Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam
Department of Computer Science & Engineering
M. Tech. CSE III Semester theory
ICS1313- Operating System Practices Laboratory

Batch: 2024-2029 AY: 2025-26 (ODD)

PROGRAMMING ASSIGNMENT – 1 (Basic UNIX Command Using System Calls)

Course outcome and knowledge level: CO2, K2

Exno: 1 Implementing a Shell with Basic UNIX Command Functionality Using System Calls

The Goal:

To design and implement a mini shell in C that can execute basic UNIX commands by utilizing system calls such as fork(), exec(), getpid(), exit(), wait(), close(), stat(), opendir(), and readdir(). This project aims to provide hands-on experience with process creation, execution, and file system interaction at the system call level.

Commands to Implement:

- List Directory (ls):

  Input: ls <directory_path> (If no directory is specified, list the current directory).

  Output: List of files and subdirectories within the specified or current directory.
- Concatenate and Display File (cat):

  Input: cat <file_path> (Display the content of the specified file).

  Output: Content of the file displayed on the terminal.
- Exit Shell (exit):

  Input: exit (Command to exit the shell).

  Output: Terminates the mini shell.

System Calls to Use:

fork(): Create a new process.

exec(): Execute a program.

getpid(): Get the process ID of the calling process.

exit(): Terminate the calling process.

wait(): Wait for a process to change state.

close(): Close a file descriptor.

stat(): Get file status.

opendir(): Open a directory stream.

readdir(): Read a directory.

Best Practices:

1. Algorithm design
2. Naming convention – for file names, variables
3. Comment usage at proper places

4. Prompt messages during reading input and displaying output
5. Error handling mechanisms for failures in system calls
6. Incremental program development
7. Modularity
8. All possible test cases in output

Output:

By completing this project, students will gain a practical understanding of process management and file system interaction using UNIX system calls. They will develop a foundational mini shell capable of executing basic commands, enhancing their skills in C programming and systems programming.

Additional Exercise:

1. Include any one user defined system call to Linux Kernel and test its execution by

recompiling the kernel.