SOFTWARE ENG. SYSTEM PROGRAMMING 2023-2024 FALL TERM PROJECT

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1. Introduction

The objective of this project was to develop a command-line based archive program named "tarsau,", more like well-known tools like tar, rar, or zip. However, unlike these tools, 'tarsau' focuses solely on merging files without compressing them. This report details the development process, challenges, and solutions implemented in the creation of 'tarsau'.

2. Project Overview

Tarsau is a straightforward, user-friendly archive tool designed for Unix/Linux systems, developed in C language. Its primary functions are to bundle multiple ASCII text files into a single file and extract them back into individual files. It operates using simple command-line arguments and ensures that the original file attributes, like size and name, are preserved during the archiving process.

3. Implementation Details

3.1. Command-Line Interface

Tarsau is operated via two main commands:

Bundling (-b) files into an archive: tarsau -b [files] -o [output file]

Extracting (-a) files from an archive: tarsau -a [archive file] [directory]

3.2. Key Functions

a. bundleFiles

This function takes multiple text files as input and combines them into a single archive file. It also records basic metadata for each file (name and size), which is essential for the extraction process. Each file's content is written sequentially into the archive.

b. extractFiles

This function reads the archive file, extracts the metadata for each bundled file, and then reconstructs the original files in a specified directory. It ensures that the files maintain their original integrity.

3.3. Metadata Approach

To ease the implementation, the metadata format was simplified. Each file's metadata (name and size) is directly followed by its content in the archive. This approach simplifies parsing and writing operations, making the tool more accessible and easier to debug.

3.4. Error Handling and Validation

Basic error handling was implemented to manage common issues such as file read/write errors and invalid command inputs. However, to keep the tool straightforward and student-friendly, more advanced error checks (like file type validation and permission handling) were not included in this version.

4. Challenges and Solutions

One of the main challenges was handling file paths and ensuring that metadata is correctly written and read without exceeding buffer sizes. This was addressed by implementing checks on the lengths of file paths and adding safeguards against buffer overflows. Additionally, the simplicity of the metadata format significantly reduced the complexity of parsing operations.

5. Conclusion

The 'tarsau' project successfully demonstrates the fundamentals of file handling in C and command-line interface design in Unix/Linux environments. While it lacks the advanced features of professional archiving tools, its simplicity makes it an excellent educational tool for understanding basic concepts in system programming and file manipulation. Future enhancements could include robust error handling, support for different file types, and compression capabilities.

Thank you!