Review for Final Examination

CS-450 and CS-550: Operating Systems

1. Functions of the Operating System (OS)

2. Different Environments within which the computer and its OS must function

3. Design Goals

4. OS-Related Terminology

5. Major OS Concepts and their evolution from the first, primitive systems
    a. Single-Job-at-a-Time
    b. Batch Mode
    c. Multi-Programming
    d. Time-Sharing
    e. Standalone PCs
    f. Networked PCs
    g. GUI
    h. Multi-Processors
        i. Symmetric
        ii. Asymmetric
    i. Slave Processors
    j. Distributed Systems
    k. Hand-Held
    l. Process Control & Real-Time
        i. Hard Real-Time
        ii. Soft Real-Time

6. Simultaneity *vs.* Concurrency

7. Hardware Features that Support the OS
    a. Processor States and Privileged Instructions
    b. Examples of Privileged Instructions

8. Sequence of Events when a System Call is invoked

9. The Concept of the Process
    a. The Process Image
    b. The Role of the OS in Managing the Processes on the Machine

10. Multiple Virtual Environments: "VM370"

11. Multiprocessing and the Context Switch

12. Process States and Permissible/Impermissible State Transitions

13. The Process Descriptor

14. Handling of Interrupts

15. Processes and Threads: similarities and differences
    a. User-Level Threads *vs.* Kernel-Level Threads
    b. Creation & Termination of a Process
    c. Creation & Termination of a Thread

16. Semaphores and Mutual Exclusion

17. Three Kinds of Process Schedulers
    a. Long-Term
    b. Medium-Term
    c. Short-Term

18. Process-Scheduling or Thread-Scheduling Algorithms
    a. FCFS
    b. SJF
    c. SRT
    d. Round-Robin
    e. Priority Scheduling
    f. Shortest-Process Next
    g. Fair-Share Scheduling

19. Deadlock & Starvation
    a. Definitions of the terms
    b. How does deadlock occur
    c. Four Conditions necessary for deadlock to occur
    d. Kinds of Resources that can get deadlocked

20. The Resource-Allocation Graph

21. Detection of the Occurrence of Deadlock
    a. Graphical Detection
    b. Vector-&-Matrix Detection

22. Four Major Approaches for Dealing with Deadlock
    a. Deadlock Prevention
    b. Deadlock Avoidance
    c. Deadlock Detection & (Manual) Resolution
    d. The Ostrich Technique

23. Memory Management: Design Goals & Requirements
24. Memory Management Models
25. Resolution of Memory Addresses
26. Approaches to Keeping Track of Memory Allocation
27. Algorithms for Allocation of Partitioned Memory
28. Virtual Memory
29. Page-Replacement Algorithms
30. Input-Output & File Systems
31. *UNIX-LINUX* and Practical OS Design Issues
32. The practical use of various commands of the "Bourne Again Shell" (*bash*) in ***Linux.***