

Syllabus

Sul Ross State University, Spring 2017

CS 3306-001 Operating Systems

Instructor: Dr. Kennard Laviors

Office Location: ACR 107 **Office Phone:** 432-837- 8500

Email: kennard.laviors@sulross.edu

Office Hours:

MW 8:30am - 9:00am and 10:00am - 11:00am
TTH 8:30am - 9:30am and 11:00am - 12:00pm
F 10:00am - 11:00am

Class: *TTH* 9:30 am - 10:45 am BAB 303;

Textbook:

Operating System Concepts, 9th Edition

By: Abraham Silberschatz

Publisher: Wiley; 9 edition (October 10, 2012)

ASIN: B00APSZCEQ

Online Tools: Google Doc's Draw is a free app offered by Google.

Program Learning Objective

1. Understand the fundamental concepts of computer science including algorithms and data structures.
2. Understand modern computer systems, databases and networking.
3. Display an understanding and ability to implement current programming methodologies.
4. Become proficient with systems design based on object-oriented programming.
5. Work as a team in workgroup environments.

Course Objectives

Week 1

Subject: Course Overview/ Introduction to Operating Systems

Goal: This chapter will introduce students to operating systems and the role they play in today's computing environment.

Learning Objective:

1. To describe the basic organization of computer systems
2. To provide a tour of the components of operating systems
3. Give an overview of the many types of computing environments
4. To explore several open-source operating systems

Week 2**Subject:** Operating-System Structures**Goal:** This chapter will begin the hands on component needed to understand how to install an operating system and how the operating system is loaded when the computer turns on.**Learning Objective:**

1. To describe the services an operating system provides to users, processes, and other systems.
2. To discuss the various ways of structuring an operating system
3. To explain how the operating systems are installed and customized and how they boot.

Week 3**Subject:** Processes**Goal:** This chapter will begin the hands on component needed to understand how to install an operating system and how the operating system is loaded when the computer turns on.**Learning Objective:**

1. To describe the services an operating system provides to users, processes, and other systems.
2. To discuss the various ways of structuring an operating system
3. To explain how the operating systems are installed and customized and how they boot.

Week 4**Subject:** Threads**Goal:** This module explores problems and solutions to multi-threaded processes.**Learning Objective:** Students

1. To introduce the notion of a thread—a fundamental unit of CPU utilization that forms the basis of multithreaded computer systems
2. To discuss the APIs for the Pthreads, Windows, and Java thread libraries
3. To explore several strategies that provide implicit threading
4. To examine issues related to multithreaded programming
5. To cover operating system support for threads in Windows and Linux

Week 5**Subject:** Process Synchronization**Goals:** This module addresses the many problems associated with multiple processes running at the same time and sharing the same resources.

Learning Objective:

1. To understand process synchronization.
2. To understand the critical-section problem, whose solutions can be used to ensure the consistency of shared data
3. Be familiar with both software and hardware solutions of the critical-section problem
4. To know several classical process-synchronization problems
5. Be aware of several tools that are used to solve process synchronization problems

Week 6**Subject:** CPU Scheduling

Goal: Today's computers are able to run many programs at the same time. This requires some clever algorithms to schedule times for the CPU to process the programs in such a way that they do not interfere with each other. This module will introduce CPU scheduling to students.

Learning Objective:

1. To understand CPU scheduling, which is the basis for multi-programmed operating systems
2. To describe various CPU-scheduling algorithms
3. To discuss evaluation criteria for selecting a CPU-scheduling algorithm for a particular system
4. To examine the scheduling algorithms of several operating systems

Week 7**Subject:** Deadlocks

Goal: There are many problems associated with multiple processes and threads running at the same time. The most prevalent of these problems comes when we associate priorities to processes which can lead to a process not ever getting a high enough priority to get looked at by the CPU; this is known as a deadlock and this chapter explores solutions to this common problem.

Learning Objective:

1. To be able to describe deadlocks, which prevent sets of concurrent processes from completing their tasks
2. Be able to present a number of different methods for preventing or avoiding deadlocks in a computer system

Week 8**Subject:** MIDTERMWeek 9

Subject: Main Memory

Goal: This chapter begins our look into how the operating system uses the computers memory hierarchy beginning with the Random Access Memory (RAM).

Learning Objective:

1. To provide a detailed description of various ways of organizing memory hardware
2. To discuss various memory-management techniques, including paging and segmentation
3. To provide a detailed description of the Intel Pentium, which supports both pure segmentation and segmentation with paging

Week 10

Subject: Virtual Memory

Goal: We will introduce students to solutions to overcoming memory shortages.

Learning Objective:

1. To describe the benefits of a virtual memory system
2. To explain the concepts of demand paging, page-replacement algorithms, and allocation of page frames
3. To discuss the principle of the working-set model
4. To examine the relationship between shared memory and memory-mapped files
5. To explore how kernel memory is managed

Week 11

Subject: Mass Storage Systems

Learning Objective:

1. To describe the physical structure of secondary storage devices and its effects on the uses of the devices
2. To explain the performance characteristics of mass-storage devices
3. To evaluate disk scheduling algorithms
4. To discuss operating-system services provided for mass storage, including RAID

Week 12

Subject: File System Interface

Learning Objective:

1. To explain the function of file systems
2. To describe the interfaces to file systems
3. To discuss file-system design tradeoffs, including access methods, file sharing, file locking, and directory structures
4. To explore file-system protection

Week 13

Learning Objective:

1. To describe the details of implementing local file systems and directory structures
2. To describe the implementation of remote file systems
3. To discuss block allocation and free-block algorithms and trade-offs

Week 14

Subject: IO Systems

Learning Objective:

1. Explore the structure of an operating system's I/O subsystem
2. Discuss the principles of I/O hardware and its complexity
3. Provide details of the performance aspects of I/O hardware and software

Week 15

Subject: Final

Attendance

Any student who accumulates 10 **unexcused** absences (MWF Classes) or 7 **unexcused** absences (MW classes) will be automatically dropped from this course.

Need for Assistance

Qualified students with disabilities needing academic or other accommodations to ensure full participation in the programs, services and activities at Sul Ross State University should contact the Disabilities Services Coordinator, in Counseling and Prevention Services, Ferguson Hall 112, Box C-117, Alpine, Texas 79832. Please notify me before the third day of classes.

Course Policies

Quizzes and assignments must be submitted on time. I have set up rules in Blackboard so that assignments cannot be submitted after the due date.

Academic Dishonesty: Honesty in completing assignments is essential to the mission of the university and to the development of the personal integrity of the student. Cheating, plagiarism, or other kinds of academic dishonesty will not be tolerated and will result in appropriate sanctions that may include failing an assignment, failing the class, or being suspended or expelled. Suspected cases in this course may be reported to Student Life.

Posting of Grades

As soon as assignments, exams, and quizzes are graded, the grades will be posted in Blackboard.

Grading

Letter grades will be determined using a standard percentage point evaluation as outlined below. Please note that this is a tentative schedule and can change. Any changes that happen will be updated in Blackboard. Due Dates for assignments will also be posted in Blackboard.

Grades are derived as:

50% Homeworks/Projects

25% Attendance and participation

12.5% Midterm

12.5% Final

Your final grade will be determined by calculating points based on the following weights:

- A 90 - 100 %
- B 80 - 89 %
- C 70 – 79 %
- D 60 – 69 %
- F < 60%