CA115, Digital Innovation Management Enterprise

Recent Computer History

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20th Century, pre-WW2

- Alan Turing, who worked on code-cracking for the UK during the war, designed an abstract computing machine which is now called a Turing machine
- This is a useful theortical idealisation of a computer
- The Universal Turing Machine, is a further abstraction that can describe any kind of computer
- John von Neumann was also working on ideas in computing at this time

20th Century, WW2 (1)

Stored Programs and Electronic Computers

- ENIAC, was built in late wartime in the US to calculate trajectories
- Electronic Numerical Integrator and Computer
- 25 metres long!
- Designed by Eckert and Mauchly
- John von Neumann, who was working on the Manhattan project, also involved. He specified an architecture now called the von Neumann Architecture, for computing machines
- Kathleen McNulty (also Antonelli), was an Irish-American programmer of the ENIAC - our building here in DCU is named for her

The 1950s

Integrated Circuits

- Integrated circuits and silicon transistors (valves) invented, allowing far more data processing per unit volume
- Punch cards still used to program machines, although electrical rather than mechanical systems
- keyboards becoming more common and nascent graphical user interfaces

The 1960s

Apollo, business mainframes, mini-computers

1961: NASA and the Apollo Program

- "Even though unmanned satellites and space probes pioneered the use of computers in mission control, the need for quick response and redundancy, the inherent complexity of manned spaceflight, and the rigors of the race to the moon forced rapid improvements and innovations in systems used in manned mission control so that they surpassed the older systems."
- "[When] NASA approached IBM with the requirements for computers to do telemetry monitoring, trajectory calculations, and commanding, IBM found a market for its largest computers ..."
- "Several individuals contributed to OS/360, the first multiprogramming system made commercially available by IBM2. One became head of the personal computer division"

1965: DEC PDP-8

- This was a 12-bit minicomputer built by Digital Equipment Corporation

- Designed by Gordon Bell and Edson de Castro as a small general purpose computer
- Over 10,000 machines were built, making it one of the most successful
- DEC itself lasted until 1992

DEC's Blockbuster: The PDP-8. The Computer History Museum.

1968: Intel

- Founded by Gordon Moore and Robert Noyce
- Short for "Integrated Electronics"
- Intel 4004, with 2,300 MOS (Metal Oxide Silicon) transistors

Intel. Silicon Valley Historical Association.

1969: ArpaNet

- First computer-to-computer signal on ArpaNet between UCLA and Stanford Research Institute
- Sponsored by ARPA - the Advanced Research Projects Agency
- A distributed network rather than centrally controlled
- The initial four hosts were at UCLA, UCSB, Stanford Research Institute and The University of Utah
- ArpaNet is a direct descendent of the Internet

ArpaNet. DARPA.

The 1970s

Home Computing

1972: Atari

- Founded by Nolan Bushnell and Ted Dabney in Sunnyvale, California
- Pioneered popular arcade games and, in 1977, the Atari 2600 revolutionised consoles
- Although Atari was not the first arcade games manufacturer or the first to imagine home consoles, it did successfully market simple, playable games

Atari's Roller-Coaster Ride. The Computer History Museum.
The Inside Story of Pong and the Early Days of Atar. Leslie Berlin, Wired. 2017.
Atari & Chuck E. Cheese's: Nolan Bushnell. How I Built This with Guy Raz. 2018.

1975: MITS Altair 8800

- MITS, in Albuquerque in New Mexico, built the Altair 8800 microcomputer in 1975
- It was the leading kit computer, i.e. you had to assemble it yourself
- The Altair 8800 and MITS in part led to the formation of Microsoft

Altair 8800. Computer History Museum.

1975: Microsoft

- Founded by Bill Gates and Paul Allen in Albuquerque, New Mexico, to build software for the Altair 8800
- In 1980 developed an operating system called Xenix
- MS-DOS, developed from a clone of another operating system built by Seattle Computer Products for the 8086 Intel chips

The Road Ahead after 25 years. Bill Gates. His book, The Road Ahead, written in 1995 is worth reading through to get a sense of where Microsoft's thinking was in the 1990s and something about its history.

1976: Apple

- Founded by Steve Wozniak, Steve Jobs and Ronald Wayne with the Apple I kit computer
- Worked out of Steve Jobs' garage
- Inspired by Atari's use of colour, Wozniak developed the Apple II personal computer
- This was an instant success (see 1980s, Apple Macintsosh)

Steve Wozniak Was My Computer Teacher in 1995
Steve Wozniak: Inventor and Apple co-founder
The Founding of Apple Computers, Inc.
Yuo will have no trouble finding interesting reading about Steve Jobs! This video of Jobs' retreat with his NeXT Team is a good one.

Other Things in the 1970s

- 1971: The first floppy disk.
- 1973: Xerox invents Ethernet, a family of technologies that underpin modern networks.

The 1980s

Consumer Hardware, Consumer Software, Portable Computing

1981: IBM's first PC

- The IBM PC quickly displaced the Apple II as the best selling home computer
- Powered by the Intel 8088 microprocessor, precursor to today's designs
- PCs were shipped with a version of MS-DOS, Microsoft's command-line operating system, branded as IBM PC DOS

The birth of the IBM PC, from IBM's website.

1984: Apple Macintosh

- This was Apple's attempt to take on IBM and to keep the company relevant
- It featured Apple's graphical user interface (GUI) and updated operating system, MAC OS
- It didn't take off until 1987 after several upgrades

Apple Macintosh Personal Computer, at the Smithsonian
Apple's famous 1984 advertisement for the Macintosh.

1984: Dell

- Founded by Michael Dell in his college dorm at UT Texas in Austin
- Innovation was to build IBM-type machines with upgraded components

How I Built This with Guy Raz. Dell Computers: Michael Dell (2018).
How we got here, from Dell's website.

1985: Microsoft Windows 1.0

- This was a GUI for MS-DOS
- It became very popular after Version 3.0 in 1990

Apple Macintosh Personal Computer, at the Smithsonian
Apple's famous 1984 advertisement for the Macintosh.

1980s: Many Other Honourable Mentions

- 1981: Sinclair ZX81. Designed and built in Britain, introduced many to home computing. Clive Sinclair died about a month ago. See The 40-Year-Old Version: ZX81's sleek plastic case shows no sign of middle-aged spread.
- 1982: Commodore 64 by Commodore Business Machines in Pennsylvania. This successful machine was built until 1993. It had an ecosystem of some 10,000 programs and was relatively affordable, about $1,500 in today's money. The Smithsonian has a summary of the Commodore 64.

The 1990s

Modern Multimedia PCs, the World Wide Web and the First Wave of Internet Tech Companies

Early 90s: CD ROM

- Allowed easy distribution of large media-heavy programs

1993: The World Wide Web

- Tim Berners-Lee, working at CERN, invents the World Wide Web in 1989
- Operating on top of the Internet, CERN open sources the World Wide Web in 1993, starting the web as we know it

The birth of the Web. CERN.

1994: Amazon

- Jeff Bezos founds Amazon in 1994, making deliveries himself

1994: Linux

- Built by Linus Torvalds and a team of volunteers
- Free and open rival to Microsoft and Apple
- Powers most servers on the Internet

See linux.org

1995: Windows 95

- Microsoft's revamped OS to compete with MAC OS
- Successor to Windows 3.1
- Debut of the Start Button

Windows 95 ad.

1998: Google

- Founded by Larry Page and Sergey Brin in a garage close to Stanford
- Innovation was the idea to use back-links to determine page rank
- Before Google, Alta Vista was probably the most popular search engine

Stanford University in Stanford, California. Close by Palo Alto, Mountain View and Menlo Park.
https://about.google/our-story/

1998 - 2001: The DotCom Bubble and Bust

2000s

The Second Wave of New Internet Companies, Web 2.0 and Cloud Computing

- 2002: Amazon Web Services
- 2003: Android
- 2004: Gmail
- 2004: Facebook
- 2005: YouTube
- 2006: Twitter
- 2007: iPhone

The 2010s

2010s: Maturing Web 2.0 and New Wave of Companies, Internet Everywhere, Mobile First Web and Apps

- Mobile computing and phones everywhere
- Video and image
- Misinformation, disinformation and spying
- Machine learning and artificial intelligence

2010s: Companies

- Instagram and many social apps including Whatsapp
- Video on demand services, e.g. Netflix
- Niche technical services built for cloud computing, e.g. Stripe
- Google Deepmind and many machine learning companies

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Niall McMahon, 2022.