HO CHI MINH UNIVERSITY OF SCIENCE

FACULTY OF INFORMATION TECHNOLOGY

FTP CLIENT WITH VIRUS SCANNING VIA CLAMAVAGENTS

LAB PROJECT - (Course: Computer Networking)

TEAM: Just2chillGuys

MEMBERS:

Trương Tấn Dũng - 24127026

Nguyễn Kinh Quốc - 24127230

SUPERVISOR(S): Nguyễn Thanh Quân

Ho Chi Minh City, August 2025

Acknowledgements

This project could not have been completed without the guidance of our instructor(s), the support of our families, and the collaboration of all team members. We sincerely thank our supervisor(s) for their invaluable feedback throughout the project, and we appreciate each teammate for their dedication and contributions.

1. Group Introduction

1.1 Group details

Group name: Just2chillGuys

1.2 Members information

Name	Student ID
Trương Tấn Dũng	24127026
Nguyễn Kinh Quốc	24127230

1.3 Individual contributions

Name	Student ID	Team role	Description
Trương Tấn Dũng	24127026	Networking(Transfer & ClamAV) UI/UX Designer, Report Writer	Implemented the upload/download, integrated the ClamAV scanning agent into the transfer flow and designed the Tkinter/CustomTkinter UI with thread-safe progress/logging, error handling, and timeouts
Nguyễn Kinh Quốc	24127230	Storage & Session Engineer, Report Writer	Implemented local/remote file & directory operations with conflict/overwrite policy and error reporting, built session management and authored the README with setup, usage, and troubleshooting

2. System Design Overview

2.1 Project Objectives & Boundaries

- **Socket-level FTP client for LAN:** Implement an FTP client that speaks RFC 959 over raw TCP sockets against a LAN server (e.g., FileZilla Server).

- **Protocol correctness:** Keep a persistent control socket (TCP/21) and open per-operation data sockets. Implement core verbs: USER, PASS, PWD/CWD, TYPE, PASV/PORT, LIST, RETR, STOR, QUIT.

- **Both data connection modes:** Support Passive (PASV) *and* Active (PORT). Default to PASV for simplicity; allow switching to Active (client advertises its IP/port and accepts the server's incoming data connection).

- **Both transfer modes:** Support Binary (TYPE I) as the safe default and ASCII (TYPE A) for text when CRLF normalization is needed.

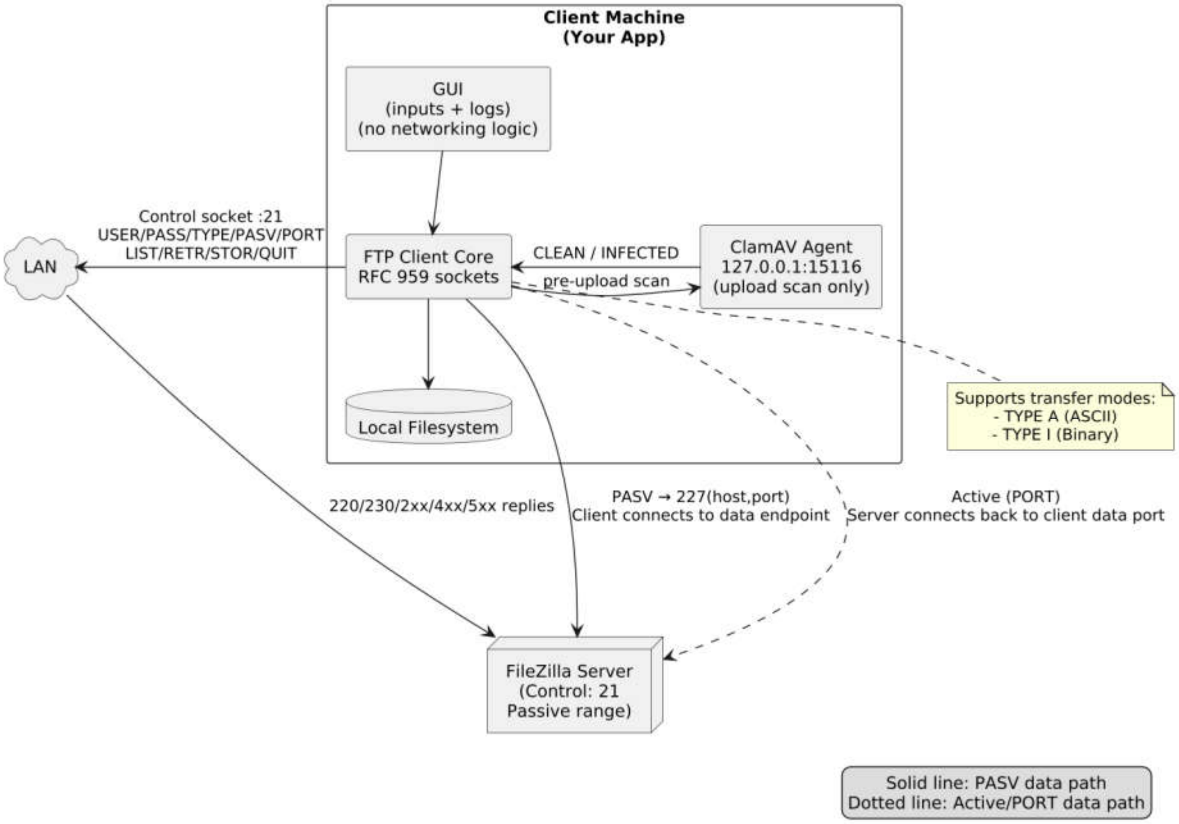
- **Upload-only malware scanning (ClamAV agent):** Before any upload, send the file to a local ClamAV agent over TCP (127.0.0.1:15116) using a simple header <filename><SEPARATOR><filesize>, stream the bytes, and only proceed with STOR if the agent replies CLEAN. (Downloads are not scanned.)

- **Response handling & robustness:** Parse single/multi-line replies; surface actionable errors (530, 550, 425/426) and apply socket timeouts with limited retries on transient failures.

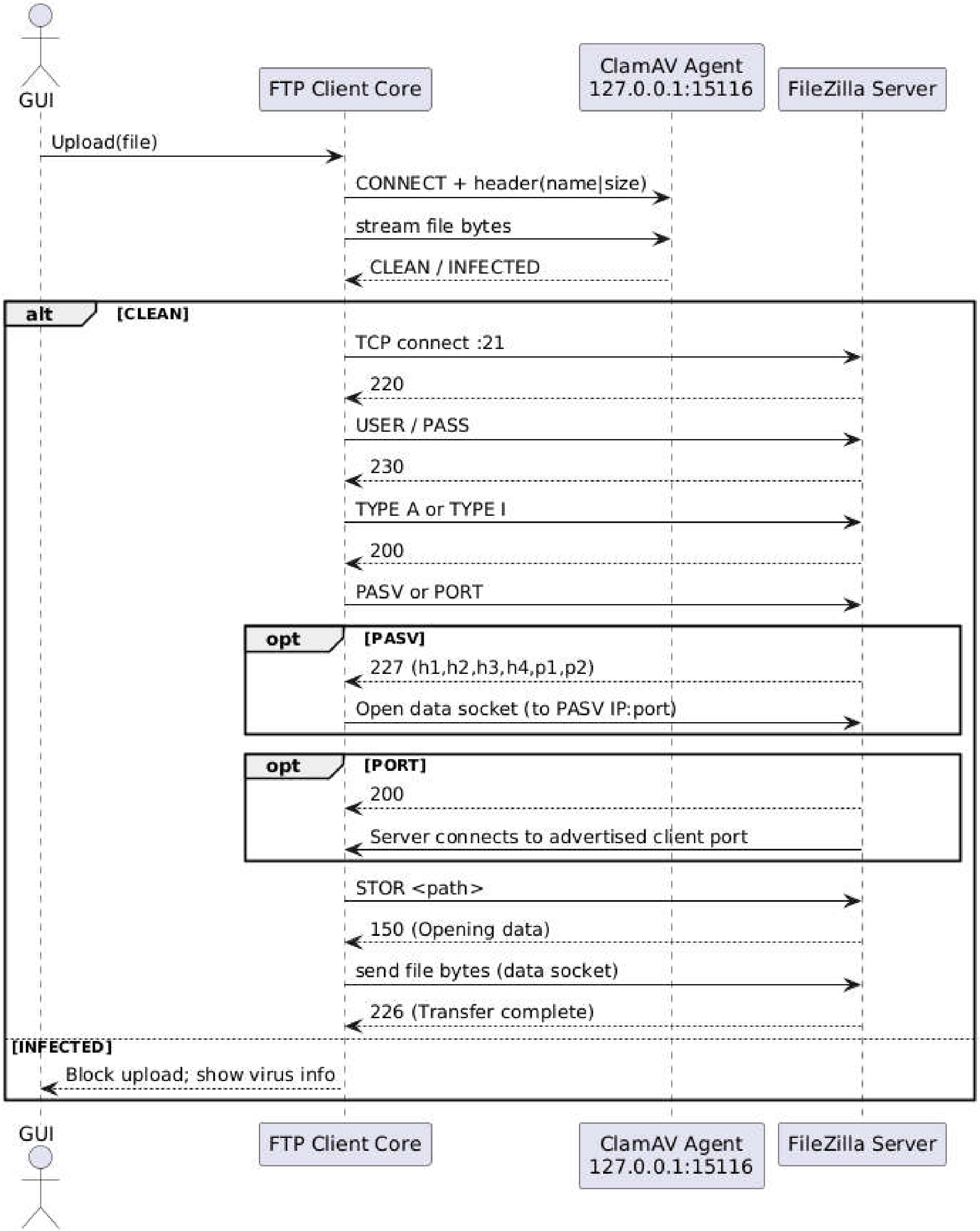
- **Optional security (RFC 4217):** Support Explicit FTPS — AUTH TLS on the control socket, PBSZ 0/PROT P for protected data channels when required.

- **Minimal GUI footprint:** The GUI collects inputs (host/port/credentials/paths), triggers the socket/scan flows, and displays logs/progress/scan results. All networking and scanning orchestration live outside the UI.

2.2 High-Level Architecture

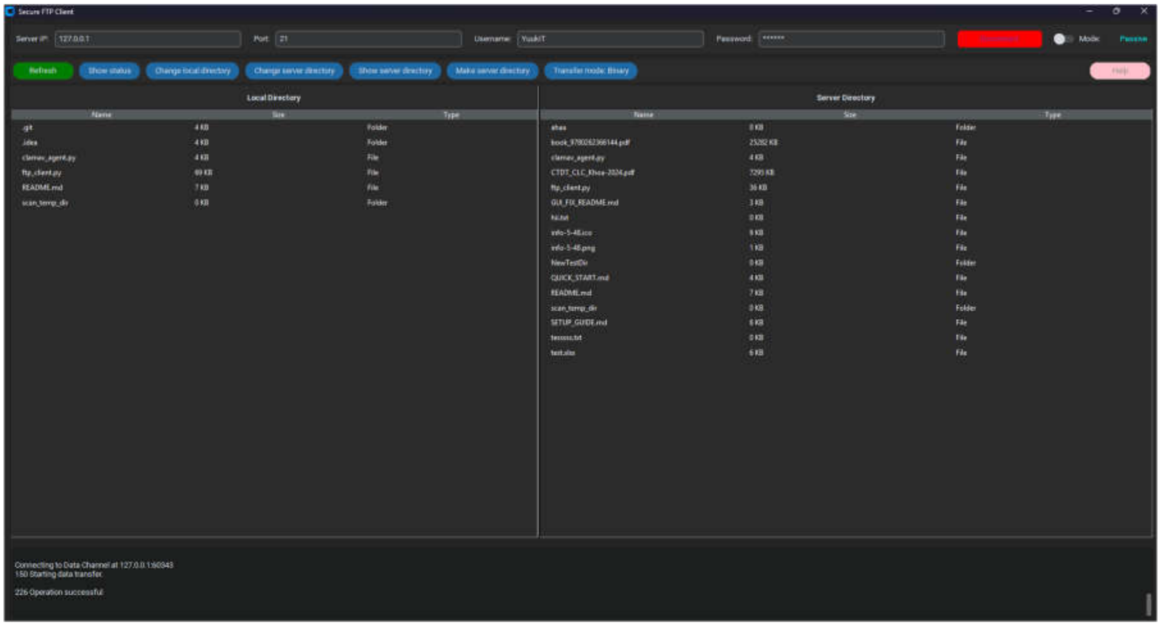


2.3 Upload Flow with ClamAV



3. Screenshots of successful sessions

3.1 Connect & Login



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
.git	4 KB	Folder
.idea	4 KB	Folder
clamav_agent.py	4 KB	File
ftp_client.py	69 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder

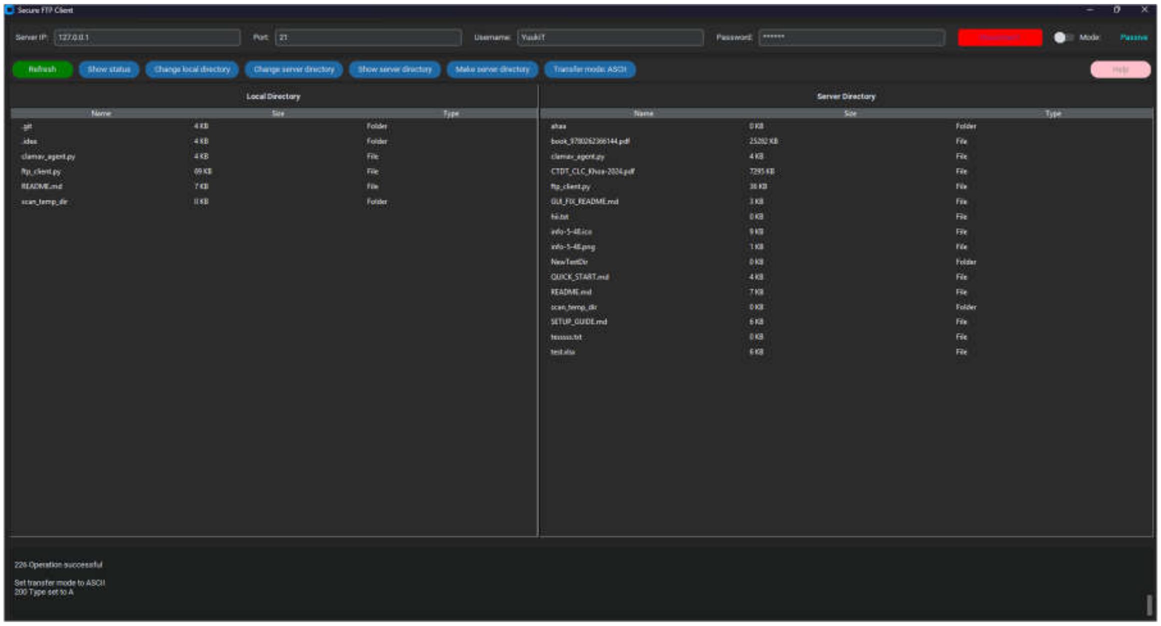
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
Connecting to Data Channel at 127.0.0.1:60343
150 Starting data transfer.

226 Operation successful.
```

3.2 Set up transfer mode



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
.git	4 KB	Folder
.idea	4 KB	Folder
clamav_agent.py	4 KB	File
ftp_client.py	69 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder

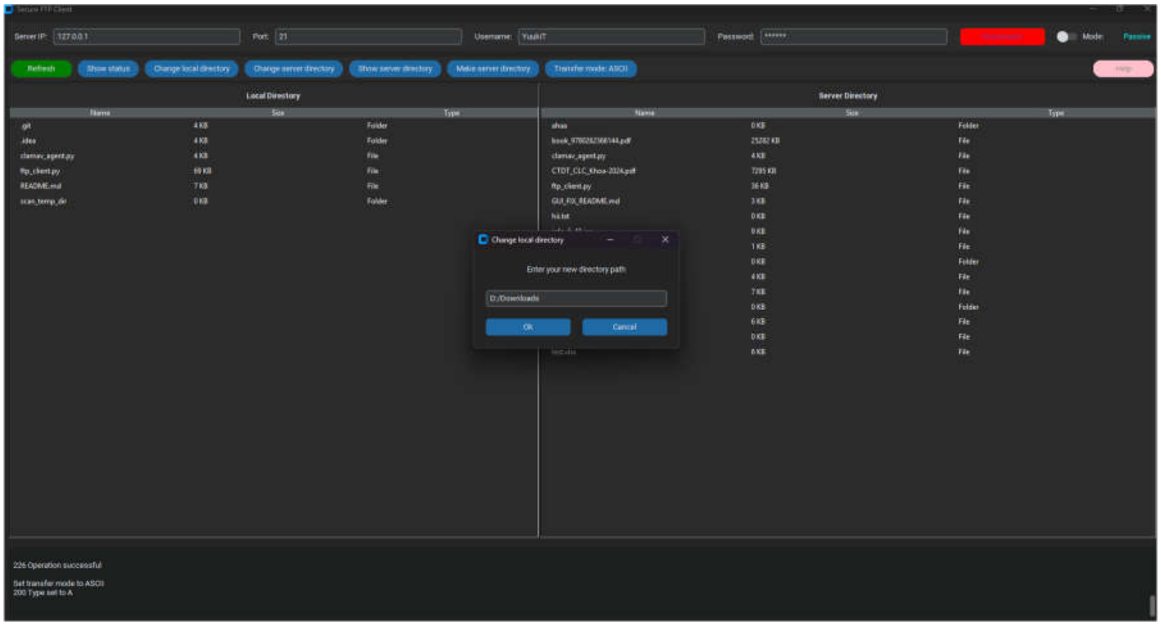
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
226 Operation successful.

Set transfer mode to ASCII
200 Type set to A
```

3.3 Change local/server directory



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Enter your new directory path

D:/Downloads

Local Directory

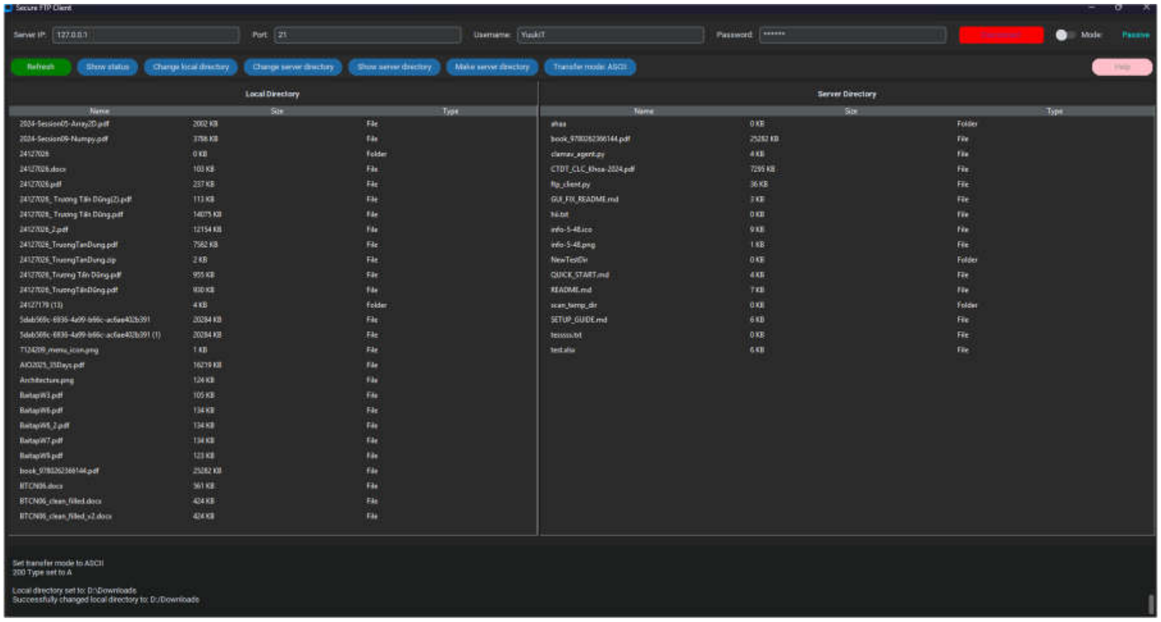
Name	Size	Type
.git	4 KB	Folder
.idea	4 KB	Folder
clamav_agent.py	4 KB	File
ftp_client.py	69 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder

Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
	9 KB	File
	1 KB	File
	0 KB	Folder
	4 KB	File
	7 KB	File
	0 KB	Folder
	6 KB	File
	0 KB	File
test.xlsx	6 KB	File

```
226 Operation successful

Set transfer mode to ASCII
200 Type set to A
```



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
2024-Session05-Array2D.pdf	2002 KB	File
2024-Session09-Numpy.pdf	3786 KB	File
24127026	0 KB	Folder
24127026.docx	103 KB	File
24127026.pdf	237 KB	File
24127026_ Truong Tấn Dũng(2).pdf	113 KB	File
24127026_ Truong Tấn Dũng.pdf	14075 KB	File
24127026_2.pdf	12154 KB	File
24127026_TruongTanDung.pdf	7562 KB	File
24127026_TruongTanDung.zip	2 KB	File
24127026_Trương Tấn Dũng.pdf	955 KB	File
24127026_TruongTấnDũng.pdf	930 KB	File
24127179 (13)	4 KB	Folder
5dab569c-6936-4a99-b66c-ac6ae402b391	20284 KB	File
5dab569c-6936-4a99-b66c-ac6ae402b391 (1)	20284 KB	File
7124209_menu_icon.png	1 KB	File
AIO2025_35Days.pdf	16219 KB	File
Architecture.png	124 KB	File
BaitapW3.pdf	105 KB	File
BaitapW6.pdf	134 KB	File
BaitapW6_2.pdf	134 KB	File
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	361 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File

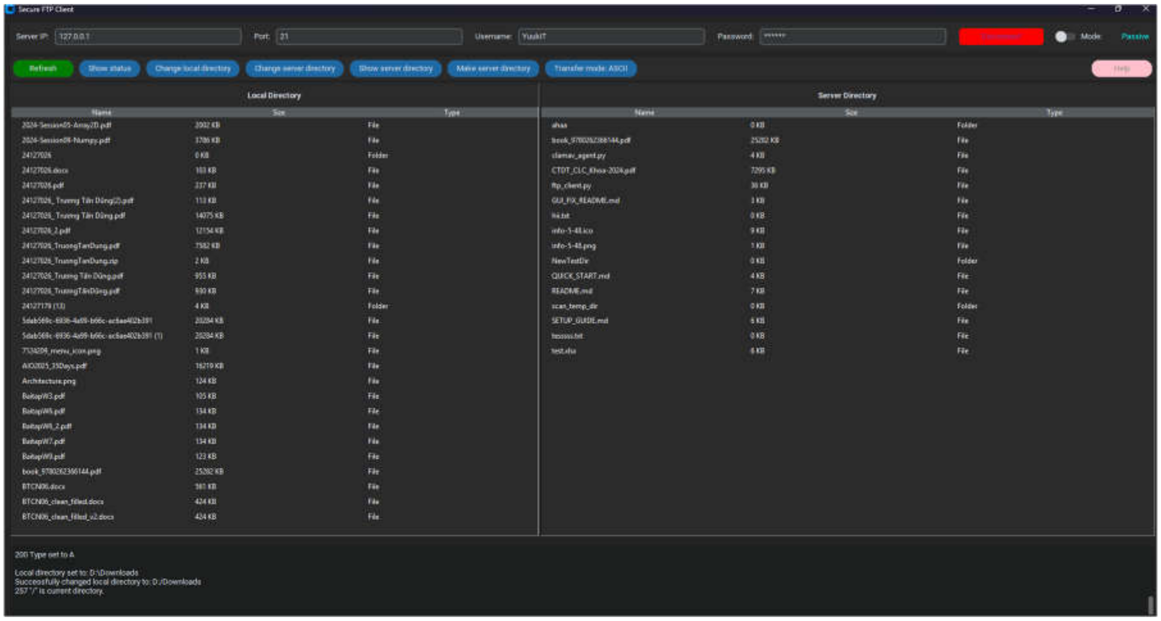
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
Set transfer mode to ASCII
200 Type set to A

Local directory set to: D:\Downloads
Successfully changed local directory to: D:/Downloads
```

3.4 Show server directory



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
2024-Session05-Array2D.pdf	2002 KB	File
2024-Session06-Numpy.pdf	3786 KB	File
24127026	0 KB	Folder
24127026.docx	103 KB	File
24127026.pdf	237 KB	File
24127026_ Trương Tấn Dũng(2).pdf	113 KB	File
24127026_ Trương Tấn Dũng.pdf	14075 KB	File
24127026_2.pdf	12154 KB	File
24127026_TruongTanDung.pdf	7582 KB	File
24127026_TruongTanDung.zip	2 KB	File
24127026_Trương Tấn Dũng.pdf	955 KB	File
24127026_TrươngTấnDũng.pdf	930 KB	File
24127179 (13)	4 KB	Folder
5dab569c-6936-4a99-b66c-ac6ae402b391	20284 KB	File
5dab569c-6936-4a99-b66c-ac6ae402b391 (1)	20284 KB	File
7124209_menu_icon.png	1 KB	File
AIO2025_35Days.pdf	16219 KB	File
Architecture.png	124 KB	File
BaitapW3.pdf	105 KB	File
BaitapW5.pdf	134 KB	File
BaitapW5_2.pdf	134 KB	File
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File

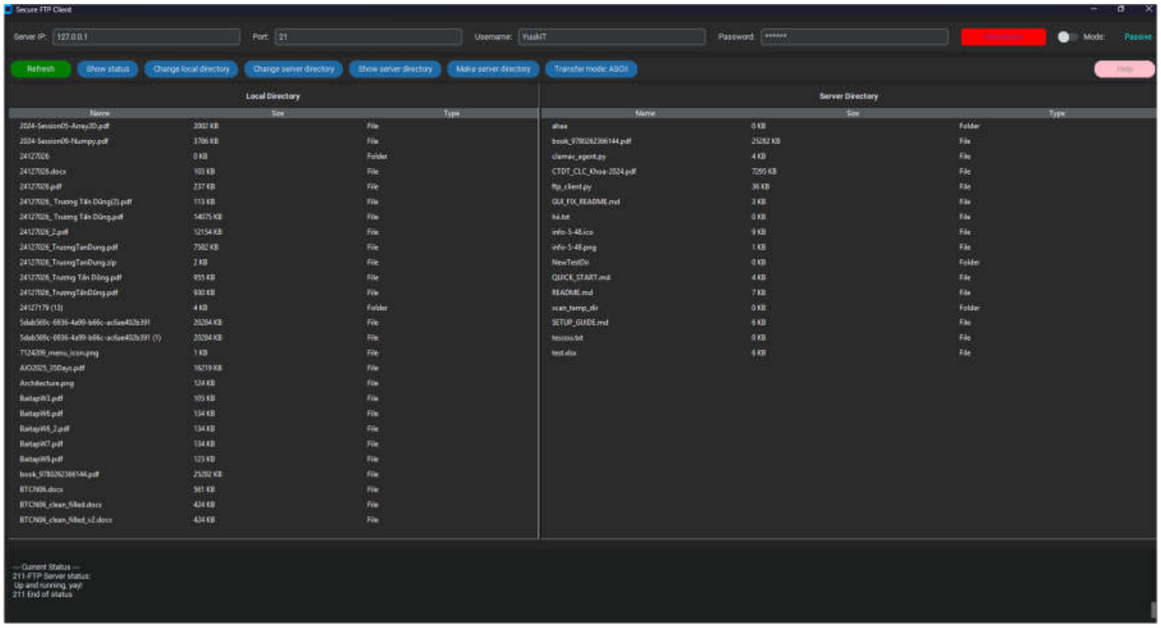
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	30 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
testsss.txt	0 KB	File
test.xlsx	6 KB	File

```
200 Type set to A

Local directory set to: D:\Downloads
Successfully changed local directory to: D:/Downloads
257 "/" is current directory.
```

3.4 Show status:



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

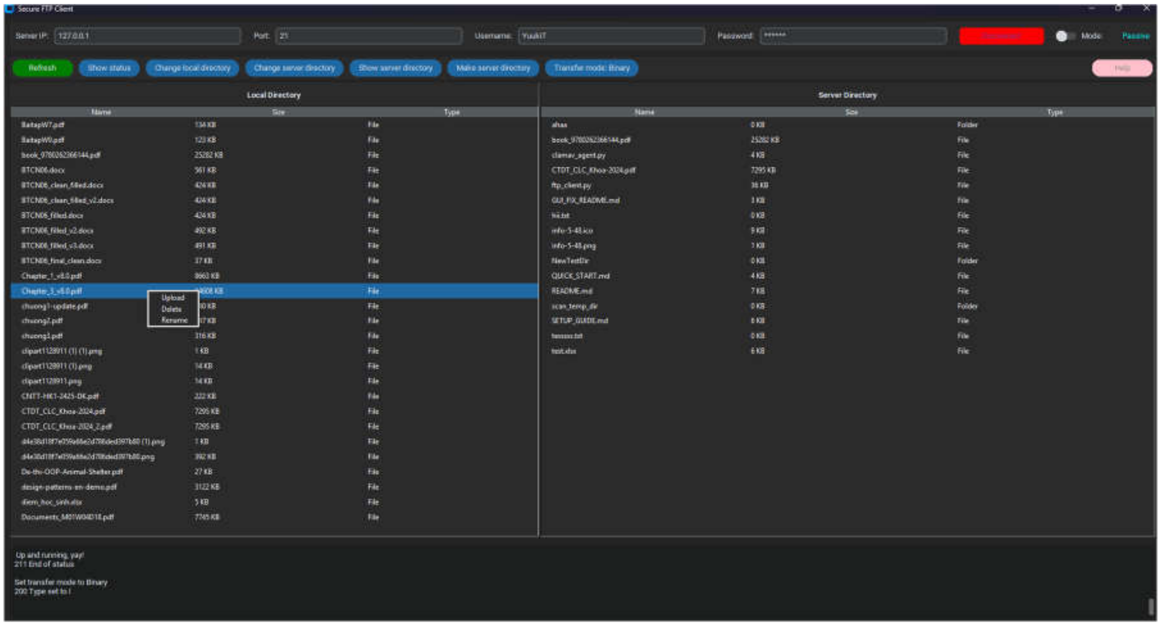
Name	Size	Type
2024-Session05-Array2D.pdf	2002 KB	File
2024-Session06-Numpy.pdf	3786 KB	File
24127026	0 KB	Folder
24127026.docx	103 KB	File
24127026.pdf	237 KB	File
24127026_ Trương Tấn Dũng(2).pdf	113 KB	File
24127026_ Trương Tấn Dũng.pdf	14075 KB	File
24127026_2.pdf	12154 KB	File
24127026_TruongTanDung.pdf	7582 KB	File
24127026_TruongTanDung.zip	2 KB	File
24127026_Trương Tấn Dũng.pdf	955 KB	File
24127026_TrươngTấnDũng.pdf	930 KB	File
24127179 (13)	4 KB	Folder
5dab569c-6936-4a99-b66c-ac6ae402b391	20284 KB	File
5dab569c-6936-4a99-b66c-ac6ae402b391 (1)	20284 KB	File
7124209_menu_icon.png	1 KB	File
AIO2025_35Days.pdf	16219 KB	File
Architecture.png	124 KB	File
BaitapW3.pdf	105 KB	File
BaitapW5.pdf	134 KB	File
BaitapW5_2.pdf	134 KB	File
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File

Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	30 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
testsss.txt	0 KB	File
test.xlsx	6 KB	File

```
--- Current Status ---
211-FTP Server status:
 Up and running, yay!
211 End of status
```

3.5 Upload



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

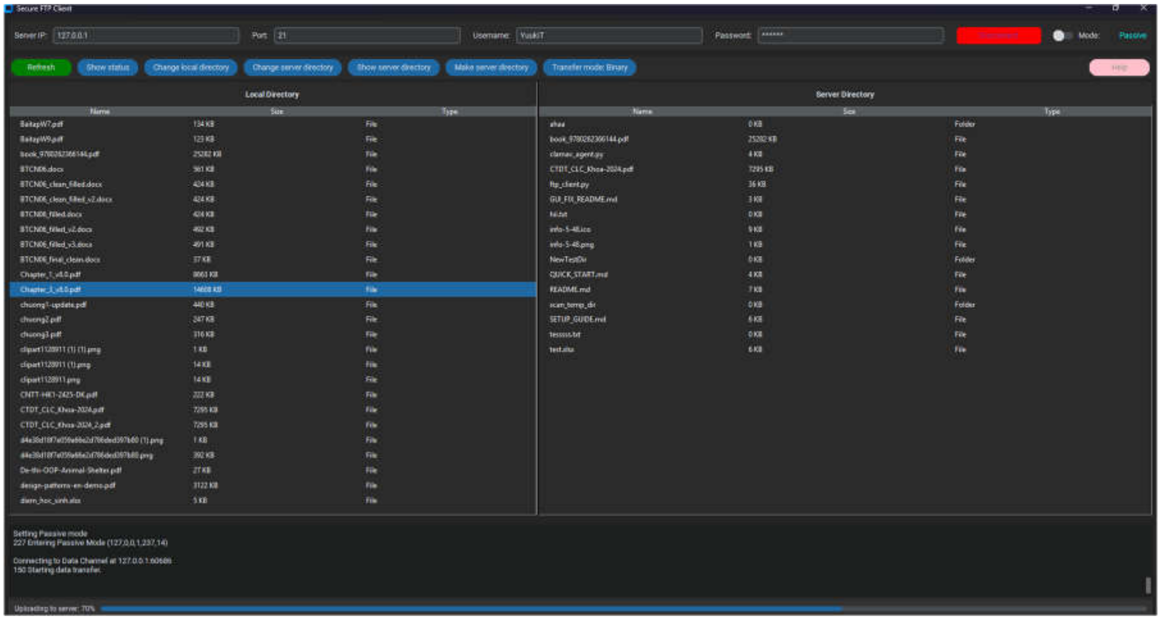
Name	Size	Type
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File
BTCN06_filled.docx	424 KB	File
BTCN06_filled_v2.docx	492 KB	File
BTCN06_filled_v3.docx	491 KB	File
BTCN06_final_clean.docx	37 KB	File
Chapter_1_v8.0.pdf	8663 KB	File
Chapter_3_v8.0.pdf	4608 KB	File
chuong1-update.pdf	0 KB	File
chuong2.pdf	7 KB	File
chuong3.pdf	316 KB	File
clipart1128911 (1) (1).png	1 KB	File
clipart1128911 (1).png	14 KB	File
clipart1128911.png	14 KB	File
CNTT-HK1-2425-DK.pdf	222 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
CTDT_CLC_Khoa-2024_2.pdf	7295 KB	File
d4e38d18f7e059e66e2d786ded397b80 (1).png	1 KB	File
d4e38d18f7e059e66e2d786ded397b80.png	392 KB	File
De-thi-OOP-Animal-Shelter.pdf	27 KB	File
design-patterns-en-demo.pdf	3122 KB	File
diem_hoc_sinh.xlsx	5 KB	File
Documents_M01W04D18.pdf	7745 KB	File

Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tessss.txt	0 KB	File
test.xlsx	6 KB	File

```
Up and running, yay!
211 End of status

Set transfer mode to Binary
200 Type set to I
```



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File
BTCN06_filled.docx	424 KB	File
BTCN06_filled_v2.docx	492 KB	File
BTCN06_filled_v3.docx	491 KB	File
BTCN06_final_clean.docx	37 KB	File
Chapter_1_v8.0.pdf	8663 KB	File
Chapter_3_v8.0.pdf	14608 KB	File
chuong1-update.pdf	440 KB	File
chuong2.pdf	247 KB	File
chuong3.pdf	316 KB	File
clipart1128911 (1) (1).png	1 KB	File
clipart1128911 (1).png	14 KB	File
clipart1128911.png	14 KB	File
CNTT-HK1-2425-DK.pdf	222 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
CTDT_CLC_Khoa-2024_2.pdf	7295 KB	File
d4e38d18f7e059e66e2d786ded397b80 (1).png	1 KB	File
d4e38d18f7e059e66e2d786ded397b80.png	392 KB	File
De-thi-OOP-Animal-Shelter.pdf	27 KB	File
design-patterns-en-demo.pdf	3122 KB	File
diem_hoc_sinh.xlsx	5 KB	File

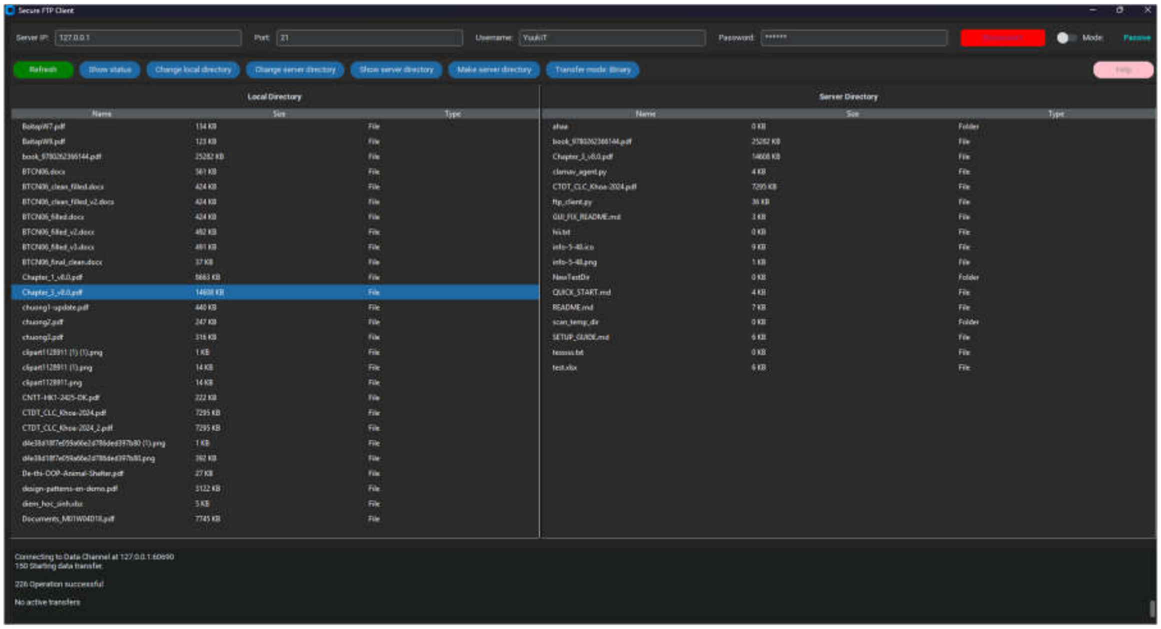
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tessss.txt	0 KB	File
test.xlsx	6 KB	File

```
Setting Passive mode
227 Entering Passive Mode (127,0,0,1,237,14)

Connecting to Data Channel at 127.0.0.1:60686
150 Starting data transfer.
```

Uploading to server: 70%



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File
BTCN06_filled.docx	424 KB	File
BTCN06_filled_v2.docx	482 KB	File
BTCN06_filled_v3.docx	481 KB	File
BTCN06_final_clean.docx	37 KB	File
Chapter_1_v8.0.pdf	5663 KB	File
Chapter_3_v8.0.pdf	14608 KB	File
chuong1-update.pdf	440 KB	File
chuong2.pdf	247 KB	File
chuong3.pdf	316 KB	File
clipart1128911 (1) (1).png	1 KB	File
clipart1128911 (1).png	14 KB	File
clipart1128911.png	14 KB	File
CNTT-HK1-2425-DK.pdf	222 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
CTDT_CLC_Khoa-2024_2.pdf	7295 KB	File
d4e38d18f7e059a66e2d786ded397b80 (1).png	1 KB	File
d4e38d18f7e059a66e2d786ded397b80.png	362 KB	File
De-thi-OOP-Animal-Shelter.pdf	27 KB	File
design-patterns-en-demo.pdf	3122 KB	File
diem_hoc_sinh.xlsx	5 KB	File
Documents_M01W04D18.pdf	7745 KB	File

Server Directory

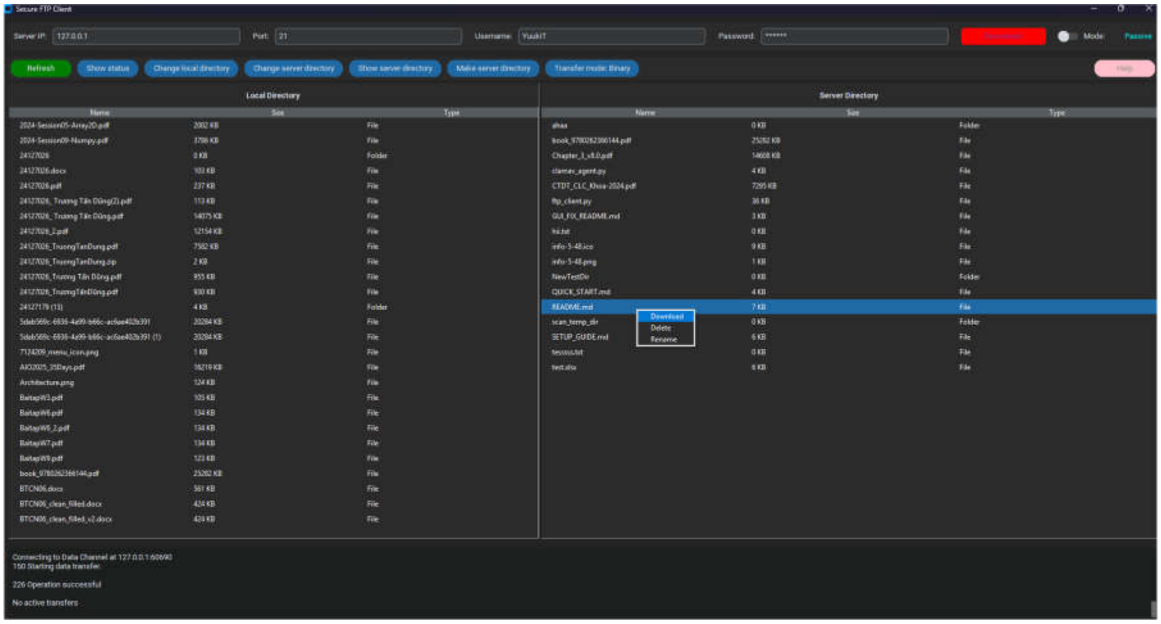
Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
Chapter_3_v8.0.pdf	14608 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
Connecting to Data Channel at 127.0.0.1:60690
150 Starting data transfer.

226 Operation successful

No active transfers
```

3.6 Download



Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ****** Mode: Passive

Local Directory

Name	Size	Type
2024-Session05-Array2D.pdf	2002 KB	File
2024-Session09-Numpy.pdf	3786 KB	File
24127026	0 KB	Folder
24127026.docx	103 KB	File
24127026.pdf	237 KB	File
24127026_ Trương Tấn Dũng(2).pdf	113 KB	File
24127026_ Trương Tấn Dũng.pdf	14075 KB	File
24127026_2.pdf	12154 KB	File
24127026_TruongTanDung.pdf	7582 KB	File
24127026_TruongTanDung.zip	2 KB	File
24127026_Trương Tấn Dũng.pdf	855 KB	File
24127026_TrươngTấnDũng.pdf	930 KB	File
24127179 (13)	4 KB	Folder
5dab569c-6936-4a99-b66c-ac6ae402b391	20284 KB	File
5dab569c-6936-4a99-b66c-ac6ae402b391 (1)	20284 KB	File
7124209_menu_icon.png	1 KB	File
AIO2025_35Days.pdf	16219 KB	File
Architecture.png	124 KB	File
BaitapW3.pdf	105 KB	File
BaitapW6.pdf	134 KB	File
BaitapW6_2.pdf	134 KB	File
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File

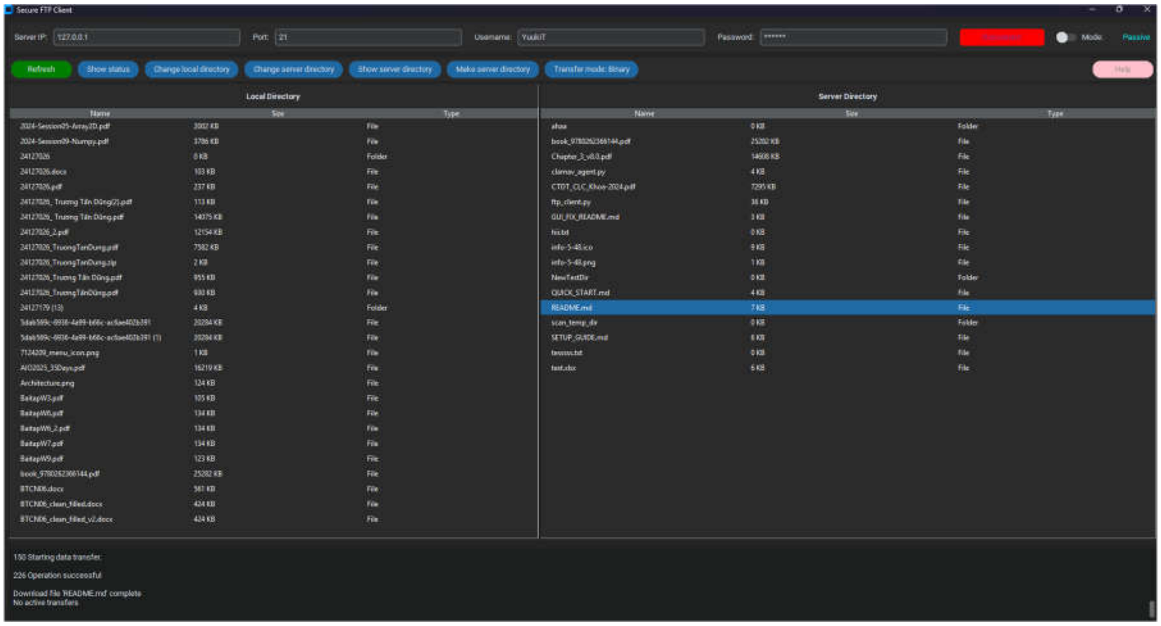
Server Directory

Name	Size	Type
ahaa	0 KB	Folder
book_9780262366144.pdf	25282 KB	File
Chapter_3_v8.0.pdf	14608 KB	File
clamav_agent.py	4 KB	File
CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hii.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
Connecting to Data Channel at 127.0.0.1:60690
150 Starting data transfer.

226 Operation successful

No active transfers
```



Secure FTP Client

Server IP: 127.0.0.1 Port: 21 Username: YuukiT Password: ******

Local Directory

Name	Size	Type
2024-Session05-Array2D.pdf	3002 KB	File
2024-Session09-Numpy.pdf	3786 KB	File
24127026	0 KB	Folder
24127026.docx	103 KB	File
24127026.pdf	237 KB	File
24127026_ Trương Tấn Dũng(2).pdf	113 KB	File
24127026_ Trương Tấn Dũng.pdf	14075 KB	File
24127026_2.pdf	12154 KB	File
24127026_TruongTanDung.pdf	7582 KB	File
24127026_TruongTanDung.zip	2 KB	File
24127026_Trương Tấn Dũng.pdf	955 KB	File
24127026_TrươngTấnDũng.pdf	930 KB	File
24127179 (13)	4 KB	Folder
5dab599c-6938-4a99-b66c-ac5ae402b391	20284 KB	File
5dab599c-6938-4a99-b66c-ac5ae402b391 (1)	20284 KB	File
7124209_menu_icon.png	1 KB	File
AIO2025_35Days.pdf	16219 KB	File
Architecture.png	124 KB	File
BaitapW3.pdf	105 KB	File
BaitapW6.pdf	134 KB	File
BaitapW6_2.pdf	134 KB	File
BaitapW7.pdf	134 KB	File
BaitapW9.pdf	123 KB	File
book_9780262366144.pdf	25282 KB	File
BTCN06.docx	561 KB	File
BTCN06_clean_filled.docx	424 KB	File
BTCN06_clean_filled_v2.docx	424 KB	File

Server Directory

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ahaa	0 KB	Folder
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CTDT_CLC_Khoa-2024.pdf	7295 KB	File
ftp_client.py	36 KB	File
GUI_FIX_README.md	3 KB	File
hi.txt	0 KB	File
info-5-48.ico	9 KB	File
info-5-48.png	1 KB	File
NewTestDir	0 KB	Folder
QUICK_START.md	4 KB	File
README.md	7 KB	File
scan_temp_dir	0 KB	Folder
SETUP_GUIDE.md	6 KB	File
tesssss.txt	0 KB	File
test.xlsx	6 KB	File

```
150 Starting data transfer.

226 Operation successful

Download file 'README.md' complete
No active transfers
```

4. Summary of How Each Requirement Was Fulfilled

Requirement	How we implemented it
Connect & authenticate	Open a persistent TCP control socket to server:21; send USER/PASS; handle 220 → 331/230 login flow.
Directory listing	TYPE A or TYPE I → PASV (get 227) or PORT (get 200); open data socket; send LIST; expect 150 → 226.
Download (RETR)	Set transfer mode; negotiate data socket (PASV/PORT); RETR <path>; read to EOF; then 226.
Upload (STOR) with ClamAV (upload-only scan)	Pre-upload: send file to local ClamAV agent (127.0.0.1:15116); proceed only if CLEAN. Then negotiate data socket and STOR; expect 150 → 226.
Data connection modes	Support both: PASV (client connects to server's 227 IP:port) and Active/PORT (server connects back to client's advertised port).
Transfer modes	Support TYPE I (Binary) and TYPE A (ASCII); default to Binary for byte-exact files.
Error handling & robustness	Parse single/multi-line replies; timeouts on control/data sockets; retry selected transient failures; map 530/550/425/426 to clear messages.

Optional FTPS (if enabled)	Explicit TLS: AUTH TLS → wrap control; PBSZ 0, PROT P for protected data channels.
Minimal GUI	GUI only collects inputs and shows logs/progress/scan results; all networking lives in the socket layer.

5. Problems encountered

- Corrupted files (ASCII vs Binary)
  - **Symptom:** Images/archives broken; text lines altered.
  - **Root cause:** Using TYPE A for binary files (CRLF conversions) or the opposite.
  - **Fix:** Default to TYPE I (Binary); use TYPE A only for plain text that requires CRLF normalization.
  - **Evidence:** Byte size and optional hash match between source and destination.

- 550 File unavailable / wrong path
  - **Symptom:** LIST/RETR/STOR returns 550.Root cause: Using TYPE A for binary files (CRLF conversions) or the opposite.
  - **Root cause:** Wrong working directory or malformed/relative paths.
  - **Fix:** Use PWD/CWD to confirm location; normalize separators; prefer absolute paths for reliability.
  - **Evidence:** Same command succeeds after correcting path (150/226 instead of 550).

- FTPS handshake issues (Explicit TLS)
  - **Symptom:** After AUTH TLS, commands fail or data is unprotected.
  - **Root cause:** Missing PBSZ 0 / PROT P, or certificate trust problems.
  - **Fix:** Sequence: AUTH TLS → wrap control socket → PBSZ 0 → PROT P; configure trust for the server cert (self-signed in LAN if needed).
  - **Evidence:** Control returns 200 after PBSZ/PROT; transfers succeed over protected data channels.

- UI freezes & multi-transfer failures (GUI-driven)
  - **Symptom:** The window becomes unresponsive when starting LIST/RETR/STOR; with multi-select uploads/downloads, some items randomly fail (425/426, missing 226, or 421 Timeout).
  - **Root cause:** Network I/O executed on the GUI event loop, so the UI blocks. Kicking off several actions from the GUI causes simultaneous use of a single control socket—replies interleave and commands race. (In addition, unsafe UI updates from background tasks can crash or deadlock.)

- **Fix:** Keep all socket I/O off the UI thread. Use one background worker that owns the control connection and processes a FIFO job queue (LIST, RETR, STOR, delete/rename), opening a fresh data socket per job. If you truly need parallel transfers, spawn separate client instances—each with its own control socket—instead of sharing one. The GUI should only enqueue jobs and receive progress via a thread-safe dispatcher (e.g., after(...)), never touching sockets directly.
- **Evidence:** With the queue/worker pattern, the UI stays responsive; control logs show clean, serialized sequences (… → 150 → 226); multi-file operations finish without random 425/426 errors.

6. Security Considerations

- Use Explicit FTPS for encryption where possible (server must be configured with a certificate).
- Restrict server accounts to the minimum necessary permissions and a defined home directory.
- Open only the required ports in the Windows Firewall (FTP 21 and passive range on the server).
- Validate file paths to prevent directory traversal in local operations.
- ClamAV scanning before upload/after download for high-risk environments.

7. References

- FileZilla Server documentation

- RFC 959 (FTP) and RFC 4217 (FTP over TLS)

- Python ftplib/ssl/Tkinter references