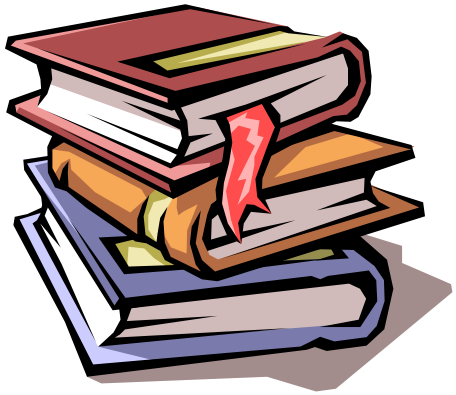


ISO-OSI Reference Model

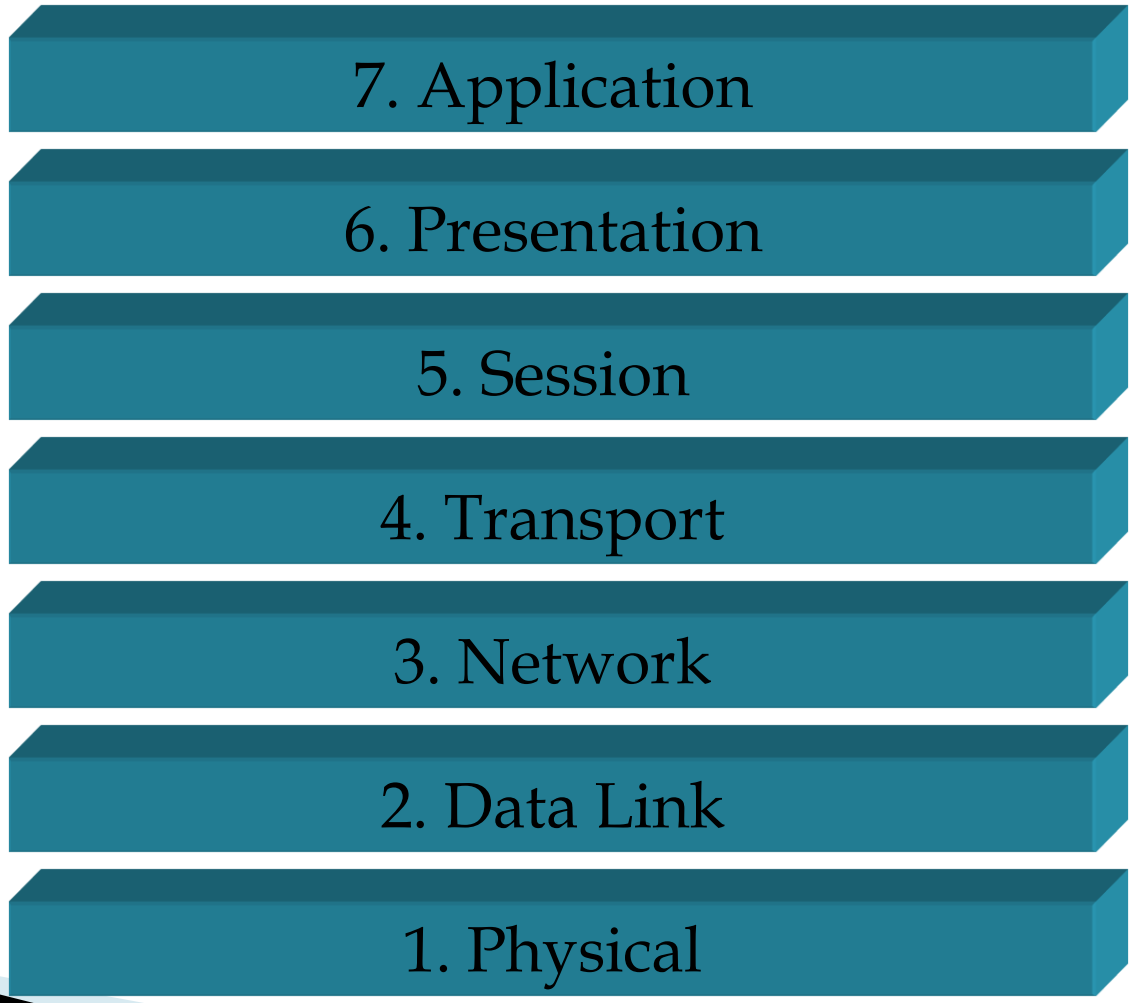
ISO and OSI Defined

- ISO
  - International Standards Organization
- OSI
  - Open Systems Interconnect

OSI Model Background

- Introduced in 1978 and revised in 1984
- Formulates the communication process into structured layers
- The model acts as a frame of reference in the design of communications and networking products

The Layered Approach to Communication



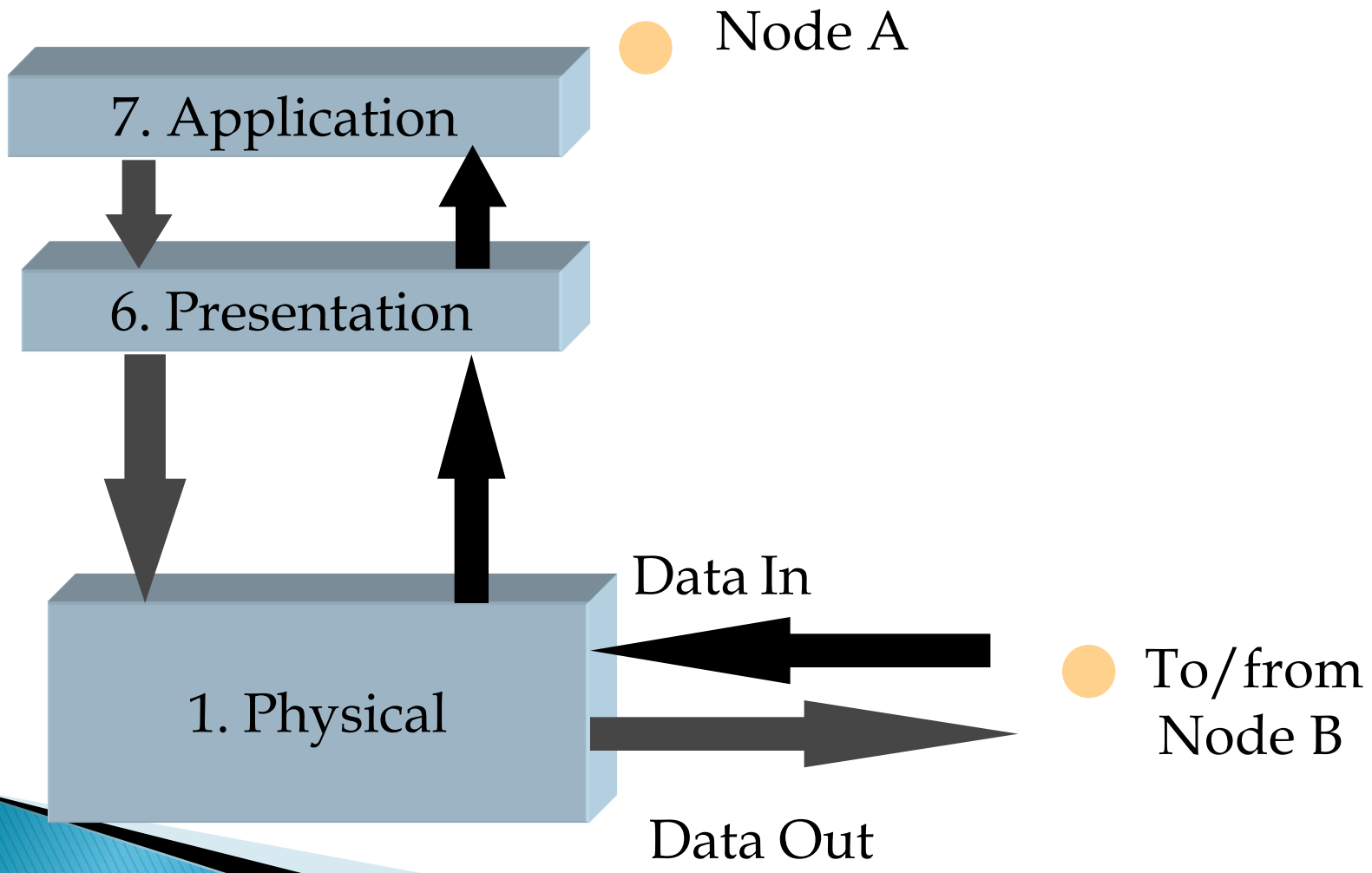
Division of Layers

Upper Layers

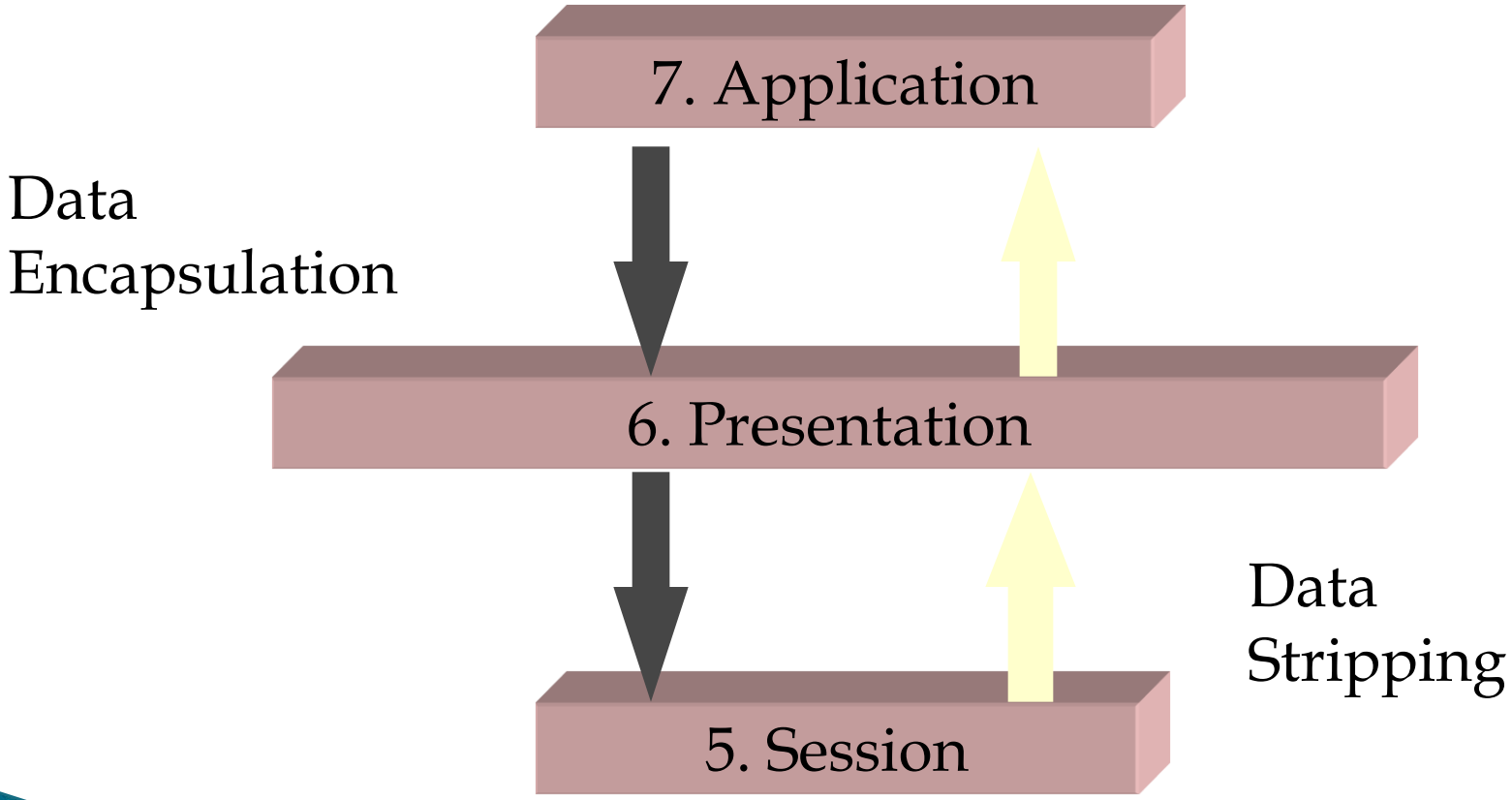
Middle Layer

Lower Layers

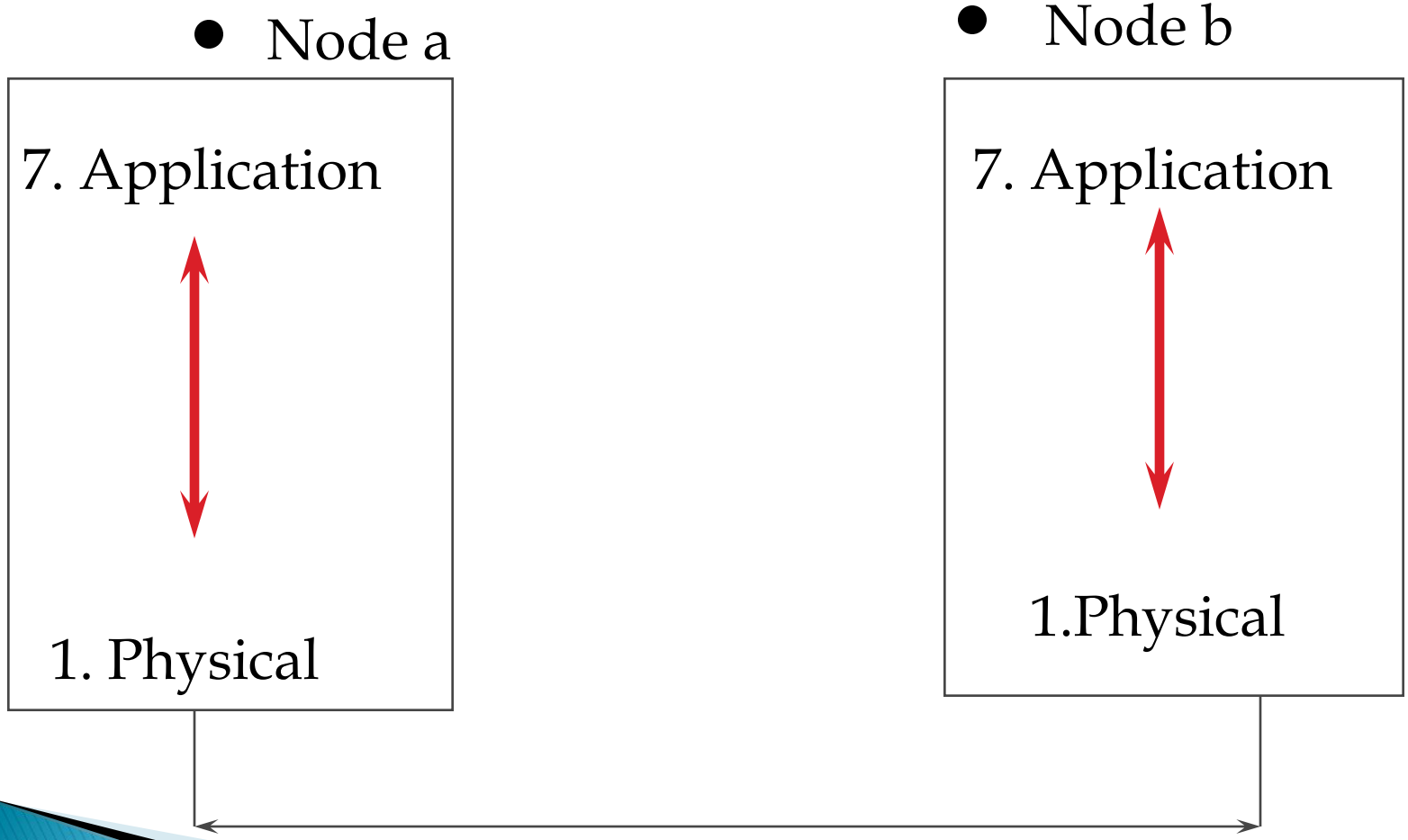
Role of Layers



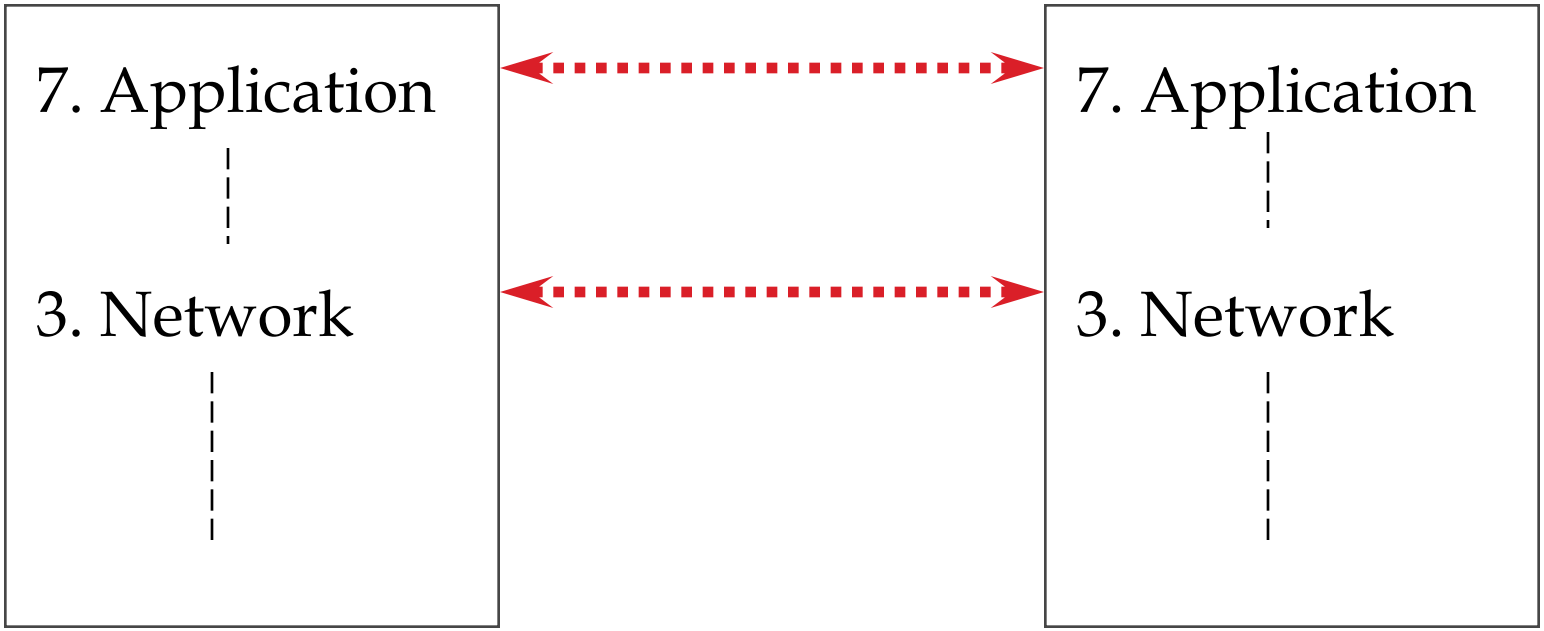
Communication Between Layers



The Role of Layers in Point-to-point Communication



Virtual Communication Between Layers



7. Application Layer

- Purpose
  - User application to network service interface
- Examples
  - File request from server
  - E-mail services
  - etc.

Application Layer Function

- General network access
- Flow control
- Error recovery

6. Presentation Layer

- Purpose
  - Formats data for exchange between points of communication
    - Ex: Between nodes in a network
- Example:
  - Redirector software
    - Formats for transmission to the server

Presentation Layer Function

- Protocol conversion
- Data translation
- Encryption
- Character set conversion
- Expansion of graphics command

5. Session Layer

- Purpose
  - Oversee a communication session
    - Establish
    - Maintain
    - Terminate

Session Layer Function

- Performs name recognition and related security
- Synchronization between sender and receiver
- Assignment of time for transmission
  - Start time
  - End time etc.

4. Transport Layer

- Purpose
  - Repackage proper and efficient delivery of packages
    - Error free
    - In sequence
    - Without duplication

Transport Layer Function

- For sending data
  - Repackage the message to fit into packets
    - Split long messages
    - Assemble small messages
- On receiving data
  - Perform the reverse
  - Send an acknowledgment to the sender
- Solve packet problems
  - During transmission and reception

3. Network Layer

- Purpose
  - Addressing and routing the packets
- Example application at the router
  - If the packet size is large, splits into small packets

Network Layer Function

- Address messages
- Address translation from logical to physical
  - Ex: nganesa ----------> 102.13.345.25
- Routing of data
  - Based on priority
  - Best path at the time of transmission
- Congestion control

2. Data Link Layer

- Purpose
  - Manages the flow of data over the physical media
- Responsible for error-free transmission over the physical media
- Assures error-free data submission to the Network Layer

Data Link Layer Function

- Point of origin
  - Packages data for transmission over physical line
- Receiving end
  - Packages data for submission to the network layer
- Deals with network transmission protocols
  - IEEE 802. protocols

Data Link Layer Subdivision

- Improvement to ISO Model
- Logical Link Control (LLC) sub-layer
  - Manages service access points (logical link)
  - Error and flow control
- Media Access Control (MAC) sub-layer
  - Applies directly to network card communication
  - Access control

Media Access Control Application

- Network Interface Card driver

1. Physical Layer

- Purpose
  - Deals with the transmission of 0s and 1s over the physical media
    - Translation of bits into signals
- Example
  - Pulse duration determination
  - Transmission synchronization
  - etc.

Physical Layer Function

- Encode bits into signals
  - Carry data from the h higher layers
- Define the interface to the card
  - Electrical
  - Mechanical
  - Functional
  - Example: Pin count on the connector