CSC104 winter 2013
Why and how of computing
week 8

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Text: Picturing Programs
Outline

Modern hardware architecture

operators and operating systems

Notes
what Von Neumann looks like

bus connects ALU/control to memory (RAM) and I/O keyboard, monitor, storage, etc.

1. LOAD A1 R1
2. LOAD A2 R2
3. ADD R1 R2 R3
4. STORE R3 A3
5. HALT
where Von Neuman’s going

There are some issues

- Von Neumann bottleneck
  - wavelength of light too close to space between wires!
  - increasing memory speed, speed of CPU speed
  - all communications through same

- mortality of Moore’s Law
  - empirically, size of computer memory halves every 18 months, and speed increases proportionately
  - limit to miniaturization
  - heat dissipation
  - resolution of circuit photographically

FP
input, output
for geezers

Compiles for 
waits for 
in put 
user waits for 
output

much larger than smartphone

lots of real estate
to get ideas in, out
doesn’t fit in pocket
storage
hard drive

 MTBF ~ 5 years.

when power's of, your info is here.

sectors ~ 1024 bytes, byte ~ 8 bits

track.
cylinders
storage
flash drive

store electrons in silicon dioxide chambers
- persists when power is removed
- no macroscopic moving parts.
bits, files, buffers
protect us from the machine

sector 5

sector 27

computer (OS) reads all into from

our creation

into main memory + presents it as a single "piece"
Machines began to take over setting the program counter to a new job, collecting the output, fetching memory... but it was still one job at a time.
time sharing, version 0.1
one user, one program, one computer
task-switching to time-splitting, v 1.0

Does one task stop, or only appear to stop, for the other?
unix (mostly) to the desktop
GUIs, time-sharing, networking, flame-wars
an operating system should have

- kernel (shell, shielded access to hardware, referee sharing)
- utilities