Birla Institute of Technology & Science, Pilani
Hyderabad Campus
Computer Science and Information Systems Department
First Semester 2013-2014 Course Handout (Part II)

Date: 01 Aug 2013

In addition to part-I (General handout for all courses appended to the timetable) this portion gives further specific details regarding the course:

COURSE NO. : CS C372/IS C362

OPERATING SYSTEMS

Instructors: **Chittaranjan Hota** (hota@hyderabad.bits-pilani.ac.in)
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Scope and Objectives

The Operating Systems (OS) are at the heart of every computer. The OS provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which it runs. It provides relatively uniform interfaces to access the extremely wide variety of devices that a computer interacts with, from input/output devices such as printers and digital cameras, to wired and wireless network components that allow computers to communicate. The OS is responsible for sharing resources (e.g., disks, and processors), providing common services needed by many different programs (e.g., access to the printer), and protecting individual programs from interfering with one another. There is a tremendous range and variety of computer systems for which operating systems are being designed: from embedded devices e.g., the on-board computers for the space shuttle or a luxury sedan and cellphones to PCs, workstations, and mainframes, to supercomputers. The intent of this course is to provide a thorough discussion of the fundamentals of operating system design, and to relate these to contemporary design issues and current directions in the development of operating systems. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems. We will also study existing operating systems such as UNIX/Windows and learn the application of studied concepts. The course will have programming assignments in the area of process synchronizations, inter process communications, device drivers, file system, scheduling, memory management etc. in Linux/C environment.

TEXT BOOK

T1 Silberschatz, Galvin, and Gagne, “Operating System concepts”, 8e, John Wiley & Sons, 2009.

REFERENCE BOOKS

R1 W. Stallings, “Operating Systems: Internals and Design Principles”, 6e, Pearson, 2009.
R2 Achyut S. Godbole, “Operating Systems”, 2e, Tata McGraw Hill, 2008.
R3 Elmasri, Carrick, & Levine, “Operating Systems: A Spiral Approach”, MGH, 2009.
R4 Tanenbaum,Woodhull,“Operating Systems Design & Implementation”,3e, Pears, 2006.
R5 Dhamdhere, “Operating Systems: A Concept based Approach”, 2e, McGrHi, 2009.
R6 Robert Love, “Linux Kernel Development”, 3e, Pearson, 2010.

PLAN OF STUDY:

S. No.	TOPIC	CHAPTER REF (Text)	Lect.s
1.	**Introduction**: What OS's do? System Organization & Architecture, OS Operations, Open source OSs.	Chapter 1	2
2.	**OS Structures:** OS Services, System calls, OS Structures, Virtual machine, System boot.	Chapter 2	2
3.	**Processes:** Process Concepts, Scheduling, Operations, Inter Process Communication.	Chapter 3	3
4.	**Threads**: Libraries, Multithreading model, Threading issues.	Chapter 4	2
5.	**CPU Scheduling**: Criteria, Algorithms, Multiple processor scheduling.	Chapter 5	3
6.	**Synchronization**: Critical section problem, Peterson's solution, Semaphores, Classical problems, Monitors.	Chapter 6	3
7.	**Recent research on CPU Scheduling**	IEEE/ACM	1
8.	**Deadlocks**: System model, Prevention, Avoidance, Detection, and Recovery from deadlocks.	Chapter 7	3
9.	**Memory Management**: Swapping, Contiguous memory allocation, Paging, Segmentation.	Chapter 8	3
10.	**Virtual Memory**: Demand paging, page replacement, Thrashing, Memory mapped files, Allocating Kernel memory.	Chapter 9	3
11.	**Recent research on Memory Management**	IEEE/ACM	1
12.	**File System Interface**: File system, Access methods, Mounting, sharing, and disk structures.	Chapter 10	2
13.	**File System Implementation**: Structure and Implementation, Allocation methods and Free space management.	Chapter 11	2
14.	**Mass Storage**: Disk structure, disk scheduling, disk management, and RAID.	Chapter 12	2
15.	**I/O Systems:** I/O hardware, I/O Interface, Kernel I/O subsystem.	Chapter 13	2
16.	**Recent research on File Systems**	IEEE/ACM	1
17.	**Protection:** Access Matrix Model, Implementation of AMM: Capabilities, and Access Control List.	Chapter 14	2
18.	**Special Purpose Operating Systems:** Overview of Real-time Operating Systems, Multi-media OS, and Distributed Operating Systems.	Chapters 15, 16	2
19.	**Case Studies:** Linux, Windows XP.	Chapters 21, 22	2

EVALUATION SCHEME:

Sl No.	Component & Nature	Duration	Weightage	Date and Time
1.	Coding Assignments (Take Home)	*	25%	
2.	Test I (Closed Book)	60 mins	20%	1/10, 8.00 -- 9.00 AM
3.	Test II (Closed Book)	60 mins	20%	8/11, 8.00 -- 9.00 AM
4.	Comprehensive Exam (Part Open)	3 hrs	35%	13/12 , 2.00 -- 5.00 PM

Tutorial classes will be of problem solving nature and coding/implementation aspects on the theory covered in the classes. Any outside help concerning the use of the computer facilities is acceptable. You may discuss the meaning or intent of an assignment with instructors. All coding work turned in must be completely your own.

Note: All notices related to the course will be displayed on the **CSIS Notice Board**. Make ups shall be granted to genuine cases with a request for makeup reaching the I/C on or before the test.

Chamber Consultation Hour: Hota: , C R Prasanna: Fri (3 to 4pm, B221), Sanjeet: Tue (3to 4pm, B205) Kavitha: Mon(3 to 4 pm,B223)