performance, schedule tasks, provide security, and start up the computer.
* **Providing user interface:** Operating systems allow users to interact with application programs and computer hardware through a user interface. Almost all operating systems use a graphical user interface (GUI). A graphical user interface uses graphical elements such as icons and windows.
* **Running applications:** Operating systems load and run applications such as word processors and spreadsheets. Most operating systems support multitasking**,** or the ability to switch between different applications stored in memory. With multitasking, you could have Word and Excel running at the same time and switch easily between the two applications. The program that you are currently working on is described as running in the foreground**.** The other program or programs are running in the background**.**

Operating systems have several features in common with application programs including:

* **Icons** – graphic representations for a program, type of file, or function.
* **Pointer** – controlled by a mouse, trackpad, or touchscreen, the pointer changes shape depending upon its current function.
* **Windows** – rectangular areas for displaying information and running programs
* **Menus** – provide a list of options or commands
* **Tabs** – divide menus into major activity areas
* **Dialog boxes** – provide information or request input.
* **Help** - provides online assistance for operating system functions and procedures.
* **Gesture control** – ability to control operations with finger movements such as swiping, sliding, and pinching.

The three main categories of operating systems are:

* **Embedded operating systems** are used for handheld devices such as smartphones. The entire operating system is stored within or embedded in the device.
* **Network operating systems** (NOS) are used to control and coordinate computers that are networked or linked together.
* **Stand-alone operating systems** control a single desktop or notebook computer.

1. **What are mobile operating systems? Describe the leading mobile operating systems.**

Mobile operating systems, also known as mobile OS, are a type of embedded operating system. Every mobile computer including smartphones requires an operating system. These mobile operating systems are less complicated and more specialized for wireless communication. While there are numerous mobile operating systems, some of the best known are:

* **Android** – was originally developed by Android Inc. and later purchased by Google. Android is widely used in many of today’s smartphones.
* **BlackBerry OS** – also known as RIM OS, a mobile phone OS designed as the platform for the BlackBerry handheld computer, but has evolved into a powerful mobile operating system.
* **iOS** – formerly known as iPhone OS. iOS is based on Mac OS and is used as the platform for Apple’s iPhone, iPod Touch, and iPad.
* **WebOS** – originally developed for Palm’s handheld computers, it has evolved to support HP’s smartphones and tablet computers.
* **Windows Phone 8** – was introduced in 2012 by Microsoft to support a variety of mobile devices including smartphones. It has the ability to run many powerful programs designed for desktop and laptop computers.

1. **What are desktop operating systems? Compare Windows, Mac OS, Linux, and Chrome OS. Discuss virtualization.**

Desktop operating systems, also called stand-alone operating systems, control a single desktop or notebook computer. Every microcomputer has an operating system controlling its operations. These operating systems are located on the computer’s hard disk. Often desktop computers and notebooks are part of a network. In those cases, the desktop operating system works with the network’s NOS to share and coordinate resources. The operating system is often referred to as the software environment or software platform. Almost all application programs are designed to run with a specific platform.

* **Windows** – is the most widely used microcomputer operating system market, because its market share is so large, more application programs are developed to run under Windows than any other operating system. Windows comes in a variety of different versions and is designed to run with a variety of different microprocessors. The most recent version Windows 8 was created to better integrate Microsoft’s desktop operating systems with its mobile operating systems. It provides support for gestures, cloud integration, and apps.

* **MAC OS**- Designed to run on Apple machines, Mac OS is not as widely used as the Windows operating system. Fewer applications have been written for it. Mac OS X is the most widely used Mac OS. Its two most recent versions are:
  + **OS X Lion,** released in 2011, included several powerful features including Launchpad to display and provide direct access to applications, Mission Control to display all running applications, and gestures.
  + **OS X Mountain Lion**, released in 2012, was designed for desktops and laptops. Its user interface is very similar to the interface used with its tablets and smartphones. The functionality of Mountain Lion is similar to Windows 8 although it is generally regarded as easier to use.
* **Linux** is an operating system that extended one of the UNIX versions. It was released as open source which allows free distribution of the operating system code and encourages others to modify and further develop the code. Linux is a popular and powerful alternative to the Windows operating system.

* **Google’s Chrome OS** is based on Linux. Chrome OS focuses on Internet connectivity and cloud computing.
* **Virtualization** – a method in which a physical computer can support multiple operating systems that operate independently. With virtualization software a single computer operates as though it were two or more separate and independent computers known as virtual machines. Each virtual machine appears to the user as a separate independent computer with its own operating system. The OS of the physical machine is known as the host operating system. The OS for each virtual machine is known as the guest operating system. Users can readily switch between virtual computers and programs running on them. There are several programs to create and run virtual machines. One such program, Microsoft's Hyper-V, is included with Windows 8 Professional version.

1. **Discuss utilities. What are the most essential utilities? What is a utility suite?**

Utilities are specialized programs designed to make computing easier. The most essential are:

* **Troubleshooting or diagnostic programs** that recognize and correct problems, ideally before they become serious.
* **Antivirus programs** that guard your computer system against viruses or other damaging programs that can invade your computer system.
* **Backup programs** that make copies of files to be used in case the originals are lost or damaged.
* **File compression programs** that reduce the size of files so they require less storage space and can be sent more efficiently over the Internet.

1. **Explain the role of device drivers. Discuss the Add a Device Wizard and Windows Update.**

Every device, such as a mouse or printer that is connected to a computer system has a special program associated with it. This program, called a device driver, works with the operating system to allow communication between the device and the rest of the computer system. Each time the computer system is started, the operating system loads all of the device drivers into memory.

* **Windows’ Add a Device Wizard** provides step-by-step guidance for selecting the appropriate hardware driver and installs that driver.
* **Windows Update** makes it easy to update the drivers on your computer. At times when your computer behaves unpredictably, users find this utility to be an invaluable resource.

**Chapter 5 Answers**

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| 1 | C | C |
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**Open Ended Questions:**

1. **Describe the four basic types of personal computers and personal computer system units.**

* **Desktop system units** - Most desktopshave their system unit in a separate case. This case contains the system’s electronic components and selected secondary storage devices. Input and output devices are located outside the system unit. Desktop system unit that are placed vertically are sometimes referred to as a tower unitor tower computer. Some desktop computers, like Apple's iMac, have their monitor and system unit housed together in the same case. These computers are known as all-in-one.
* **Notebooks -** although typically not as powerful as desktops, notebooks are portable and much smaller. Their system units are housed with selected secondary storage devices and input devices. Notebooks are often called laptops.
* **Tablets,** also known as tablet computers, are the newest and one of the most popular types of computer. They are effectively a thin slab that is all monitor with the system unit located behind the monitor. Tablets are smaller, lighter, and generally less powerful than notebooks. Like a notebook, tablets have a flat screen but typically do not have a standard keyboard. Instead tablets typically use a virtual keyboard that appears on the screen and is touch sensitive. One distinguishing feature among tablet computers is the operating system that controls their operations. Apple's iPad uses the mobile operating system iOS. It is capable of running apps specifically designed for it. Many other tablets use Microsoft's Windows 8 operating system and can run many general purpose applications as well as apps specifically designed for it.
* **Mobile devices -** By far the most popular computer is the smartphone. These devices are smaller and generally less powerful that tablets. Unlike a tablet, smartphones typically provide a keypad for entering instructions. Smartphones greatly extend the capabilities of a cell phone by providing computing power. In addition to capturing and sending audio and video, smartphones run apps, connect to the Internet, and more. Their system unit is located behind the display screen and keypad.

1. **Describe system boards including sockets, chips, chip carriers, slots, and bus lines.**

System board is also known as the mainboard or motherboard. The system board controls communications for the entire computer system. Every component within the system unit connects to the system board. All external devices including the keyboard, mouse, and monitor connect to the system board. It acts as a data path and traffic monitor, allowing the various components to communicate efficiently with one another. The system board is a flat circuit board covered with a variety of different electronic components including:

* **Sockets** – provide a connection point for small specialized electronic parts called chips. Sockets are used to connect the system board to a variety of different types of chips, including microprocessors and memory chips.
* **Chips**-consist of tiny circuit boards etched onto squares of sand-like material called silicon. A chip is also called a silicon chip, semiconductor, or integrated circuit.
* **Chip carriers**– chips are mounted on carrier packages. These packages plug either directly into sockets on the system board or onto cards that are then plugged into slots on the system board.
* **Slots** – provide a connection point for specialized cards or circuit boards
* **Bus lines** – provide pathways that support communication among the various electronic components that are either located on the system board or attached to the system board.

1. **Discuss microprocessors components, chips, and specialty processors.**

The central processing unit (CPU) or processor is contained on a single chip called the microprocessor. The microprocessor is the “brains” of the computer system. It has two basic components: the control unit and the arithmetic-logic unit.

* **Control unit**
  + Tells the rest of the computer system how to carry out a program’s instructions.
  + Directs the movement of electronic signals between memory, which temporarily holds data, instructions, and processed information and the arithmetic-logic unit.
  + Directs these control signals between the CPU and input and output devices.
* **Arithmetic-logic unit (ALU)**
  + Performs two types of operations: arithmetic and logic.
  + Arithmetic operations are the fundamental math operations: addition, subtraction, multiplication, and division.
  + Logical operations consist of comparison where two pieces of data are compared to see whether one is equal to (=), less than (<), or greater than (>) the other.
* **Multicore chips** – the most significant recent developments in microprocessors are the 64-bit processor and the multicore chip. Multicore chips can provide two or more separate and independent CPUs. These chips allow a single computer to run two or more operations at the same time.
* **Specialty processors** are specialty chips designed to improve specific computing operations. These include:
  + Graphics coprocessors (also called a GPU) are processors designed to handle a variety of specialized tasks such as displaying 3-D images and encrypting data.
  + Smart cards are plastic cards the size of a regular credit card that have an embedded specialty chip.
  + Processors in automobiles, satellites entertainment, and tracking systems.

1. **Define computer memory including RAM, ROM, and flash memory.**

Memory is a holding area for data, instructions, and information. Memory is contained on chips connected to the system board. There are three well-known types of memory chips: random-access memory (RAM), read-only memory (ROM), and flash memory.

* Random-access memory (ROM) chips hold the program (sequence of instructions) and data that the CPU is presently processing. RAM is called temporary or volatile storage because everything in most types of RAM is lost as soon as the personal computer is turned off.
  + Cache memory improves processing by acting as a temporary high-speed holding area between the memory and the CPU. The computer detects which information in RAM is most frequently used and then copies that information into the cache.
* Read-only memory (ROM) chips have information stored in them by the manufacturer. Unlike RAM chips, ROM chips are not volatile and cannot be changed by the user. “Read only” means that the CPU can read or retrieve data and programs written on the ROM chip. However, the computer cannot write-encode or change- the information or instructions in ROM. Not long ago, ROM chips were typically used to contain almost all instructions for basic computer operations. Recently, however, flash memory chips have replaced ROM chips for many applications.
* Flash memory offers a combination of the features of RAM and ROM. Like RAM, it can be updated to store new information. Like ROM, it does not lose that information when power to the computer system is turned off. Flash memory is used to store startup instructions. This information is called the system's BIOS (basic input/output system).

1. **Define expansion slots, cards, Plug and Play, PC cards, PCMCIA slots and ExpressCard slots.**

Expansion slots are provided on a personal computer where users can insert optional devices known as expansion cards into these slots.

* **Graphics cards**: provide high-quality 3D graphics and animation for games and simulations.
* S**ound cards:** These cards accept audio input from a microphone and convert it into a form that can be processed by the computer. Also, these cards convert internal electronic signals to audio signals so they can be heard from external speakers.
* **Network interface cards (NIC)**: These cards are used to connect a computer to one or more other computers. The network adapter card typically connects the system unit to a cable that connects to the network.
* **Plug and Play** was originally a set of specific hardware and software standards developed by Intel, Microsoft, and others. Overtime the concept of Plug and Play has become a generic term that is associated with the ability to plug any device such as a printer or monitor into a computer and have it play or work immediately.
* **PCMCIA slots and ExpressCard slots** – meet the size constraints of notebook, tablets and mobile devices, small credit card-sized expansion cards, known as PC cards, have been developed. These cards plug into PCMCIA slots (called PC Card slots) or, more recently, ExpressCard slots.

1. **Describe bus lines, bus width, system bus, and expansion bus.**

A bus line, or bus, connects the parts of the CPU to each other. Buses also link the CPU to various other components on the system board. A bus is a pathway for bits representing data and instructions.

* The number of bits that can travel simultaneously down a bus is known as bus width.
* Expansion buses connect the CPU to other components on the system board, including expansion slots. The principal types are:
  + **Universal serial bus (USB)** is widely used to connect external USB devices. The USB then connects to the PCI bus on the system board.
  + **FireWire bus** – similar to USB but more specialized. They are used primarily to connect audio and video equipment to the system board.
  + **PCI Express (PCIe)** is widely used in powerful computers. Unlike most other buses that share a single bus line or path with several devices, the PCIe bus provides a single dedicated path for each connected device.

1. **Define ports including standard and specialized ports.**

A port is a socket for external devices to connect to the system unit. Some ports connect directly to the system board while others connect to cards that are inserted into slots on the system board.

The most common standard ports are:

* **VGA (Video Graphics Adapter)** and **DVI (Digital Video Interface)** ports provide connections to analog and digital monitors. DVI is the most commonly used standard.
* **Universal serial bus (USB)** ports can be used to connect several devices to the system unit and are widely used to connect keyboards, mice, printers, storage devices , and a variety of specialty devices.
* **FireWire** ports provide high-speed connections to specialized FireWire devices such as camcorders and storage devices.
* **Ethernet** ports are a high-speed networking port that has become standard for many of today’s computers. Ethernet allows you to connect multiple computers for sharing files, or to a DSL, or cable modem for high-speed Internet access.

The most common specialized ports are:

* **External Serial Advanced Technology Attachment (eSATA)** ports provide very high-speed connections for external hard disk drives, optical disks, and other large secondary storage devices.
* **High Definition Multimedia Interface (HDMI)** ports provide high-definition video and audio, making it possible to use a computer as a video jukebox or an HD video recorder.
* **Musical instrument digital interface (MIDI**) ports are a special type of port for connecting musical instruments like an electronic keyboard to a sound card. The sound card converts the music into a series of digital instructions. These instructions can be processed immediately to reproduce the music or saved to a file for later processing.
* **Mini DisplayPort** (**MiniDP** or **mDP**) ports are an audio-visual port typically used to connect large monitors. These ports are used with many Apple Macintosh computers
* Thunderbolt ports provide high-speed connections.

1. **Describe power supply including power supply units and AC adapters.**

Computers require DC current to power their electronic components and to represent data and instructions.

* Desktop computers have a power supply unit located inside the system unit that converts AC to DC.
* Notebook and tablet PCs use AC adapters that are typically located outside the systems unit. AC adapters plug into a wall outlet and convert AC to DC.

1. **Discuss electronic data and instructions.**

Computers can only recognize digital electronic signals. Before any processing can occur within the system unit, a conversion must occur from what humans understand (analog) to what the system unit can electronically process (digital).

* Numeric representation:
  + Computers use a two-state (binary system) – on or off arrangement to represent data and instructions.
  + Binary system consists of only two digits – 0 and 1. Each 0 or 1 is called a bit – short for binary digit.
  + In the system unit, the 1 can be represented by a positive charge and the 0 by no electrical charge.
  + In order to represent numbers, letters, and special characters, bits are combined into groups of eight called bytes.
  + Hexadecimal system uses 16 digits to represent binary numbers. Each hex digit represents four binary digits, and two hex digits are commonly used together to represent 1 byte (8 binary digits)
* Character encoding:
  + Nonnumeric characters are assigned encoding schemes or standards which assign a unique sequence of bits to each character.
  + ASCII – used in personal computers and uses 7 bits to represent a character which means that only 128 total characters can be represented
  + EBCDIC – used in mainframe computers
  + Unicode – most widely used character encoding standard and is recognized by virtually every computer system. Unicode uses a variable number of bits to represent each character, which allows non-English characters and special characters to be represented.