SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF ARTIFICIAL INTELIGENCE & MACHINE LEARNING

23AMT302- COMPUTER NETWORK AND SECURITY

UNIT 1 – Introduction and Physical Layer

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Understanding the Application Layer

OSI Model Layer 7

It is the closest layer to the end user.

Network Services Provided

Supports user applications like browsers and email clients.

Data Handling

Manages data formatting, encryption, and session management.

The Application Layer ensures seamless interaction.

It connects user applications to network services.

This layer is vital for data presentation and security.

What Are Application Layer Protocols?

Define Rules

They establish communication guidelines for applications over networks.

Data Handling

Specify data formatting, transmission, and interpretation methods.

Ensure Interoperability

These protocols allow diverse software systems to work together.

Protocols are essential for network communication.

They ensure applications can speak the same language.

This enables specific functionalities like web browsing.

HTTP: Hypertext Transfer Protocol Overview

World Wide Web

HTTP is the core protocol for web data exchange.

TCP Ports

Operates on TCP ports 80 (HTTP) and 443 (HTTPS).

Stateless Model

Uses a request-response model between clients and servers.

HTTP forms the backbone of web communication.

It facilitates resource identification using URIs.

This protocol underpins all web browsing activities.

HTTP: Key Features & Evolution

1 — HTTP/1.1

Introduced persistent connections and pipelining requests.

2 — HTTP/2

Enabled multiplexing and server push for efficiency.

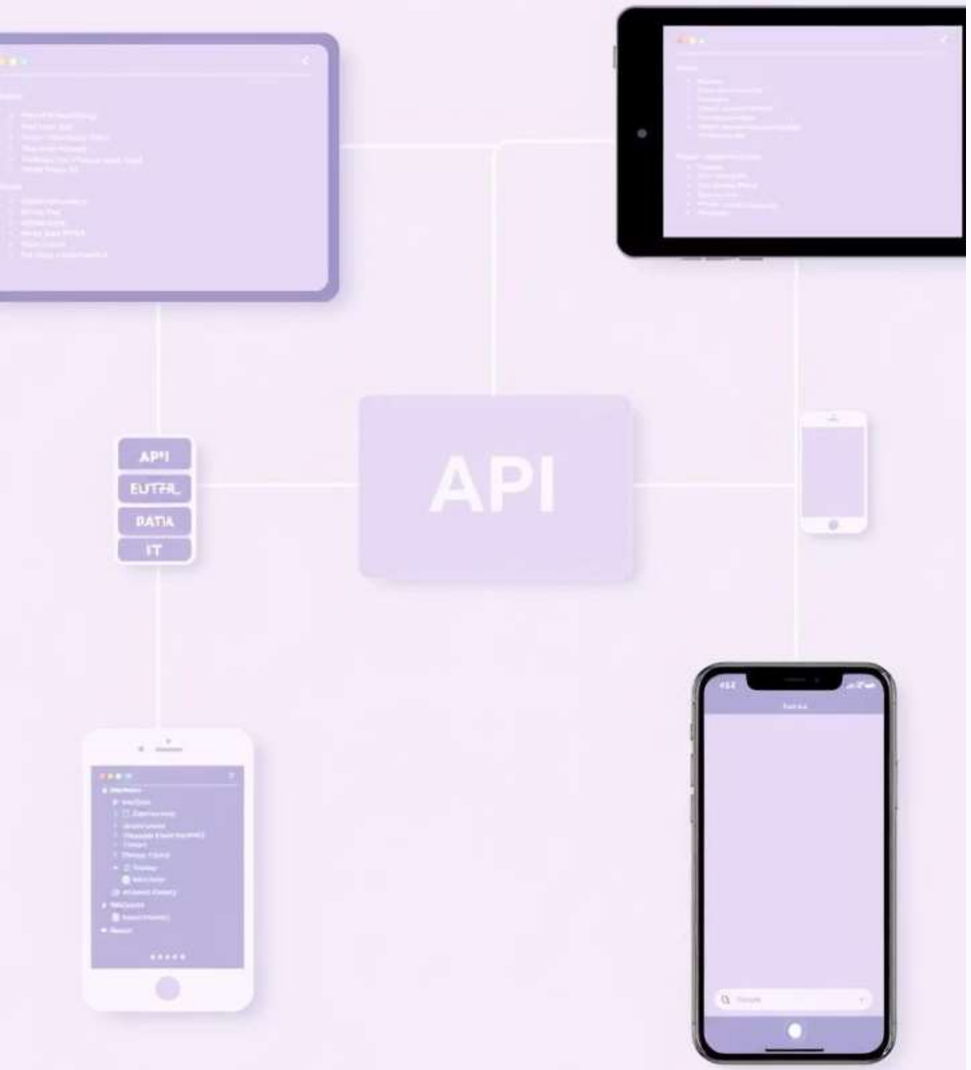
3 — HTTP/3

Based on QUIC (UDP), reducing latency and improving connection migration.

HTTP has continuously evolved for better performance.

Each version brought significant advancements.

Common methods include GET, POST, PUT, and DELETE.



HTTP: Common Use Cases & Importance

Web Browsing

Fundamental for loading web pages, images, and videos.

RESTful APIs

Powers web services communication via APIs.

Mobile Apps

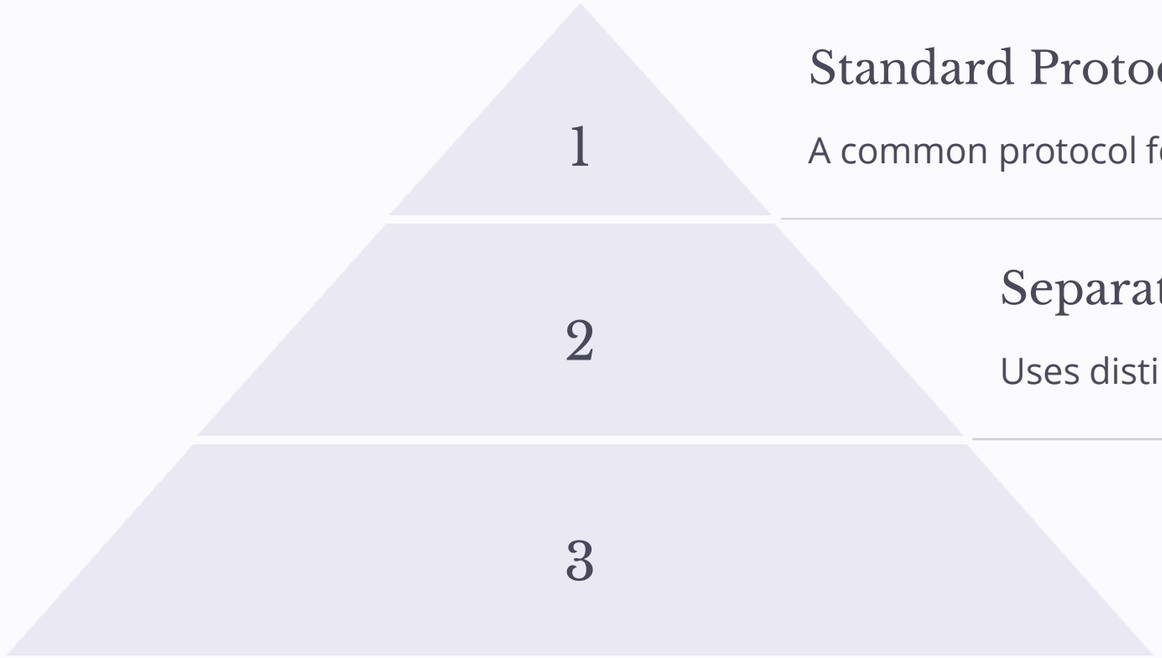
Enables mobile application interaction with backend servers.

HTTP is indispensable across digital services.

It drives web content delivery and app functionality.

Streaming media heavily relies on HTTP for segments.

FTP: File Transfer Protocol Overview



Standard Protocol

A common protocol for transferring computer files.

Separate Connections

Uses distinct control (port 21) and data (port 20 or dynamic) channels.

Bi-directional

Supports both uploading and downloading of files.

FTP is dedicated to file transfer operations.

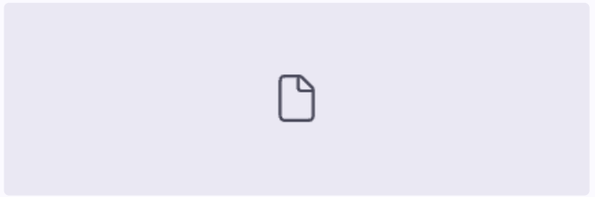
It pre-dates HTTP and handles bulk transfers.

Its dual-channel design optimizes file movement.

FTP: Operation Modes & Channels

Control Channel

Uses Port 21 for commands and responses.



Data Channel

Uses Port 20 or dynamic for file transfer.

Active Mode

Server initiates data connection to client.

Passive Mode

Client initiates data connection to server (firewall friendly).

FTP employs separate channels for control and data.

It has distinct modes for connection initiation.

Passive mode is commonly used with firewalls.

FTP: Use Cases & Security Considerations

Large File Transfer

Ideal for website updates and server backups.

Security Risk

Transmits credentials and data in plain text by default.

Secure Replacements

Superseded by FTPS (SSL/TLS) or SFTP (SSH).

FTP is used for bulk file transfers.

However, it poses significant security risks.

Secure alternatives are now widely adopted.

Conclusion: The Power of Application Layer Protocols

HTTP Dominance

- Web and API communication.
- Dynamic content delivery.
- Performance through evolution (HTTP/3).

FTP for Transfers

- Essential for file transfers.
- Secure variants (FTPS/SFTP) are preferred.
- Supports bulk data movement.

HTTP and FTP are cornerstones of internet functionality.

They ensure effective digital communication.

Continuous development improves security and efficiency.