History of Computing

“Hello, world!”*

*Warm-up: When was this term first coined?

Welcome to CSE 490H!

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- BS/MS Student
- TA/instructor in Allen School for various courses including CSE 143/154/311/332/341
- Many interests, especially exploring the exciting history of computer science!

Remy Wang

- Grad student studying programming languages in PLSE lab
- Interests in PL, game theory, and of course, the exciting history of computer science!

Overview of CSE 490H

- Course website here: https://courses.cs.washington.edu/courses/cse490h1/19wi/

A Few “First Things First” Logistics

- We’re scheduling a field trip to Living Computer Museum!
  - Option 1: Thursday leaving at 2:30PM, arrive back to campus around 4:30PM
  - Option 2: Saturday leaving at 1PM, arrive back around 3:30PM

What This Seminar Is About

- Explore the origins of computer science - beyond the first computer!
- Draw connections to other CS courses you are taking
- Hear from domain experts about case studies, milestones, innovations, etc.
- Read a few pioneering papers on different innovations/ideas in computing
- Take advantage of discussions with guest speakers and your peers!
- This is the first time we've offered the seminar - let us know what is/isn't working over the weeks!

Why are ***you*** taking this seminar?

What do you know about HOC so far?

Warm-up activity! (See website for key)

Why is it important to study the history of computing?

- Innovations in computing have dramatically **shaped the way the world works today**
- We continue to come across challenges in technology (societal, economical, ethical, etc.)
- Important to **reflect on the past** to inform decisions and policies implemented today
- Provide **context** to CS foundations in your **current** courses
- Inform decisions for **your future contribution**s in the field
- Generally really interesting :)

What drives the history of computing?

- Ideas?
- Inventions?
- People? Companies? Governments?
- Wars?
- Courses on HOC vary greatly
  - Some focus on linear timelines
  - Some start before the 1800's, some in 1950
  - We'll focus on particular topics with some exciting guest speakers (and a field trip!)

How to study the history of computing?

- Each weekly topic has 1-2 recommended readings
- We will add an optional collaborative Google Doc for each reading and you can add your own questions/discussion questions/thoughts to discuss with peers/us/speakers
- Take advantage of weekly lectures/discussions!
- We also will be building onto a resources page over the quarter

When Did Computers Begin?

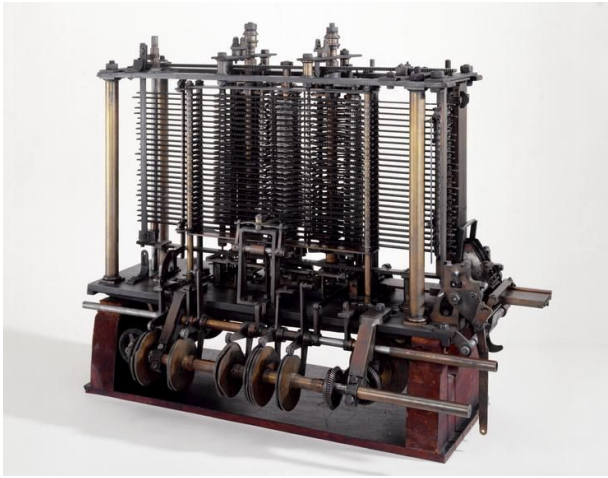
- Early innovations in computing driven by calculators to aid scientific research and growing economies
  - First mechanical calculator invented by Blaise Pascal in 1642
- As populations grew, need to store/analyze data also grew
- Start of “Computer Age” considered to be 1950’s shortly after Turing’s paper proposing design of computer with circuit diagrams
- 1950’s saw lots of electronic computers created between US and UK
  - EDSAC
  - ENIAC
  - UNIVAC
- Computers continued to become more accessible to public, software development tries to catch up with

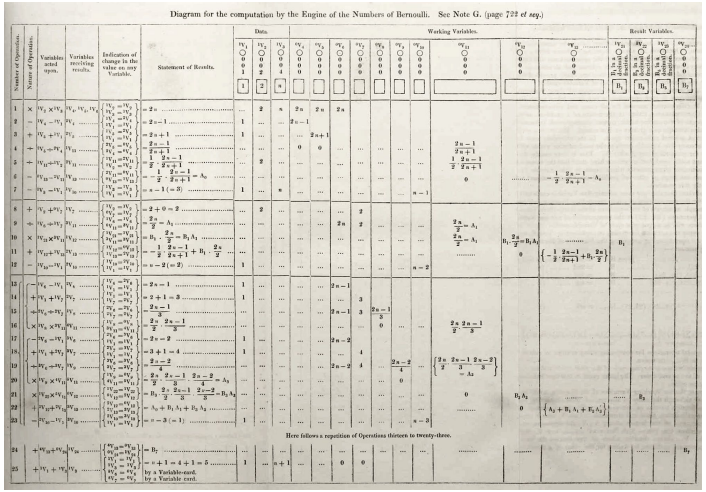
Themes in History of Computing

- Role of data
  - E.g. 1890 census collection motivated first electromechanical calculator invented by Herman Hollerith, who would help establish Computer-Tabular-Recording Company, later renamed to IBM
- Societal, economical, and political contexts
- Does technology drive society, or does society drive technology?
- Influence of wartime conflict on scientific and technological innovation (arms race)
- Research vs. industry vs. government
  - Economic competition and government pressure highly influential in 1950-80's

Key Innovations: Pre-1900's

- First mechanical calculator invented by Blaise Pascal in 1642
- Difference Engine and Analytical Engine in early 1800's (first "computing" machines)
- First "program" written by Ada Countess of Lovelace for Analytical Engine to calculate the 8th Bernoulli number
- Boolean algebra created in 1850's (fundamental in computer science)





Key Innovations: 1950-80's

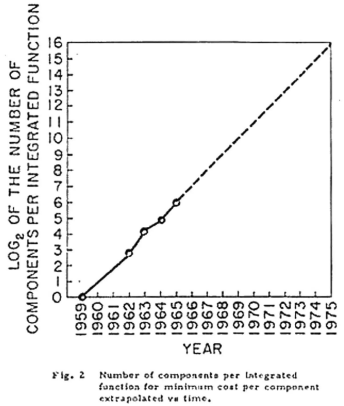


Fig. 2 Number of components per integrated function for minimum cost per component extrapolated vs time.

- Bell Labs
  - Source of much research in CS and shaped modern computers
  - Unix created in 1970 by Dennis Richie and Ken Thompson
- Hardware:
  - Transistors invented in 1947 at Bell Labs
  - Moore's Law published in 1965 by co-founder of Intel
- Theory/cryptography
  - RSA invented in 1977
- Networking
  - ARPANET started in 1968, Internet invented by Vint Cerf in 1970's

Key Innovations: 1950-80’s

- First electronic computers/operating systems
  - ENIAC/UNIVAC
  - Unix in 1970
  - Personal computers in 1970’s (PDP-11 on the right)
- First programming languages:
  - COBOL created by Grace Hopper in 1953
  - FORTRAN in 1950’s
  - ALGOL/LISP in ~1960
  - C in 1972
  - BASIC in 1974

Key Innovations: 1950-80's

- Software Development Practices
  - General era of SW bugs and councils/policies created as a result
  - Art of Computer Programming first released in 1962 by Donald Knuth
- HCI
  - First computer mouse invented in 1968
  - GUI's become more prevalent with newer Windows computers
  - Microsoft Word created in 1983
- UW CSE!
  - Started in 1967 for graduates, 1975 for undergrads
  - In 1970, only 7 faculty
  - Ladner Theorem in 1975

Authorization of UW CSE Program

C O P Y

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Date March 8, 1967

TO President Charles E. Odegaard

Executive Offices

From Dean Joseph L. McCarthy

The Graduate School

Subject Recommendation for new degree program for Doctor of Philosophy and Master of Science in the field of computer science

Dear President Odegaard:

(1) The faculty of the Computer Science Committee has requested authorization to offer a graduate program leading to the degrees Master of Science and Doctor of Philosophy in the field of computer science.

(2) Rapid advances in computer technology in recent years have given rise to a demand for trained personnel to operate and help design computers having ever-increasing capabilities. According to a report published in February, 1966,

Source: http://lazowska.cs.washington.edu/history/Board_of_Regents_Minutes_March_1967.pdf

Key Innovations: 1980’s-2000’s

- Digital Information
  - Internet continued to become public-facing
  - First online newspaper in 1980 (the Columbus Dispatch)
- World Wide Web
    - Invented by Tim Berners-Lee (1990)
    - FIrst graphical web browser (Netscape) released in 1994
- Search Engine
  - “Archie” invented in 1990
  - Yahoo and Google founded in 1995

Key Innovations: 1980’s-2000’s

- Start of online economies
  - Amazon.com founded in 1994 by Jeff Bezos
  - Ebay.com founded in 1998
- Many, many more programming languages
  - BASH in 1989
  - Python in 1989
  - Java in 1996

Key Innovations: 21st Century

What do you think are the key innovations of the 21st century so far?

Next Week: History of Game Theory (with games!)

- Our first topic will be the history of game theory - please review the posted readings before Tuesday!