1.2 ISO / OSI

domenica 25 febbraio 2024 16:49

ISO/OSI (open system interconnection) Model
- Conceptual framework for computer network communication.
- Developed by ISO (International Standard Organization) in 1984.
- Divides network communication into distinct layers.
- Facilitates interoperability and standardization.
- ISO/IEC 7498-1: This standard, titled "Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model," provides a detailed overview and explanation of the OSI model.

Layers of ISO/OSI Model
1. Physical
2. Data Link
3. Network
4. Transport
5. Session
6. Presentation
7. Application

Layer	Layer Name	Functionality
7	Application Layer	Provides interface between application and network. Supports user processes like email, file transfer, etc.
6	Presentation Layer	Translates data between application and network formats. Handles encryption, compression, and data formatting.
5	Session Layer	Establishes, manages, and terminates sessions between applications. Controls dialogues between devices.
4	Transport Layer	Manages end-to-end communication. Ensures reliable and error-checked delivery of data.
3	Network Layer	Routes data packets across networks. Handles logical addressing and determines the best path for data.
2	Data Link Layer	Manages data framing and physical addressing. Ensures error-free transmission over the physical layer.
1	Physical Layer	Handles physical connections and signaling between devices. Transmits raw bitstream over the network medium.

socket

Key Concepts
- Layering: Separation of responsibilities.
- Layering anymore?

Analogy

1. Physical Layer: Sub-Atomic Particles
   - Fundamental building blocks of matter.
   - Analogous to physical signals in networks.
2. Data Link Layer: Atom Elements
   - Atoms combine to form molecules.
   - Analogous to framing and addressing data in networks.
3. Network Layer: Molecules
   - Molecules combine to form complex structures.
   - Analogous to routing and forwarding data packets in networks.
4. Transport Layer: Organic Molecules
   - Complex molecules essential for life processes.
   - Analogous to ensuring reliable transmission of data across networks.
5. Session Layer: DNA
   - Genetic material containing instructions for life.
   - Analogous to establishing, maintaining, and terminating connections in networks.
6. Presentation Layer: Proteins
   - Essential for cellular functions and structures.
   - Analogous to data translation, encryption, and compression in networks.
7. Application Layer: Cells
   - Basic units of life with specialized functions.
   - Analogous to end-user applications and services in networks.

ISO (some examples of standards)

information (office)

1. ISO 216: Paper Sizes: This standard specifies the dimensions of paper sizes such as A4, A3, etc., ensuring compatibility and consistency in paper dimensions globally.
2. ISO 8601: Date and Time Representation: This standard defines the internationally accepted way to represent dates and times, facilitating consistency in date and time formats across different systems and regions.
3. ISO 4217: Currency Codes: This standard provides three-letter codes for currencies used worldwide, enabling uniformity in currency representation and facilitating international transactions.
4. ISO 639: Language Codes: This standard defines two-letter and three-letter codes for representing languages, promoting consistency in language identification for computer systems and documents.
5. ISO 7810: Identification Cards: This standard specifies physical characteristics of identification cards, including size, thickness, and layout, ensuring interoperability and compatibility of ID cards.
6. ISO 9000: Quality Management Principles: While ISO 9000 is often associated with quality management systems, it also includes principles for quality management that can influence product features and specifications to ensure customer satisfaction and continual improvement.
7. ISO 3166: Country Codes: This standard provides two-letter and three-letter codes for representing countries and their subdivisions, facilitating international communication and data exchange.
8. ISO 9660: File System for Optical Discs: This standard defines the file system structure for optical discs, ensuring compatibility and interoperability of data storage across different platforms and devices.
9. ISO 13406: Ergonomic Requirements for Work with Visual Display Terminals (VDTs): This standard specifies ergonomic requirements for displays and workstations, influencing the design of products like computer monitors to reduce eye strain and fatigue.
10. ISO 14443: Contactless Smart Cards: This standard defines the physical characteristics and communication protocols for contactless smart cards, ensuring interoperability and security in applications like public transportation fare systems and access control.

processes

1. Quality Management Systems (QMS): ISO 9001 specifies requirements for a quality management system, helping organizations ensure consistent quality and customer satisfaction.
2. Environmental Management Systems (EMS): ISO 14001 provides guidelines for establishing and maintaining an effective environmental management system, aiding in environmental sustainability and compliance.
3. Information Security Management Systems (ISMS): ISO 27001 outlines requirements for establishing, implementing, maintaining, and continually improving an information security management system, ensuring confidentiality, integrity, and availability of information assets.
4. Occupational Health and Safety Management Systems (OHSMS): ISO 45001 specifies requirements for occupational health and safety management systems, helping organizations create safer working environments and prevent work-related injuries and illnesses.
5. Food Safety Management Systems (FSMS): ISO 22000 sets out requirements for a food safety management system, ensuring food safety throughout the food chain from production to consumption.
6. Energy Management Systems (EnMS): ISO 50001 provides a framework for organizations to establish, implement, maintain, and improve energy management systems, helping them enhance energy efficiency and reduce energy consumption.
7. Risk Management: ISO 31000 offers principles and guidelines on risk management processes, assisting organizations in identifying, assessing, and mitigating risks effectively.
8. Social Responsibility (SR): ISO 26000 provides guidance on social responsibility, helping organizations understand and address their social, economic, and environmental impacts.
9. Asset Management: ISO 55001 specifies requirements for an asset management system, assisting organizations in managing their assets effectively to achieve their objectives.
10. Medical Devices: ISO 13485 outlines requirements for quality management systems for medical devices, ensuring regulatory compliance and the safety and effectiveness of medical devices.

mechanics
hydraulic
electronic

1. ISO 68-1: ISO general purpose screw threads — Basic profile: This standard specifies the basic profile for ISO metric screw threads, including dimensions and tolerances, ensuring compatibility and interchangeability of screws across different applications.
2. ISO 262: Fasteners - ISO general-purpose metric screw threads - Selected sizes for screws, bolts and nuts: This standard specifies selected sizes for ISO metric screw threads, providing guidelines for the selection of screw sizes based on application requirements.
3. ISO 4762: Hexagon socket head cap screws: This standard specifies the dimensions and mechanical properties of hexagon socket head cap screws, ensuring uniformity in the design and performance of these fasteners.
4. ISO 898-1: Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread: This standard specifies the mechanical properties of carbon steel and alloy steel fasteners, including bolts, screws, and studs, ensuring their strength and reliability in various applications.
5. ISO 15170: Hydraulic fluid power — Hose assemblies — Dimensions, requirements: This standard specifies the dimensions and requirements for hydraulic hose assemblies, ensuring compatibility and safety in hydraulic systems.
6. ISO 7241: Hydraulic fluid power — Quick-action couplings for use at pressures of 20 MPa (200 bar) to 31,5 MPa (315 bar): This standard specifies quick-action couplings used in hydraulic systems, ensuring reliable and efficient connection and disconnection of hydraulic lines.
7. ISO 16028: Hydraulic fluid power — Flush-face type, quick-action couplings for use at pressures of 20 MPa (200 bar) to 31.5 MPa (315 bar): This standard specifies flush-face type quick-action couplings for hydraulic systems, minimizing fluid loss during connection and disconnection.
8. ISO 4401: Hydraulic fluid power — Four-port screw-in cartridge valves - Mounting surfaces: This standard specifies mounting surfaces for four-port screw-in cartridge valves used in hydraulic systems, ensuring compatibility and interchangeability of valves from different manufacturers.
9. ISO 4165: Road vehicles — Electrical connections — Double-pole connections — Dimensions and specific requirements: This standard specifies dimensions and requirements for double-pole electrical connections used in road vehicles, ensuring compatibility and safety in vehicle electrical systems.
10. ISO 15171: Road vehicles — Hydraulic braking systems — Non-petroleum-base hydraulic brake fluid compatibility: This standard specifies requirements for the compatibility of non-petroleum-base hydraulic brake fluids with hydraulic braking systems in road vehicles, ensuring safe and reliable braking performance.

From <https://chat.openai.com/c/0ef76fd2-f1ce-4a53-910d-843d8c505fbb>

- Not only layers but planes
  - Data Plane: Actual data transfer.
  - Control Plane: Routing and traffic control.
  - Management Plane: Resource management.

Service Access Point (SAP)
- Defined interface between layers.
- Facilitates communication between layers.
  - Request: Initiates communication.
  - Indication: Signals arrival of request.
  - Confirmation: Acknowledges receipt of request.
  - Response: Provides actual response.

Integration

- ISO/OSI model provides framework.
- Request-Indication-Confirmation-Response model governs communication flow within layers.
- SAPs enable interaction between layers.

Conclusion
- ISO/OSI model structures network communication.
- Request-Indication-Confirmation-Response model manages communication within layers.
- SAPs facilitate communication between layers.

In the OSI (Open Systems Interconnection) model, which is a conceptual framework used to understand and standardize the functions of a telecommunication or computing system without regard to its underlying internal structure and technology, the terms PDU (Protocol Data Unit) and SDU (Service Data Unit) are used to describe units of data at different layers.

PDU (Protocol Data Unit)
- Definition: The PDU represents a unit of data specified in a protocol of a given layer, which consists of protocol-specific control information and user data. The PDU varies depending on the layer in which it is used. For example, at the Network layer, the PDU is called a packet; at the Data Link layer, it's called a frame; and at the Transport layer, it's called a segment (in TCP) or a datagram (in UDP).
- Purpose: PDUs facilitate the communication between peers in the same layer across a network. The control information contained in a PDU is used by the protocols to manage the data delivery, including addressing, error checking, sequencing, and control information.

SDU (Service Data Unit)
- Definition: The SDU refers to the data that is passed down from an upper layer to a lower layer and is to be encapsulated into a PDU. It represents the payload or data that needs to be transmitted, upon which control information is added by the current layer's protocol to form the PDU.
- Purpose: SDUs provide a way to separate the data portion of a transmission from the control information, allowing for a clear distinction between the user data and the information needed to deliver it.

How They Work Together
- When data moves from an upper layer to a lower layer in the OSI model, the SDU (from the upper layer) becomes part of the PDU of the lower layer. Each layer adds its own header (and sometimes trailer) information to the SDU it receives, encapsulating it to form the PDU for that layer. This process is known as data encapsulation.
- As an example, when a message starts at the Application layer and moves down the layers to be sent over the network, it becomes encapsulated at each layer with headers (and trailers) relevant to the protocols used at each layer. This encapsulation process ensures that the data can be correctly interpreted and managed at each layer of the OSI model.

Da <https://chat.openai.com/c/5c7d3d7a-3205-4352-96d8-84ec8bd0f13d>