

Course Title: Operating System Laboratory

Course Type: Main Course
Unit Type: Practical
Teaching Hours: 32

Prerequisites: Operating System
Units: 1

Our aim in this laboratory will be to test and examine the concepts presented in Operating Systems course in a scientific way. Our focus in the first part of the laboratory will mostly be on Linux operating system, and in the second part, on programming for this operating system and interacting with its kernel.

Syllabus:

Preface: history, open-source concept, distribution concept, general architecture of Linux operating system, booting process, and introduction to Shell environment.

Linux file system: file system concepts, Linux File System, commands for using directories, files and their contents, introduction to a command-line editor, users and group management, 'permission' and 'mounting' concepts and regarding commands.

Processes: 'Process' concepts, process IDs, process owners, parent and child concepts, 'signal' and 'scheduling commands', foreground and background tasks and their commands.

Shell programming: bash important files, variable definition, bash operators, writing a function in bash and calling it.

Programming in Linux: introduction to compilers, MakeFiles, installation of a program from the source code.

Interacting with kernel in Linux: Virtual File System concept, reading kernel information, commanding kernel by writing in Virtual File System.

Process programming: creating processes, Inter-process communications, Shared Memory and Mapped Memory.

Multi-Threading: thread concept review and its difference with process, using pthread library, mutual exclusion and synchronization concepts review and implementing some cases.

Installing and setting up a new kernel

Kernel modules programming: modules management, creating a Hello World module, installing Header files and creating MakeFile for module.

'System Call's in Linux: introduction to some system calls, adding a system call to kernel.

1. W. Rothwell, Linux for Developers: Jumpstart Your Linux Programming Skills, Addison-Wesley, 2017.
2. C. Flynt, S. Lakshman and S. Tushar, Linux Shell Scripting Cookbook, 3rd ed., Packt, 2017.
3. A. Tanenbaum and H. Bos, Modern Operating Systems, 4th ed., Prentice Hall, 2015.