

Simulation of a Multi-User, Multi-Directory File System

I. Background and Purpose

In the study of operating systems, understanding the mechanisms of file systems is crucial. This project proposes to construct a simulated multi-user, multi-directory file system. Through this practical platform, learners can gain a more intuitive understanding of key concepts such as the structure of file systems, permission management, and data storage, and experience the operation and management of file systems in a multi-user environment.

II. Project Goals

The core objectives of this project are to create a simulated environment that includes:

- Implementation of basic file operations such as create, read, update, and delete.
- User authentication mechanism to ensure graded operation privileges and security.
- Multi-level directory management, providing support for complex file paths.
- Interactive command-line interface to enhance the real operation experience.

III. Technical Approach

The technical implementation of the project will be based on the following considerations:

- Selection of an appropriate programming language.
- Permission management will use effective strategies to ensure secure isolation between users.
- Persistence storage of data is a key part of the design, to ensure the continuity of the file system state.
- Testing, including unit and integration tests, is critical to ensure project quality.

IV. Expected Outcomes

By implementing this project, we expect to achieve:

- A prototype of a simulated file system that meets design objectives.
- Practical experience in file system design and management.

V. Conclusion

Through the implementation of this project, we anticipate enhancing learners' understanding of file systems and providing practical experience in complex multi-user scenarios, thereby laying the foundation for further study in operating systems or related work.