File Transfer Protocol (FTP)

IT2234 Web services & Server Technologies

Introduction to FTP

- Standard protocol to exchange files over TCP/IP networks.
- Based on client-server architecture.
- Uses separate control and data connections.
- Main alternative: HTTP.

Features of FTP

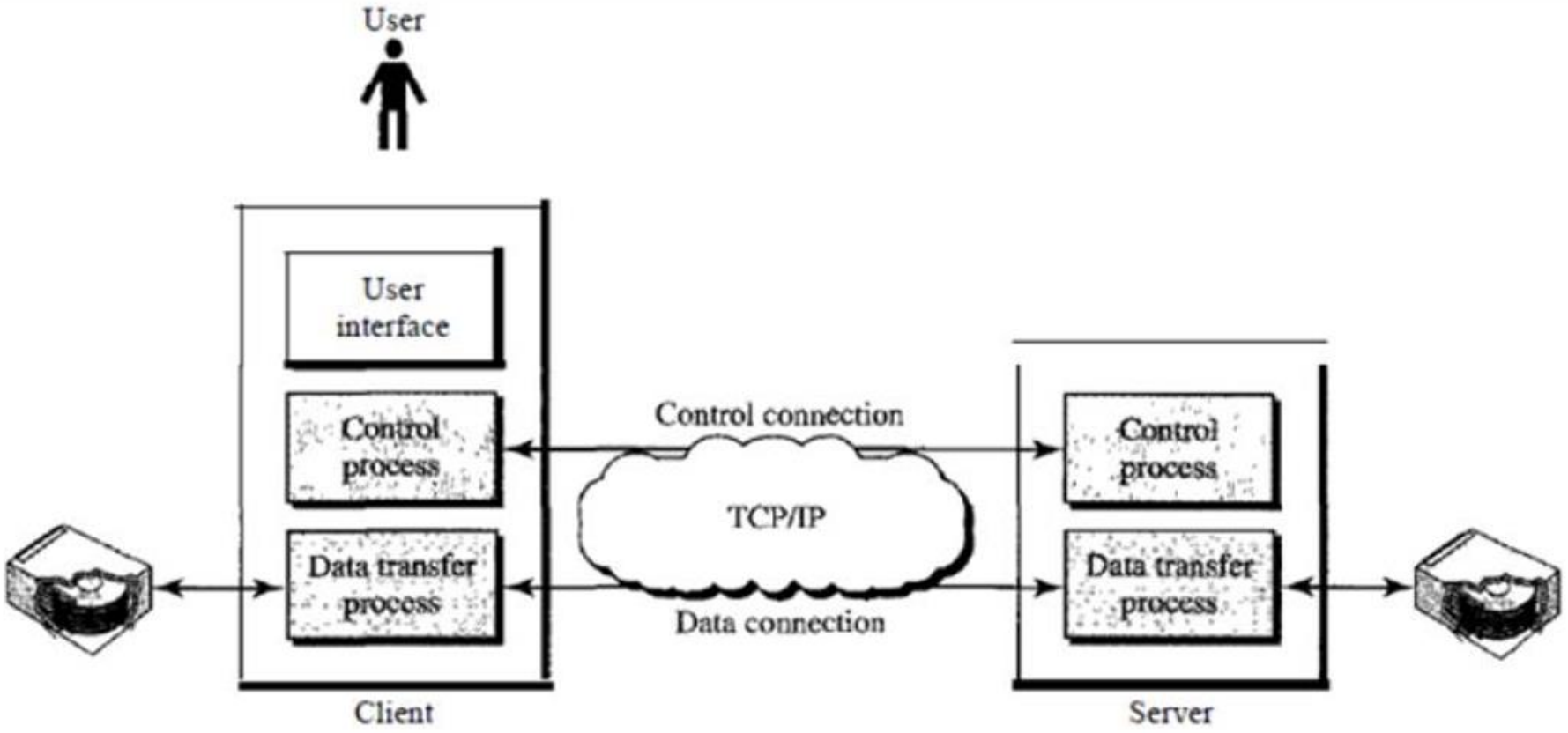
- Supports ASCII, EBCDIC, and binary file types.
- File organization: unstructured and structured.
- Transmission modes: Stream, Block, Compressed.
- Uses TCP for reliable transfer.
- Access control via login/password.

FTP Data Structures

- File structure: continuous stream of bytes.
- Record structure: text divided into records.
- Page structure: divided into numbered pages with headers.

FTP Model Overview

- Uses two TCP ports: 21 (Control), 20 (Data).
- Client: UI, control process, data transfer process.
- Server: control process, data transfer process.
- Control connection remains open; data opens per transfer.


User
User interface
Control process
Data transfer process
Client
Control connection
TCP/IP
Data connection
Control process
Data transfer process
Server

Control and Data Connection

- Control connection (Port 21): exchanges commands/responses.
- Data connection (Port 20): transfers files.
- Control uses Protocol Interpreter (PI) with NVT syntax.
- Data Transfer Process (DTP) handles actual file transfer.

FTP Operations

- RETR: retrieve file from server.
- STOR: store file to server.
- LIST: list directory contents.

Anonymous FTP

- Access without valid login credentials.
- Used for public file downloads.
- Username: 'anonymous'; password optional.

FTP Servers and Clients

- Servers may offer public (anonymous) or restricted access.
- Client software initiates connection to FTP daemon on server.
- Uses command (control) and data connections.

Transmission Modes

- ASCII Mode: text files.
- Binary Mode: binary files.
- Line Mode: enhanced ASCII, line-by-line transfer.

Data Representation

- File Types: ASCII, EBCDIC, Image, Local.
- Transmission Modes: Stream, Block, Compressed.

FTP Characteristics

- Uses TCP (connection-oriented).
- Port 21: control; Port 20: data.
- Persistent control connection, non-persistent data connection.

Example FTP Transaction

- USER → PASS → PORT → LIST → RETR → QUIT.
- Server responds with codes (220, 331, 230, etc.).
- Each command triggers specific server behavior.

Common FTP Commands

- USER, PASS, LIST, STOR, RETR, QUIT.
- PORT, TYPE, CWD, DELE, ABOR, SIZE, PWD.

Advantages of FTP

- Efficient bulk transfer.
- Can resume interrupted transfers.
- Organized directory transfers.
- Mode selection: ASCII/Binary.

Disadvantages of FTP

- Lacks security (no encryption).
- Credentials sent in plain text.
- Susceptible to attacks: spoofing, bounce, sniffing.
- Limited mobile access.