CSE 143
Lecture 25

Computer Science

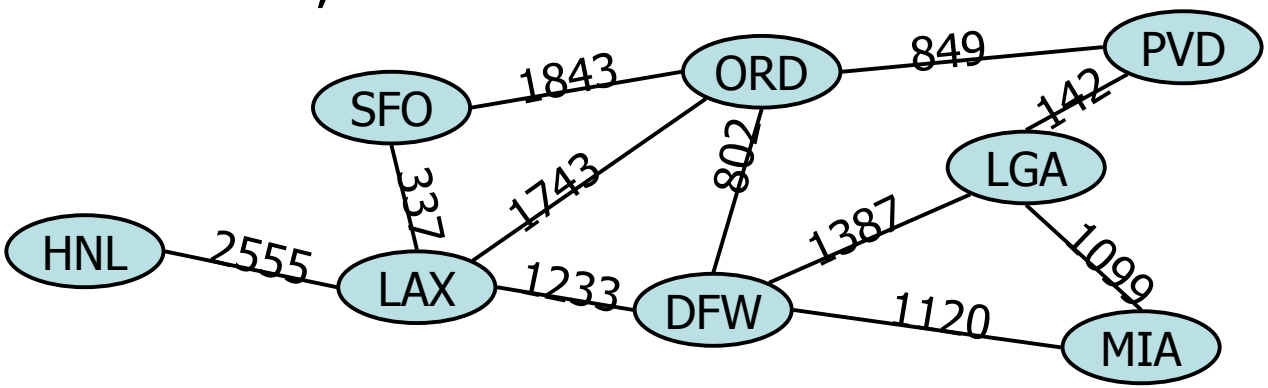
slides created by Marty Stepp, Hélène Martin, and Benson Limketkai
http://www.cs.washington.edu/143/

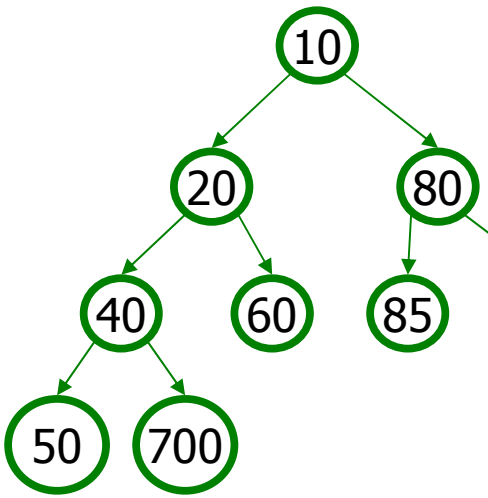
What's next?

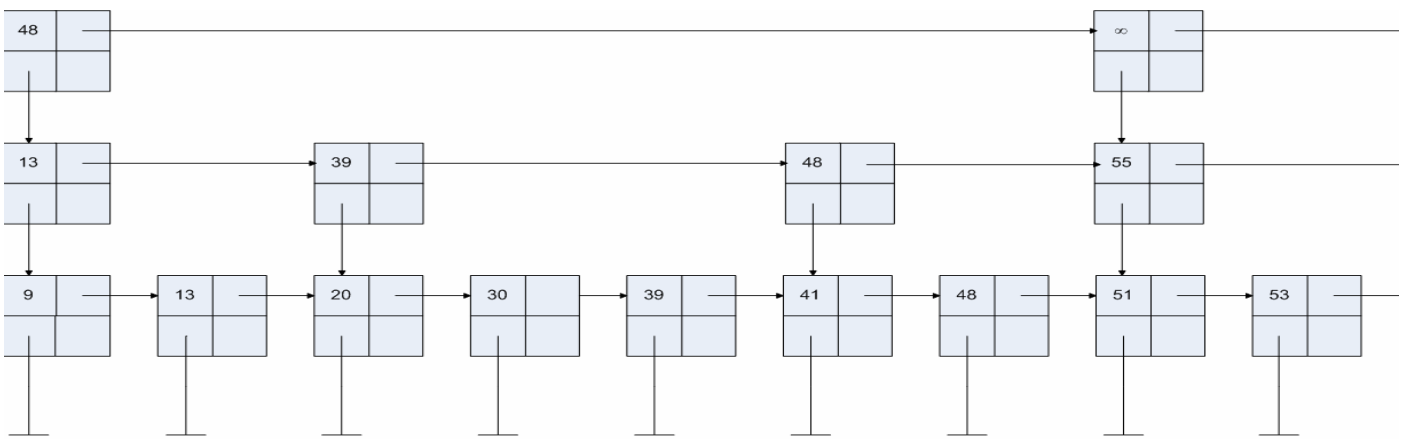
- CSE non-majors
  - CSE 373: Data Structures and Algorithms
  - CSE 374: Programming Concepts and Tools (C/C++, Linux, ...)
  - CSE 190M: Web Programming
  - CSE 131: Digital Photography
  - CSE 460: Animation Capstone (open to all majors)
  - INFO, AMATH, DXARTS, ...
- CSE majors
  - CSE 332: Data Abstractions (Data Structures and Algorithms)
  - CSE 311: (Mathematical) Foundations of Computing
  - CSE 331: Software Design and Implementation
  - CSE 341: Programming Languages
  - CSE 344: Intro to Data Management (and databases)
  - CSE 351: Hardware/Software Interface

Data structures

- graphs, heaps, skip lists
- balanced trees (AVL, splay, red-black)
- CSE 373, 332

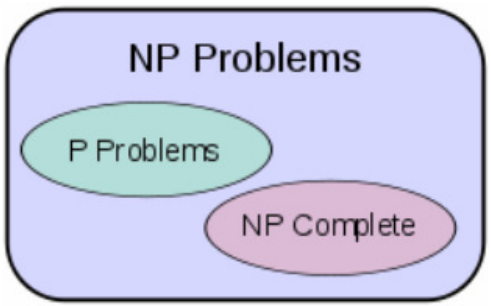






Theory of computation

- languages, grammars, and automata
- computational complexity and intractability
  - Big-Oh
  - polynomial vs. exponential time
  - P = NP?
- graph theory



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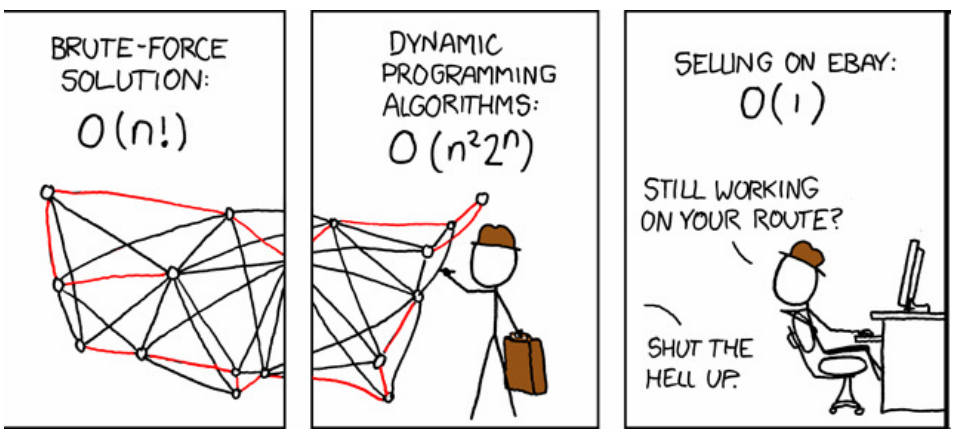
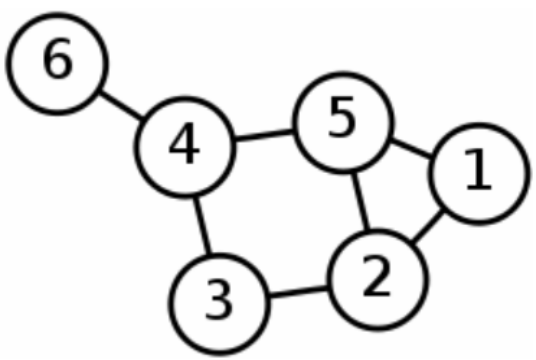


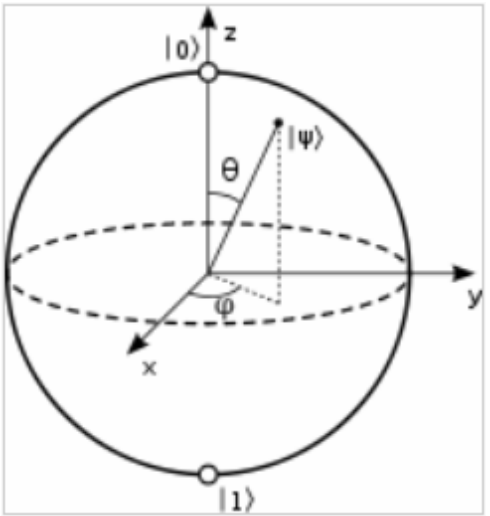


Security

- **cryptography**: study of hiding information
  - enigma machine
  - RSA encryption
  - steganography
- security problems and attacks
  - social engineering
  - viruses, worms, trojans
  - rootkits, key loggers
- CSE 484 security course
  - hacking assignment: hack into grades, change from 0 to 100%

Quantum computing

- **qubit**: A particle that can store 0, 1, or any "superposition" between
  - a bit that can sort of be 0 and 1 at once
  - **quantum computer**: uses qubits, not bits
  - theoretically makes it possible to perform certain computations very quickly
    - Example: factoring integers (why is that useful?)
  - actual implementation still in its infancy
    - can add single-digit numbers; can factor 15

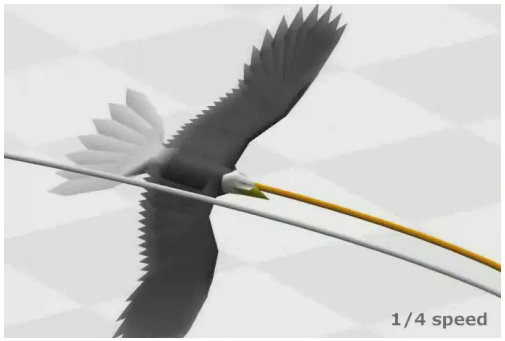


Robots

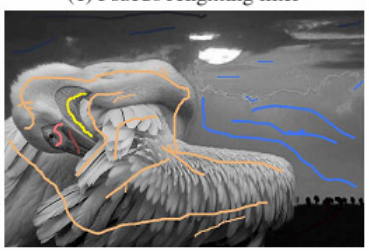
- toys, building cars, vacuums, surgery, search and rescue, elder care, exploration

Graphics and vision

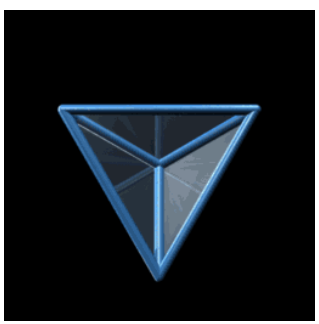
- GRAIL (Graphics and AI Lab)
- computer vision
- AI and the Turing Test



(c) Psuedo relighting filter

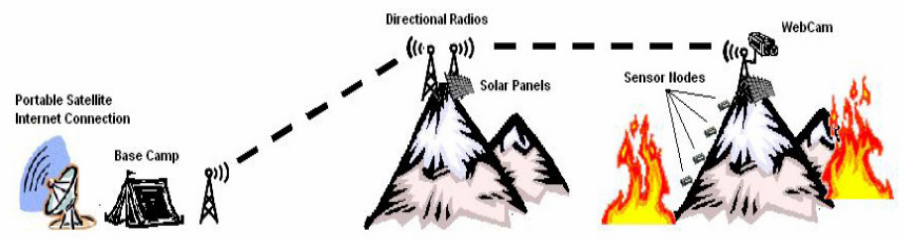


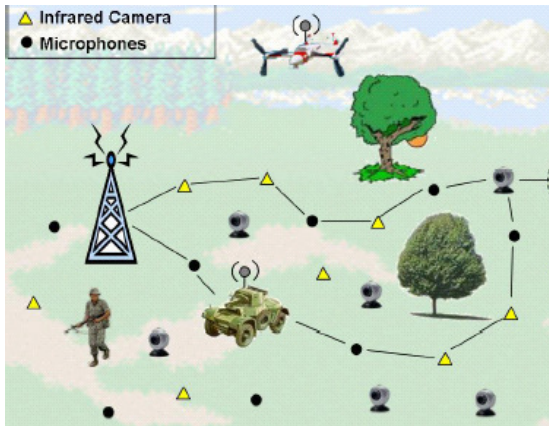
High dynamic range | Enhanced exposure | Object removal



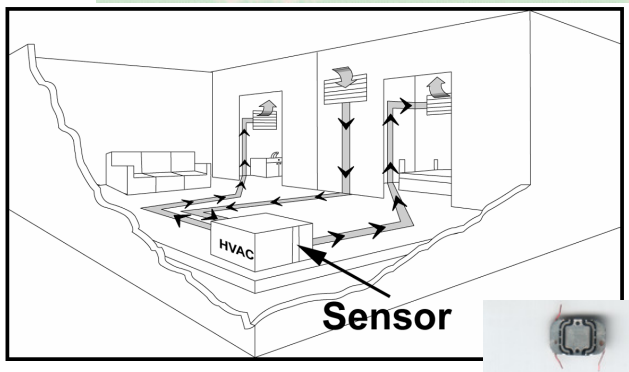
Sensor networks

- Environment monitoring
- Military Intelligence

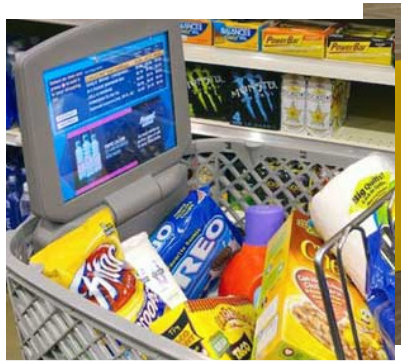


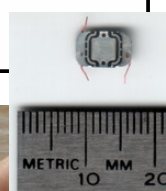


- Intelligent homes
  - detecting human activity through device usage / voltage (S. Patel, UW)



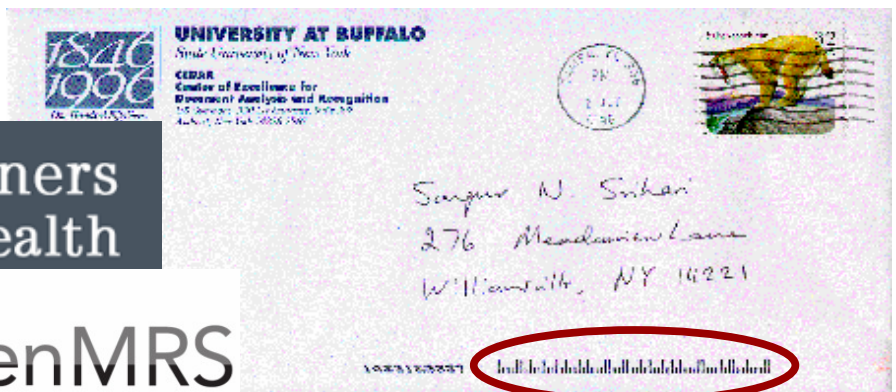
- radio freq. identification (RFID)
  - shopping, inventory
  - credit cards, toll roads, badges





Data mining

- **data mining**: extracting patterns from large data sets
  - What do these two lists have in common?
    - coughing, rash, high fever, sore throat, headache, heartburn
    - V14GR4, cheap meds, home loans, Nigeria, lower interest rate
  - And what does it have to do with sorting your mail?
    (90% of mail is sorted automatically)
    - http://www.usps.com/strategicplanning/cs05/chp2_009.html (2005)

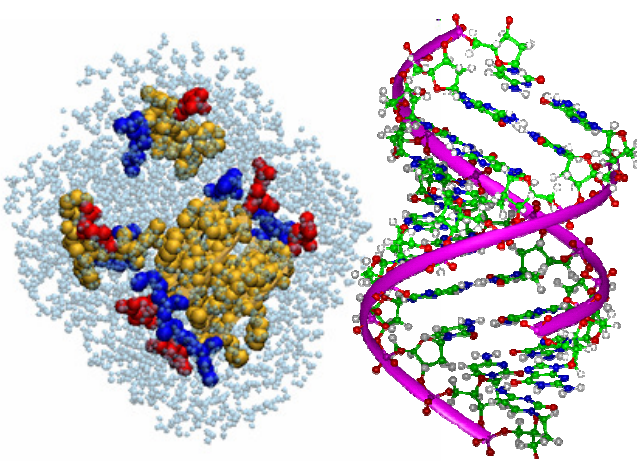


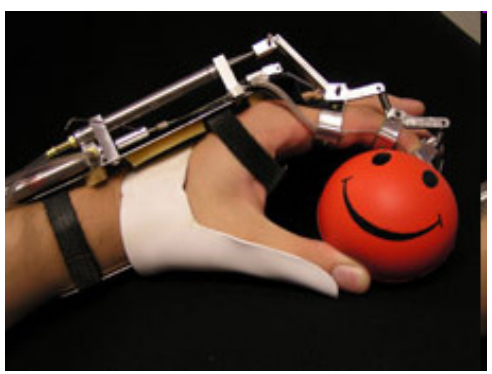
Partners In Health

OpenMRS
MEDICAL RECORD SYSTEM

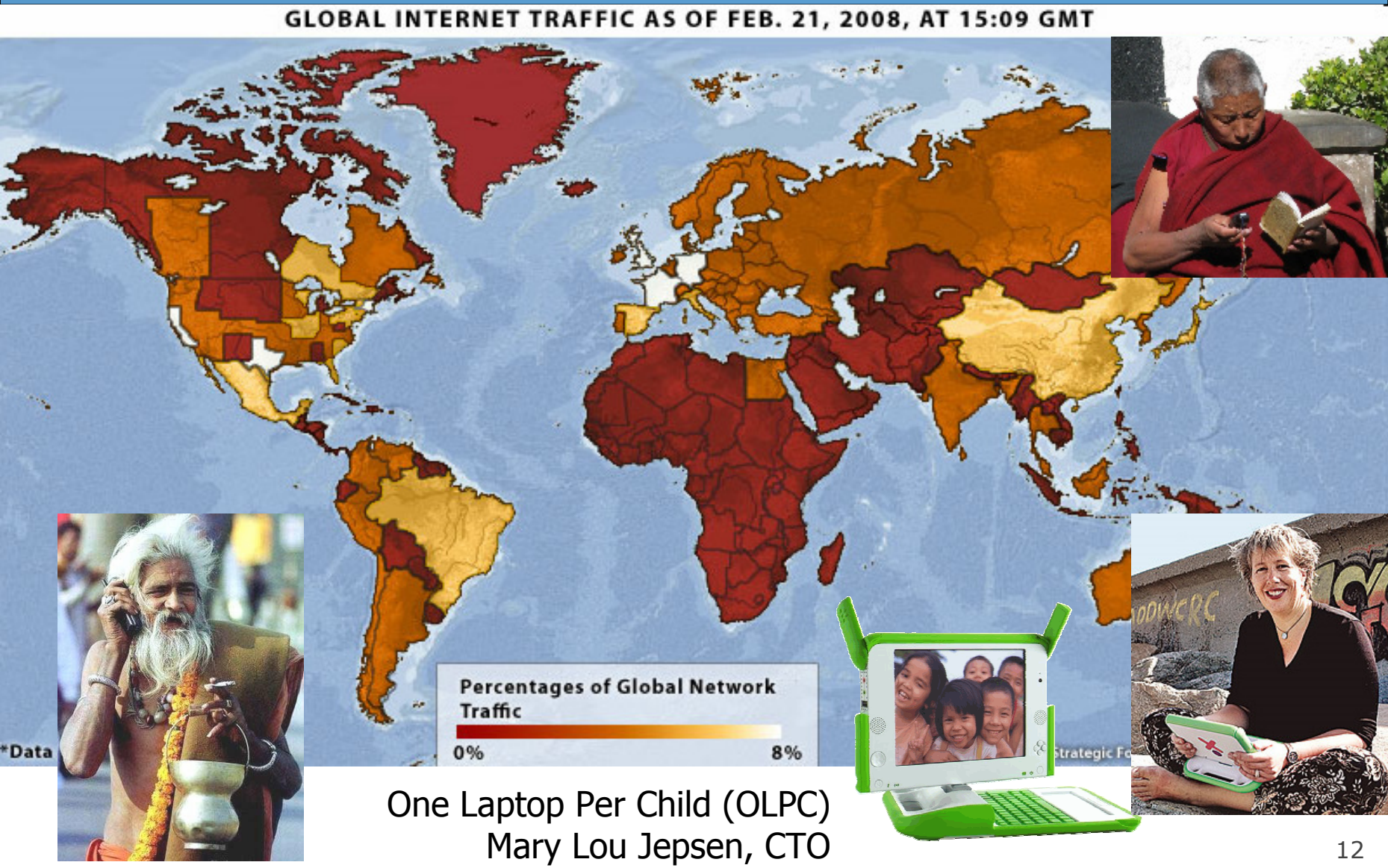
Science and medicine

- computer science
  - **bioinformatics**: applying algorithms/stats to biological datasets
  - **computational genomics**: study genomes of cells/organisms
  - **neurobotics**: robotic brain-operated devices to assist human motor control
    - http://neurobotics.cs.washington.edu/videos.html
  - assistive technologies





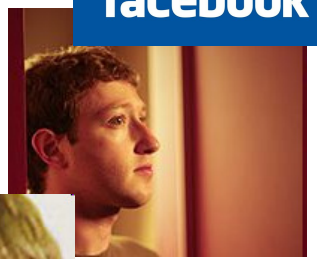
The developing world



One Laptop Per Child (OLPC)
Mary Lou Jepsen, CTO

Experience optional

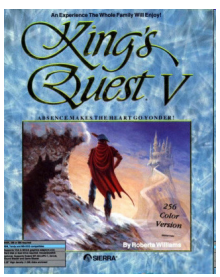
- Mark Zuckerberg, Facebook
  - side project while soph. CS major at Harvard
    - in 2 weeks, 2/3 of Harvard students joined



- Bill Gates started "Micro-Soft" at age 20

- Larry Page / Sergei Brin, Google
  - made "BackRub" search at age 23

- Roberta Williams, Sierra
  - pioneer of adventure gaming



- Ryan Hankins, vsfinder.com

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