Graphic Era Hill University
DEHRADUN • BHIMTAL • HALDWANI

PROJECT AND TEAM INFORMATION

Project Title

(Try to choose a catchy title. Max 20 words).

LiteShell: - A lightweight, efficient and user-friendly command line shell.

Student/Team Information

Team Name:	Tech Trio
Team member 1 (Team Lead) (Name, Student ID, Email, Picture):	Ishika Sharma – 220111796 ishikasharma24124@gmail.com 
Team member 2 (Name, Student ID, Email, Picture):	Diksha – 220112703 danudiksha892@gmail.com 

Team member 3 (Name, Student ID, Email, Picture):	Mahi Tyagi - 220123195 tyagimahi716@gmail.com 
Team member 4 (Name, Student ID, Email, Picture):	NA

PROJECT PROGRESS DESCRIPTION

Project Abstract

(Brief restatement of your project's main goal. Max 300 words).

The main objective for this project is to learn how an operating system works improve C/C++/Python coding skills and understand Linux commands by creating a simple custom shell. This will help in building a strong resume and also to learn and add features like scripting, multithreading, automation etc. A shell is a program that allows users to interacts with operating system by typing commands.

Updated Project Approach and Architecture

(Describe your current approach, including system design, communication protocols, libraries used, etc. Max 300 words).

1. Requirements & Design

Defining core function: -

- Command Execution
- I/O redirection
- Pipelining
- Built in Commands

2. Technology Stack

- Programming Language: C++ (for direct system interaction)
- System Calls: fork(), waitpid().
- Version Control: Git & GitHub for collaboration.
- Header Files - iostream, string, vector, algorithm, unistd.h, sys/wait.h, cstring, fstream

3. Development Plan

- Core Shell Implementation: -

1. Implement Command parsing to split input into commands and requirement.
2. Add basic command execution using fork() and execvp().

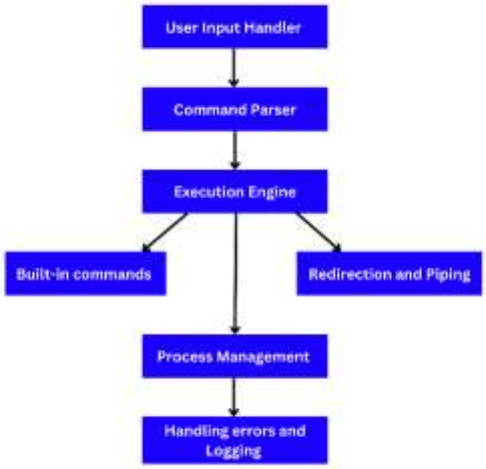
- Built-in commands: -

1. Implement cd, exit, echo, etc.
2. Handle core message.

- Implement redirection using dup2().
- Implement piping to perform command chaining.

- Background Process Management.
- Enhancement & Optimization.
- Testing and fixing bugs and edge cases.

System Architecture –



- **User Input Handler** - accepts & handles user commands from terminal.
- **Command parser** - Splits input into command, arguments and special operators.
- **Execution engine** - Run system commands using fork() and execvp().
- **Built in commands** - Handles commands like cd, exit, pwd without external process.
- **Redirection & Piping** - Manage I/O redirection
- **Process Manager** - Handles background processes and manages running processes.
- **Error handling and Logging** - Detects invalid commands, report errors and log system issues.

Tasks Completed

(Describe the main tasks that have been assigned and already completed. Max 250 words).

Task Completed	Team Member
User Input Handler	Diksha
Command Parser	Mahi
Execution Engine	Ishika, Mahi
Built-in commands	Ishika
Process Manager	Mahi
Error Handling	Diksha
I/O Redirection	Diksha, Mahi
Pipelining	Ishika

Challenges/Roadblocks

(Describe the challenges that you have faced or are facing so far and how you plan to solve them. Max 300 words).

- **Working with Linux** - Used Ubuntu for Linux Commands
- **Command Parsing and Tokenization** - Accurately parsing user input, especially when handling quoted strings, escape characters etc.
- **Handling Built-in vs External Commands** - Maintain a map of built-in commands and their corresponding handler functions.
- **Process Creation and Management** - Use fork() to create a child process and execvp() to execute commands. Use waitpid() in the parent process to handle cleanup and avoid zombies.

Tasks Pending

(Describe the main tasks that you still need to complete. Max 250 words).

Task Pending	Team Member (to complete the task)

Project Outcome/Deliverables

(Describe what are the key outcomes / deliverables of the project. Max 200 words).

A lightweight efficient command line shell that executes system commands.
A parser for parsing and tokenizing the input.
Supports foreground, background execution and process control.
Handles I/O redirection and piping.
Detects invalid inputs, prevents crashes and ensures smooth execution.

Progress Overview

(Summarize how much of the project is done, what's behind schedule, what's ahead of schedule. Max 200 words.)

Completed (On Schedule)

- **User Input Handler** – Implemented and stable.
- **Command Parser** – Functional with expected input handling.
- **Execution Engine** – Successfully executes commands.
- **Built-in Commands** – Core built-ins (e.g., cd, exit) implemented.
- **Process Manager** – Handles fork(), exec(), and process cleanup.
- **Error Handling** – handling of common runtime and syntax errors.
- **I/O Redirection** – Yet to be implemented. This includes support for >, <, >>, etc.
- **Piping** – Still pending. Requires handling of inter-process communication using pipe().

Codebase Information

(Repository link, branch, and information about important commits.)

GitHub Repository – https://github.com/Mahi-1905/LiteShell
Main Branch
Commits done –
57edd7e (HEAD -> main, origin/main, origin/HEAD) modifications#
afb33df 100 implementation#
6204dd9 adding template
f3538de modifying some commands
ed3d48b adding doc files
33099dd adding files
e190882 Initial commit

Testing and Validation Status

(Provide information about any tests conducted)

Test Type	Status (Pass/Fail)	Notes
Tested using Ubuntu command line Tested using text files	Pass Pass	Executes the built-in commands Executes commands in files

Deliverables Progress

(Summarize the current status of all key project deliverables mentioned earlier. Indicate whether each deliverable is completed, in progress, or pending.)

Completed (On Schedule)

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