Exam Review

Monitors

Deadlocks

Memory Management

Monitors

• What is a monitor?

• What is a condition variable?

• Hoare vs Mesa style monitors.

• Dining philosophers, readers and writers
Deadlocks

• What is a deadlock? Difference from starvation
• Necessary conditions for a deadlock
• Deadlock detection, avoidance, prevention
• Resource allocation graph - deadlock detection
• Concept of a safe state
• Banker’s algorithm
  – Problem solving with banker’s algorithm

Memory Management

Topics you should understand:
1. What is virtual memory and why do we use it?
2. Memory allocation strategies:
  – Relocation and Contiguous allocation (first-fit and best-fit algorithms)
  – Paging
  – Segmentation
  – Paged segmentation
  – Demand paging
Memory Management (cont.)

For each strategy, understand these concepts:
• Address translation
• Hardware support required
• Coping with fragmentation
• Ability to grow processes
• Ability to share memory with other processes
• Ability to move processes
• Memory protection
• What needs to happen on a context switch to support memory management

Things you should be able to do:

• Given a request for memory, determine how the request can be satisfied using contiguous allocation.

• Given a virtual address and the necessary tables, determine the corresponding physical address.
Memory management strategies

• Contiguous allocation
  – static versus dynamic allocation
  – Base and limit registers
  – Best, first, worst-fit strategies

Paging and Segmentation

Topics you should understand:

• What is paging, a page, a page frame?
• What does the OS store in the page table?
• What is a TLB? How is one used?
  – Effective memory access times using a TLB
• What is segmentation? where are segment tables stored?
• How to combine segmentation and paging?
• What is demand paging?
• What is a page fault, how does the OS know it needs to take one, and what does the OS do when a page fault occurs?
Demand Paging

• What is demand paging?

• What is a page fault?

Paging (cont.)

• Page replacement algorithms. For each understand how they work, advantages, disadvantages, and hardware requirements.
  1. FIFO
  2. MIN
  3. LRU

• How do global and per-process (aka local) allocation differ?
• What is temporal locality? What is spatial locality? What effect do these have on the performance of paging?
• What is a working set?
Paging (cont.)

- What is thrashing and what are strategies to eliminate it?
- What considerations influence the page size that should be used?

Things you should be able to do:

1. Given a page reference string and a fixed number of page frames, determine how the different replacement algorithms would handle the page faults.