



OSI Model



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Open systems interconnection

- *OSI was developed by Standard organization ISO in the year of 1984 .*
- *OSI Model defines and is used to understand how data is transferred from one computer to another in a computer network.*

NOTE :

- **ISO**-International Organization for Standardization .



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In order to accomplish a successful communication between computers or different networks , 7 layers of OSI Model was introduced by ISO.



Each layer in OSI Model is a package of Protocols



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7 layers of OSI Model

Application layer

Presentation layer

Session layer

Transport layer

Network layer

Data Link layer

Physical layer

Receiver

Sender



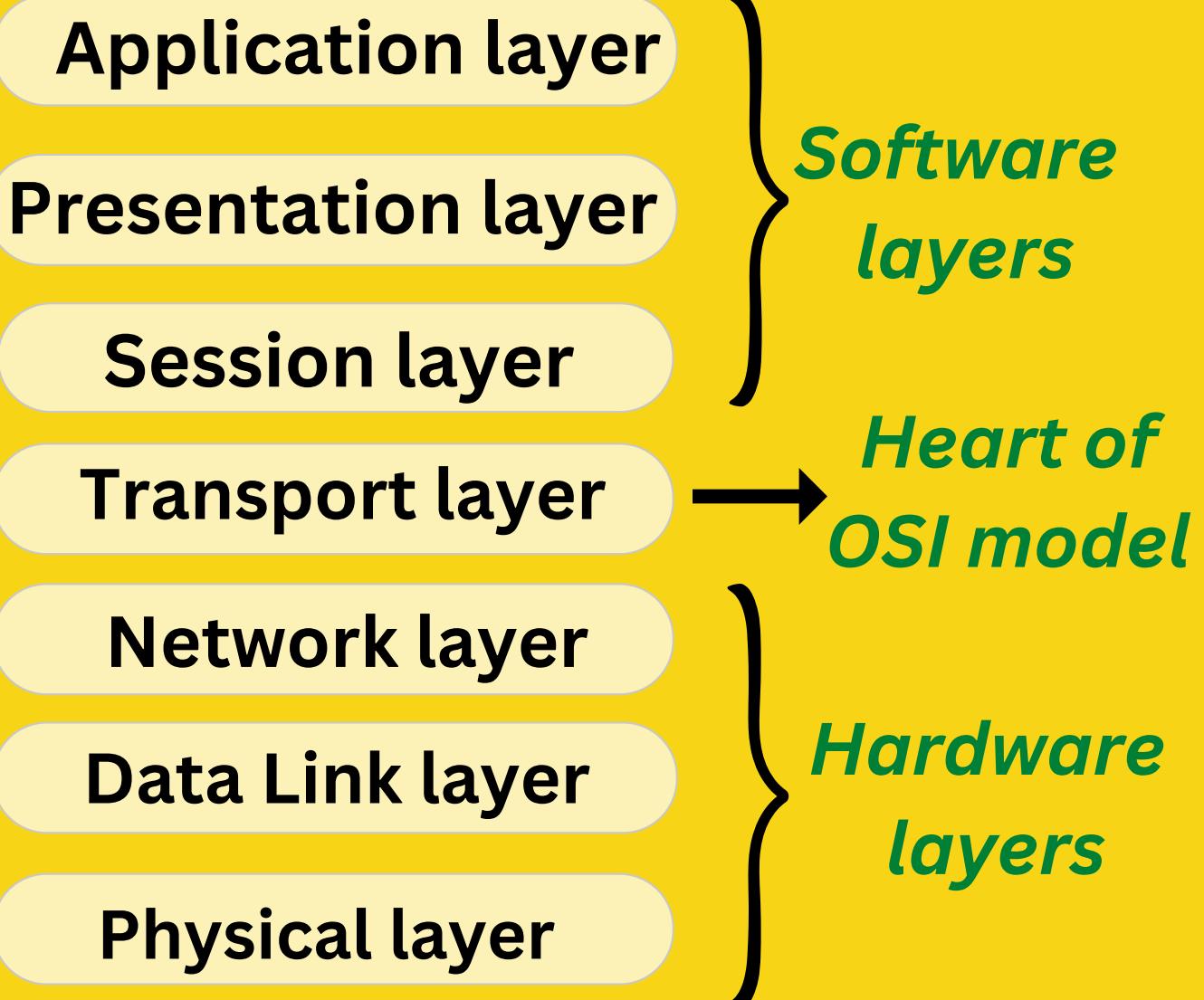
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7 layers of OSI Model



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Easy way to learn 7 layers of OSI Model

"Please Do Not Throw Sausage Pizza Away "

- **Please** - Physical Layer
- **Do** - Data Link Layer
- **Not** - Network Layer
- **Throw** - Transport Layer
- **Sausage** - Session Layer
- **Pizza** - Presentation Layer
- **Away** - Application Layer



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Let's understand each layers of OSI Model separately .

1

Physical layer

- *It is responsible for the actual physical connection between the devices.*
- *When receiving data, this layer will get the signal received and convert it into Binary format (0s and 1s).*
- *It will then send them to the Data Link layer, which will put the frame back together.*



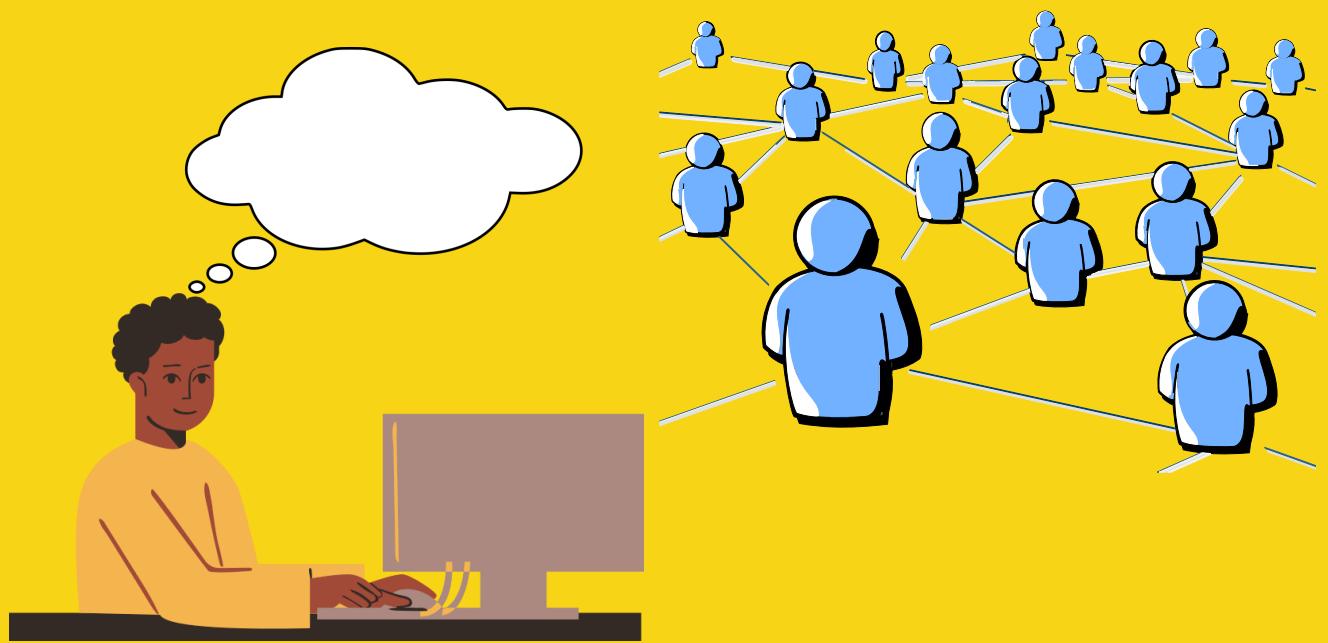
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- The signal generated by physical layer depends on the type of media used to connect two devices .
- Hubs, Repeaters, Modem, Cables are examples Physical Layer devices.



2

Data Link layer

- *This is the second layer of OSI reference Model.*

It performs following functions:

- **Framing-** *Dividing the data received into manageable data frames and adding frame headers and trailers to the frames for transmission.*
- **Access Control -** *Managing access to the physical medium so that two devices do not transmit data simultaneously.*



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- **Physical addressing** of the data is also done at Data Link layer.
- Data Link layer also performs functions like **Flow control** and **Error control**.
- Switch and Bridge are examples of Data Link Layer devices.



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Network layer

- *Network layer is the third layer of OSI reference model .*
- *It works for the transmission of the received data from one computer to another computer located in different networks.*
- *Networking devices such as Routers used for this purpose.*

The main functions of network layer :

- *Logical Addressing*
- *Routing*
- *Path Determination*



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Logical addressing :

- *IP addressing done in Network layer is called Logical Addressing .*

Routing :

- *It is a method of moving data packets from Source to Destination.*

Path Determination :

- *Choosing the best possible path for data delivery from source to destination is called path determination as there are many ways.*



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Transport layer

- *Transport layer is the fourth layer of the OSI Model.*
- *It is also called heart of OSI model.*
- *Transport layer controls the reliability of the communication through :*
 - 1. Segmentation**
 - 2. Flow control**
 - 3. Error control**



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Segmentation :

- *The data received is divided into small units called Segments .*

Flow control :

- *The transport layer controls the amount of data being transmitted at a moment of time.*



Error control :

- *Some data does not arrive at destination, The transport layer uses Automatic Repeat request Scheme to retransmit the lost or encrypted data .*



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Transport layer protocols :

- **TCP** : *Transmission Control Protocol.*
- **UDP** : *User Datagram Protocol.*



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Session layer

- **Session layer** is the fifth layer of the OSI reference model .
- It helps in setting up and managing connections and Enabling sending and receiving of data.
- **Authentication** and **Authorization** both these functions are performed by **Session layer**.



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- *Session layer keep track of file which are being downloaded.*
- *Session layer helps in session management.*
- *Our web browser performs all functions of session layer, Presentation layer and Application layer .*
- *Now data is transmitted to the next layer .*



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6 Presentation layer



- *Presentation layer is sixth layer of OSI reference Model.*
- *The Presentation Layer is responsible for formatting the data so that it can be presented to the Application Layer in a consistent, secure, and compatible manner.*

Some of the key functions of the Presentation Layer are:

1. Data translation
2. Data compression
3. Data Encryption and Decryption



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- **Data Translation** - Translating data from one format to another for compatibility between different systems.



- **Data Compression** - reduces the amount of space used to store the original file , and as the size reduces it can reach the destination in very less time.
- The bit reduction process is called data compression , and it can be lossy or lossless .



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- **Data Encryption** - Converting plain text data into a secure and encrypted format for secure transmission across a network.
- To maintain the integrity of data before transmission , the data is encrypted.
- Encryption enhances the security of sensitive data.
- At sender side the data is **encrypted**.
- At receiver side data is **decrypted** .
- **SSL(Secure Sockets Layer)** is used for Encryption/Decryption.



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Application layer

- *This is the seventh layer in the OSI reference Model.*
- *It is used by Network application.*
Network application means Computer applications that use internet like Chrome, Firefox etc.



- **Application layer** provides the interface through which we can transfer the data .



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Some Application layer Protocols :



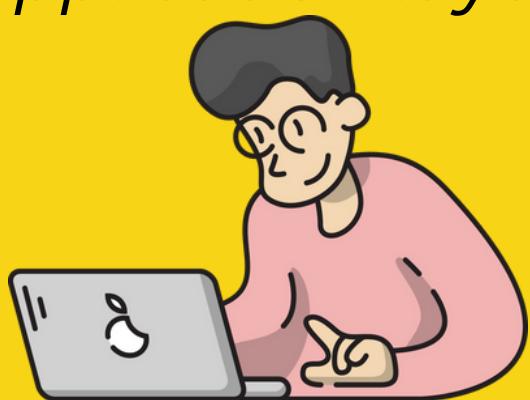
1. TELNET
2. FTP
3. HTTP
4. DMTP
5. NNTP

- *There are dozens of application layer protocols that enables various functions at this layer .*
- *All these protocols collectively form **application layer** .*



How data is passed through the layers ?

- Physical layer receives the signals and convert them into binary format and pass it to the datalink layer as a frames.
- Frame is further Decapsulated, as data moves through higher layers.
- When it reaches presentation layer binary format data is converted into numbers and characters. And finally the data is moved to the Application layer.



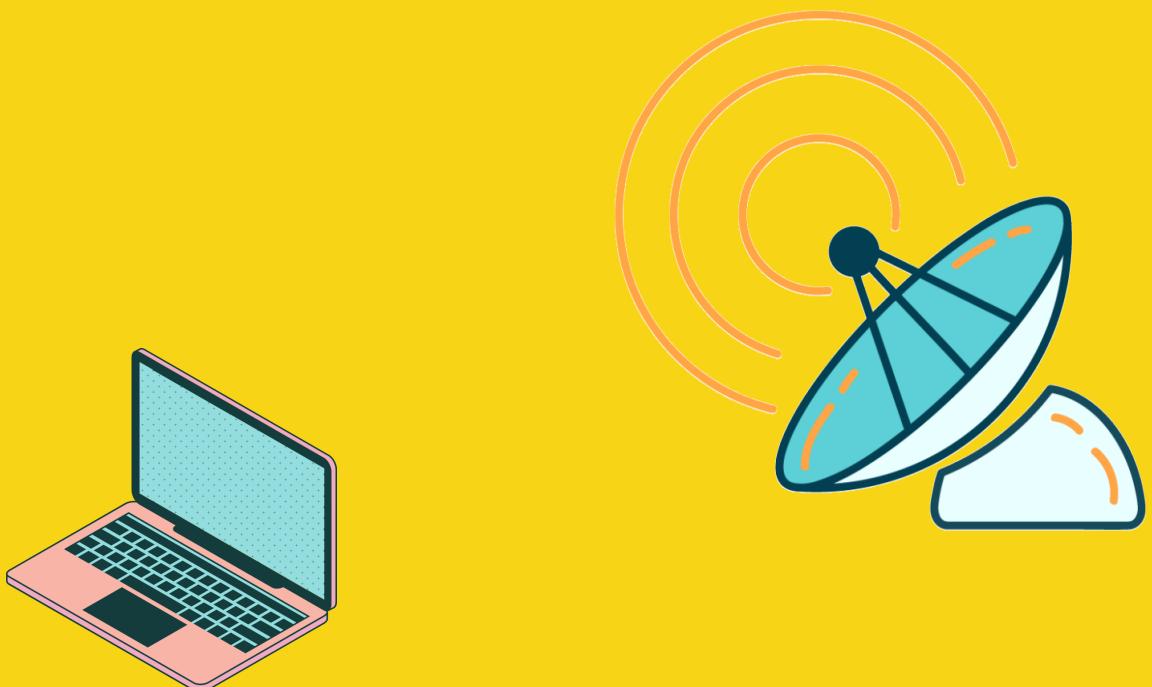
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- *Application layer Protocols makes the sender's message Visible in the Receiver's computer screen .*
- *In this way , OSI Model helps in data Transfer .*



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In Other words -

- *In the OSI model, data is transferred from one layer to another through a process known as protocol data unit (PDU) encapsulation.*
- *The PDU is a unit of data that is specific to each layer, and each layer adds its own header and/or trailer to the data as it is passed down the stack. This process is called **encapsulation**.*
- *The resulting PDU with added header/trailer becomes the data that the next lower layer processes.*



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- When data is transmitted, it is passed down the layers of the *sender's OSI stack*, with each layer adding its own header/trailer to the PDU.
- Once the data reaches the Physical Layer, it is transmitted across the communication medium to the receiving device, where it is passed up the layers of the *receiver's OSI stack*.
- As the data moves up the stack, each layer removes the corresponding header/trailer that was added by the sender, until the original data is delivered to the application layer of the receiver.

This is how data is passed from one layer to other layer in OSI Model.



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