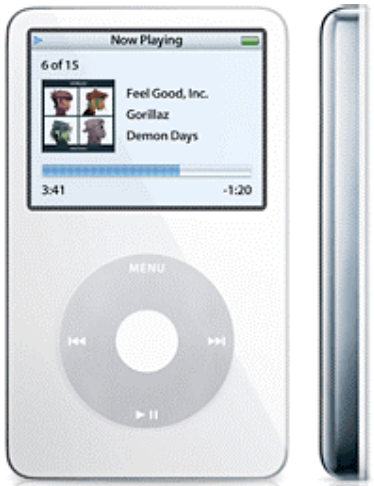
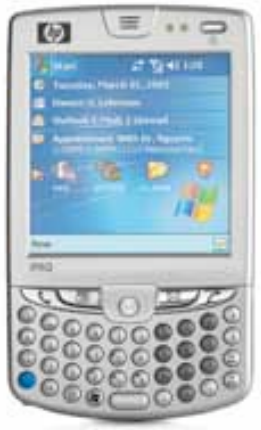
Designing an Operating Systems

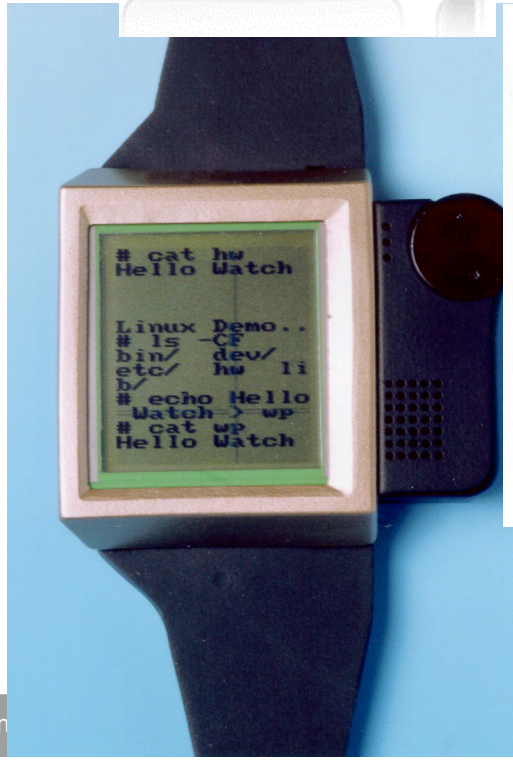
- Goal is to understand how the technologies that we studies so far apply to typical machines
- Today we focus on PDAs and Laptops
  - Both are mobile, inexpensive
  - Battery is a big concern
    - Quick startup
    - Quick shutdown
    - Frequent suspends

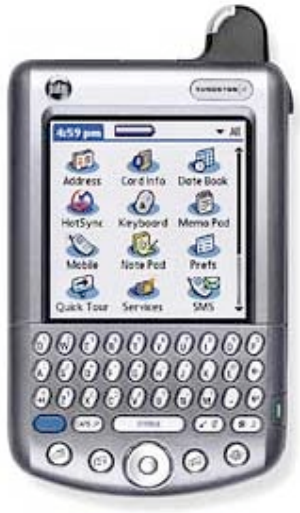
PDA

- Small mobile devices
- Important design elements:
  - Inexpensive
  - Mobile (small, rugged, good battery life)
  - Constrained CPU, memory, storage, screen
  - CPU: 200 MHz
  - Memory: 64 MB
  - Storage: Flash or Microdrive
- OS: Symbian, PalmOS, MS Windows Mobile, QNX, Linux?









PDA and Process

- Usually: only one user, process at any one time
  - Palm context switches by “freezing” process state and unthawing old process
- Process Synchronization: Little system support.
- Many multimedia applications (video, audio, cellular calls)

PDA and memory/storage

- Usually no MMU

- Storage: Flash or Microdrive
  - Flash has no moving components, however can only be rewritten a finite number of times
  - Mobile device and so storage should be consistent

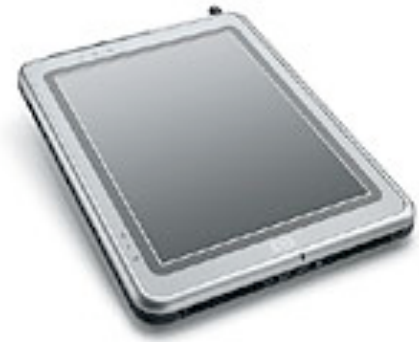
PDA and security

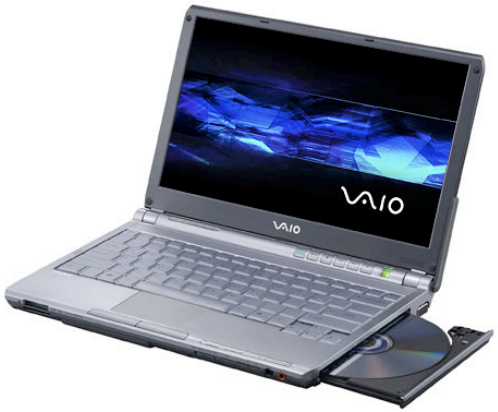
- Heavily uses physical security feature

- Overall: What is the roll of PDA and whatever we learnt?
  - Why do we even discuss PDA class machines?

Laptop class

- Important design factors:
  - Cost, weight
  - CPU: as fast as your lap can tolerate
  - Memory: upto 2 GB
  - Disk: upto 160 GB
    - Future might bring flash
  - Energy consumed depends on amount of resource
- OS: MS Windows, Mac OSX, Linux, FreeBSD, …





Laptops and Processes

- Modern laptops are multicore
  - Mostly interactive tasks and hence prefer interactive applications
  - Frequent suspend - does that affect scheduling?
- Process synchronization
- Users use productivy apps, multimedia apps and solitaire

Laptops - memory and storage

- What do you do with 2 GB on a laptop?
  - Leave memory of exitted programs to quicken startup?
    - Energy cost
  - Use massive buffered IO?
    - Reliability when memory runs out
- Disks and Flash
  - Disks support fully operational, spin-down, park modes

Laptops and protection

- Physical security still possible
- Rarely multiuser