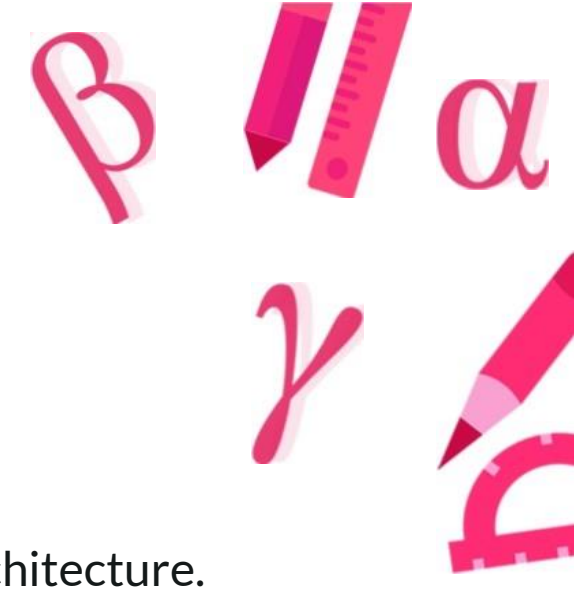
OSI Model and Network Commands

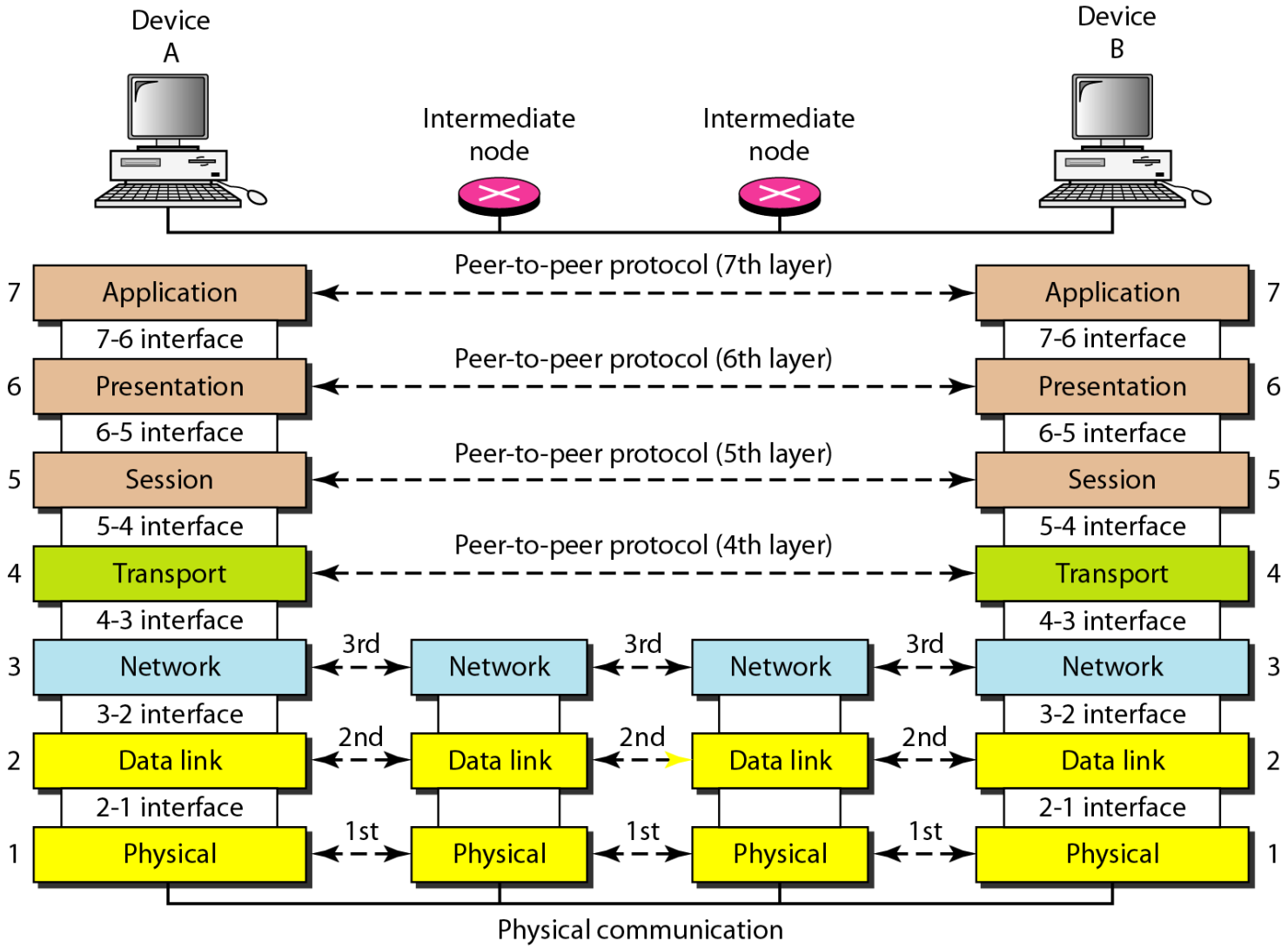
OSI Model



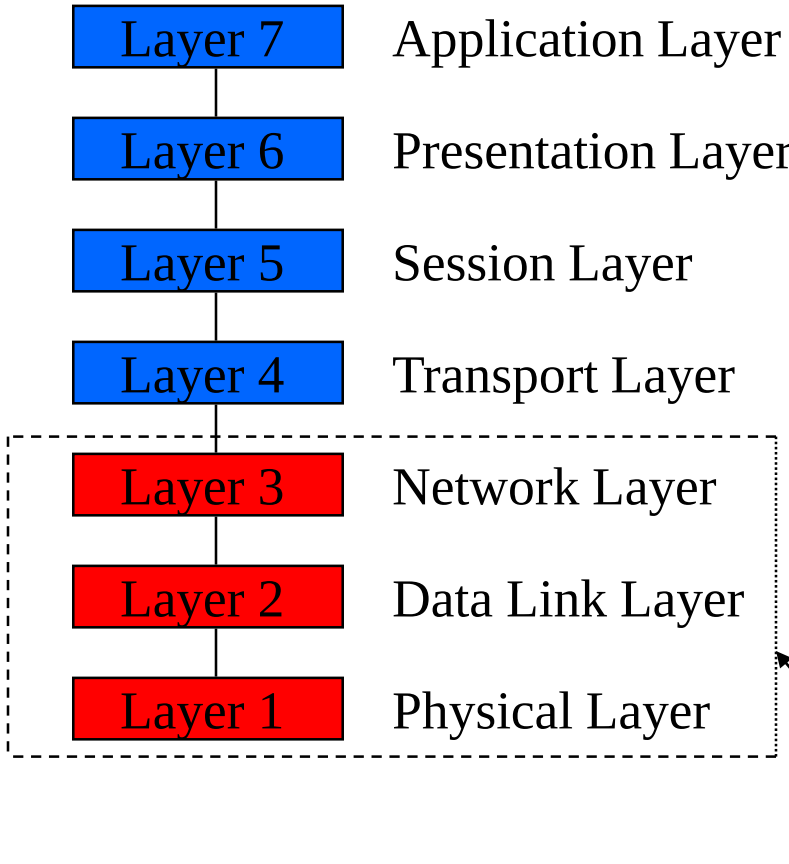
OSI Reference Model

- OSI Reference Model - internationally standardised network architecture.
- OSI = Open Systems Interconnection: deals with open systems, i.e. systems open for communications with other systems.
- Specified in ISO 7498.
- Model has 7 layers.

Interactions Between Layers



7-Layer OSI Model



Layers 1-4 relate to communications technology.

Layers 5-7 relate to user applications.

Layer 7: Application Layer

- Level at which applications access network services.
- Represents services that directly support software applications for file transfers, database access, and electronic mail etc.

Layer 6: Presentation Layer

- **Related to representation of transmitted data**
  - ✓ Translates different data representations from the Application layer into uniform standard format

- **Providing services for secure efficient data transmission**
  - ✓ e.g. data encryption, and data compression.

Layer 5: Session Layer

- **Allows two applications on different computers to establish, use, and end a session.**
  - ✓ e.g. file transfer, remote login
- **Establishes dialog control**
  - ✓ Regulates which side transmits, plus when and how long it transmits.
- **Performs token management and synchronization.**

Layer 4: Transport Layer

- **Manages transmission packets**
  - ✓ Repackages long messages when necessary into small packets for transmission
  - ✓ Reassembles packets in correct order to get the original message.

- **Handles error recognition and recovery.**
  - ✓ Transport layer at receiving acknowledges packet delivery.
  - ✓ Resends missing packets

Layer 3: Network Layer

- **Manages addressing/routing of data within the subnet**
  - ✓ Addresses messages and translates logical addresses and names into physical addresses.
  - ✓ Determines the route from the source to the destination computer
  - ✓ Manages traffic problems, such as switching, routing, and controlling the congestion of data packets.

- **Routing can be:**
  - ✓ Based on static tables
  - ✓ determined at start of each session
  - ✓ Individually determined for each packet, reflecting the current network load.

Layer 2: Data Link Layer

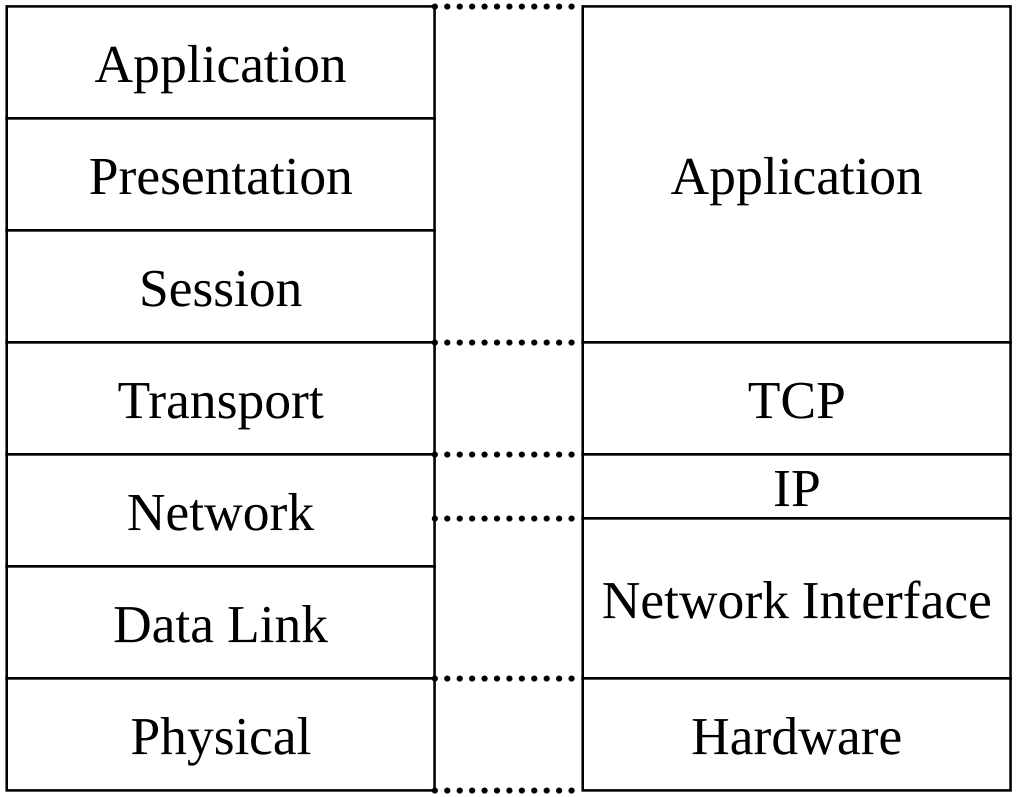
- **Packages raw bits from the Physical layer into frames (logical, structured packets for data).**

- **Provides reliable transmission of frames**
  - ✓ It waits for an acknowledgment from the receiving computer.
  - ✓ Retransmits frames for which acknowledgement not received

Layer 1: Physical Layer

- Transmits bits from one computer to another
- Regulates the transmission of a stream of bits over a physical medium.
- Defines how the cable is attached to the network adapter and what transmission technique is used to send data over the cable. Deals with issues like
  - ✓ The definition of 0 and 1, e.g. how many volts represents a 1, and how long a bit lasts?
  - ✓ Whether the channel is simplex or duplex?
  - ✓ How many pins a connector has, and what the function of each pin is?

Internet Protocols vs OSI



- Explicit Presentation and session layers missing in Internet Protocols
- Data Link and Network Layers redesigned

Services in the OSI Model

- In OSI model, each layer provide services to layer above, and ‘consumes’ services provided by layer below.
- Active elements in a layer called entities.
- Entities in same layer in different machines called peer entities.

Connections

- Layers can offer connection-oriented or connectionless services.
- Connection-oriented like telephone system.
- Connectionless like postal system.
- Each service has an associated Quality-of-service (e.g. reliable or unreliable).

Reliability

- Reliable services never lose/corrupt data.
- Reliable service costs more.
- Typical application for reliable service is file transfer.
- Typical application not needing reliable service is voice traffic.
- Not all applications need connections.

Network commands

hostname

hostname *with no options displays the machine's hostname*

hostname –d *displays the domain name the machine belongs to*

hostname –f *displays the fully qualified host and domain name*

hostname –i *displays the IP address for the current machine*

Network commands

ping

- It sends packets of information to the user-defined source. If the packets are received, the destination device sends packets back. Ping can be used for two purposes

  1. To ensure that a network connection can be established.
  2. Timing information as to the speed of the connection.

If you do **ping www.google.com** it will display its IP address.

Network commands

ifconfig

- View network configuration, it displays the current network adapter configuration. It is handy to determine if you are getting transmit (TX) or receive (RX) errors.

Network commands

netstat

- Most useful and very versatile for finding a connection to and from the host. You can find out all the multicast groups (network) subscribed by this host by issuing "netstat -g"

Network commands

Nslookup

- If you know the IP address it will display hostname. To find all the IP addresses for a given domain name, the command nslookup is used. You must have a connection to the internet for this utility to be useful,

- You can also use the **nslookup** to convert hostname to IP Address and from IP Address from the hostname.

Network commands

- **traceroute**
  A handy utility to view the number of hops and response time to get to a remote system or website is traceroute. Again you need an internet connection to make use of this tool.

- **finger**
  View user information, displays a user's login name, real name, terminal name and write status. this is pretty old Unix command and rarely used nowadays.

- **telnet**
  Connects destination host via the telnet protocol, if telnet connection establishes on any port means connectivity between two hosts is working fine.

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Thank You !!