Lectures:
Sect 1-2 LECTURES: MonWed: *:8:10-9:30 HLL 116

Recitations
Sec 1 Mon 6:55-7:50 SEC 211
Sec 2 Wed 6:55-7:50 ARC 205

Instructor
Prof. M. Paull
Room: Hill 361, Preferred Means Of Communication
Phone: x-3548, Preferred Means Of Communication
Course Website : http://www.cs.rutgers.edu/~paull/
Office Hours Wed 2-4PM: or by appointment. All are welcome

Teaching Assistants: Settled
Turgut,Begumhan Mon 6:55-7:50 SEC 211
     bturgut@cs.rutgers.edu Hill 202
Le, Trung Kien Wed 6:55-7:50 ARC 205
     X5 4634 lekien@cs.rutgers.edu office hrs THUR 12-2PM

Objectives
To convey an understanding of the basics of an operating system by study of techniques and algorithms used in developing the services they provide in a computer system., To understand their implementation, with examples from existing operating system(s) and a set of programming exercises.

Prerequisites
CS-211 , Eng 331. (Arcitechture)
CS-113 or Eng 252 or CS-314 (C lang)

Expected Work and Effect On Grade
HW ASSIGNMENTS ~1 per week. Assignments are from the book and elsewhere. (Good For Test Prep)
     Grade Effect: Used in borderline cases

PROGRAMMING ASSIGNMENTS: 3 or more :
     We will do programming in The UNIX environment, using many of the system calls it provides, including creation of, and communication amongst, multiple processes system. This requires a basic understanding of C. (An introduction to C will be given in recitation).
     Grade Effect: 30%

MIDTERM EXAM:
Grade Effect:30%,

FINAL EXAM:
Grade Effect:40%

NOTE: THE OVERALL GRADE IS BASED ON THE PERCENTAGES ABOVE, BUT YOU MUST ALSO DO PASSING WORK ON THE PROGRAM ASSIGNMENTS AND THE EXAMS TO PASS THE COURSE

Course Text and Lecture Notes
Andrew S. Tanenbaum MODERN OPERATING SYSTEMS (SECOND EDITION)

Lecture Notes in the form of illustrations are available on my website before each lecture
OUTLINE

Most, but not all, of Chapters 1 through 6 of the Text are covered in the order 1, 2, 3, 4, 6, 5. ALSO material in Chapt 10 which provide UNIX examples of the material in Chapters 1-6 will be covered. Parts of Chapt 8 and 9 on Multi-Processors and Security will also be included. All this material will be supported and in some cases augmented by the notes which will be distributed through my website.

Course Contents By Chapters:

Chapt 1  HISTORY, HARDWARE REVIEW(211), BASICS CONCEPTS-
Purpose of Operating System, Fork, Multi-Programming, Processes, Deadlock, Memory Management, Files, System Calls, Structure Of Implementations).

Chapt 2  PROCESSES (THREADS-LATER) and SCHEDULING
PROCESSES: IPC (Interprocess Communication)-Mutual Exclusion, Busy Waiting, Semaphors, Monitor, Message Passing; Examples-Consumer Producer, Classical IPC Problems;
SCHEDULING: MM Replacements, MM Running; Batch; FCFS, SF, SN; Round Robin, Priority, etc.

Chapt 3: DEADLOCKS (Problems Arrising When Many Processes Have Access To Many Resources)
DEFINITION AND MODELLING Detection, Recovery, Avoidance, Prevention

Chapt 4: MEMORY MANAGEMENT (With And Without Swapping,)
Continuous storage, Paging, Segmentation, Virtual Memory, Page Replacement Algorithms, Their Models And Implementation,

Chapt 6: FILE SYSTEMS
Files -Naming,-Structure,-Type, Directories) Files On Disk Naming, Structure, Implementation, Protection. UNIX examples

Chapt 5: INPUT/OUTPUT (Control In Hardware -in Software)
Control in Hardware-Software, Disks, Clocks, Terminals, Power Management

Chapt 10  CASE STUDY UNIX AND LINUX: The topics in chapters 1-6 are illustrated from systems described in this chapter

ALSO We hope to cover some material in:

Chapt 9  SECURITY Protection Matrix, Passwords, Cryptography
Chapt 2  Threads Sketch Of Implementations
Chapt 8  MultiProcessors Some Basics
<table>
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<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter(s)</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction; Operating System: Structure, Hist., Multiprogramming, Fork, etc.</td>
<td>Chapt 1</td>
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<tr>
<td>2</td>
<td>Processes, Address Spaces, Context Switching; IPC Concurrent Processes</td>
<td>Chapt 1-2</td>
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<td>3</td>
<td>Critical Section; Need For Mutual Exclusion, OS-Independent Mutual Exclusion</td>
<td>Chapt 2</td>
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<td>4</td>
<td>OS-Dependent Mutual Exclusion, Scheduling</td>
<td>Chapt 2</td>
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<tr>
<td>5</td>
<td>Scheduling, Deadlock</td>
<td>Chapt 3.</td>
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<td>6</td>
<td>Memory Management Before Virtual Memory</td>
<td>Chapt 4.</td>
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<td>7</td>
<td>MIDTERM in class- open 1 sheet both side Covers thru Deadlock</td>
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<tr>
<td>8</td>
<td>Memory Management-Virtual Memory</td>
<td>Chapt 4</td>
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<td>9</td>
<td>Memory Management- Page replacement policies</td>
<td>Chapt 4</td>
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<td>10</td>
<td>File Systems, Implementation and Performance</td>
<td>Chapt 6</td>
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<td>11</td>
<td>File Systems, Unix</td>
<td>Chapt 6, 10</td>
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<td>12</td>
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<td>13</td>
<td>Threads</td>
<td>Chapt 1</td>
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<td>14</td>
<td>Protection and Security;</td>
<td>Chapt 9</td>
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* A “WEEK” REFERS TO 2 CLASSES. BECAUSE OUR TERM BEGINS ON WED THE 2 CLASSES ARE A WED FOLLOWED BY A MONDAY CLASS.