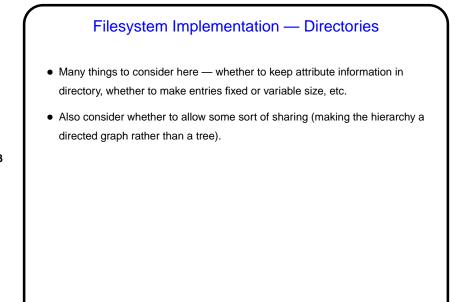


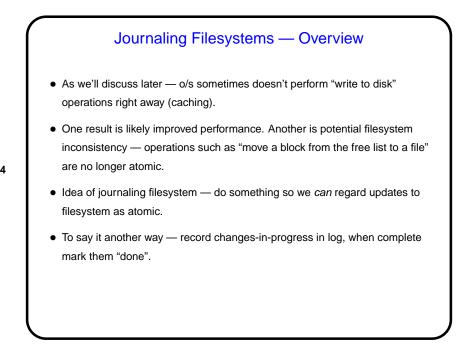
Filesystem Implementation — Recap
Idea of filesystems — directory entry for a file points to something we can use to find file's blocks:

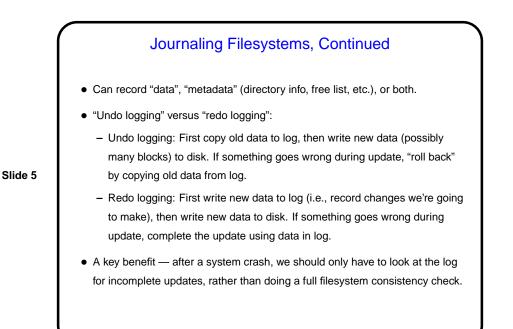
First block and size of contiguous sequence.
First block of linked list of blocks.
Entry in FAT, which points to first block and holds linked lists.
I-node, which contains list of blocks.

Directory entry can also contain file attributes, or they can be stored elsewhere (e.g., in i-node).
Notice how this is somewhat analogous to memory management — similar tradeoffs.



Slide 3





## Journaling Filesystems Versus Log-Structured Filesystems

- Log-structured filesystem *everything* is written to log, and only to log. Seems like an interesting idea, but tough to implement on real systems.
- Journaling filesystem log contains only recent and pending updates.



Managing Free Space — Bitmap
Another way to track which blocks are free — "bitmap" with one bit for each block on disk, also kept on disk.
How this works:

Keep one block of map in memory.
Modify entries as for free list.

Usually requires less space.

