

CSE 143

Lecture 27

Computer Science

slides created by Marty Stepp and Benson Limketkai

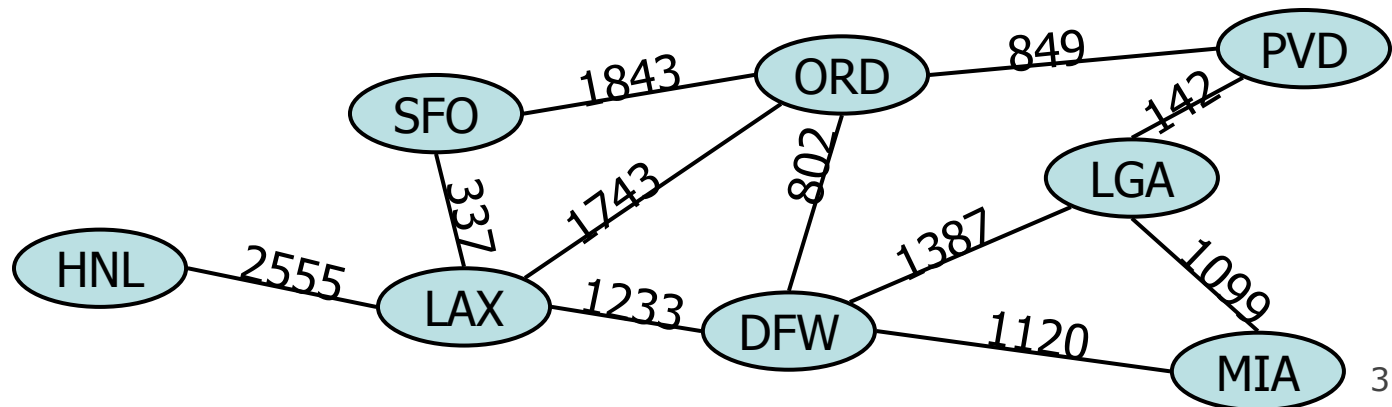
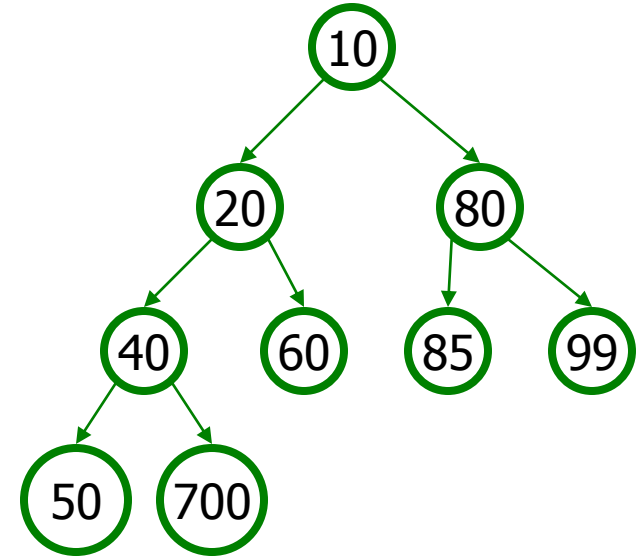
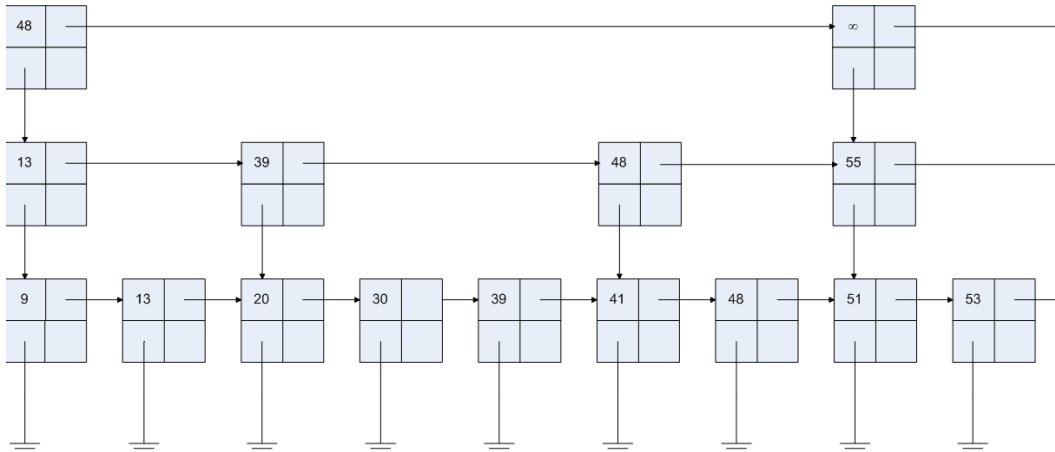
<http://www.cs.washington.edu/143/>

What's next?

- CSE non-majors
 - CSE 373: Data Structures and Algorithms
 - CSE 190 M: Web Programming
 - INFO, DXARTS
 - ...
- CSE majors
 - CSE 303: Software Tools (C/C++, Unix/Linux, scripting)
 - CSE 332: Data Abstractions
 - CSE 311/312: Discrete Structures / Mathematical Foundations
 - CSE 341: Programming Languages
 - CSE 351: Introduction to Digital Design

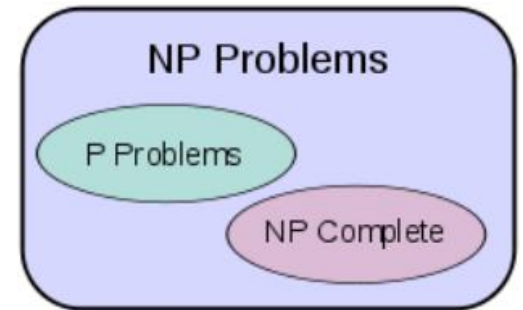
Data structures

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

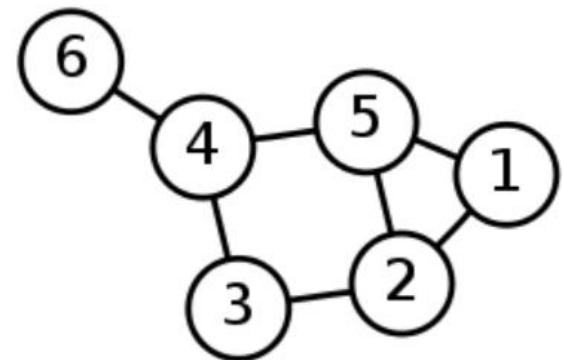
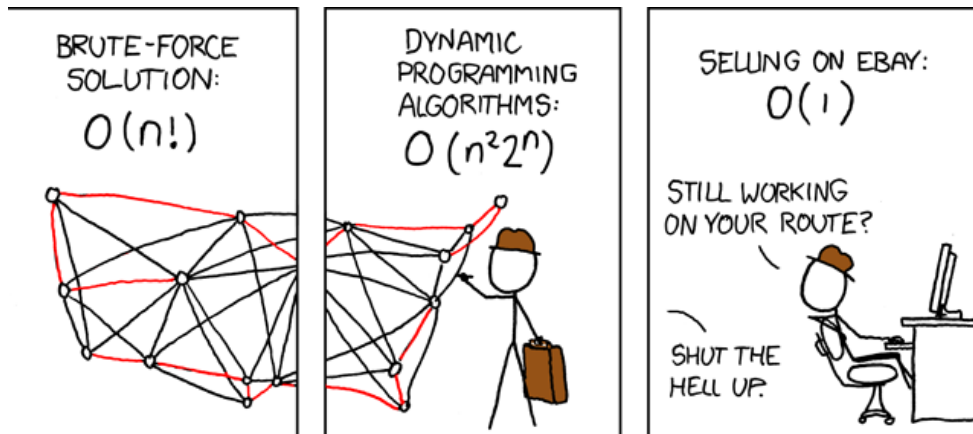


Theory of computation

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

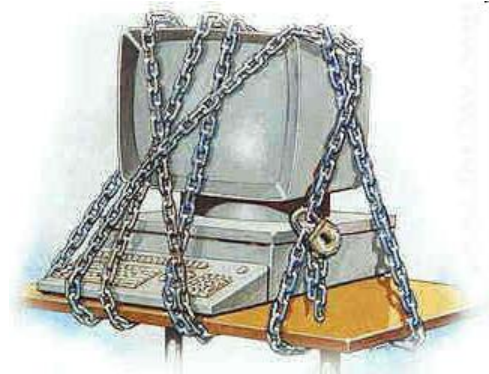


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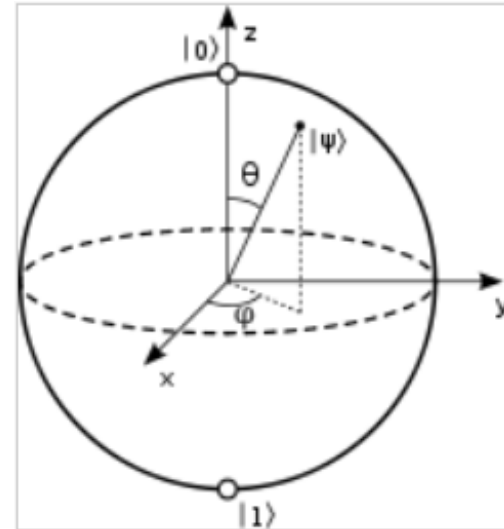
Security

- **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%



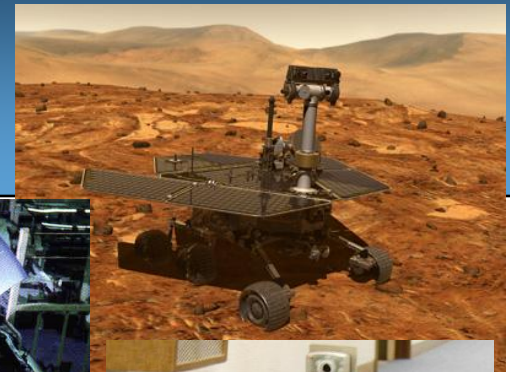
Quantum computing

- **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

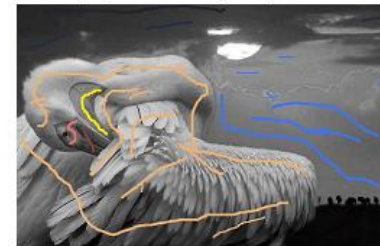


Graphics and vision

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



(c) Pseudo relighting filter



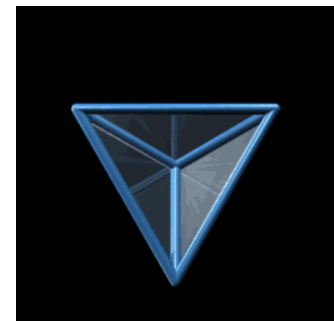
High dynamic range

Enhanced exposure

Object removal

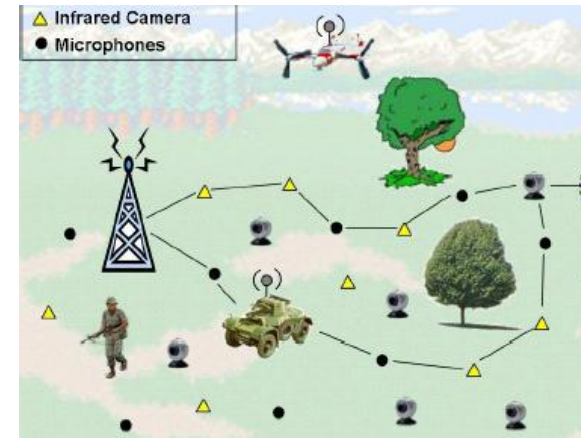
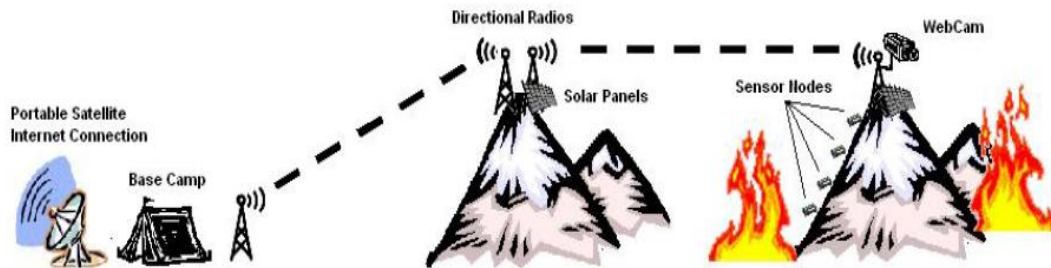
TURING TEST EXTRA CREDIT:
CONVINCE THE EXAMINER
THAT HE'S A COMPUTER.

YOU KNOW, YOU MAKE
SOME REALLY GOOD POINTS.
I'M ... NOT EVEN SURE
WHO I AM ANYMORE.

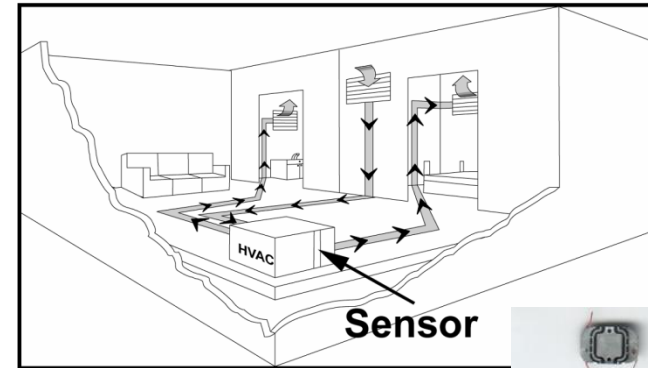


Sensor networks

- 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

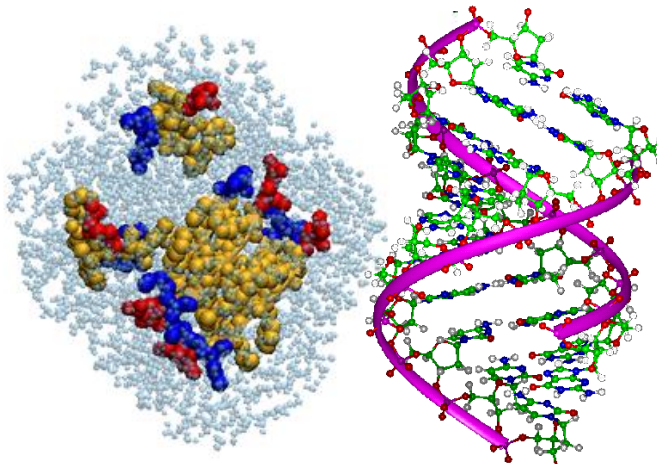
- **data mining:** extracting patterns from large data sets
 - What do these two lists have in common?
 - coughing, rash, high fever, sore throat, headache, heartburn
 - V14GR4, cheap meds, home loans, Nigeria, lower interest rate
 - And what does it have to do with sorting your mail?
(90% of mail is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



1846
1996
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State University of New York
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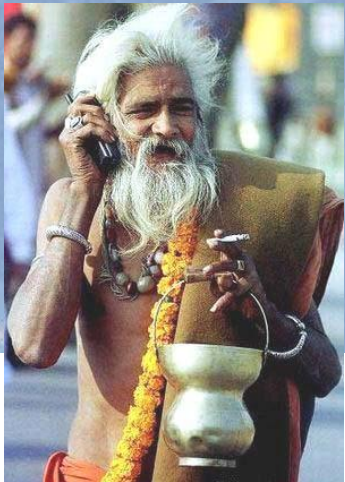
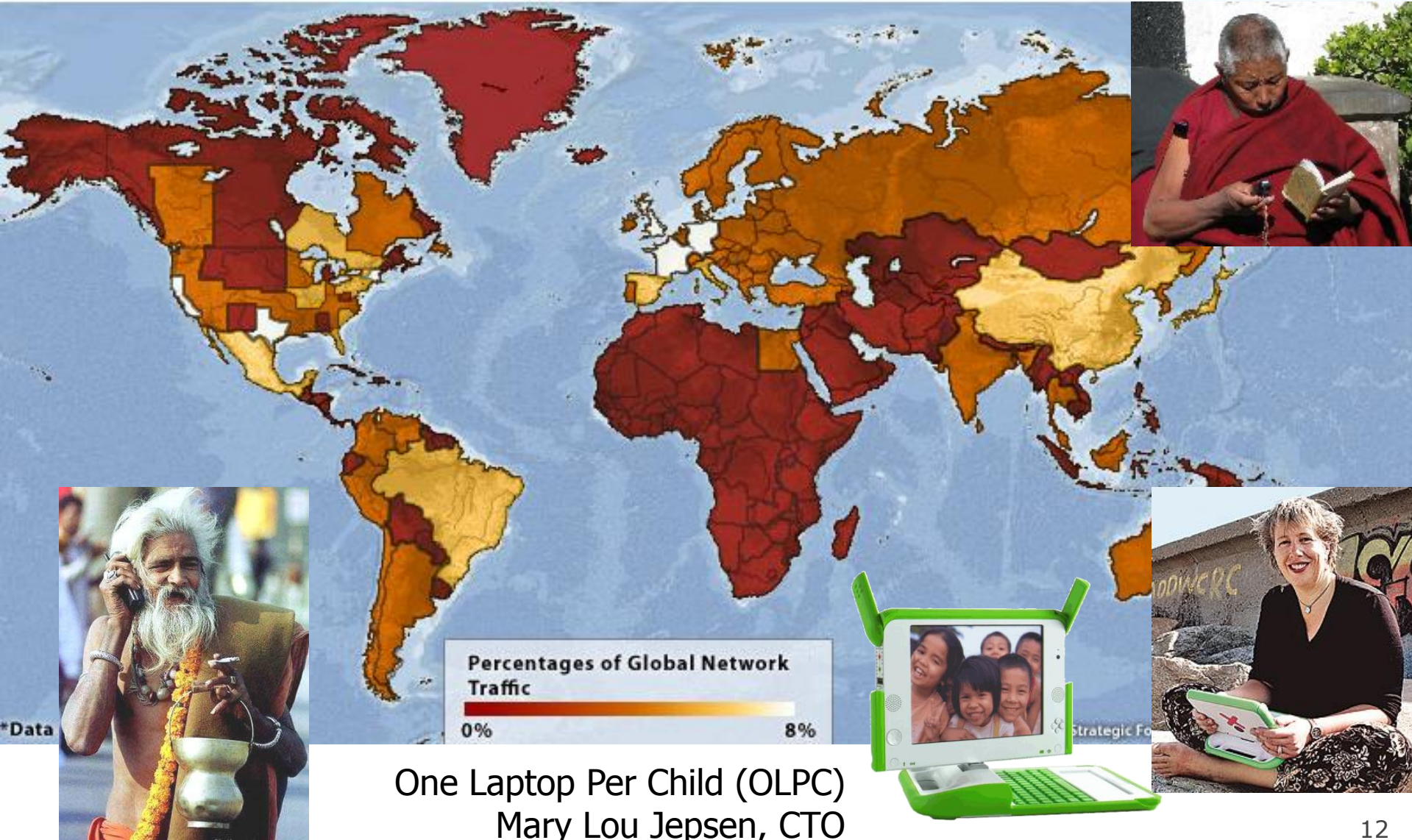
Science and medicine

- 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

GLOBAL INTERNET TRAFFIC AS OF FEB. 21, 2008, AT 15:09 GMT



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

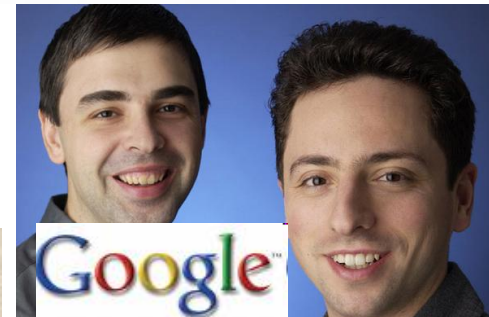
Experience optional

- 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
- UWTools.com

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Microsoft



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