

Course: Basics of ICT (1431)
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Assignment no 2

Q.1 a) List Down Key Functions Performed by System Software

System software is a type of computer software designed to manage and control the computer hardware and provide a platform for application software to run. The key functions performed by system software include:

1. **Operating System Management:** The operating system (OS) is the core system software that manages computer resources, including memory, CPU, and peripherals. It provides a user interface and handles tasks like process management, file management, and device drivers.
2. **Memory Management:** System software manages computer memory, ensuring efficient allocation and deallocation of memory resources to running processes and applications.
3. **Device Management:** It handles communication between the hardware devices and the operating system, allowing them to interact and function correctly.
4. **File Management:** System software enables the creation, storage, retrieval, and manipulation of files and directories on storage devices.
5. **Security Management:** System software provides security measures such as access control, authentication, and encryption to protect data and system resources from unauthorized access.

6. **Utility Programs:** These are additional software tools that perform specific tasks, such as disk cleanup, defragmentation, backup, and antivirus scans.
7. **Virtualization:** System software enables virtualization, allowing multiple virtual machines to run on a single physical machine, improving resource utilization and scalability.
8. **BIOS and Firmware:** System software includes the Basic Input/Output System (BIOS) and firmware, which handle the initial booting process and low-level hardware control.

b) What is Utility Program? Why Are They Used?

Utility programs are specialized software tools designed to perform specific tasks to enhance system performance, manage files, maintain security, and optimize the computer's operation. They are used for the following reasons:

1. **System Maintenance:** Utility programs help in cleaning up unnecessary files, organizing data, and optimizing system performance. Examples include disk cleanup, defragmentation, and registry cleaners.
2. **Security Enhancement:** Antivirus and anti-malware utility programs protect the system from viruses, malware, and other security threats, ensuring data integrity and privacy.
3. **Data Backup and Recovery:** Utility programs assist in creating backups of important data and recovering lost or deleted files, providing data redundancy and safeguarding against data loss.
4. **File Management:** Utility tools allow users to manage files, folders, and directories efficiently, helping to organize data and enhance productivity.

5. **System Diagnosis and Troubleshooting:** Diagnostic utility programs identify hardware and software issues, aiding in system troubleshooting and problem resolution.
6. **Network Management:** Some utility programs assist in managing network connections, IP settings, and network performance monitoring.

c) What is Meant by Word Processing? List Key Features Provided by Word Processors.

Word Processing: Word processing refers to the creation, editing, formatting, and manipulation of textual documents using software applications called word processors. Word processors provide a user-friendly interface for working with text and offer various features, including:

1. **Text Formatting:** Word processors allow users to change font styles, sizes, colors, and apply formatting such as bold, italic, underline, and strikethrough.
2. **Page Layout:** Users can set margins, adjust page size, orientation, and create headers, footers, and page numbers.
3. **Spell and Grammar Check:** Word processors include built-in spell and grammar checkers to identify and correct errors in the document.
4. **Document Templates:** Users can choose from pre-designed templates for resumes, letters, reports, and more, saving time and ensuring a professional layout.
5. **Copy, Cut, and Paste:** The ability to copy, cut, and paste text enables easy rearrangement and duplication of content within the document.

6. **Tables and Charts:** Word processors allow the insertion of tables, graphs, and charts to present data in a structured manner.
7. **Images and Multimedia:** Users can add images, audio, and video elements to enhance the document's visual appeal.
8. **Mail Merge:** Word processors support mail merge functionality, allowing the user to create personalized mass mailings.
9. **Collaboration:** Many word processors offer collaboration features, allowing multiple users to edit and comment on the same document simultaneously.

d) Explain the Important Features of Spreadsheet Package

Spreadsheet Package: A spreadsheet package is software used for organizing, analyzing, and manipulating numerical data in tabular form. Some important features of a spreadsheet package are:

1. **Cells and Worksheets:** Spreadsheets are organized into cells, where data is entered and calculated. Multiple worksheets allow users to work on different aspects of data in one file.
2. **Formulas and Functions:** Users can create formulas using mathematical operators and functions to perform calculations, summarize data, and derive results.
3. **Data Formatting:** Spreadsheet packages provide options for formatting data, such as applying number formats, currencies, dates, and conditional formatting based on specified criteria.
4. **Charts and Graphs:** Users can create various types of charts and graphs to visualize data trends, comparisons, and patterns.

5. **Data Sorting and Filtering:** Spreadsheets allow users to sort and filter data based on specific criteria, making it easier to analyze and extract relevant information.
6. **Data Validation:** Users can set rules and criteria to validate data entries, preventing errors and ensuring data accuracy.
7. **What-If Analysis:** Spreadsheet packages support "What-If" scenarios, where users can change certain variables to see how they affect the overall data.
8. **Data Protection:** Users can protect sensitive data by setting password protection and access permissions to restrict editing and viewing rights.
9. **Linking and Consolidating Data:** Spreadsheets can link data from different sheets or files and consolidate data from various sources.
10. **Import and Export:** Users can import data from external sources and export spreadsheet data to other file formats like CSV, PDF, or Excel.
11. **Macros and Automation:** Advanced spreadsheet packages allow users to create macros and automate repetitive tasks, saving time and effort.

Overall, spreadsheet packages are powerful tools for data analysis, financial modeling, budgeting, and decision-making in various professional and academic fields.

Q.2 a) Define System Performance Measures & Process Management Tools in Detail

System Performance Measures: *System performance measures are metrics used to evaluate the efficiency and effectiveness of a computer system. These measures assess various aspects of system performance, including:*

1. **Response Time:** *The time taken by the system to respond to a user's input or request.*
2. **Throughput:** *The rate at which the system processes and completes tasks or transactions.*
3. **Resource Utilization:** *The extent to which system resources such as CPU, memory, and storage are being utilized.*
4. **Reliability:** *The ability of the system to perform consistently and reliably over time without failures.*
5. **Availability:** *The proportion of time the system is available for use without downtime or interruptions.*
6. **Scalability:** *The system's ability to handle an increasing number of users or tasks without degradation in performance.*
7. **Load Balancing:** *The distribution of processing tasks across multiple resources to ensure efficient resource utilization.*

Process Management Tools: *Process management tools are software components that control and manage processes within an operating system. They include:*

1. **Process Scheduler:** *The process scheduler determines which process should be allocated CPU time and in what order.*
2. **Memory Manager:** *The memory manager handles memory allocation and deallocation for processes.*
3. **Input/Output Manager:** *The input/output manager manages input/output operations and handles data transfers between processes and devices.*

4. **File System Manager:** *The file system manager handles file operations and manages file access and storage.*
5. **Device Driver:** *Device drivers are software components that allow the operating system to interact with hardware devices and peripherals.*

b) Write Short Notes on the Following Topics:

Popular Operating Systems:

- *Windows:* Developed by Microsoft, Windows is one of the most widely used operating systems for personal computers. It offers a user-friendly interface, multitasking capabilities, and extensive software support.
- *macOS:* Developed by Apple, macOS is the operating system used on Mac computers. It is known for its smooth integration with Apple hardware and design aesthetics.
- *Linux:* Linux is an open-source operating system favored by developers and tech enthusiasts. It provides flexibility, security, and a vast range of distributions tailored to specific user needs.

Network Connection and IP-Setting:

- *Network Connection:* Network connection refers to the establishment of a connection between a device and a network, allowing data transfer and communication. This can be wired (Ethernet) or wireless (Wi-Fi).
- *IP-Setting:* IP setting involves configuring the IP address for a device to identify and communicate with other devices on a network. IP addresses are unique numeric identifiers for devices connected to an IP-based network.

Q.3 a) Explain Different Types of Network Topologies with Their Characteristics

Network Topologies: Network topology refers to the arrangement or layout of devices and connections in a computer network. The main types of network topologies are:

1. **Star Topology:** In a star topology, all devices are connected directly to a central hub or switch. This central hub acts as a junction point for data communication between devices. Characteristics include easy scalability, simple management, and the ability to isolate faulty devices.
2. **Bus Topology:** In a bus topology, all devices are connected to a single shared communication line (the bus). Data travels along the bus, and each device listens for the relevant data. Characteristics include simplicity and cost-effectiveness but can lead to a single point of failure.
3. **Ring Topology:** In a ring topology, devices are connected in a closed loop, where each device is connected to two others, forming a circular data path. Data circulates around the ring until it reaches the intended destination. Characteristics include balanced network traffic and stability but can be affected if a single connection fails.
4. **Mesh Topology:** In a mesh topology, each device is connected to every other device directly. This provides redundancy and multiple data paths, ensuring high fault tolerance and reliable communication. Characteristics include high cost and complex cabling but excellent reliability.

5. **Tree Topology:** A tree topology is a combination of bus and star topologies. It consists of multiple star networks connected through a bus backbone. Characteristics include scalability and the ability to cover a large area but can be affected if the backbone fails.

b) Explain the Difference Between Switching and Routing

Switching: Switching refers to the process of forwarding data packets between devices on the same network. It is commonly used in local area networks (LANs). Switches operate at the data link layer (Layer 2) of the OSI model and use MAC addresses to determine the appropriate destination for incoming data packets. They create dedicated paths between the sender and receiver, reducing collision and optimizing data transfer within the network.

Routing: Routing involves directing data packets between different networks. It is used in wide area networks (WANs) and the internet. Routers operate at the network layer (Layer 3) of the OSI model and use IP addresses to determine the best path for data packets to reach their destination. They make intelligent decisions based on network topology and maintain routing tables to forward packets through appropriate paths to reach remote networks.

c) Describe the Basic Concepts of OSI Reference Model

The OSI (Open Systems Interconnection) reference model is a conceptual framework used to understand and standardize communication protocols in computer networks. It divides network communication into seven layers, each responsible for specific tasks. The layers from the bottom to the top are:

1. **Physical Layer (Layer 1):** The physical layer deals with the physical medium and electrical characteristics of data transmission. It defines specifications for cables, network cards, and other hardware components.
2. **Data Link Layer (Layer 2):** The data link layer provides error detection and correction and organizes data into frames for transmission. It uses MAC addresses to identify devices on the same network.
3. **Network Layer (Layer 3):** The network layer is responsible for routing data packets between different networks. It uses IP addresses to determine the best path for data delivery.
4. **Transport Layer (Layer 4):** The transport layer ensures reliable data delivery between devices. It handles data segmentation, flow control, and error recovery.
5. **Session Layer (Layer 5):** The session layer establishes, maintains, and terminates communication sessions between devices. It manages dialogues and synchronization.
6. **Presentation Layer (Layer 6):** The presentation layer translates data from the application layer into a format suitable for transmission. It handles data compression, encryption, and decryption.
7. **Application Layer (Layer 7):** The application layer provides network services directly to end-users. It includes communication protocols used by applications, such as HTTP, FTP, and SMTP.

The OSI model allows for the standardization of network communication, enabling devices from different vendors to communicate seamlessly by adhering to the same layer specifications.

Q.4 a) Explain the Different Components of Multimedia in Detail with the Help of Illustrations.

Multimedia: Multimedia refers to the integration of various forms of media, including text, graphics, audio, video, and animations, in a single presentation or application.

The components of multimedia include:

1. **Text:** Text is a basic component of multimedia that conveys information through written language. It appears as captions, labels, or interactive buttons.
2. **Graphics:** Graphics include images, illustrations, icons, and other visual elements that enhance the presentation's visual appeal.
3. **Audio:** Audio components involve sound effects, background music, voiceovers, or narration that enrich the user's experience.
4. **Video:** Video components consist of moving images, video clips, or full-motion videos that provide dynamic content.
5. **Animations:** Animations involve dynamic movement of objects or images to create a sense of motion and engagement.
6. **Interactive Elements:** Interactive elements enable users to interact with the multimedia content, such as clickable buttons or hyperlinks.

b) Explain the Different Applications of Multimedia in Detail with the Help of Illustrations.

Multimedia finds various applications in different fields, including:

1. **Entertainment:** Multimedia is widely used in the entertainment industry, including movies, video games, and online streaming platforms. It provides immersive experiences and engages users through audio, video, and interactive elements.
2. **Education:** Multimedia is used in educational institutions to deliver interactive lessons, virtual simulations, and e-learning courses. It enhances learning experiences and facilitates better understanding of complex topics.
3. **Advertising and Marketing:** Multimedia plays a significant role in advertising and marketing campaigns. It is used in commercials, social media content, and interactive advertisements to capture the audience's attention.
4. **Web Design:** Multimedia elements are integral to modern web design. Websites use graphics, videos, and animations to create visually appealing and interactive user interfaces.
5. **Digital Art and Design:** Multimedia is a powerful tool for digital artists and designers to create visual masterpieces, digital illustrations, and animations.
6. **Virtual Reality (VR) and Augmented Reality (AR):** Multimedia is central to VR and AR experiences, providing users with immersive and interactive virtual environments.
7. **Interactive Presentations:** In business settings, multimedia is used for interactive presentations, product demos, and sales pitches to engage clients and stakeholders.
8. **Medical and Scientific Applications:** Multimedia is utilized for medical simulations, visualizing complex medical procedures, and data representation in scientific research.
9. **Video Conferencing:** Multimedia facilitates video conferencing, enabling real-time communication and collaboration among individuals or teams located in different places.

Q.5 a) What is Programming Language? How is a Computer Program Related to a Programming Language?

Programming Language: A programming language is a formal set of instructions used to write computer programs. It provides a way for programmers to communicate with computers, instructing them on what tasks to perform and how to perform them.

Computer Program and Programming Language

Relationship: A computer program is a set of instructions written in a programming language. These instructions are translated by a compiler or interpreter into machine code that the computer can understand and execute. The programming language acts as an intermediary between human-readable code and machine-executable code, enabling programmers to create complex software applications.

b) What is the Difference Between Low-Level and High-Level Language?

Low-Level Language: Low-level languages are programming languages that closely resemble the binary language understood by the computer's hardware. These languages are hardware-specific and require a deep understanding of the computer's architecture. Examples include assembly languages.

High-Level Language: High-level languages are programming languages designed for human readability and ease of use. They are further from the computer's hardware and focus on

abstraction. Programmers can write high-level code in a more natural language-like syntax. Examples include Python, Java, C++, and JavaScript.

c) Why are High-Level Languages Easier to Use?

High-level languages are easier to use for several reasons:

1. **Human-Readable Syntax:** High-level languages use a syntax that closely resembles human language, making it easier for programmers to understand and write code.
2. **Abstraction:** High-level languages abstract the complexity of hardware operations, allowing programmers to focus on solving problems without worrying about low-level details.
3. **Built-in Functions and Libraries:** High-level languages come with built-in functions and libraries that provide a wide range of functionalities, reducing the need for developers to reinvent the wheel.
4. **Automatic Memory Management:** High-level languages handle memory allocation and deallocation automatically, reducing the risk of memory-related errors.
5. **Portability:** High-level languages are generally more portable, meaning that the same code can run on different platforms without major modifications.
6. **Rapid Development:** High-level languages facilitate rapid development by enabling programmers to write code quickly and efficiently.

Overall, high-level languages prioritize ease of use, productivity, and abstraction, making them more accessible to a broader range of programmers and applications.