Secure FTP Client with Virus Scanning via ClamAVAgent

A. Overview

In this project, you will simulate a **real-world file transfer scenario** where files are scanned for viruses before being uploaded to a server. You will use **socket programming** to build communication between components and practice using the **FTP protocol** and **ClamAV antivirus engine**.

You will write **two programs** and work with an **FTP Server** setup:

1. A **custom FTP Client** to interact with an FTP Server and a ClamAV scanning service.
2. A **ClamAVAgent**, running on a separate machine, to receive files, scan them using `clamscan`, and return the result.

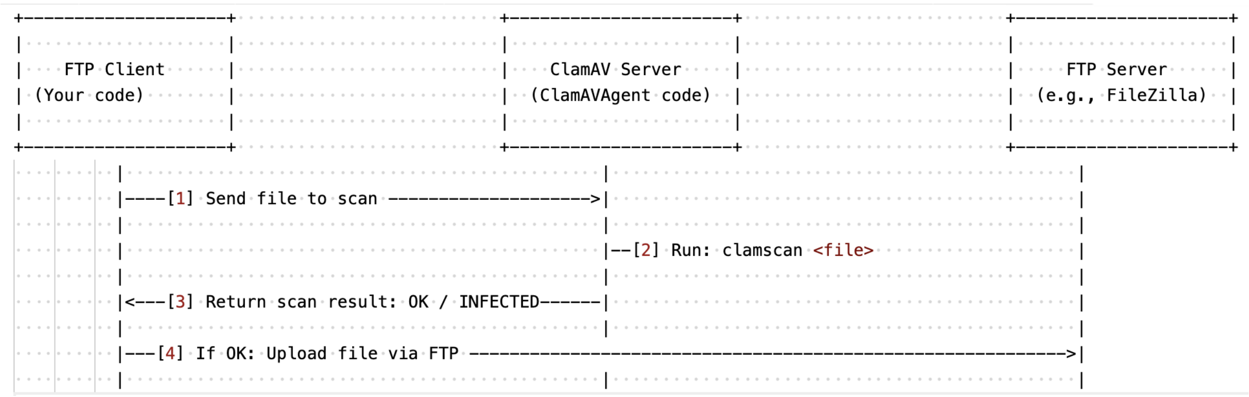
This lab will give you hands-on experience with:

- Client-server communication using sockets
- Protocols (FTP)
- File handling and virus scanning
- Command parsing and user interaction

B. What You Will Learn

- How to implement a simple FTP-like client that interacts with servers
- How to implement a server program to receive and scan files using antivirus tools
- How to integrate socket communication between different machines
- How to parse commands and build a command-line interface
- How to transfer files securely in controlled environments

C. System Components & Setup



```
+--------------------+                          +----------------------+                          +---------------------+
|                    |                          |                      |                          |                     |
|   FTP Client       |                          |   ClamAV Server      |                          |    FTP Server       |
| (Your code)        |                          |  (ClamAVAgent code)  |                          |  (e.g., FileZilla)  |
|                    |                          |                      |                          |                     |
+--------------------+                          +----------------------+                          +---------------------+
          |                                               |                                               |
          |----[1] Send file to scan -------------------->|                                               |
          |                                               |                                               |
          |                                               |--[2] Run: clamscan <file>                     |
          |                                               |                                               |
          |<---[3] Return scan result: OK / INFECTED------|                                               |
          |                                               |                                               |
          |---[4] If OK: Upload file via FTP ---------------------------------------------------------->|
          |                                               |                                               |
```

You need to **simulate 3 machines** (can be 3 actual machines or 3 terminal windows using different ports/IPs):

1. FTP Client (Your Code)

- Runs your main client application.
- Accepts FTP-like commands (e.g., `ls`, `put`, `get`, etc.).
- For every file upload to the FTP server (`put`, `mput`), it **first sends the file to the ClamAVAgent** for virus scanning.
  - If the result is `OK`, then it uploads the file to the FTP Server.
  - If the result is `INFECTED`, it aborts the upload and shows a warning.

2. ClamAV Server (ClamAVAgent – Your Code)

- Receives files from the FTP Client via a socket.
- Runs virus scanning using (with the ClamAV software, which can be downloaded from https://www.clamav.net/downloads):
  `clamscan <file>`
- Sends result (`OK` or `INFECTED`) back to the client.

3. FTP Server (Use any available software)

- Receives file uploads from the client.
- Can be FileZilla Server, vsftpd, or any tool the student prefers.

D. Functional Requirements

FTP Client Commands (MUST support)

1. File and Directory Operations

Command	Description
`ls`	List files and folders on the FTP server
`cd`	Change directory (on server or local)
`pwd`	Show the current directory on the server
`mkdir`, `rmdir`	Create or delete folders on the FTP server
`delete`	Delete a file on the FTP server
`rename`	Rename a file on the FTP server

2. Upload and Download

Command	Description
`get`, `recv`	Download a file from the FTP server
`put`	Upload a single file (must be scanned by ClamAVAgent before FTP upload)
`mput`	Upload multiple files (wildcard supported, all must be scanned first)
`mget`	Download multiple files
`prompt`	Toggle confirmation for `mget` / `mput` operations

3. Session Management

Command	Description
`ascii` / `binary`	Set file transfer mode (text/binary)
`status`	Show current session status

`passive`	Toggle passive FTP mode
`open`, `close`	Connect/disconnect to the FTP server
`quit`, `bye`	Exit the FTP client
`help`, `?`	Show help text for commands

E. Deliverables

1. Source Code

- `ftp_client.py` (or `ftp_client.cpp`, etc.)
- `clamav_agent.py` (or other language)
- Comments and documentation are required.
- File transfer must use sockets (not system copy).

2. README File

Include the following:

- Instructions to run the programs
- Sample commands and expected outputs
- FTP Server software used and how it was set up
- ClamAV installation and configuration

3. Report (PDF or Markdown)

- Overview of your system design
- Diagrams (architecture)
- Screenshots of a successful session
- Problems encountered and how you solved them
- Summary of how each requirement was fulfilled

F. Testing Checklist

Before submitting, make sure:

- You can list, rename, delete, and navigate files/folders on the FTP server.

- Upload is only allowed if the file is clean.
- ClamAVAgent correctly scans files and returns results.
- Wildcard (`mput`, `mget`) operations work.
- All commands behave as expected.
- All communication happens over sockets (not system shell calls except `clamscan`).

G. Grading Rubric (Total 10 Points)

No.	Requirement	Points
1	Uploads go through virus scanning (ClamAVAgent works)	2
2	File & folder management commands (`ls`, `cd`, etc.)	2
3	Upload/download with `put`, `get`, `mput`, `mget`	4
4	Session control (`open`, `status`, `quit`, etc.)	1.5
5	Report & instructions	0.5

H. Bonus Points (Up to 2.5 Points)

Bonus Feature	Points
GUI, Progress Bar, or real-time upload status in the client	+0.5
Supports **recursive upload/download** for folders	+0.5
Log file created for all file transfers and scans	+0.5

I. Group Requirement & Submission Guidelines

- This exercise must be completed in a group of 3 students.
- Only **one student from the group** needs to submit the assignment.
- Submit all files in a ZIP file to the course platform before the deadline.