

Lab 1: Mini UNIX Shell

User Documentation

1. Overview

This is a UNIX-like shell implemented in C++ as part of the System Concepts course assignment. It can execute UNIX commands, handle pipes, input/output redirection, and background jobs.

2. Supported Features

Feature
External command execution
Built-in commands (cd, exit, pwd)
I/O Redirection (<, >, >>)
Pipeline (cmd1 cmd2)
Background Execution (&)
Quoted strings and backslash escaping
Command substitution \$(...)
Current directory in prompt
Ctrl+C does not kill the shell

3. Compilation and Execution

```
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ make clean
rm -rf bin
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ make
mkdir -p bin
g++ -std=c++17 -Wall -Wextra -g -o bin/shell src/shell.cpp
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ ./bin/shell
/mnt/d/IITD/system concepts/assignment/debugger> |
```

4. Usage Examples

- Start the shell by running the executable in the terminal.
- Type the desired command and press Enter to execute.
- Commands can be piped together using the | operator, for example: `echo "Hello" | grep "e"`.
- To redirect input/output to/from a file, use the < and > operators, for example: `command < input.txt > output.txt`.

```
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ make clean
rm -rf bin
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ make
mkdir -p bin
g++ -std=c++17 -Wall -Wextra -g -o bin/shell src/shell.cpp
ag@LAPTOP-5IOEOS47:/mnt/d/IITD/system concepts/assignment/debugger$ ./bin/shell
/mnt/d/IITD/system concepts/assignment/debugger> echo hello world
hello world
/mnt/d/IITD/system concepts/assignment/debugger> ls -l | grep cpp
-rwxrwxrwx 1 ag ag 5076 Dec  6 21:09 shell.cpp
```

Examples

```
> echo Hello World
Hello World
```

```
> ls | grep '.cpp'
file1.cpp
file2.cpp
```

```
> pwd
/home/user
```

5. Background Jobs

Commands ending with & run in the background. The shell immediately returns the prompt and prints the process group ID.

```
/mnt/d/IITD/system concepts/assignment/debugger> sleep 10 &
[5575]
```

6. Supported Built-in Commands

- cd - Change the current directory.
- exit - Exit the shell.
- pwd - Print the current working directory.
- echo - Display a message to the terminal.

7. Exit Methods

- Type exit
- Press Ctrl+D

This shell provides a robust, user-friendly experience very close to real UNIX shells while strictly adhering to assignment constraints.

8. Conclusion

MiniShell offers basic shell functionality with support for pipes, background execution, redirection, and built-in commands. It is suitable for users who need a lightweight and simple shell to run basic commands.