University of Dhaka

Department of Computer Science and Engineering

Project Report: Object Oriented Programming

Project Name: CSEDU_OneShare

Team Members:

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Introduction

CSEDU_OneShare is a cutting-edge file sharing and messaging software engineered specifically for local area networks (LANs). Leveraging the power of Java and the JavaFX framework, it promises rapid file transfers and effortless communication within LAN environments. Whether it's sharing large files or exchanging messages in real-time, CSEDU_OneShare provides users with a seamless experience, thanks to its lightweight design and intuitive interface.

Underneath its user-friendly exterior lies a robust architectural foundation. CSEDU_OneShare adopts the Model-View-Controller (MVC) design pattern and incorporates various object-oriented programming (OOP) principles to ensure scalability and reliability. This structural integrity not only guarantees a smooth user experience but also lays the groundwork for future enhancements and expansions. In essence, CSEDU_OneShare represents a sophisticated yet accessible solution for optimizing collaboration and connectivity within LAN settings.

Objectives

Embark on a journey of seamless communication and lightning-fast file sharing with CSEDU_OneShare, where peer-to-peer connections redefine LAN networking. Powered by Java and JavaFX, this innovative software combines speed, reliability, and decentralization to revolutionize the way you collaborate within your network.
The objective of CSEDU_OneShare is to:

- Establish peer-to-peer connections between devices within a local area network (LAN), eliminating server dependency and allowing each computer to serve as both a server and client.
- Enable faster and more efficient file sharing and messaging by leveraging direct device-to-device communication.
- Prioritize lightweight and user-friendly design to ensure optimal performance and ease of use.
- Utilize Java and JavaFX framework to develop a practical software solution that emphasizes speed, reliability, and decentralization.
- Learn and apply real-life Java application development principles, including the utilization of frameworks and object-oriented design patterns.
- Gain hands-on experience in software engineering practices, enhancing proficiency in Java programming and application development.

Project Features:

1. Peer-to-Peer Connectivity: Establish direct connections between devices within the LAN, eliminating the need for server intermediaries.
2. Lightning-Fast File Sharing: Enjoy rapid and efficient file transfers, allowing users to exchange large files seamlessly.
3. Real-Time Messaging: Engage in instant messaging with peers, fostering collaboration and communication within the network.
4. Decentralized Communication: Enable decentralized communication, enhancing network efficiency and reliability.
5. Lightweight Design: Prioritize a lightweight software design, ensuring minimal resource usage and optimal performance.
6. Intuitive GUI: Boast an intuitive graphical user interface (GUI), making navigation and operation of the software effortless for users of all levels.
7. Java and JavaFX Framework: Leverage the power of Java and the JavaFX framework to deliver a robust, reliable, and user-friendly application.
8. MVC Architecture: Implement the Model-View-Controller (MVC) design pattern to ensure clean and maintainable code architecture.
9. Object-Oriented Design Patterns: Utilize various object-oriented design patterns to enhance code readability, scalability, and maintainability.
10. Real-Life Application: Provide a practical solution for LAN communication, allowing users to experience the real-world application of Java programming and software engineering principles.

Project Modules

1. Core Modules

1. Peer-to-Peer Connectivity Module
    - Description: Handles the establishment of direct connections between devices within the LAN, eliminating the need for server intermediaries.
    - Responsibilities:
        - Discovery of peers within the network.
        - Establishment and management of peer-to-peer connections.
        - Handling connection protocols and ensuring secure communication.
2. File Transfer Module
    - Description: Manages the sending and receiving of files between peers.
    - Responsibilities:
        - Reading files from the local file system.
        - Transmitting files over the network.
        - Receiving files and saving them to the local file system.
        - Handling file transfer progress and error management.

3. Messaging Module
    - Description: Facilitates real-time messaging between users.
    - Responsibilities:
        - Sending and receiving text messages.
        - Handling message notifications and updates.

2. User Interface (UI) Modules

4. Main Interface Module
    - Description: Provides the primary interface for user interaction.
    - Responsibilities:
        - Main application window and navigation.
        - Integration of other UI components.
        - Display of system status and notifications.
5. File Sharing Interface Module
    - Description: Offers a user-friendly interface for file sharing.
    - Responsibilities:
        - File selection and upload interface.
        - Management of received files.
6. Messaging Interface Module
    - Description: Provides the interface for real-time messaging.
    - Responsibilities:
        - Chat window for real-time messaging.
        - Notification of new messages.

Platform, Library & Tools

Programming Language: Java

- Java: Utilized for its versatility and platform independence, handling core functionalities and ensuring compatibility across different systems.

Framework and Libraries: JavaFX, Scene Builder

- JavaFX: Employed for its rich set of graphical user interface (GUI) components and powerful multimedia capabilities, enhancing user experience and visual appeal.
- Scene Builder: Integrated with IntelliJ IDEA for intuitive visual layout design of

FXML files, streamlining the development process and ensuring better visualization of UI components.

IDE (Integrated Development Environment): IntelliJ IDEA

- IntelliJ IDEA: Chosen for its robust features, intelligent code assistance, and seamless integration with Java and JavaFX, providing an efficient and productive development environment.

Version Control and Collaboration: GitHub

- GitHub: Utilized for project collaboration, allowing seamless version control, issue tracking, and collaborative development among team members.

Limitations :

Despite our best efforts, CSEDU_OneShare may still have some limitations and potential bugs. Undetected issues might affect certain use cases, and performance can vary with network stability and bandwidth. Additionally, users on different systems might experience varying performance levels, and resource consumption may be higher than expected in some scenarios. Furthermore, the graphical user interface is not very intuitive, which could impact user experience. We are committed to continuous improvements to address these issues and enhance CSEDU_OneShare based on user feedback and technological advancements.

Conclusions:

In conclusion, the development journey of CSEDU_OneShare has been a significant learning experience for our team, characterized by growth, collaboration, and overcoming challenges. Reflecting on the project, several key conclusions can be drawn regarding our expectations, learnings, and encountered difficulties.

Learnings and Insights:

- Throughout the development process, we gained invaluable insights into Java programming, JavaFX framework, and the application of design patterns in real-world scenarios. This project served as a hands-on learning opportunity, allowing us to deepen our understanding of software engineering principles and practices.
- Additionally, the experience of working with peer-to-peer communication and decentralized networking provided valuable insights into network protocols and communication architectures, enriching our knowledge base and skill set.

Challenges and Growth:

- Undoubtedly, the development journey was not without its challenges. From debugging intricate code to optimizing performance, we encountered various hurdles along the way. However, each challenge presented an opportunity for growth, pushing us to innovate, problem-solve, and refine our approach.
- Collaborative efforts played a pivotal role in overcoming these challenges. Through effective communication, teamwork, and mutual support, we navigated through complexities, emerging stronger and more resilient as a team.

Future Plan for “CSEDU_OneShare”:

Looking ahead, our future plans for CSEDU_OneShare are centered around enhancing its usability, expanding its features, and optimizing its performance to cater to widespread usage in laboratory environments. With a focus on improving user experience and streamlining functionality, the following roadmap outlines our vision for the project:

1. Integration with Lab Management Systems:
   - Explore integration possibilities with existing lab management systems to streamline workflows and enhance interoperability.
   - Provide seamless integration with laboratory equipment and devices, allowing for efficient data exchange and synchronization.

2. Enhanced User Interface:
   - Invest in redesigning the user interface to make it more intuitive and visually appealing.

- Incorporate user feedback to identify pain points and areas for improvement, ensuring a seamless and user-friendly experience.

3. Advanced File Management Features:
   - Introduce additional file management capabilities, such as file organization, search functionalities, and batch processing.
   - Implement file preview options to allow users to preview files before downloading or sharing, enhancing efficiency and convenience.

4. Collaboration Tools:
   - Integrate collaborative features, such as real-time document editing and shared workspaces, to facilitate teamwork and collaboration among users within the lab environment.

5. Performance Optimization:
   - Conduct performance audits to identify and address bottlenecks, ensuring optimal speed and responsiveness.
   - Optimize resource utilization to minimize system requirements and maximize compatibility across different devices and platforms.

6. Continuous Improvement and Updates:
   - Commit to regular updates and maintenance to address bugs, incorporate new features, and adapt to evolving user needs and technological advancements.
   - Foster an open feedback loop with users to gather insights and suggestions for further improvements, ensuring that CSEDU_OneShare remains a valuable and indispensable tool in laboratory settings.

By focusing on these future plans, we aim to elevate CSEDU_OneShare into a comprehensive and indispensable software solution for file sharing and collaboration in laboratory environments, ultimately empowering users to enhance productivity and efficiency in their day-to-day workflows.

Repositories

Github repository: https://github.com/Jannatul-2003/ChatApp