Online lecture notes

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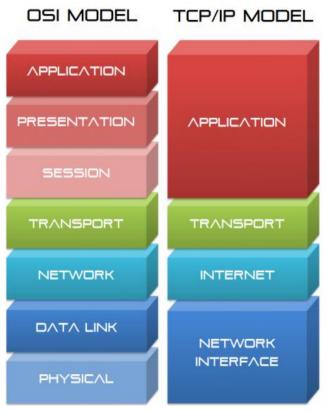
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Topic: Protocol Hierarchies



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A protocol hierarchy is a layered system of rules for computer



network communication, where each layer performs specific functions and provides services to the layer above it. This architecture simplifies design, modularity, enables and interoperability promotes by dividing complex communication tasks into smaller, manageable parts. Common examples seven-layer OSI include the (Open System Interconnection) model and the five-layer TCP/IP (Transmission Control Protocol/ Internet P rotocol) model, which organizes protocols into stacks that process data from the application layer down to the

physical layer for transmission and back up again at the receiving end.

How Protocol Hierarchies Work:

- Layered architecture: Protocols are organized into layers, with each layer performing a specific set of functions.
- Service to higher layers: Each layer provides services to the layer immediately above it, abstracting away the details of its own implementation.
- Interfaces: Layers interact with each other through well-defined interfaces.
- **Data flow**: When a device sends data, it moves down the stack, from the application layer to the physical layer, where it is transmitted over a medium like wires or radio waves.

- Peer-to-peer communication: At the receiving end, the data moves up the stack, with each layer interacting with its corresponding peer layer on the destination computer.
- Encapsulation: As data moves down the stack, each layer adds its own header (and sometimes a trailer), a process called encapsulation, to the data before passing it to the layer below.

Characteristics of Protocol

- Syntax: The format of the data being transferred.
- **Semantics**: The meaning of each bit and section of the data.
- Timings: The speed of data transfer and the timing of events during communication.

Benefits of protocol hierarchy

- **Modularity**: Network software is built as a stack of layers, making it easier to develop, manage, and update.
- **Interoperability**: Different vendors can develop hardware and software for different layers that can work together, as long as they adhere to the standards for their respective layers.
- Simplicity: Each layer is responsible for a specific task, simplifying the overall design and allowing developers to focus on one layer at a time.

Examples of models

- OSI model: A conceptual, seven-layer model that provides a detailed framework for network communication.
- TCP/IP model: A four or five-layer model that is the basis for the internet and most modern networks.