

## **Course Overview**

- Processes & Threads
- Memory
- I/O, file systems
- Networking, distributed systems

| Hardware abstraction | Example OS Services  | User abstraction                               |
|----------------------|--|--|
| Processor            | Process management, Scheduling, Traps, protection, accounting, synchronization | Process  |
| Memory               | Management, Protection, virtual memory   | Address spaces                                 |
| I/O devices          | Concurrency with CPU, Interrupt handling                                       | Terminal, mouse, printer,<br>system calls      |
| File System          | File management, Persistence   | Files  |
| Distributed systems  | Networking, security, distributed file system                                  | Remote procedure calls,<br>network file system |



## Highlights of Process Management

- 1. What is a context switch? What happens during a context switch? What causes a context switch to occur?
- 2. What is the difference between a process and a thread?
- 3. What are FCFS, Round Robin, SJF, and Multilevel Feedback Queue algorithms?
- 4. What is an I/O bound process? What is a CPU bound process? Is there any reason to treat them differently for scheduling purposes?
- 5. What is a thread? User level v/ kernel-level
- 6. What is a semaphore? What are the three things a semaphore can be used for?
- 7. What is a monitor? What is a condition variable?
- 8. What is busy waiting?
- 9. What are the four necessary conditions for deadlock to occur?
- 10. What is the difference between deadlock detection and deadlock prevention?
- 11. After detecting deadlock, what options are conceivable for recovering from deadlock?

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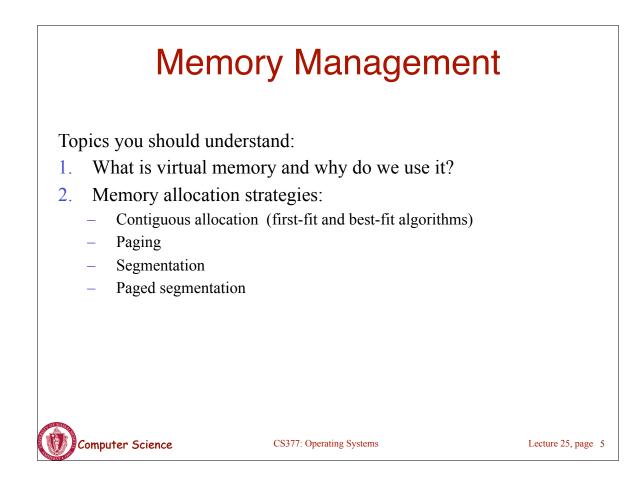
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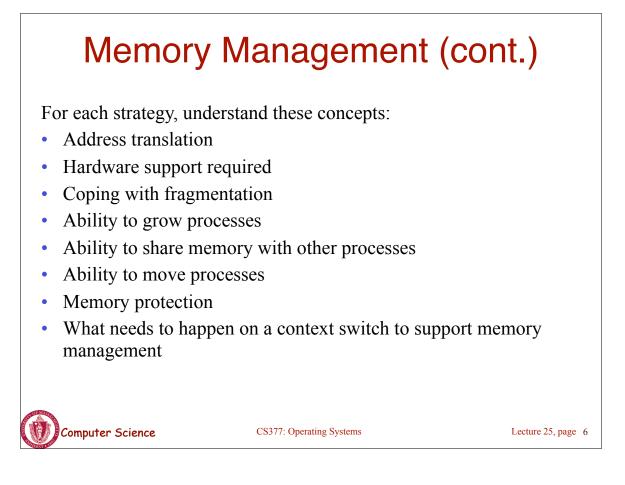
### Highlights of Memory and I/O Management

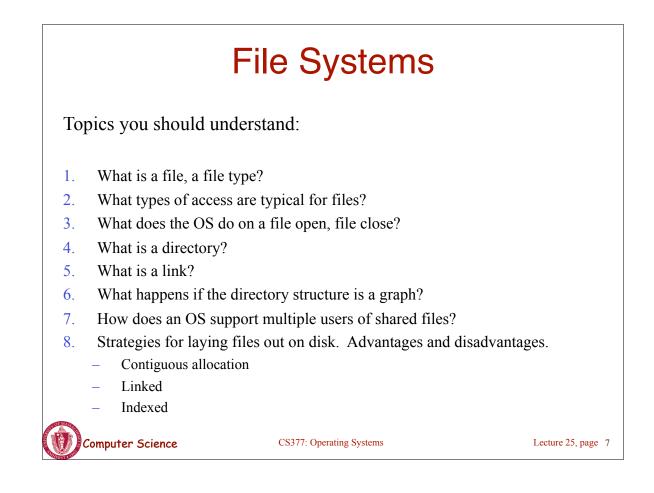
- 1. What is virtual memory and why do we use it?
- 2. What is paging, a page?
- 3. What does the OS store in the page table?
- 4. What is a TLB? How is one used?
- 5. What is a page fault, how does the OS know it needs to take one, and what does the OS do when a page fault occurs?
- 6. Page replacement algorithms: FIFO, MIN, LRU, Second chance. For each understand how they work, advantages and disadvantages.
- 7. How does the OS communicate with I/O devices?
- 8. What are I/O buffers used for?
- 9. What are I/O caches used for? How do they affect reading and writing to I/O devices?
- 10. What is seek time?
- 11. What is rotational latency?
- 12. What is transfer time?
- 13. Disk scheduling algorithms: FIFO, SSTF, SCAN, C-SCAN. How do they work, advantages and disadvantages.

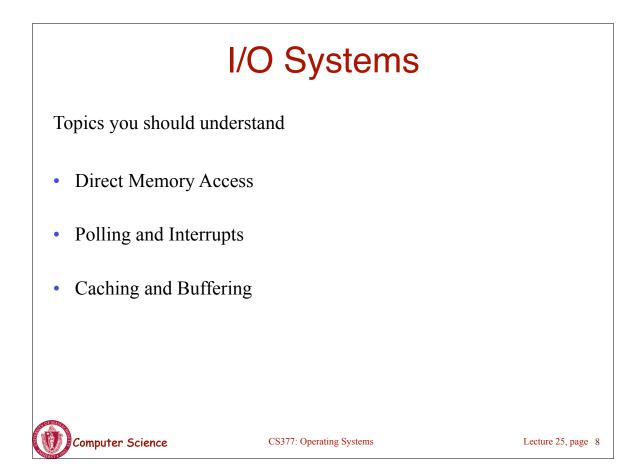


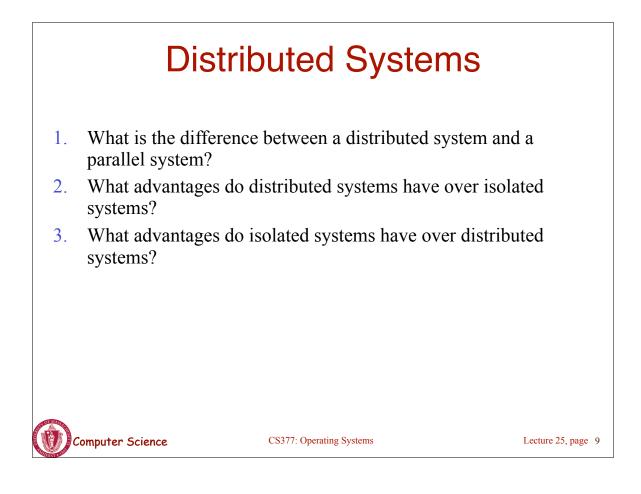
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## Networks

- 1. What is a LAN?
- 2. What is a WAN?
- 3. What are common network topologies? Which are most suitable to WANs? Which to LANs?
- 4. How do node failures affect the different network topologies?
- 5. What are the expected communication costs for the different network topologies?
- 6. What are packets?
- 7. What is a network protocol stack? What is TCP/IP?



### Distributed sharing

- 1. What is data migration? When would you use it?
- 2. What is computation migration? When would you use it?
- 3. What is job migration? When would you use it?



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## **Remote Procedure Call**

- 1. What is RPC?
- 2. How does RPC differ from normal procedure call?
- 3. What extra computation is required to do RPC instead of a normal procedure call?
- 4. Would you ever use RPC to communicate between two processes on the same machine?

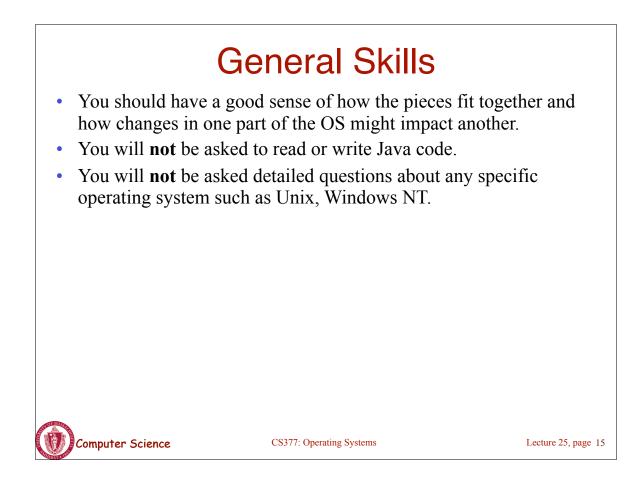


### **Distributed file systems** What are location transparent names? 1 What are location independent names? 2. What does it mean to say that a distributed file system has a 3. single (global) namespace? What is a cache? 4. What are the advantages of using a cache in a distributed file 5. system? What are the disadvantages? What are the advantages and disadvantages of write-back and 6. write-through caches? Computer Science Lecture 25, page 13 CS377: Operating Systems

# Protection

- 1. What is protection and how does it differ from security?
- 2. What is a domain?
- 3. What is a domain access matrix? How are these implemented in actual operating systems?
- 4. How can entries in an access matrix be modified? What is a domain switch and why is it needed?





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