Operating Systems – Project 1 - Simple Shell
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Report

Introduction

This report provides an analysis of the implementation of a simple shell C program. The shell allows users to execute commands, including built-in commands like ‘cd’, ‘pwd’, ‘echo’, and others. It also supports input/output redirection, piping, and running background commands.

Authors

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Code Structure and Organization

The code is well-organized and structured. It can be broken down into the following sections:

- Header Files
  The code includes the standard header files for input/output, process control, signal handling, and file operations.

- Constants
  The defined constants include the maximum command line length and the maximum number of command line arguments.

- Signal Handling
  Signal handlers for Ctrl-C (SIGINT) and a timer signal (SIGALRM) are defined.

- Main Function
  The main function is the entry point of the program and contains the main logic for the shell.

- Prompt Printing
  A print_shell_prompt function prints the shell prmpts (including the current working directory).

- Command Processing Loop
  The main processing for user commands.

- Built-In Commands
  Several built-in commands are implemented, such as ‘cd’, ‘pwd’, ‘echo’, ‘exit’, ‘env’, and ‘setenv’. These commands are handles separately from external commands.

- External Command Execution
  For external commands, the code forks a child process, handles input/output redirection, and executes the command.

- Error handling
  The code provides error handling for various system calls and functions.

- Background Execution
  The code allows for background execution of commands using the '&' symbol.

- Piping
  The code supports command piping using the '|' sumbol.

- Clean-up

Built-In Commands

The simple shell implements several built-in commands, including 'cd', 'pwd', 'echo', 'exit', 'env', and 'setenv'. These commands are processed within the main function and provide core functionality for the shell.