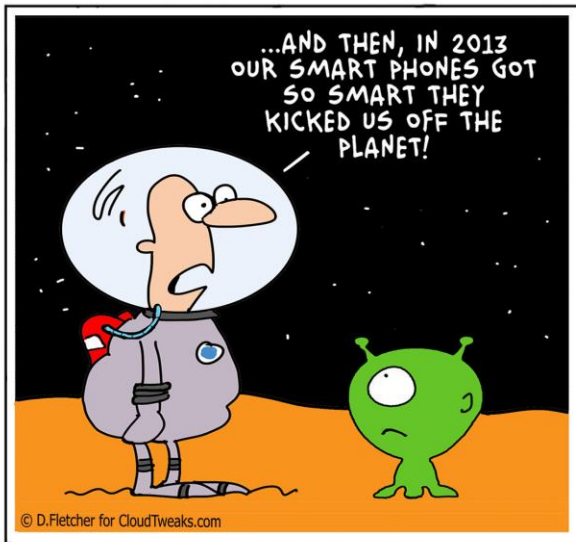# History of Computing

Lecture 24 – COMPSCI111/111G SS 2020

Today's lecture

- The history of computing, focusing on the personal computer (PC)
  - The first computers
  - Computers in WWII
  - 1950s - 1980s: from the room to the desk
  - 1980s – 2000s: the computer becomes personal
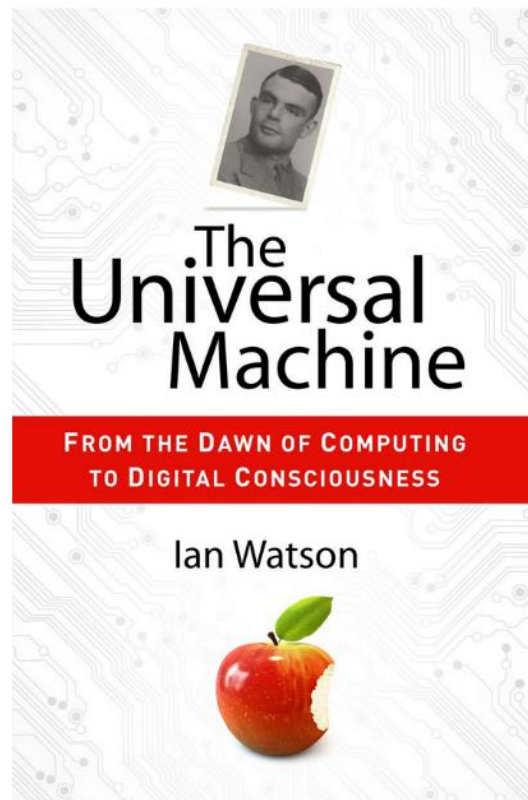 - Future of the PC

Why bother?!

- Knowing the history of computing gives us:
  - A better understanding of how computers work
  - An appreciation how quickly computing technology has developed
  - Insights into the future of computing

Computer Science timeline

Helpful resources

▶ "The Universal Machine" by Assoc Prof Ian Watson

Helpful resources

► Computer Science Department's Computing History displays

► Website explaining the displays: https://www.cs.auckland.ac.nz/historydisplays/

The first computers

▶ People were the first computers, performing calculations by hand to produce tables of mathematical results (eg. ordinance tables)

▶ In 1832, Charles Babbage designed the Analytical Engine; a mechanical device that performed basic arithmetic

   ▶ Basic operations could be combined to perform complex calculations

   ▶ Key advantages: speed and accuracy

   ▶ Cost, construction challenges and the Engine's size meant it was never built
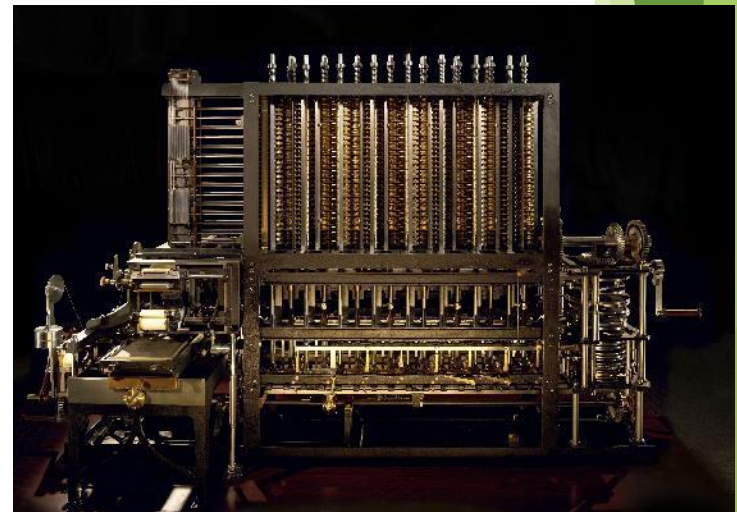
The first computers

▶ It took clerks 7 years to manually compile the results of the 1880 US census

▶ The **Electric Tabulating System** designed by Herman Hollerith compiled the 1890 Census results in 2½ years rather than a decade!

▶ Over the 1800's and early 1900's, computing machines were designed and refined

▶ In 1914, Computing-Tabulating-Recording Company (CTR) was renamed **International Business Machines Corporation (IBM)**
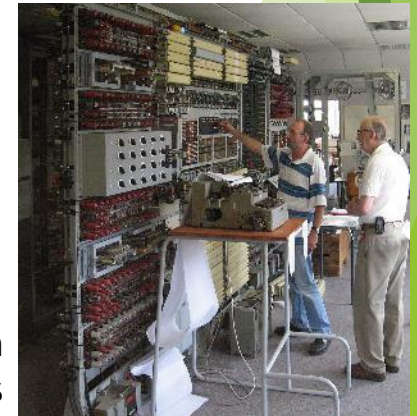
Computers in WWII

▶ IBM and Harvard built the Harvard Mark 1 to calculate artillery tables for the US military

▶ In Bletchley Park, computers were used to break encrypted German radio messages

  ▶ Alan Turing developed the **Bombe** in 1939 to decode Enigma messages

  ▶ Tommy Flowers developed **Colossus** to decode Lorenz messages

Rotating drums on the Bombe

Using a reconstruction of Colossus

The 1950's

▶ Mainframes such as the UNIVAC and the IBM 701 were the only computers available

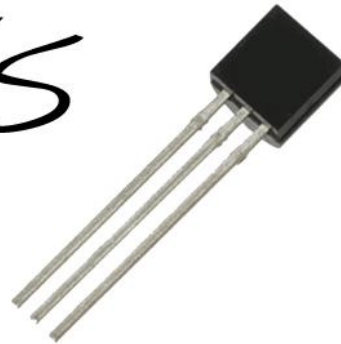▶ Mainframes were very expensive, took up a lot of room and were difficult to operate

IBM 701 operator's console

The 1960's

▶ Invention of the transistor, which replaced vacuum tubes, made computers smaller, faster and more reliable

▶ IBM became the dominant computer manufacturer, producing successful computers like the IBM 7090

The 1970's

- Palo-Alto Research Centre (PARC)
  - Opened by Xerox in 1969
  - Created things used by modern computers; eg. mouse, GUI, laser printer

- Terminals and time-sharing systems
  - Users worked on a terminal connected to a main computer
  - Each user's processing was completed in a short slice of time on the main computer. To the user, it seemed like they had full use of the main computer

- First microprocessor – the Intel 4004
  - Intel founded in 1968 by Gordon Moore and Robert Noyce
  - Intel 4004 released in 1971, followed by the Intel 8080 in 1974
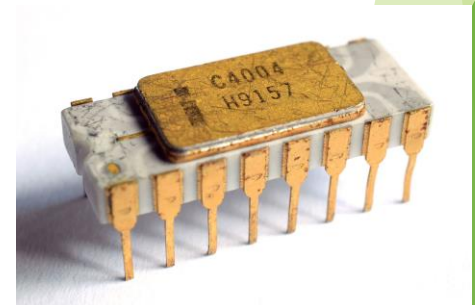
The 1970's

▶ MITS releases the Altair in 1975
  ▶ Founded by Ed Roberts, MITS originally produced calculators
  ▶ The Altair was a kitset computer that buyers had to assemble
  ▶ Initially, users had to toggle the front switches to load programs into the Altair's memory

▶ Microsoft founded in 1975
  ▶ Bill Gates and Paul Allen developed a BASIC interpreter for the Altair
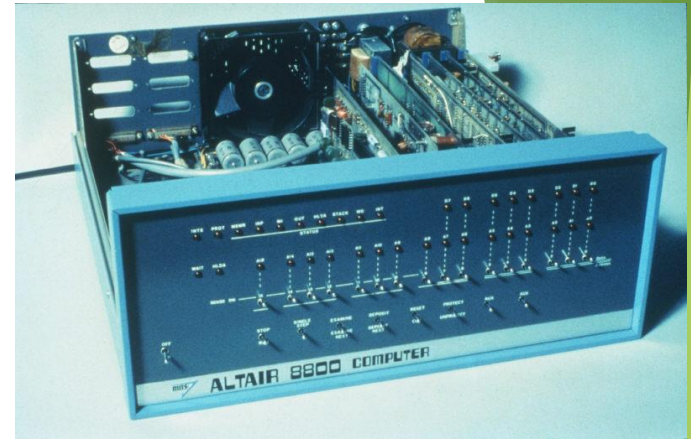
The 1970's

- Apple founded in 1976
  - Steve Jobs and Steve Wozniak initially sold the Apple I kitset
  - Apple II was the first successful personal computer
    - First sold in 1977
    - Features: colour graphics, slots for third-party cards

- VisiCalc released in 1979
  - Developed by Dan Bricklin and Bob Frankston of VisiCorp
  - First spreadsheet program
  - VisiCalc was initially released on the Apple II. It became the computer's **killer app**, making the Apple II very popular
  - VisiCalc was killed by Lotus 1-2-3

The 1980's

- Microsoft purchased QDOS in 1981 from Seattle Computer Products
  - "one of the shrewdest business deals of the century…"
    – *The Universal Machine*

- QDOS was renamed MS-DOS and licensed to IBM
  - PC-DOS was the operating system for the IBM PC, released in 1981

- Other manufacturers reverse-engineered the IBM PC's proprietary BIOS and produced 'IBM clones'
  - Crucially, Microsoft was able to license MS-DOS to other manufacturers, meaning they could compete with IBM
 - This eroded IBM's market dominance and made Microsoft very profitable

The 1980's

▶ In 1984, Apple released the Macintosh; the PC with a GUI (based on the Alto)

▶ "For the first time a person could buy a computer, take it home, take it out of the box, turn it on and use it without having to learn and type complex and arcane commands." -*The Universal Machine*

The 1990's

▶ Microsoft releases Microsoft Office (1990) and Windows 95, followed by Windows 98
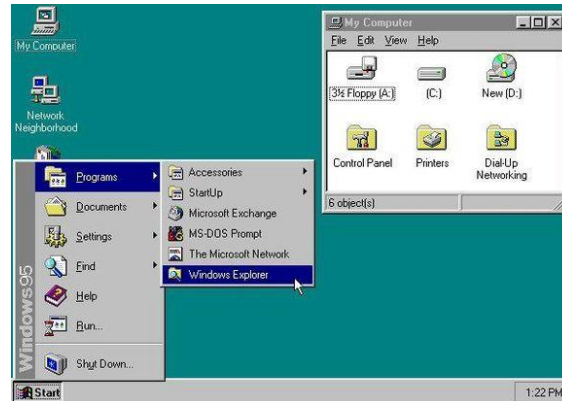
▶ Apple releases the iMac in 1998

The 1990's

- Personal Digital Assistants (PDAs) were popular in the 1990s because they were portable
  - Common features included a touchscreen display, web browser, music player and apps

- Psion's Series 3, released in 1991, was the first 'real' PDA

- The IBM Simon, released in 1994, was the first device with PDA and cellphone functionality
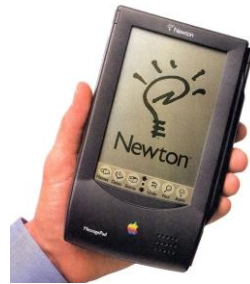
The 1990's

▶ Other popular PDA brands included:

Palm

Blackberry

Apple

Nokia

The 2000's

- ▶ Laptops become more powerful and portable (lighter and better battery life)

- ▶ Growing popularity of different ways of interacting with computers; gestures, voice commands, touchscreens

- ▶ Greater availability of fast Internet connections opens new uses for our PCs

The 2000's

▶ Apple releases the iPhone in 2007 and the iPad in 2010, creating new categories of personal computing devices

▶ The variety of fixed (eg. desktops) and mobile (eg. tablets) computing devices we have today brings us closer to an era of "ubiquitous computing"

The future of the PC

▶ The end of the desktop PC with the rise of:
  ▶ Mobile computing
  ▶ Cloud computing

▶ Computers get even more personal – wearable tech, embedded tech

▶ Computers that are artificially intelligent?

Questions

- ▶ Give two advantages of transistors over vacuum tubes

- ▶ What did other PC manufacturers have to reverse-engineer in order to create 'IBM clones'?

- ▶ Name two new ways (apart from the mouse and keyboard) to interact with computers

Summary

▶ The first computers were people, followed by very large electromechanical devices

▶ Key technologies such as transistors and microprocessors helped to reduce size and cost

▶ Software, such as MS-DOS and VisiCalc, were important to the success of early personal computers

▶ Over time, computing technology has become smaller, cheaper, more user-friendly, more powerful