

## **CS 303 – Operating Systems**

### **Study guide for Midterm Exam**

Syllabus:

#### Chapter 1: Introduction

- What operating systems do – user view & system view, defining operating systems,
- Computer system organization – computer system operation, storage notation, storage structure, I/O structure.
- Computer system architecture – single processor systems, multiprocessor systems, clustered systems.
- Operating system structure – multiprogramming.
- Operating system operations – dual mode, timer.
- Process management
- Memory management
- Storage management: file systems, mass storage, caching.
- Protection & security
- Computing environments – traditional, mobile, distributed, client-server, peer-peer, virtualization, cloud, real-time.
- Open source operating systems.

#### Chapter 2: System Structures

- OS services.
- User interface: command line, GUI.
- System calls, types of system calls.
- System programs.
- OS design & implementation: design goals, mechanisms & policies, implementation.
- OS structure – simple, layered, microkernels. Modules, hybrid, structure of popular operating systems.
- OS debugging tools.
- OS boot.

#### Chapter 3: Process Concept

- The Process, process state, process control block, threads.
- Process scheduling – scheduling queue, schedulers (long term, short term, medium term), degree of multiprogramming, context switch.
- Operations on processes – process creation, fork ( ), exec ( ), wait ( ), process termination exit ( ).
- Inter process communication – shared memory, pipes.

#### Chapter 5: Process Scheduling

- Basic concepts, CPU bound vs. IO bound, CPU scheduler, preemptive and non-preemptive scheduling.
- Scheduling criteria.
- Scheduling algorithms – First Come First Served, Shortest Job First, Priority scheduling, Round Robin scheduling.
- Predicting future CPU bursts.
- Multilevel queue scheduling.
- Multiprocessor Scheduling.
- Real-time systems scheduling – Rate Monotonic & Earliest Deadline First.
- Scheduling in operating systems – Linux, Windows, Solaris.
- Algorithm evaluation – modeling, simulation.

## Chapter 4: Multithreaded Programming

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- Concept of a thread.
  - Motivation for having threads.
  - Benefits of threads.
  - Concurrency vs. parallelism.
  - Pthread API.
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