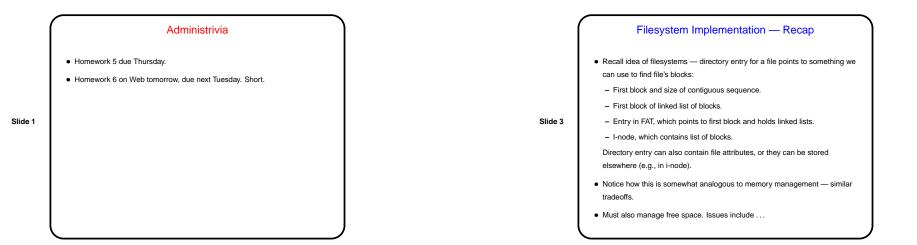
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Minute Essay From Last Lecture

 One student thought Homework 4 was much harder than previous assignments. Do you agree? If so, why?
 About evenly split, a few more agreed.

Slide 2

Blocksize

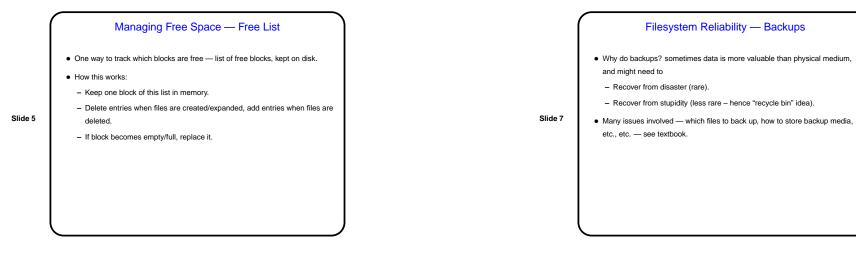
- "I/O software" can provide a device-independent blocksize (and translate to cylinder/track/sector disk addresses).
- How big should blocks be?
- What if they're really big?
- What if they're really small?

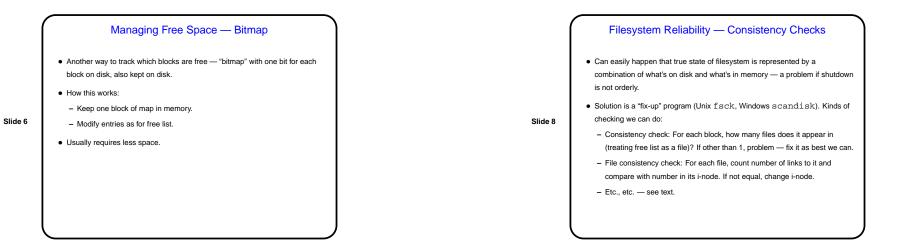
Slide 4

- Usually compromise, also consider page size.

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Filesystem Performance

- Access to disk data is much slower than access to memory seek time plus rotational delay plus transfer time.
- So, file systems include various optimizations ...

Slide 9

Slide 11

Improving Filesystem Performance — Caching

- Idea keep some disk blocks in memory; keep track of which ones are there using hash table (base hash code on device and disk address).
- When cache is full and we must load a new block, which one to replace?
 Could use algorithms based on page replacement algorithms, could even do LRU accurately — though that might be wrong (e.g., want to keep data blocks being filled).
- Slide 10
- When should blocks be written out?
- If block is needed for file system consistency, could write out right away.
- If block hasn't been written out in a while, also could write out, to avoid data loss in long-running program.
- * "Write-through cache" (Windows) always write out modified blocks right away.
- * Periodic "sync" to write out (Unix).

Improving Filesystem Performance — Reducing Disk Arm Motion

Improving Filesystem Performance — Block

Read-Ahead

 Idea — if file is being read sequentially, can read some blocks "ahead". (Of course, doesn't help if file is being read non-sequentially. Decide based on

recent access patterns.)

- Group blocks for each file together easier if bitmap is used to keep track of free space. If not grouped together — "disk fragmentation" may affect performance.
- Place i-nodes so they're fast to get to (and so maybe we can read an i-node and associated file block together).

Slide 12

Slide 14

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