

Report

Ahmet Ertuğrul Hacıoğlu, 2020400132

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This report outlines the development approach and challenges faced during the implementation of a shell program. The program encompasses functionalities such as command execution, alias management, input/output redirection, and background process handling.

The core features of the shell program include:

The program utilizes the `execvp()` function to execute commands obtained from the `PATH` environment variable.

Alias creation and storage are supported, enabling users to manage aliases within the shell. Storage is maintained both in memory and in a file (`aliases.txt`).

The shell handles various forms of input/output redirection, including `>`, `>>`, and `>>>`, allowing output to be directed to files. Reverse append redirection is also supported.

It effectively tracks and manages background processes using `waitpid()` and handles terminated processes.

Challenges encountered during development involved:

- Parsing complexities with aliases, particularly when dealing with nested or embedded quotes.
- Managing multiple types of output redirection while ensuring command integrity.

To tackle these challenges, careful parsing approaches were adopted to handle quoted sections within aliases. For redirection handling, robust checks and conditional blocks were implemented to differentiate between different types of redirections and handle them appropriately.

The program could be enhanced by:

- Improving error handling to provide more descriptive messages for users.
- Expanding supported redirection types or introducing additional shell functionalities to improve user experience.

During parsing, quotation marks caused issues because I hadn't indicated inside quote to detect the first quotation mark. Consequently, when there was only an empty quotation mark inside an alias command, it didn't work

properly. However, adding !inside quote led the code to enter the first 'if' part after the '=' followed by the first quotation mark. When encountering another quotation mark, I checked whether it was the end of the alias command by copying the token and examining another element for whether it was null or not. The only potential issue here could be if there was an " outside the quotation marks, but I overlooked this. Another difficulty was handling both alias and non-alias commands together. This was resolved by adding alias commands to 'notquoted' while examining other elements. Another challenge was reversing and writing to a file in the reverse redirection command. I addressed this by forking again to resolve the issue. Another challenge was finding the current number of processes for 'Bello.' I solved this by adding processes to an array each time a background process occurred, then calling this array before 'Bello,' using waitpid to remove completed processes from the array and returning the number of current processes.

In conclusion, the shell program effectively executes commands, manages aliases, handles various forms of redirection, and tracks background processes. Challenges faced during parsing and redirection were successfully addressed through meticulous tokenization and conditional handling.