

## 1/3 MCA Second Semester

**CA2T3**

**UNIX PROGRAMMING**

**Credits : 4**

Lecture Hours : 4 periods / week

Internal assessment : 30 Marks

Semester and Examination: 70 Marks

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### **Course Description:**

One of the leading service providers of Operating System Unix is Berkeley, Unix Ideas and History, Basics Commands, frequently learned and Running Commands, Browsing the File System, creation of Users, Groups and Permissions and Advanced topics, The Unix file system in-depth. Through this course we are providing training to the students about *vi* editor: An advanced text editor, Standard I/O and Pipes, Using the shell, Configuring the Shell, Shell Programming, Investigating the Unix process and Data Management, Managing Process, Finding and Processing Files, Some of the functionalities of Message Queues, Semaphores and Socket Programming. There for we are going to train the client server applications through sockets.

### **Course Objectives:**

- State the major components and describe the architecture of the UNIX operating system
- State how the shell functions at the user interface and command line interpreter.
- Modify built-in shell variables and create and use user-defined shell variables.
- Use I/O redirection, pipes, quoting, and filename expansion mechanisms.
- Create structured shell programming which accept and use positional parameters and exported variables.
- Use shell flow control and conditional branching constructs (while, for, case, if, etc.)
- Create shell programs which process interrupts, pass signals, invoke sub-shells and functions, and trap signals.
- Use shell debugging mechanisms to improve shell program efficiency and detect and correct errors.
- Develop the user interface menu system using shell programming constructs.
- Developing the Client/Server applications by using Sockets.

### **UNIT I:**

**Review of Unix Utilities and Shell Programming** - File handling utilities, security by file permissions, process utilities, disk utilities, networking commands, backup utilities, text processing utilities, Working with the Bourne shell, shell responsibilities, pipes and input redirection, output redirection.

### **UNIT II:**

**Introduction to Shell** - Shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

### **UNIT III:**

**Unix Files** - Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

#### **UNIT IV:**

**Unix Process** - Process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management, fork, vfork, exit, wait, waitpid, exec system calls.

#### **Unit V:**

**Threads & Process** - Threads, Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, cancelling a thread, threads vs. processes, Signals, Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions. file and record locking ( creating lock files, locking regions, use of read/ write locking, competing locks, other commands, deadlocks). Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes, FIFOs.

#### **UNIT VI:**

**Message Queues** - IPC, permission issues, Access permission modes, message structure, working message queues, Unix system V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

#### **UNIT VII:**

**Semaphores** - Unix system V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores. Shared Memory: Unix system V shared memory, working with a shared memory segment, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example

#### **UNIT VIII:**

**Sockets** - Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example client/server program, advanced socket system calls, socket options.

### **Learning Resources**

#### **Text Books:**

1. Unix Concepts and Applications, Sumitabha Das, TMH, 3/e, 2004.
2. Advanced Unix Programming, N B Venkateswarlu, BSP, 2/e, 2010.

#### **Reference Books:**

1. Unix and shell Programming, Sumitabha Das, TMH, 2009.
2. A Beginner's Guide to Unix, N.P.Gopalan, B.Sivaselva, PHI, 1/e, 2009.
3. Unix Shell Programming, Stephen G.Kochan, Patrick Wood, Pearson,3/e, 2003.
4. Unix and shell Programming, N B Venkateswarlu, Reem, New Delhi, 3/e, 2010.
5. Unix Programming, Kumar Saurabh, Wiley,India, 1/e, 2008.
6. Unix Shell Programming, Lowell Jay Arthus & Ted Burns, GalGotia, 3/e, 2004.
7. Unix Concepts and Applications, Das, TMH, 4/e, 2003.
8. Shell Programming , Yeswanth Kanitkar, Pearson, 2/e, 1996.