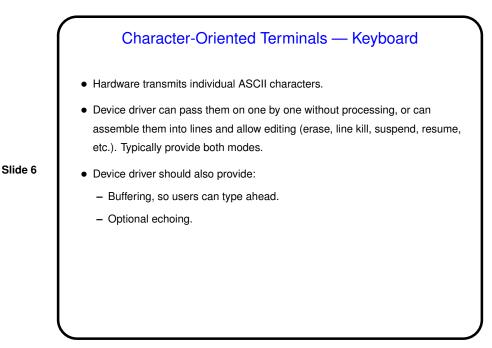
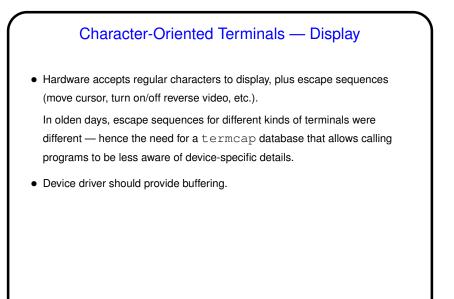


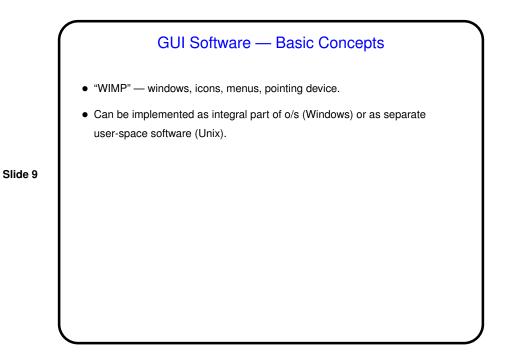


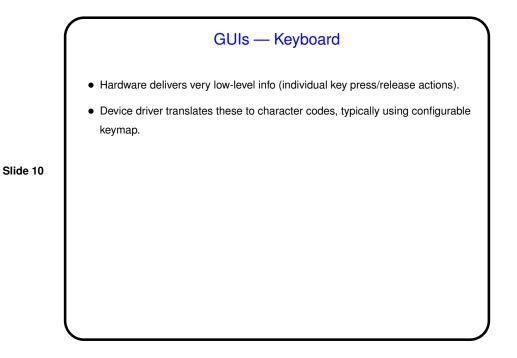
- Hardware consists of character-oriented display (fixed number of rows and columns) and keyboard, connected to CPU by serial line.
- Actual hardware no longer common (except in mainframe world), but emulated in software (e.g., Unix xterm) so old programs still work. (Why does anyone care? some of those old programs are still useful — e.g., text editors — and usually very stable.)

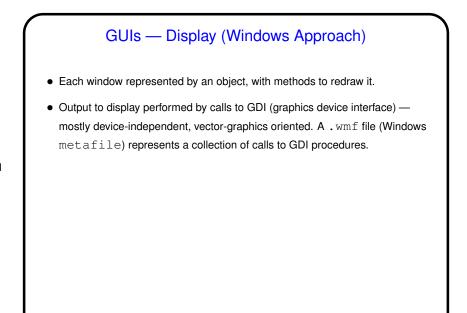


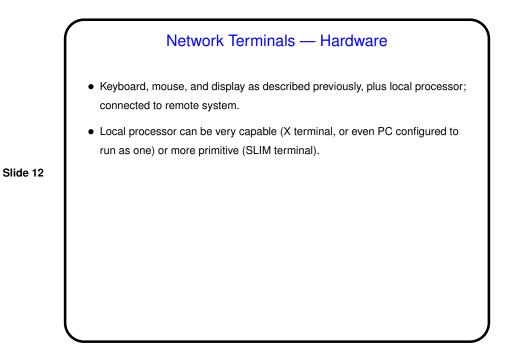


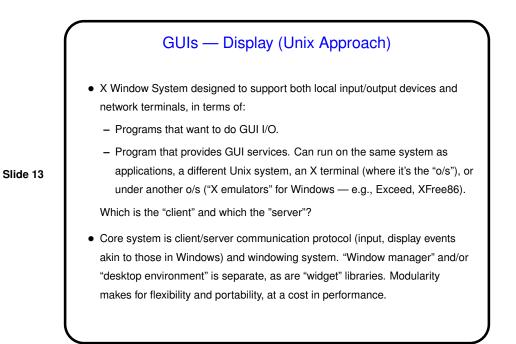
GUIs — Hardware Overview PC keyboard — sends very low-level detailed info (keys pressed/released); contrast with keyboard for character-oriented terminal. Mouse — sends (delta-x, delta-y, button status) events. Display can be vector graphics device (rare now, works in terms of lines, points, text) or raster graphics device (works in terms of pixels). Raster graphics device uses graphics adapter, which includes: Video RAM, mapped to part of memory. Video controller that translates contents of video RAM to display. Has two modes, text and bitmap.

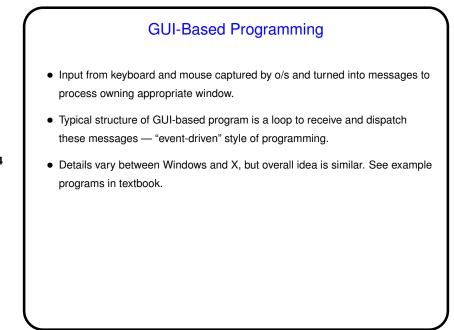


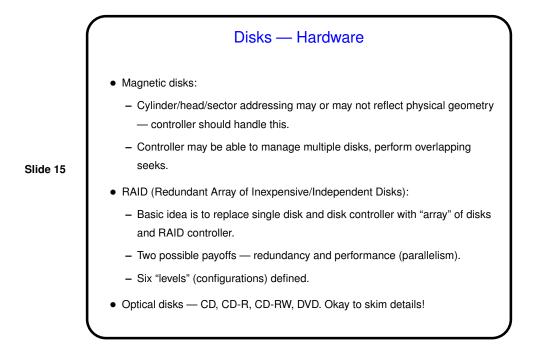


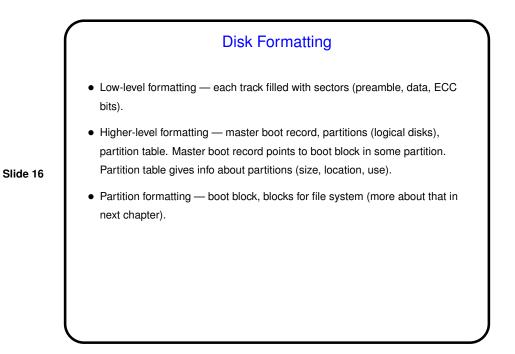


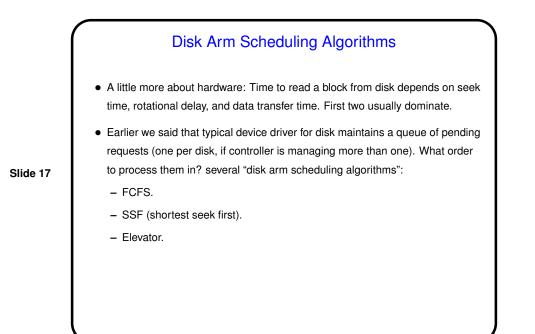












Disk Error Handling
Almost all disks have sectors with defects. Some controllers can recognize them (repeated failures) and avoid them; if not, o/s (device driver) must do this.
Other kinds of errors also possible, e.g., failure to correctly position read/write head; also must be handled either by controller (if possible) or o/s.

