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Computer Network and Layers

Computer Network

Definition: A computer network is a collection of interconnected computers and devices that can communicate and share resources. These connections can be established through cables, wireless signals, or optical fibers, allowing for efficient data exchange and resource utilization across various locations.

Uses:

- **Resource Sharing**: Sharing hardware like printers and scanners, as well as software applications.
- **Communication**: Facilitating email, instant messaging, and video conferencing.
- **Data Sharing**: Enabling file sharing and access to centralized databases.
- **Internet Access**: Providing web browsing and online services.
- **Entertainment**: Supporting streaming of music, videos, and games, as well as online gaming.
- **Remote Access**: Allowing remote work and technical support.
- **Education**: Enhancing e-learning and collaborative learning experiences.
- **Business Operations**: Integrating Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems.

OSI Model: Layers and Their Uses

The OSI (Open Systems Interconnection) model is a conceptual framework used to understand and implement network protocols in seven distinct layers.

1. **Physical Layer**:
    - **Function**: Deals with the physical connection between devices, including cables, switches, and other hardware.
    - **Use**: Transmits raw bit streams over a physical medium.
2. **Data Link Layer**:
    - **Function**: Provides node-to-node data transfer and handles error detection and correction from the physical layer.
    - **Use**: Establishes and terminates connections between two physically connected nodes.
3. **Network Layer**:
    - **Function**: Manages device addressing, tracks the location of devices on the network, and determines the best way to move data.
    - **Use**: Routes data packets across different networks and handles logical addressing through IP addresses.

4. **Transport Layer**:
    - **Function**: Provides reliable data transfer services to the upper layers, ensuring complete data transfer with error checking and recovery.
    - **Use**: Segments and reassembles data into a data stream, handling flow control and error correction.
5. **Session Layer**:
    - **Function**: Manages sessions or connections between applications.
    - **Use**: Establishes, maintains, and terminates communication sessions.
6. **Presentation Layer**:
    - **Function**: Translates data between the application layer and the network format, encrypting and decrypting data as necessary.
    - **Use**: Ensures that data is in a usable format and is presented correctly to the application layer.
7. **Application Layer**:
    - **Function**: Provides network services directly to end-user applications.
    - **Use**: Facilitates user interaction with the network, handling protocols like HTTP, FTP, SMTP, and DNS.