

LINUX PROGRAMMING

VI Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACS010	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil		Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

- I. Interpret the Linux utilities to control the resources.
- II. Learn basic concepts of shell scripts and file structures.
- III. Understand the concepts of process creation and interruption for multitasking applications.
- IV. Explore memory allocation and inter process communication methods.
- V. Provide support for distributed and network applications in Linux environment.

COURSE OUTCOMES (COs):

The Students should enable to:

- CO 1 Understand the basic commands of Linux operating system and Demonstrate Sed and awk scripting
 CO 2 Demonstrate shell scripts and understand creation of file systems and directories and operate them
 CO 3 Synthesis creation of background and fore ground processes management through system calls and Generalize signal functions to handle interrupts by using system calls.
 CO 4 Demonstrate Inter process communication using shared memory segments, pipes ,message queues
 CO 5 Demonstrate various client server applications using TCP or UDP protocols.

COURSE LEARNING OUTCOMES(CLO's)

The Students should enable to:

- 1 Learn the importance of Linux architecture along with features.
- 2 Identify and use Linux utilities to create and manage simple file processing operations
- 3 Apply the security features on file access permissions by restricting the ownership using advance Linux commands.
- 4 Implement the SED Scripts, operation, addresses, and commands.
- 5 Implement the GREP and AWK commands for pattern matching and mathematical functions.
- 6 Understand the shell responsibilities of different types of shells
- 7 Develop shell scripts to perform more complex tasks in shell programming environment.
- 8 Illustrate file processing operations such as standard I/O and formatted I/O.
- 9 Illustrate directory operations such as standard I/O and formatted I/O.
- 10 Understand process structure, scheduling and management through system calls.
- 11 Generalize signal functions to handle interrupts by using system calls.
- 12 Illustrate memory management of file handling through file/region lock
- 13 Design and implement inter process communication (IPC) in client server environment by using pipe.
- 14 Design and implement inter process communication (IPC) in client server environment by using named Pipes
- 15 Illustrate client server authenticated communication in IPC through messages queues, semaphores
- 16 Illustrate client server authenticated communication in IPC through shared memory.
- 17 Demonstrate socket connections, socket attributes, socket addresses
- 18 Demonstrate various client server applications on network using TCP.
- 19 Demonstrate various client server applications on network using UDP protocols.
- 20 Design custom based network applications using the sockets interface in heterogeneous platforms

SYLLABUS

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UNIT-I	INTRODUCTION TO LINUX UTILITIES	Classes: 08
<p>Linux utilities: A brief history of UNIX, architecture and features of UNIX, introduction to vi editor. General purpose utilities, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands; Text processing and backup utilities: Text processing utilities and backup utilities; SED: Scripts, operation, addresses, commands; AWK: Execution, fields and records, scripts, operation, patterns, actions, associative arrays, string and mathematical functions, system commands in awk, applications.</p>		
UNIT-II	WORKING WITH THE BOURNE AGAIN SHELL (BASH)	Classes: 10
<p>Shell: Shell responsibilities, types of shell, pipes and i/o redirection, shell as a programming language, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, quoting, test command, control structures, arithmetic in shell, interrupt processing, functions, and debugging scripts; File structure and directories: Introduction to file system, file descriptors, file types, file system structure; File metadata: Inodes; System calls for file I/O operations: open, create, read, write, close, lseek, dup2, file status information-stat family; File and record locking: fcntl function, file permissions, file ownership, links; Directories: Creating, removing and changing directories, obtaining current working directory, directory contents, scanning directories.</p>		
UNIT-III	PROCESS AND SIGNALS	Classes: 09
<p>Process: Process identifiers, process structure: process table, viewing processes, system processes, process scheduling; Starting new processes: Waiting for a process, process termination, zombie processes, orphan process, system call interface for process management, fork, vfork, exit, wait, waitpid, exec.</p> <p>Signals: Signal functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets.</p>		
UNIT-IV	DATA MANAGEMENT AND INTER PROCESS COMMUNICATION	Classes: 10
<p>Data Management: Managing memory: malloc, free, realloc, calloc; File locking: Creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks; Inter process communication: Pipe, process pipes, the pipe call, parent and child processes, named pipes, semaphores, shared memory, message queues; Shared memory: Kernel support for shared memory, APIs for shared memory, shared memory example; Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores</p>		
UNIT-V	SOCKETS	Classes: 08
<p>Introduction to sockets: Socket, socket connections, socket attributes, socket addresses, socket system calls for connection oriented protocol and connectionless protocol, socket communications, comparison of IPC mechanisms.</p>		
<p>Text Books:</p>		
<ol style="list-style-type: none">1. W. Richard, Stevens, Advanced Programming in the UNIX Environment, Pearson Education, 1st Edition, 2005.2. Sumitabha Das Unix Concepts and Applications Tata McGraw-Hill, 4th Edition, 2006.3. Neil Mathew, Richard Stones, Beginning Linux Programming Wrox, Wiley India, 4th Edition, 2011.		

Reference Books:

1. Sumitabha Das Your Unix the Ultimate Guide Tata McGraw-Hill, 4th Edition, 2007.
2. W. R. Stevens, S. A. Rago Advanced Programming in the Unix Environment Pearson Education, 2nd Edition, 2009.
3. B. A. Forouzan, R. F. Gilberg Unix and Shell Programming Cengage Learning, 3rd Edition, 2005.

Web References:

1. <http://www.linux-tutorial.info/>
2. <http://www.ee.surrey.ac.uk/Teaching/Unix/>
3. <http://www.tutorialspoint.com/listtutorials/linux/1>
4. http://linuxcommand.org/learning_the_shell.php

E-Text Books:

1. <http://vic.gedris.org/Manual-ShellIntro/1.2/ShellIntro.pdf>
2. <http://www.freeos.com/guides/lsst/>

Course Home Page: