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EECE 4830-5830 - Network Design

Project Phase 1

**Introduction**

This project introduces basic UDP communication and reliable data transfer techniques. Phase 1a involves a simple message exchange between a client and server. Phase 1b extends this by implementing a file transfer system using UDP sockets. The integrity of the transferred file is verified through size and hash comparisons.

**Project Overview**

This project follows a client-server model using UDP sockets.

**Phase 1a: Message Exchange**

**-Client:** Sends a message to the server and waits for a response.

**-Server:** Listens for incoming messages, processes them, and responds accordingly.

**Phase 1b: File Transfer**

**-Client:** Reads a BMP file, breaks it into 1024-byte chunks, and sends them to the server.

**-Server:** Receives packets, reconstructs the file, and saves it.

**-Verification:** A script compares the file size and hash value to ensure correctness.

**Implementation**

**Phase 1a - Message Exchange**

**Client (client\_1a.py)**

-Creates a UDP socket.

-Sends a message (e.g., "HELLO") to the server.

-Waits for the server's response.

-Displays the received message.

-If "bye" is sent or received, the program terminates.

**Server (server\_1a.py)**

* Creates a UDP socket and listens for incoming messages.
* Receives and processes the message.
* Responds with the same message.
* If "bye" is received, the server shuts down.

**Phase 1b - File Transfer**

**Client (client\_1b.py)**

-Reads test.bmp in 1024-byte chunks.

-Adds an 8-byte sequence number to each packet.

-Sends packets to the server.

-Sends an "END" signal upon completion.

**Server (server\_1b.py)**

-Listens for incoming packets.

-Reconstructs and saves the received file as received.bmp.

-Stops when the "END" signal is received.

**Expected Output**

**Phase 1a: Message Exchange**

Client Output

Client: HELLO

Server: HELLO

Server Output

UPD Server is listening on port 20001…

Client: HELLO

Server: HELLO (echoed back)

**Phase 1b: File Transfer Verification**

Check Script Output

Original File Size: 518456 bytes

Received File Size: 518456 bytes

MD5 Hash of Original File: 6dd901fa155974e6fb7d2a043d2e8088

MD5 Hash of Received File: 6dd901fa155974e6fb7d2a043d2e8088

If the hashes match, the transfer was successful.

**Screenshots**

**Phase 1a**

A screenshot of a computer

AI-generated content may be incorrect.

**Phase 2b**

A screenshot of a computer

AI-generated content may be incorrect.

**Conclusion**

This project successfully demonstrated UDP-based communication. Phase 1a established basic message exchange, while Phase 1b implemented file transfer with verification to ensure reliability. These steps help in understanding how to build robust network applications over UDP.

**References**

* Kurose & Ross - Reliable Data Transfer (Section 3.4.1)
* Python socket module documentation
* Beej's Guide to Network Programming
* ChatGPT (for implementation guidance and code assistance)