

Name: **Muhammad Luqman**

ID NO: **13474**

Degree: BS (SE)

Subject: INTRODUCTION TO ICT

Lecturer**: DR ATIF ISHTIAQ**

**QUESTION NO 1**

**Write a note on Multimedia and its type with common media for storage access and transmission in details.**

**ANSWER**

**Multimedia**

We will understand the literal meaning of multimedia.

* **Multi** − it means more than one
* **Medium** − it is singular and it means intermediary or mean
* **Media** − it is plural and it means conveying the information

Likewise, Multimedia is the field of Computer Science that integrates different forms of information and represents in the form of audio, video, and animation along with the traditional media, i.e., text, graphics/drawings, images, etc.

Multimedia is the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be signified, stored, communicated and handled digitally.

Multimedia can be recorded and played, displayed, interacted with or accessed by information satisfied processing devices, such as high-tech and automated devices, but can also be part of a live presentation. Multimedia devices are electronic media strategies used to store and involvement multimedia content. Multimedia is notable from diverse media in fine art; for model, by containing audio it has a broader scope. In the early years of multimedia the term "rich media" was identical with collaborating multimedia and "hypermedia" was an application of multimedia

**Its type with common media for storage access and transmission in details**

* Text
* Graphics
* Audio
* Animation
* Video
* Interactivity

**Text**

The form in which the text can be stored can vary greatly. In addition to ASCII based files, text is typically stored in processor files, spreadsheets, databases and annotations on more general multimedia objects. With availability and proliferation of GUIs, text fonts the job of storing text is becoming complex allowing special effects (color, shades..). Text, Start

**Graphics**

There is great variance in the quality and size of storage (Image file formats) for still images (Bitmap - gif, jpg, bmp) (Vector - svg, pdf, swf, ps). Digitalized images are sequence of pixels that represents a region in the user's graphical display.

**Audio**

An increasingly popular datatype (audio file format) being integrated in most of applications is Audio. It’s quite space intensive. One minute of sound can take up to 2-3 Mbs of space. Several techniques are used to compress it in suitable format.

**Animation**

It involves the appearance of motion caused by displaying still images one after another. Often, animation is used for entertainment purposes. In addition to its use for entertainment, animation is considered a form of art. It is often displayed and celebrated in film festivals throughout the world. Also used for educational purposes.

**Video**

One on the most space consuming multimedia data type is digitalized video. The digitalized videos are stored as sequence of frames. Depending upon its resolution and size a single frame can consume up to 1 MB. Also to have realistic video playback, the transmission, compression, and decompression of digitalized require continuous transfer rate. See also: iMovie, Codec, Guide, Video Tools, and Software

**Interactivity**

These consist of special data structures used to define 2D & 3D shapes through which we can define multimedia objects. These include various formats used by image, video editing applications.

**QUESTION NO: 2**

**What are the relation between hardware and software. And types of software with Logical system architecture.**

**ANSWER**

**Hardware** refers to the physical devices of a computer system

**Software** refers to a collection of programs

**Relation between hardware and software**

* Both hardware and software are necessary for a computer to do useful job.they are complementary to each other
* Same hardware can be loaded with different software to make a computer system perform different types of jobs
* Except for upgrades, hardware is normally a onetime expense whereas software is a continuing expense
* Upgrades refer to renewing or changing components like increasing the main memory or hard disk capacities or adding speakers, modems, etc.

**Types of software with logical system architecture**

**System software**

System software is designed to control the operation and extend the processing capability of a computer system. System software is a type of computer program that is designed to run a computer's hardware and application programs. If we think of the computer system as a layered model, the system software is the interface between the hardware and user applications

**Application software**

Application software is designed to solve a specific problem or to do a specific task. Application software (app for short) is a program or group of programs designed for end users. Examples of an application include a word processor, a spreadsheet, an accounting application, a web browser, an email client, a media player, a file viewer, simulators, a console game or a photo editor. The collective noun application software refers to all applications collectively. This contrasts with system software, which is mainly involved with running the computer.

|  |  |  |  |
| --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | |  | | --- | | **Hardware**  **(physical devices? components of the computer system)** |   **System software**  **(software that constitute the operating and programming environment of computer system** |   **Application software**  **(software that do a specific task or solve a specific problem)** |   **Users**  **(normally interact with the system via the user interface provide by the application software)** |

Relation between hardware, system software, application software and user of that computer system.

**QUESTION NO:3**

**Write a note on each of the following in details.**

**(a) Modulation Techniques. (b) Multiplexing & De Multiplexing**

**(c) Switching Techniques. (d) Optical Fiber Communication System**

**ANSWER**

**(Part a)**

**Modulation techniques**

Modulation is nothing but, a carrier signal that varies in accordance with the message signal. Modulation technique is used to change the signal characteristics

* **Amplitude modulation(AM):**

Two binary values (0 and 1) of digital data are represented by two different amplitudes of the carrier signal, keeping frequency and phase constant

* **Frequency modulation(FM):**

Two binary values of digital data are represented by two different frequencies while amplitude and phase are kept constant

* **Phase modulation (PM):**

Two binary values of digital data are represented by shift in phase of carrier signal

**(Part b)**

**Multiplexing**

* Method of dividing physical channel into many logical channels so that a number of independent signals may be simultaneously transmitted
* Electronic device that performs multiplexing is known as a multiplexer
* Multiplexing enables a single transmission medium to concurrently transmit data between several transmitters and receivers

**DE multiplexing**

DE multiplexing is a term relative to multiplexing. It is the reverse of the multiplexing process. DE multiplex is a process reconverting a signal containing multiple analog or digital signal streams back into the original separate and unrelated signals.

Although DE multiplexing is the reverse of the multiplexing process, it is not the opposite of multiplexing. The opposite of multiplexing is inverse multiplexing, which breaks one data stream into several related data streams. Thus, the difference between DE multiplexing and inverse multiplexing is that the output streams of DE multiplexing are unrelated, while the output streams of inverse multiplexing are related

**(Part c)**

**Switching Techniques**

Data is often transmitted from source to destination through a network of intermediate nodes

Switching techniques deal with the methods of establishing communication links between the sender and receiver in a communication network

Three commonly used switching techniques are:

1. **Circuit switching:**

Dedicated physical path is established between sending and receiving stations through nodes of the network for the duration of communication

1. **Message switching:**

Sender appends receiver’s destination address to the message and it is transmitted from source to destination either by store-and-forward method or broadcast method

1. **Packet switching:**

Message is split up into fixed size packets and each packet is transmitted independently from source to destination node. Either store-or- forward or broadcast method is used for transmitting the packets. All the packets of a message are re- assembled into original message at the destination node

**(Part d)**

**Optical Fiber Communication**

Definition: the technology of transmitting information through optical fiber.

Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of infrared light through an optical fiber. The light is a form of carrier wave that is modulated to carry information. Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference is required. This type of communication can transmit voice, video, and telemetry through local area networks or across long distances.

Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals. Researchers at Bell Labs have reached internet speeds of over 100 petabytes × kilometer per second using fiber-optic communication.

Optical fibers can be used to transmit light and thus information over long distances. Fiber-based systems have largely replaced radio transmitter systems for long-haul optical data transmission. They are widely used for telephony, but also for Internet traffic, long high-speed local area networks (LANs), cable TV (CATV), and increasingly also for shorter distances within buildings. In most cases, silica fibers are used, except for very short distances, where plastic optical fibers can be advantageous.

**QUESTION NO 4**

**What is OSI reference model explain each layer of OSI model in details.**

**ANSWER**

**OSI MODEL:**

* The Open System Interconnection (OSI) model is framework for defining standards for linking heterogeneous computers in a packet switched network
* Standardized OSI protocol makes it possible for any two heterogeneous computer systems, located anywhere in the world, to easily communicate with each other
* Separate set of protocols is defined for each layer in its seven-layer architecture. Each layer has an independent function

**Layers of OSI Model**

**7. Application Layer**

The application layer is used by end-user software such as web browsers and email clients. It provides protocols that allow software to send and receive information and present meaningful data to users. A few examples of application layer protocols are the Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), and Domain Name System (DNS).

**6. Presentation Layer**

The presentation layer prepares data for the application layer. It defines how two devices should encode, encrypt, and compress data so it is received correctly on the other end. The presentation layer takes any data transmitted by the application layer and prepares it for transmission over the session layer.

**5. Session Layer**

The session layer creates communication channels, called sessions, between devices. It is responsible for opening sessions, ensuring they remain open and functional while data is being transferred, and closing them when communication ends. The session layer can also set checkpoints during a data transfer—if the session is interrupted, devices can resume data transfer from the last checkpoint.

**4. Transport Layer**

The transport layer takes data transferred in the session layer and breaks it into “segments” on the transmitting end. It is responsible for reassembling the segments on the receiving end, turning it back into data that can be used by the session layer. The transport layer carries out flow control, sending data at a rate that matches the connection speed of the receiving device, and error control, checking if data was received incorrectly and if not, requesting it again.

**3. Network Layer**

The network layer has two main functions. One is breaking up segments into network packets, and reassembling the packets on the receiving end. The other is routing packets by discovering the best path across a physical network. The network layer uses network addresses (typically Internet Protocol addresses) to route packets to a destination node.

**2. Data Link Layer**

The data link layer establishes and terminates a connection between two physically-connected nodes on a network. It breaks up packets into frames and sends them from source to destination. This layer is composed of two parts—Logical Link Control (LLC), which identifies network protocols, performs error checking and synchronizes frames, and Media Access Control (MAC) which uses MAC addresses to connect devices and define permissions to transmit and receive data.

**1. Physical Layer**

The physical layer is responsible for the physical cable or wireless connection between network nodes. It defines the connector, the electrical cable or wireless technology connecting the devices, and is responsible for transmission of the raw data, which is simply a series of 0s and 1s, while taking care of bit rate control