UNIVERSITY OF DHAKA

Department of Computer Science and Engineering

CSE-3111 : Computer Networking Lab

Project Proposal

Project Title: ShouldStream

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1 Objectives and Motivation

1.1 Objectives

The primary objective of this project is to develop a comprehensive networking application using Python that seamlessly integrates video streaming, real-time chat, and file transfer capabilities. The application aims to provide a robust platform for users to engage in interactive video sessions, while simultaneously having the ability to communicate via chat and share files without interrupting the video stream.

- **Efficient Video Streaming:** Implement a robust video streaming mechanism that ensures high-quality playback with minimal latency and buffering. The system should dynamically adjust to network conditions to provide a smooth viewing experience for users.

- **Real-time Chat Integration:** Integrate a chat feature that allows users to communicate in real-time while simultaneously watching the video stream. This chat functionality should support text-based messaging, emoticons, and multimedia file sharing to enhance user interaction.

- **Secure File Transfer:** Implement secure file transfer functionality within the chat system to enable users to exchange files securely while maintaining the integrity and confidentiality of their data. Utilize encryption techniques to safeguard transferred files from unauthorized access or tampering.

- **Scalability and Performance:** Design the system to be scalable and capable of handling a large number of concurrent users without compromising performance. Employ efficient networking protocols and optimization techniques to minimize resource utilization and maximize throughput.

- **User-friendly Interface:** Develop an intuitive and user-friendly interface that allows users to easily navigate and interact with the various features of the networking application. Consider aspects such as responsiveness, aesthetics, and accessibility to enhance the overall user experience.

1.2 Motivation

The demand for integrated communication tools has skyrocketed in today's digital age. With remote work and virtual collaboration becoming the norm, there is a pressing need for a unified solution that can offer multiple forms of communication in a single, user-friendly interface. The following motivations drive this project:

- **Enhanced User Experience:** By combining video, chat, and file sharing in one application, users can enjoy a more fluid and cohesive interaction experience.

- **Efficiency:** Integrating multiple functionalities reduces the need for switching between different platforms, thereby saving time and improving productivity.

- **Accessibility:** Making this application available on various platforms ensures that a wider audience can benefit from its features.

- **Educational Value:** This project will serve as a valuable learning experience in network programming, real-time data handling, and application development using Python.

  Through this project, we aim to bridge the gap in communication tools and provide a versatile platform that caters to the evolving needs of online interaction.

2 Technology to be Used

For the implementation of the proposed networking project, the following technologies will be utilized:

- **Language:** Python
  Python will serve as the primary programming language for developing the networking application. Renowned for its simplicity, readability, and versatility, Python provides a robust foundation for building complex networking solutions. Its extensive standard library and rich ecosystem of third-party libraries make it well-suited for implementing various functionalities such as network communication, video streaming, and user interface development.

- **Framework:** Pyqt
  PyQt5 will be used for developing the graphical user interface (GUI) of the networking application. PyQt5 is a set of Python bindings for the Qt application framework, which allows developers to create cross-platform desktop applications with ease. By leveraging PyQt5, we can design intuitive and visually appealing interfaces that enhance the user experience while seamlessly integrating with the underlying Python codebase.

3 Features to be built

1. Video Streaming

2. Real-time Chat

3. File Transfer within Chat

4. File broadcasting

5. Responsive UI

4 Networking concepts to be used

- **UDP (User Datagram Protocol):** UDP is commonly used in real-time video streaming applications due to its low-latency and high-throughput characteristics. Unlike TCP, UDP does not provide guaranteed delivery or error recovery mechanisms, making it suitable for scenarios where speed and efficiency are prioritized over reliability. Implementing UDP in video streaming applications requires additional protocols or techniques to handle packet loss, retransmission, and synchronization to ensure a smooth viewing experience for users.

- **TCP (Transmission Control Protocol):** Using TCP for real-time messaging offers several benefits. TCP is a reliable protocol that ensures data packets are transmitted stably and predictably, reducing the risk of data loss or corruption. Additionally, TCP ensures that messages are delivered in the order in which they were sent, ensuring smooth and coherent conversations. By only sending data that has changed over the connection, TCP also enables efficient use of bandwidth.

- **Socket Programming:** Socket programming will be employed for handling network communication between client and server components of the application. Python's built-in socket module provides a convenient interface for creating network sockets, establishing connections, and exchanging data over TCP/IP or UDP protocols. Socket programming will enable real-time data transmission for video streaming, chat messaging, and file transfer functionalities.

5 Prospective Applications of the Project

- **Remote Work and Telecommuting:** Enable remote teams to collaborate effectively through virtual meetings, collaborative workspaces, and file sharing.

- **Online Education and E-Learning:** Facilitate virtual classrooms, interactive lectures, and collaborative learning experiences for students and educators.

- **Video Conferencing and Webinars:** Host video conferences, webinars, and virtual events for businesses, organizations, and educational institutions.

- **Media and Entertainment Streaming:** Deliver live events, concerts, sports broadcasts, and entertainment content to global audiences via streaming platforms.

- **Healthcare Telemedicine:** Support remote consultations, medical diagnostics, and patient monitoring through virtual healthcare services.

- **Collaborative Research and Development:** Enable research teams to collaborate on projects, share data, and conduct virtual experiments in real-time.

- **Social Networking and Community Building:** Foster online communities, social networking platforms, and virtual social events for connecting individuals with shared interests.