Appendix
History of Computer
Generations

- Pre-computing generation 1792 - 1871
  - Charles Babbage’s “Analytical Engine”
  - Purely mechanical
  - Designed, but never actually built
    - Required high-precision gears/cogs that didn’t exist yet
  - A man before his time
    - When this works, we’ll need software!
    - First programming language
    - World’s first programmer:
      Ada Lovelace
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
  - Vacuum tubes, relays, plug boards
  - Seconds per operation!
    - Focus on numerical calculations
  - No programming language
    - Everything done using pure machine language or wiring electrical circuits!
  - No operating system
    - Sign up for your time slot!
  - Progress: Punch cards!
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
- Second generation 1955 - 1965
  - Transistors, mainframes
  - Large human component
Problem: a lot of time wasted by operators walking around machine room

One solution: An early “batch system” by IBM
- bring cards to 1401
- read cards to tape
- put tape on 7094 which does computing
- put tape on 1401 which prints output
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
- Second generation 1955 - 1965
  - Transistors, mainframes
  - Large human component
  - Solution: Batched jobs
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
- Second generation 1955 – 1965
- Third generation 1965 – 1980
  - Integrated circuits and multiprogramming
  - IBM’s New model: all software and OS must work on all platforms
    - A beast!
  - Progress: Multiprogramming
    - Keep the CPU busy
History of Operating Systems

- Multiprogramming/timesharing system
  - Three jobs in memory – 3rd generation

Memory Management

Process Management

Job 1

Job 2

Job 3

Operating system

Memory partitions
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
- Second generation 1955 – 1965
- Third generation 1965 – 1980
  - Integrated circuits and multiprogramming
  - IBM’s New model: all software and OS must work on all platforms
  - Progress: Multiprogramming and timesharing
  - Progress: Spooling
    - Always have something ready to run
  - MULTICS + minicomputers == UNIX!
History of Computer Generations

- Pre-computing generation 1792 – 1871
- First generation 1945 – 1955
- Second generation 1955 – 1965
- Third generation 1965 – 1980
- Fourth generation 1980 – present
  - Personal computers
  - Multi-processors
  - Phones
  - …