

Custom Shell Project Report

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1. Title

Custom Shell - A miniature Linux shell implemented in C++ with features like process control, I/O redirection, piping, background jobs, signal handling, and built-in commands.

2. Code Summary

The project implements a Unix-like shell in C++.

It supports:

- Command execution using `fork()` and `execvp()`.
- Built-in commands such as `cd`, `help`, `clear`, `about`, `jobs`, `fg`, `bg`, `killjob`, `exit`.
- Input/output redirection using `<`, `>`, and `>>`.
- Piping using `|`.
- Background job execution using `&`.
- Signal handling for `Ctrl+C` and `Ctrl+Z`.
- Job control management with foreground/background switching.
- Command history and tab completion using the Readline library.
- Custom hidden Easter eggs 'rhino' and 'xsmax'.

3. Screenshots

Below are the screenshots showing compilation, execution, built-in commands, redirection, background job handling, and Easter eggs.

```
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC ~/projects/custom_shell/src
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~$ cd ~/projects
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects$ mkdir -p custom_shell/src custom_shell/bin custom_shell/include custom_shell/docs
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects$ cd custom_shell
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects/custom_shell$ cd ~/projects/custom_shell/src
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects/custom_shell/src$ gedit main.cpp &
[1] 8856
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects/custom_shell/src$ g++ src/main.cpp -o bin/shell -lreadline -std=c++17
cc1plus: fatal error: src/main.cpp: No such file or directory
compilation terminated.
[1]+  Done                  gedit main.cpp
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects/custom_shell/src$ g++ main.cpp -o ../bin/shell -lreadline -std=c++17
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC:~/projects/custom_shell/src$ [sambit-kumar-[sambit-kuma[sambit[s[samb[sambi[san[s[[[sa[sambi[sambit-ku[sambit[[[
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ pwd
/home/sambit-kumar-mohanty/projects/custom_shell/src
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ ls
main.cpp
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ whoami
sambit-kumar-mohanty
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ date
Fri Nov 7 02:26:59 PM IST 2025
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ echo Hello BABA
Hello BABA
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$
```

```
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC ~/projects/custom_shell/src
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ help
mini-shell help:
Builtins: cd, help, clear, about, jobs, fg, bg, killjob, exit
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ about
Ultimate mini-shell by Sami-style assistant.
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell/src]$ cd ..
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ pwd
/home/sambit-kumar-mohanty/projects/custom_shell
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ cd -
cd: No such file or directory
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ clear
```

```
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC ~/projects/custom_shell/src
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ echo "This is a test of output redirection" > test1.txt
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ cat test1.txt
This is a test of output redirection
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ echo "Appending this line" >> test1.txt
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ cat test1.txt
This is a test of output redirection
Appending this line
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ wc -w < test1.txt
10
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ ls | wc -l
5
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ cat test1.txt | grep "Appending"
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ cat test1.txt | grep "Appending"
Appending this line
```

```
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC ~/projects/custom_shell/src
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ ^[[200-sleep 10 &
[1] 9291 started: sleep 10
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ execvp: No such file or directory
^Cjobs
execvp: No such file or directory
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ jobs
[1] Running 9291 sleep 10 &
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ sleep 20
^Z[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ ^C
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ sleep 20
^C[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ bg %2
[2] 9295 resumed in background
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ fg %2
SIGCONT: No such process
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ sleep 30 &
[3] 9308 started: sleep 30
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ jobs
[1] Running 9291 sleep 10 &
[3] Running 9308 sleep 30 &
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ killjob %3
killed job 3
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$
```

```
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC- ~/projects/custom_shell/src

[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ sleep 20 sleep 20
^C[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ sleep 15 sleep 15
^Z[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ rhino
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ echo "Custom shell"
Custom shell
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ echo "Ester Eggs"
Ester Eggs
[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ rhino

THUG
"He who makes others see but he himself is invisible."

[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ xsmx

RESIST
"Can't see his own Abyss."

[sambit-kumar-mohanty@ultimate-shell /home/sambit-kumar-mohanty/projects/custom_shell]$ exit
sambit-kumar-mohanty@sambit-kumar-mohanty-ASUS-TUF-Dash-F15-FX517ZC-FX517ZC- ~/projects/custom_shell/src$
```

4. Conclusion

The Custom Shell project successfully replicates core features of a Linux shell, providing a robust understanding of process management, inter-process communication, and system-level programming in C++.

It serves as a strong demonstration of practical OS-level concepts and can be further expanded with scripting support, aliasing, and improved command parsing.