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Q 1) Write a note on Multimedia and its type with common media for storage access and transmission in details.?

ANS

Multimedia is a form of communication that combines different content forms such as text, audio, images, animations, or video into a single presentation, in contrast to traditional mass media, such as printed material or audio recordings. Popular examples of multimedia include video podcasts, audio slideshows, animated shows, and movies.

Multimedia can be recorded for playback on computers, laptops, smartphones, and other electronic devices, either on demand or in real time (streaming). In the early years of multimedia, the term "rich media" was synonymous with interactive multimedia. Over time, hypermedia extensions brought multimedia to the World Wide Web.

The commands determine the type of storage media needed to hold the data, based on its ... Storage media can be arranged for access in many ways. ... HDDs remain popular in enterprise disk arrays due to their increasing capacities ... Actifio Data Driven sessions detailed guidelines for your recovery plan that could save.

In computers, a storage medium is any technology -- including devices and materials -- used to place, keep and retrieve electronic data. It refers to a physical device or component in a computing system that receives and retains information relating to applications and users. The plural form of this term is storage media.

Early forms of storage media included computer paper tape. Holes punched in the paper corresponded to a single bit of data. A paper tape reader would interpret each punched hole and convert it to a number. Paper tape was supplanted by magnetic tape, which eventually evolved to magnetic floppy disk.

There are two methods used to transmit data between digital devices: serial transmission and parallel transmission. Serial data transmission sends data bits one after another over a single channel. Parallel data transmission sends multiple data bits at the same time over multiple channels.

Q2) What are the relation between hardware and software. And types of software with Logical system architecture.

ANS

Essentially, computer software controls computer hardware. These two components are complementary and cannot act independently of one another. In order for a computer to effectively manipulate data and produce useful output, its hardware and software must work together. Without software, computer hardware is useless. There are two main types of software: systems software and application software. Systems software includes the programs that are dedicated to managing the computer itself, such as the operating system, file management utilities, and disk operating system (or DOS).

Computer Software.

Computer software is defined as “a set of programs and procedures that are planned to perform specific tasks on a computer system”. A software program is a set of instructions that are aimed at changing the state of computer

hardware. At the lowest level, software is in the form of an assembly language, a set of instructions in a machine-understandable form. At the highest level, software is in the form of high-level languages, which are collected or taken into machine language code.

Major Types of Software.

Computer software systems are classified into two main types, namely

1. Application software
2. System software

1). Application Software

Definition:" A types of software which is used to achieve certain specific tasks".

OR

"Software which facilitates user is called application software".

Application software uses the capacities of a computer directly for a strong task. Application software is able to manipulate text, numbers and graphics. It can be in the form of software focused on a certain single task like word processing, spreadsheet or playing of audio and video files. Here we look at the application software types along with some examples of application software of each type.

Different Types of Application Softwares

Word Processing Software:

This software enables users to create and edit documents. The most popular examples of this type of software are MS-Word, WordPad and Notepad among other text editors.

Database Software: Database is a structured collection of data. A computer database relies on database software to organize data and enable database users to perform database operations. Database software allows users to store and retrieve data from databases. Examples are Oracle, MS Access, etc.

Spreadsheet Software: Excel, Lotus 1-2-3 and Apple Numbers are some examples of spreadsheet software. Spreadsheet software allows users to perform calculations using spreadsheets. They fake paper worksheets by displaying multiple cells that make up a grid.

Multimedia Software: They allow users to create and play audio and video files. They are capable of playing media files. Audio converters, audio players, burners, video encoders and decoders are some forms of multimedia software. Examples of this type of software include Real Player and Media Player.

Presentation Software: The software that is used to display information in the form of a slide show is known as presentation software. This type of software includes three functions, namely, editing that allows insertion and formatting of text, methods to include graphics in the text and a functionality of executing slide shows. Microsoft PowerPoint is the best example of presentation software.

Enterprise Software: It deals with the needs of organization processes and data flow. Customer relationship management or the financial processes in an organization are carried out with the help of enterprise software.

Information Worker Software: Individual projects within a department and individual needs of creation and management of information are handled by information worker software. Documentation tools, resource management tools and personal management systems fall under the category of this type of application software.

Educational Software: It has the capabilities of running tests and tracking progress. It also has the capabilities of common software. It is often used in teaching and self-learning. Dictionaries like Britannica and Encarta, mathematical software like Matlab and others like Google Earth and NASA World Wind are some of the well-known names in this category.

Simulation Software: Used to simulate physical or abstract systems, simulation software finds applications in both, research and entertainment. Flight simulators and scientific simulators are examples of simulation software.

Content Access Software: It is used to access content without editing. Common examples of content access software are web browsers and media players.

Software that aid Engineering and Development of Products: This software is used in the design and development of hardware and software products. Integrated development environments (IDE) and computer language editing tools falls under this type of application software. Interestingly, software products are developed using other software, and software communicate with one another through software.

Application programming interfaces which aid the communication of two or more software, are examples of this application software type.

2). System software:

Definition:" Software which runs computer hardware is called system software".

System software is the backbone of any computer. It consists of all the files and programs that work to make your computer operate as a computer. System software is automatically provided when you purchase a computer on the high street, and is installed along with the operating system. Examples of system software include assemblers, system utilities, tools, debuggers, operating systems device drivers, servers, windowing systems and utilities. System software helps an application programmer in selecting away from hardware.

Examples

System software contains device drivers, operating systems, servers and other such software components, which help the programmer abstract away from the memory and hardware features of the system.

FLOWCHARTING & meaning OF A FLOWCHART

Definition: "A flowchart is a diagrammatic representation that illustrates the sequence of operations to be performed to get the solution of a problem".

Flowcharts are generally drawn in the early stages of formulating computer solutions. Flowcharts facilitate communication between programmers and business people. These flowcharts play a vital role in the programming of

a problem and are quite helpful in understanding the logic of complicated and lengthy problems. Once the flowchart is drawn, it becomes easy to write the program in any high level language. Often we see how flowcharts are helpful in explaining the program to others. Hence, it is correct to say that a flowchart is a must for the better documentation of a complex program.

GUIDELINES FOR DRAWING A FLOWCHART

Flowcharts are usually drawn using some standard symbols; however, some special symbols can also be developed when required. Some standard symbols, which are commonly, required for flowcharting many computer programs are shown in the table.

Flowcharts are usually drawn using some standard symbols; however, some special symbols can also be developed when required. Some standard symbols, which are frequently, required for flowcharting many computer programs are shown in the table.

A system architecture is the conceptual model that defines the structure, behavior, and more views of a system.[1] An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe system architecture, collectively these are called architecture description languages (ADLs

Q3) Write a note on each of the following in details.

ANS

(a) Modulation Techniques.

Modulation techniques are roughly divided into four types: Analog modulation, Digital modulation, Pulse modulation , and Spread spectrum method. Analog modulation is typically used for AM, FM radio, and short-wave broadcasting. Digital modulation involves transmission of binary signals (0 and 1).

In electronics and telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal that typically contains information to be transmitted. Most radio systems in the 20th century used frequency modulation (FM) or amplitude modulation (AM) for radio broadcast.

In music production, modulation is the process of gradually changing sound properties in order to reproduce a sense of movement and depth in audio recordings. It involves the use of a source signal (known as a modulator) to control another signal (a carrier) through a variety of sound effects and methods of synthesis.[1]

A modulator is a device that performs modulation. A demodulator (sometimes detector or demod) is a device that performs demodulation, the inverse of modulation. A modem (from modulator–demodulator) can perform both operations.

The aim of analog modulation is to transfer an analog baseband (or lowpass) signal, for example an audio signal or TV signal, over an analog bandpass channel at a different frequency, for example over a limited radio frequency band or a cable TV network channel. The aim of digital modulation is to transfer a digital bit stream over an analog communication channel, for example over the public switched telephone network (where a bandpass filter limits the frequency range to 300–3400 Hz) or over a limited radio frequency band. Analog and digital modulation facilitate frequency division multiplexing (FDM), where several low pass information signals are transferred simultaneously over the same shared physical medium, using separate passband channels (several different carrier frequencies).

In analog modulation, the modulation is applied continuously in response to the analog information signal. Common analog modulation techniques include:

- Amplitude modulation (AM) (here the amplitude of the carrier signal is varied in accordance with the instantaneous amplitude of the modulating signal)

A simple example: A telephone line is designed for transferring audible sounds, for example, tones, and not digital bits (zeros and ones). Computers may, however, communicate over a telephone line by means of modems, which are representing the digital bits by tones, called symbols. If there are four alternative symbols (corresponding to a musical instrument that can generate four different tones, one at a time), the first symbol may represent the bit sequence 00, the second 01, the third 10 and the fourth 11. If the modem plays a melody consisting of 1000 tones per second, the symbol rate is 1000 symbols/second, or 1000 baud. Since each tone (i.e., symbol) represents a message consisting of two digital bits in this example, the bit rate is twice the symbol rate, i.e. 2000 bits per second.

(b) Multiplexing & De Multiplexing

(c) In telecommunications and computer networks, multiplexing (sometimes contracted to muxing) is a method by which multiple analog or digital signals are combined into one signal over a shared medium. The aim is to share a scarce resource. For example, in telecommunications, several telephone calls may be carried using one wire. Multiplexing originated in telegraphy in the 1870s, and is now widely applied in communications. In telephony, George Owen Squier is credited with the development of telephone carrier multiplexing in 1910.

(d) The multiplexed signal is transmitted over a communication channel such as a cable. The multiplexing divides the capacity of the communication channel into several logical channels, one for each message signal or data stream to be transferred. A reverse process, known as demultiplexing, extracts the original channels on the receiver end.

(e) A device that performs the multiplexing is called a multiplexer (MUX), and a device that performs the reverse process is called a demultiplexer (DEMUX or DMX).

(†) Inverse multiplexing (IMUX) has the opposite aim as multiplexing, namely to break one data stream into several streams, transfer them simultaneously over several communication channels, and recreate the original data stream.

(g) In computing, I/O multiplexing can also be used to refer to the concept of processing multiple input/output events from a single event loop, with system calls like poll[1] and select (Unix

Demultiplex (DEMUX) is the reverse of the multiplex (MUX) process – combining multiple unrelated analog or digital signal streams into one signal over a single shared medium, such as a single conductor of copper wire or fiber optic cable. Thus, demultiplex is reconverting a signal containing multiple analog or digital signal streams back into the original separate and unrelated signals.

Although demultiplex is the reverse of the multiplex process, because the multiple signals are not related, it is not the opposite of multiplexing.

The opposite of multiplexing is inverse multiplexing (IMUX), which breaks one data stream into several related data streams. Thus, the difference between demultiplexing and inverse multiplexing is that the output streams of demultiplexing are unrelated; but the output streams of inverse multiplexing are related.

(c) Switching Techniques.

In large networks, there may be more than one paths for transmitting data from sender to receiver. Selecting a path that data must take out of the available options is called switching. There are two popular switching techniques – circuit switching and packet switching.

Circuit Switching

When a dedicated path is established for data transmission between sender and receiver, it is called circuit switching. When any network node wants to send data, be it audio, video, text or any other type of information, a call request signal is sent to the receiver and acknowledged back to ensure availability of dedicated path. This dedicated path is then used to send data. ARPANET used circuit switching for communication over the network.

Advantages of Circuit Switching

Circuit switching provides these advantages over other switching techniques −

- Once path is set up, the only delay is in data transmission speed
- No problem of congestion or garbled message

Disadvantages of Circuit Switching

Circuit switching has its disadvantages too −

- Long set up time is required
- A request token must travel to the receiver and then acknowledged before any transmission can happen
- Line may be held up for a long time

Packet Switching

As we discussed, the major problem with circuit switching is that it needs a dedicated line for transmission. In packet switching, data is broken down into small packets with each packet having source and destination addresses, travelling from one router to the next router.

(d) Optical Fiber Communication System

Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of infrared light[1] through an optical fiber. The light is a form of carrier wave that is modulated to carry information.[2] Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference is required.[3] This type of communication can transmit voice, video, and telemetry through local area networks or across long distances.[4]

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 petabit × kilometer per second using fiber-optic communication

First developed in the 1970s, fiber-optics have revolutionized the telecommunications industry and have played a major role in the advent of the Information Age.[6] Because of its advantages over electrical transmission, optical fibers have largely replaced copper wire communications in backbone networks in the developed world.[7]

The process of communicating using fiber-optics involves the following basic steps:

1. creating the optical signal involving the use of a transmitter,[8] usually from an electrical signal
2. relaying the signal along the fiber, ensuring that the signal does not become too distorted or weak
3. receiving the optical signal
4. converting it into an electrical signal
5. is used by many telecommunications companies to transmit telephone signals, Internet communication and cable television signals. It is also used in a multitude of other industries, including medical, defense/government, for data storage, and industrial/commercial. In addition to serving the purposes of telecommunications, it is used as light guides, for imaging tools, lasers, hydrophones for seismic waves, SONAR, and as sensors to measure pressure and temperature.
6. Due to much lower attenuation and interference, optical fiber has large advantages over existing copper wire in long-distance, high-demand applications. However, infrastructure development within cities was relatively difficult and time-consuming, and fiber-optic systems were complex and expensive to install and operate. Due to these difficulties, fiber-optic communication systems have primarily been installed in long-distance applications, where they can be used to their full transmission capacity, offsetting the increased cost. The prices of fiber-optic communications have dropped considerably since 2000.
7. The price for rolling out fiber to homes has currently become more cost-effective than that of rolling out a copper based network. Prices have dropped to $850 per subscriber in the US and lower in countries like The Netherlands, where digging costs are low and housing density is high.[9]
8. Since 1990, when optical-amplification systems became commercially available, the telecommunications industry has laid a vast network of intercity and transoceanic fiber communication lines. By 2002, an intercontinental network of 250,000 km of submarine communications cable with a capacity of 2.56 Tb/s was completed, and although specific network capacities are privileged information, telecommunications investment reports indicate that network capacity has increased dramatically since 2004

Q 4 What is OSI reference model explain each layer of OSI model in details.

ANS

OSI model is a layered server architecture system in which each layer is defined according to a specific function to perform. All these seven layers work collaboratively to transmit the data from one layer to another. The Upper Layers: It deals with application issues and mostly implemented only in software

The OSI Model is a logical and conceptual model that defines network communication used by systems open to interconnection and communication with other systems. The Open System Interconnection (OSI Model) also defines a logical network and effectively describes computer packet transfer by using various layers of protocols.

- In the late 1970s, the ISO conducted a program to develop general standards and methods of networking.
- In 1973, an Experimental Packet Switched System in the UK identified the requirement for defining the higher-level protocols.
- In the year 1983, OSI model was initially intended to be a detailed specification of actual interfaces.
- In 1984, the OSI architecture was formally adopted by ISO as an international standard

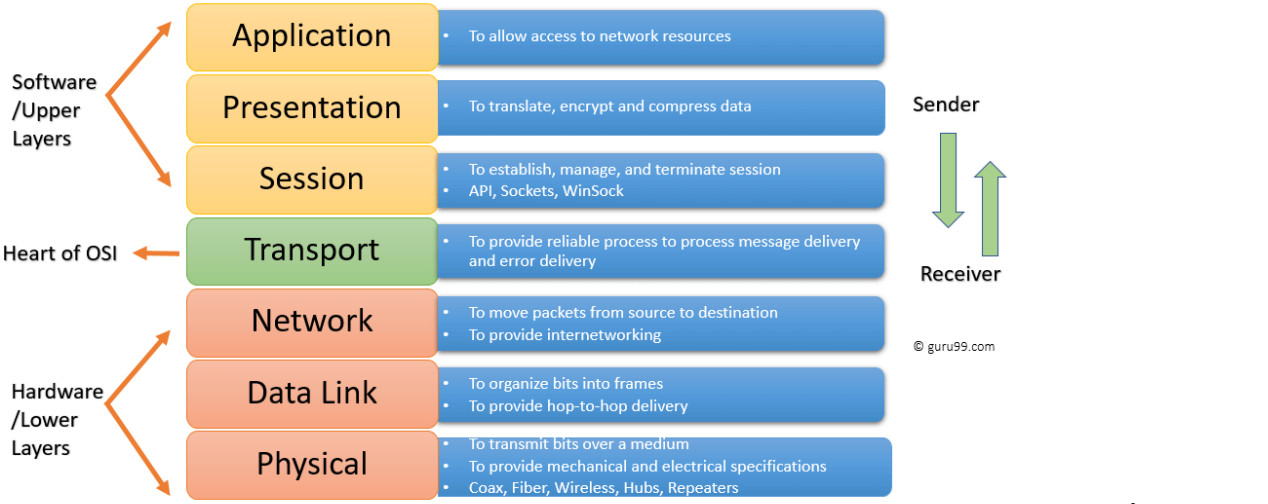
7 Layers of the OSI Model

OSI model is a layered server architecture system in which each layer is defined according to a specific function to perform. All these seven layers work collaboratively to transmit the data from one layer to another.

- The Upper Layers: It deals with application issues and mostly implemented only in software. The highest is closest to the end system user. In this layer, communication from one end-user to another begins by using the interaction between the application layer. It will process all the way to end-user.
- The Lower Layers: These layers handle activities related to data transport. The physical layer and datalink layers also implemented in software and hardware.

Upper and Lower layers further divide network architecture into seven different layers as below

- Application
- Presentation
- Session
- Transport
- Network, Data-link
- Physical layers



Network Layers Diagram

Let's Study each layer in detail:

Physical Layer

The physical layer helps you to define the electrical and physical specifications of the data connection. This level establishes the relationship between a device and a physical transmission medium. The physical layer is not concerned with protocols or other such higher-layer items.

Examples of hardware in the physical layer are network adapters, ethernet, repeaters, networking hubs, etc.

Data Link Layer:

Data link layer corrects errors which can occur at the physical layer. The layer allows you to define the protocol to establish and terminates a connection between two connected network devices.

It is IP address understandable layer, which helps you to define logical addressing so that any endpoint should be identified.

The layer also helps you implement routing of packets through a network. It helps you to define the best path, which allows you to take data from the source to the destination.

The data link layer is subdivided into two types of sublayers:

1. Media Access Control (MAC) layer- It is responsible for controlling how device in a network gain access to medium and permits to transmit data.
2. Logical link control layer- This layer is responsible for identity and encapsulating network-layer protocols and allows you to find the error.

Important Functions of Datalink Layer:

- Framing which divides the data from Network layer into frames.
- Allows you to add header to the frame to define the physical address of the source and the destination machine
- Adds Logical addresses of the sender and receivers
- It is also responsible for the sourcing process to the destination process delivery of the entire message.
- It also offers a system for error control in which it detects retransmits damage or lost frames.

- Datalink layer also provides a mechanism to transmit data over independent networks which are linked together.

Transport Layer:

The transport layer builds on the network layer to provide data transport from a process on a source machine to a process on a destination machine. It is hosted using single or multiple networks, and also maintains the quality of service functions.

It determines how much data should be sent where and at what rate. This layer builds on the message which are received from the application layer. It helps ensure that data units are delivered error-free and in sequence.

Transport layer helps you to control the reliability of a link through flow control, error control, and segmentation or desegmentation.

The transport layer also offers an acknowledgment of the successful data transmission and sends the next data in case no errors occurred. TCP is the best-known example of the transport layer.

Important functions of Transport Layers:

- It divides the message received from the session layer into segments and numbers them to make a sequence.
- Transport layer makes sure that the message is delivered to the correct process on the destination machine.
- It also makes sure that the entire message arrives without any error else it should be retransmitted.

Network Layer:

The network layer provides the functional and procedural means of transferring variable length data sequences from one node to another connected in "different networks".

Message delivery at the network layer does not give any guaranteed to be reliable network layer protocol.

Layer-management protocols that belong to the network layer are:

1. routing protocols
2. multicast group management
3. network-layer address assignment.

Session Layer

Session Layer controls the dialogues between computers. It helps you to establish starting and terminating the connections between the local and remote application.

This layer request for a logical connection which should be established on end user's requirement. This layer handles all the important log-on or password validation.

Session layer offers services like dialog discipline, which can be duplex or half-duplex. It is mostly implemented in application environments that use remote procedure calls.

Important function of Session Layer:

- It establishes, maintains, and ends a session.
- Session layer enables two systems to enter into a dialog
- It also allows a process to add a checkpoint to steam of data.

Presentation Layer

Presentation layer allows you to define the form in which the data is to exchange between the two communicating entities. It also helps you to handles data compression and data encryption.

This layer transforms data into the form which is accepted by the application. It also formats and encrypts data which should be sent across all the networks. This layer is also known as a **syntax layer**.

The function of Presentation Layers:

- Character code translation from ASCII to EBCDIC.
- Data compression: Allows to reduce the number of bits that needs to be transmitted on the network.
- Data encryption: Helps you to encrypt data for security purposes — for example, password encryption.
- It provides a user interface and support for services like email and file transfer.

Application Layer

Application layer interacts with an application program, which is the highest level of OSI model. The application layer is the OSI layer, which is closest to the end-user. It means OSI application layer allows users to interact with other software application.

Application layer interacts with software applications to implement a communicating component. The interpretation of data by the application program is always outside the scope of the OSI model.

Example of the application layer is an application such as file transfer, email, remote login, etc.

The function of the Application Layers are:

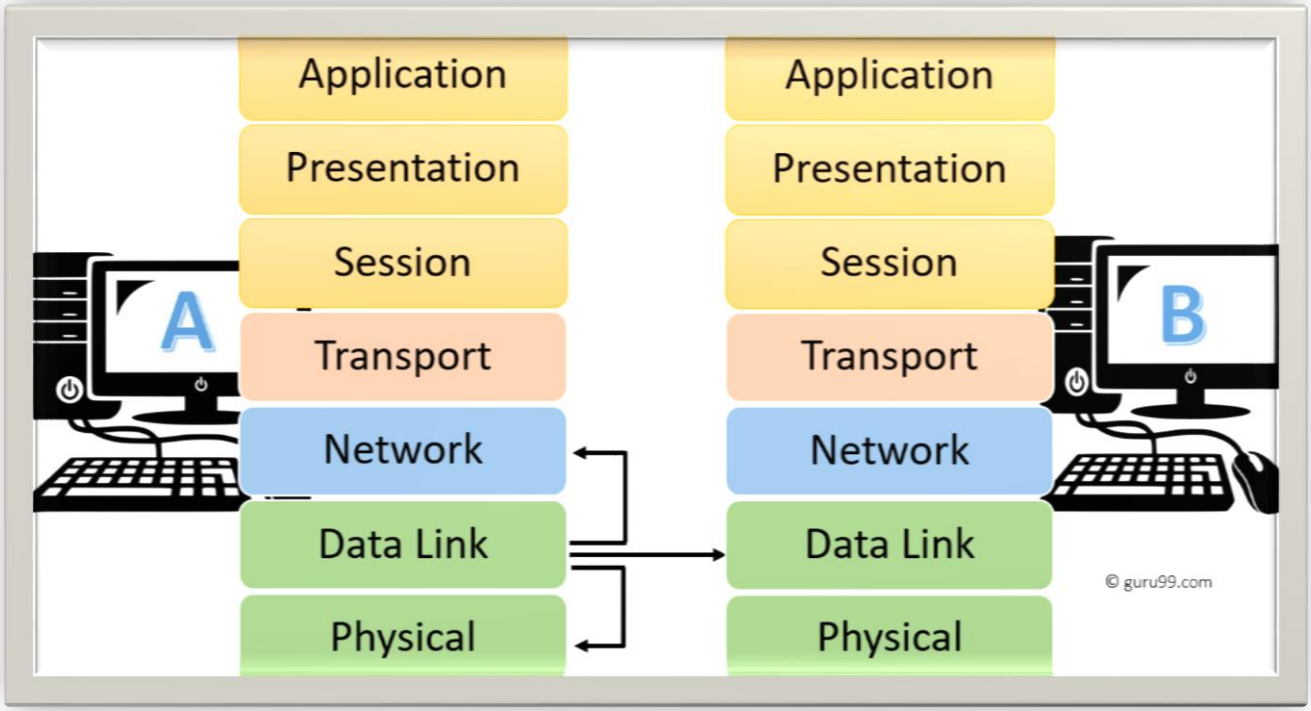
- Application-layer helps you to identify communication partners, determining resource availability, and synchronizing communication.
- It allows users to log on to a remote host
- This layer provides various e-mail services
- This application offers distributed database sources and access for global information about various objects and services.

Interaction Between OSI Model Layers

Information sent from a one computer application to another needs to pass through each of the OSI layers.

This is explained in the below-given example:

- Every layer within an OSI model communicates with the other two layers which are below it and its peer layer in some another networked computing system.
- In the below-given diagram, you can see that the data link layer of the first system communicates with two layers, the network layer and the physical layer of the system. It also helps you to communicate with the data link layer of, the second system.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