**CS 3080**

**Final Exam Review Guide**

**Spring 2021**

**Dr. Rajaei**

**Total Points: 80**

**Date/Time:**

**Wednesday April 28, 3:00 – 5:30 pm**

**Textbook**: Operating System Concepts, Silberschatz, Galvin, Gagne, chapters 1-15

**Notes:** Final Exam is comprehensive and covers all chapters discussed in the class

**Important Notes**: ***Open-notes***; No copy and paste answers from ANY-where. The answers MUST be in your ownwords. Any plagiarisms will be reported to the College. ***Exam time window is fix according to BGSU rule***.

**TOPICS**

**Chapter 1: Introductions**

* All parts of the chapter; but skip sections 1.10, 1.11, 1.13, 1.14
* pay attention to following issues:
  + ~~What operating system does?~~
  + What are typical services?
  + ~~What is interrupts and how it works~~?
  + ~~User mode and kernel mode~~
  + ~~Caches and memory hierarchy~~
  + ~~Types of operating systems~~
  + Client server & peer-to-peer

**Chapter 2: Operating System Structure**

* Read Sections 2.1, 2.2, 2.3, 2.4, 2.5); Skip the rest of the chapter
* pay attention to issues:
  + ~~OS Services~~
  + ~~User interface~~
  + ~~System calls and how it works~~
  + ~~Types of system calls~~
  + ~~How control changes between user program and OS kernel~~

**Chapter 3: Processes**

* Read Sections 3.1, 3.2, 3.3, and 3.6 (specially 3.6.1 & 3.6.3); Skip the rest of the chapter
* pay attention to issues:
  + ~~Process creation, states, operations, scheduling~~ …
  + ~~What a is context switch and its impact on OS performance~~
  + ~~How PCB is used by OS~~
  + ~~How forks and pipes work~~
  + ~~What is a socket and why/where we need them~~

**Chapter 4: Threads**

* Read Sections 4.1, 4.2, 4.3 (skip 4.3.2 & 4.3.3), 4.4 (skip 4.4.5 & 4.4.5, & 4.5)
  + ~~What is a thread and why we need it~~
  + ~~Why threads called lightweight whereas fork process called heavy process~~
  + ~~What is a Pthread and how a program~~ (like Figure 4.9 using the thread)
  + What are the three key Pthread routines and how they work when they are called?
  + ~~What are the key~~ ~~differences between Unix processes and Pthread processes?~~
  + ~~How thread communicate with each other~~**~~?~~**
  + ~~Why are threads often used in multi/parallel programming?~~

**Chapter 5: CPU Scheduling**

* Read Sections: 5.1, 5.2, 5.3, 5.4, 5.5, skip 5.6, 5.7
* pay attention to issues:

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* ~~Types of scheduling algorithms and where they are most useful~~
* ~~What are the criteria when selecting an algorithm?~~
* ~~What is fairness and starvation, and why they can contradict each other?~~
* ~~What is multi-queues and how they connect to aging?~~
* ~~Which algorithm is not fair and which will can cause starvation~~
* ~~How to use~~ ~~Gant chart to find average waiting time of a scheduling algorithm~~
* ~~How scheduling can work for multi-processor and/or multithreaded programming~~

**Chapter 6: Thread Synchronization**

* Read Sections: 6.1, 6.2, 6.3, 6.4, 6.5, 6.9, but 6.6-6.8 (overview)
* pay attention to issues:
  + ~~What is critical section and why it is needed~~
  + ~~What is mutual exclusion?~~
  + ~~Why deadlock & infinite waiting can occur in the system~~
  + ~~How waiting conditions and signals work between processes~~
  + ~~Why synchronization between processes is an important issue~~
  + ~~What kind of hardware and software solution exist for synchronization~~

**Chapter 7: Deadlock (overview)**

* Overview of Sections: 7.1, 7.2, 7.3, 7.4, 7.5, Skip the rest of the chapter
* pay attention to issues:
  + ~~What is a deadlock?~~
  + ~~What are needed~~ ~~conditions to get into deadlock?~~
  + ~~What are main methods of handling deadlock?~~
  + ~~What a circular wait is and it is used?~~

**Chapter 8: Memory Management**

* Read Sections 8.1, 8.2, 8.3, 8.4, 8.5 Skip the rest of the chapter
* pay attention to issues:
  + ~~What are a page and a frame?~~
  + ~~What is swapping and how it works?~~
  + ~~What are~~ ~~logical and physical addresses?~~
  + ~~How paging mechanism is working?~~
  + ~~How is page table used to access memory and/or allocation of memory?~~
  + ~~What types of hardware support needed for paging and why?~~

**Chapter 9: Virtual Memory**

* Read Sections 9.1, 9.2, 9.4, 9.6; Skip the rest of the chapter
* pay attention to issues:
  + ~~What Virtual Memory is and why it is need …~~
  + ~~What is a page fault and how it is handled?~~
  + ~~What factors affects performance of VM?~~
  + ~~How valid/invalid and dirty bits are used?~~
  + ~~What is a page replacement and how it works?~~
  + ~~How LRU, second chance, FIFO replacement algorithms work?~~
  + ~~What is Working Set, and how it is used~~

**Chapter 10: File-System Interface**

* Read Sections 10.1, 10.2, 10.3, 10.5; Skip the rest of the chapter
* pay attention to issues:
  + ~~What are attributes, operations, types, structure, etc.~~
  + ~~Different access methods~~
  + ~~Directory & disk structure~~
  + ~~Files in shared and distributed environments~~

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**Chapter 11: File-System Implementation (overview)**

* Read Sections 11.1, 11.2, 11.3, 11.4; Skip the rest of the chapter
* pay attention to issues:
  + ~~What is FCB, and why it is needed~~
  + ~~Main Allocations methods: Contiguous, linked, & Indexed~~
  + ~~Pros and Cons of each method~~
  + ~~Directory & disk structure~~
  + Files in shared and distributed environments

**Chapter 12: Mass-Storage Structure (Overview)**

* Read Sections 12.1, 12.2, 12.3, 12.4; & 12:6 Skip the rest of the chapter
* pay attention to issues:
  + Disk Structure and mechanical movements
  + Disk Scheduling and algorithms
  + Pros and Cons of each scheduling
  + SCAN, C-SCAN, and LOOK
  + Swap support and management

**Chapter 13: I/O System (Overview)**

* Read Sections 13.1, 13.2, 13.3, 13.4; Skip the rest of the chapter
* pay attention to issues:
  + Special hardware and Buss system
  + Devices and ports;
  + Device Driver & Device Controller
  + Interrupt system, handler, routines, and Vectors

**Chapter 14: Protection (Overview)**

* Read Sections 14.1, 14.2, 14.3, 14.4; Skip the rest of the chapter
* pay attention to issues:
  + What is the goals of protection?
  + What is Domain of Protection?
  + How Access Matrix works

**Chapter 15: Security (Overview)**

* Read Sections 15.1, 15.2, 15.3, 15.4; Skip the rest of the chapter
* pay attention to issues:
  + What is security, why it is needed, what to secure
  + Security Issues; confidentially, integrity, availability, theft, denial of service
  + Threats, and known examples
  + Encryption basics

**WHAT TO STUDY**

1. Textbook. Chapters 1 to 15
2. Your notes
3. Your lab & homework assignments
4. Your Quizzes & Exams
5. End of the chapter Exercises

**FORMAT OF TEST**: True/False, multiple choices, and short questions asking for short essay answers,possible walk-through codes. The format is similar to the midterm exams.

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