Technology Companies

Hardware and software houses of the microcomputer age

James Tam

Recall: Computers Before The Microprocessor

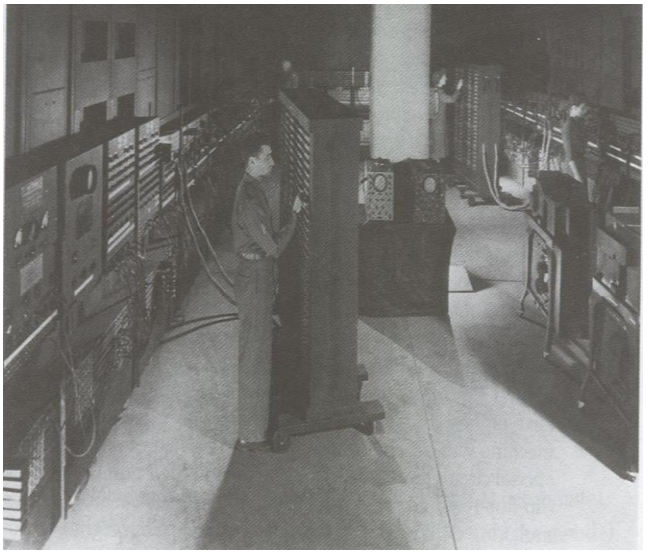

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Image: “A History of Computing Technology” (Williams)

The Microprocessor[1, 2]

- Intel was commissioned to design a special purpose system for a client.
  - Busicom (client): A Japanese hand-held calculator manufacturer
  - Prior to this the core money making business of Intel was manufacturing computer memory.
  - The Intel vs. Busicom visions for the chip were significantly different!
- "Intel designed a set of four chips known as the MCS-4."[1]
  - The CPU for the chip was the 4004 (1971)
  - Also it came with ROM, RAM and a chip for I/O
  - It was found that by designing a general purpose computer and customizing it through software that this system could meet the client's needs but reach a larger market.
    - Clock: 108 KHz[3]

1 http://www.intel.com/content/www/us/en/history/museum-story-of-intel-4004.html
2 https://spectrum.ieee.org/tech-history/silicon-revolution/chip-hall-of-fame-intel-4004-microprocessor
3 http://www.intel.com/pressroom/kits/quickreffam.htm

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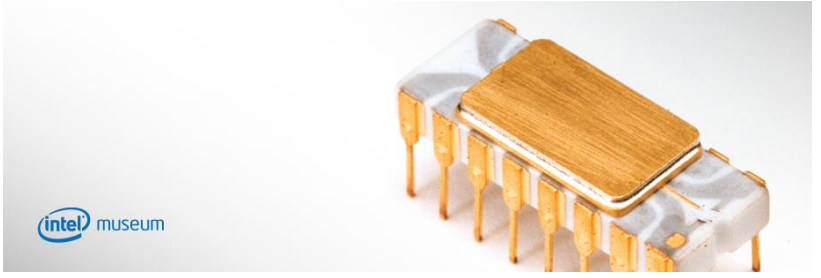
The Microprocessor[1,2] (2)

- Intel negotiated an arrangement with Busicom so it could freely sell these chips to others.
  - Busicom eventually went bankrupt!
  - Intel purchased the rights to the chip and marketed it on their own.



From the "Intel museum" www.intel.com

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The Microprocessor (3)

- 8080 processor: second 8 bit (data) microprocessor (the first was 8008).
  - Clock speed: ~2 MHz
  - Used to power the Altair computer (description comes later).
  - Many, many other processors came after this:
    - 80286, 80386, 80486, Pentium Series I – IV, Celeron, Core…
- The microprocessors development revolutionized computers by allowing computers to be more widely used.
  - Compact
  - Cheap (eventually)

James Tam

What Is **Microcomputer**?

- A computer that **uses a microprocessor** as its main processor (CPU).
- Sometimes its referred to as a 'PC' (Personal Computer).
  - Designed for use by only one person at a time.
  - Unfortunately the term PC has taken on multiple meanings.
    - PC = IBM PC (a model produced by IBM)
    - PC = A computer running a Microsoft operating system.
- Consequently the less ambiguous term 'microcomputer' will be used.

Image courtesy of James Tam

James Tam

The Altair 8800 By MITS

- Created by Ed Roberts in 1974.[1]
- Although not "the first" the Altair as sold by the company MITS (Micro Instrumentation and Telemetry Systems) was one of the most popular of the first set that was targeted towards home users.

http://www.guardian.co.uk

- It was marketed as a mini-computer (less than an expensive mainframe) but Roberts was often credited as "... the inventor of the personal computer" (Ceruzzi p. 226).

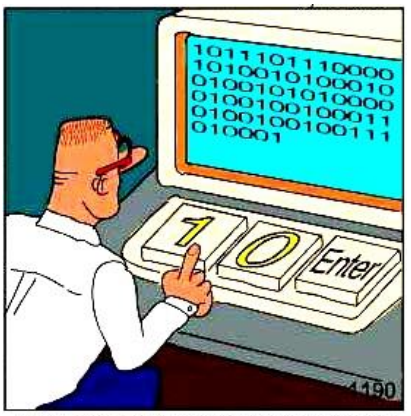
James Tam

1 "A History of Modern Computing" (2nd Edition) Paul E. Ceruzzi

The Altair (2)

Images © Mark Richards from www.computerhistory.org

Note: Most Computer Users At The Time Were Extremely Technically-Oriented[1]



REAL Programmers code in BINARY.

Image by Chris Kania
http://www.kaniamania.com/

James Tam

1 https://vtda.org/docs/computing/MITS/MITS_Altari8800OperatorsManual_1975.pdf

Altair 8800: Basic Technical Specifications

- CPU: Intel 8080 running at 2 – 3 MHz (8 bit)
- Memory: 256 *bytes* (expandable to 64 KB)
- Storage: magnetic tape[1]

1 https://historyofpersonalcomputing.com/wordpress/altair-8800/

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(Tandy) Radio Shack (TRS Computers)[1]

- TRS-80 (1977) $600
  - 4 KB ROM: startup routine and (non-Microsoft) Basic
  - Programs could be loaded from cassette or disk into RAM

www.pc-history.org

  - One version of TRS-80 acted much like early laptop

http://www.pugo.org

James Tam

1 "A history of modern computing (2nd Ed)" Paul E. Ceruzii pp. 263 - 264

TRS-80 Specifications

- Processor: Zilog Z80 1.77 MHz
- Memory: 4 KB (up to 16 KB)
- Storage: magnetic cassette (some came with a 5.25" magnetic floppy drive).
  - Both were extremely limited in capacity by modern standards but sufficient for the needs of the day.
  - Cassette tapes had the advantage of accessibility and low-cost.

1 http://www.trs-80.org/model-1/
2 https://www.pcmag.com/news/golden-age-of-trs-80-a-look-back-at-radioshack-computers

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Bill Gates

- His family was successful.
  - Banking
- His family with also involved in the community and government.
  - Philanthropy e.g., United Good Neighbors (predecessor of the United Way).
- William Henry Gates III born October 28, 1955.
  - Nicknamed 'Trey' by his father.
- Avid reader:
  - World book (A-Z) at age 7 or 8
- Known mannerism

James Tam

Image: http://www.syllablesoup.com/

Bill Gates (2)

- Known for his tenacity, even as a child.
  - Notable event was as a scout on a hike.
- This first use of a computer was in school.
  - A teletype connected to mini computer.
  - Young Bill typed in a command.
  - Seconds later the computer responded.
  - "It was better than science fiction [for Bill]"[1]

James Tam

1 "Hard Drive: Bill Gates and the making of the Microsoft Empire" (Jim Wallace & Jim Erickson: Harper Business 1993)

Another Early MS Founder

- His other classmates were similarly excited, among which was a young Paul Allen (who along with Bill) would found Microsoft.

www.digitaltrends.com

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Steve Ballmer

Image copyright unknown

- Hired by Microsoft in 1980 after dropping out of the MBA program.[1]

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https://www.forbes.com/profile/steve-ballmer/?sh=1e30632e4818

Steve Ballmer, Bill Gates

- Both Ballmer and Gates were very intense.
- They would often engage in heated debates about various topics well into the night.
  - "High bandwidth communication" (- Bill Gates)
  - They were described by others as being like "…two computers connected by modem"[1]
- They were inspired by the sight of the Altair computer in Popular electronics.

James Tam

1 "Hard Drive: Bill Gates and the making of the Microsoft Empire" (Jim Wallace & Jim Erickson: Harper Business 1993)

Steve Ballmer & Bill Gates (2)

- Their first project was to create a BASIC translator for the 8080-driven Altair.
  - They were still undergraduate students (Harvard).
  - Mission impossible (needs to efficient and fast)
  - No direct access to the necessary hardware
- They succeeded!
  - "It was the coolest program that I ever wrote."[1]
  - First instruction given to Microcomputer `BASIC: 2 + 2 = 4`
- The end product of their work eventually became Microsoft Basic.

James Tam

1 "Hard Drive: Bill Gates and the making of the Microsoft Empire" (Jim Wallace & Jim Erickson: Harper Business 1993)

Microsoft: Beginnings

- Microcomputer-software.
- Because Gates completed most of the work on BASIC there was a 64/36 split in ownership of the new company.
- Initial funds: royalties from the use of their version of BASIC (included with each Altair computer).
  - $30/computer (4 KB)
  - $35/computer (8 KB)
  - $60/computer (extended version of BASIC, required external storage)
- Also funds came from licensing of the BASIC source code.
  - Developers could modify the translator as they saw fit (for geeks who were the microcomputer users this was a real plus!!!)
- Basic was an integral part of the operating system (some say it was acting as the operating system).

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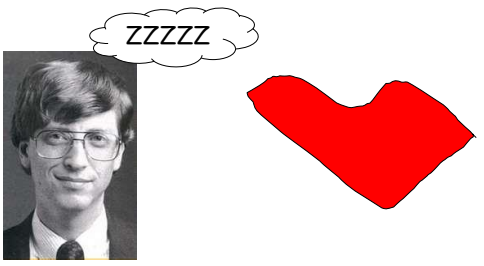
Microsoft: Beginnings (2)

- The company had humble beginnings: a section of the office was given to Microsoft by MITS (manufacturer of the Altair).
  - Gates still continued his workaholic coding schedule.



http://www.syllablesoup.com/

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Microsoft: Beginnings (4)

- To help promote the Altair (and the BASIC that came with it):
  - Gates toured with MITS to meet with computer clubs which included: engineers, technicians, hobbyists, hackers, electronicphilles etc.
  - Eventually BASIC became the standard for computers i.e. forms of basic existed for other computers because it was so important for everyday computer usage.
    - An article describing the importance/value of basic when using early microcomputers: https://www.zdnet.com/article/basic-turns-60-why-simplicity-was-this-programming-languages-blessing-and-its-curse/
    - The alternative language was a lower level, problematic to learn language: 'C'

James Tam

Microsoft: Beginnings (5)

- One of these computer clubs ("Homebrew") started in garage in Menlo Park (next to Palo Alto and Stanford university).
- More than 30 people came out for the first meeting including Steve Wozniak (who was then working in the calculator division of Hewlett-Packard).
  - Within a year of this first meeting: Wozniak along with Steve Jobs would build a personal computer of their own: Apple I.
- Although Microsoft got its start through its relationship with MITS it eventually was hobbled by it.
  - Microsoft could not license BASIC to MITS competitors.
  - At first there were no competitors (no problem).
  - In a few years dozens of other companies manufactured their own microcomputers: Commodore (PET), Radio Shack/Tandy Radio Shack (TRS-80), Apple (Apple I).

James Tam

Microsoft: Beginnings (6)

- After a long and complex legal proceedings Microsoft won the rights to sell BASIC as they saw fit.
- BASIC was licensed to many other computer manufacturers: Radio Shack (TRS-80), Apple (Apple II)
- But throughout the legal battle the company still worked on other programming languages: COBOL, FORTRAN as well as developing BASIC for chips other than the 8080.
- Gates and Ballmer were frequently underestimated by their business rivals ("who are these kids?")

http://www.syllablesoup.com/

  – But they were more than able to hold their own.

James Tam

Microsoft: Beginnings (7)

- However Gates still made time for 'fun' i.e. programming:
  - Competitions were held with employees to see who write a program in the fewest lines of code.
  - In the early years Gates himself indicates that he was heavily involved in all projects and there wasn't a line of code that he didn't personally look over (or even recode).

James Tam

Commodore Business Machines

- Founded by Jack Tramiel
- Around 15, Jack Tramiel (then named Idek Tramielski) and his parents were shipped with other Jews from Lodz, Poland to Auschwitz in 1939
- He and his mother survived the months till Auschwitz' fall in 1944.
- After emigrating to America, Jack Tramiel enlisted and served four years in the U.S. Army.
  - At Fort Dix, Jack showed a talent for un-jamming typewriters.
- When Tramiel left the army, he started work at a typewriter repair shop and then later set up his own typewriter repair business in the Bronx.

James Tam

Image: http://www.commodore.ca

Commodore Business Machines (2)

- 1955: Jack moves to Toronto, Canada and founds Commodore International Limited to assemble typewriters in Canada.
- C. Powell Morgan, the head of the Atlantic Acceptance Company financially back his business.
- 1965: Atlantic goes bankrupt and C. Powell Morgan is indicted by the Canadian government amid charges of fraudulent financial statements, dummy companies, and propped stock prices.
  - Tramiel was considered suspect as well, but was never charged.
  - 1966: To keep the struggling Commodore afloat, Jack gave partial control (17%) of Commodore to a new investor, Irving Gould for $400,000.

James Tam

Commodore Business Machines (3)

www.awesomepet.me

- 1976:
  - Commodore sets up shop on Palo Alto California
  - Commodore unveils the Commodore PET microcomputer.
  - About the same time the Apple II and TRS-80 are also unveiled.
  - 4 KB or 8 KB of 8 bit RAM.
  - Unlike many of the companies Commodore is able to start world wide distribution in months instead of years.

©www.commodore.ca

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Commodore Business Machines (4)

- 1981:
  - Commodore unveils the Commodore VIC-20 aka "the Friendly Computer" the first color microcomputer to sell for under $300 (299.95).
  - Specification:
    - ~1 MHz
    - 5k RAM expandable to 32k
    - A 22 column x 23 row 8/16 color display

www.gamesgroundbase.com

- World's 1st computer to sell 1 million units.[1]

Vic20?

Vic the trucker?

20?

James Tam

1. Many sources including: https://www.commodore.ca/commodore-products/commodore-vic-20-the-first-inexpensive-home-computer/

Commodore Business Machines (5)

- 1982:
  - Commodore introduces the VIC Modem, a 300 baud cartridge modem for US$110.
  - Commodore 64: 64KB RAM & Microsoft BASIC $600
    - Over 5 million units sold in 3 years[1] capturing much of the market[2].
- 1985: [July]
  - Commodore unveils the new Amiga 1000.
  - It features a multitasking, windowing operating system.
  - Specifications 7.14 MHz Motorola 68000 CPU, 256KB RAM, and 880KB 3.5-inch disk drive ($1300). 16/32 bit computer.
    - The processor was a slowed for compatibility with other hardware
  - 4096 color display.
  - Other computers in the Amiga line (e.g. 500, 2000) came later.

1 https://commodore.international/2021/07/05/how-many-c64-and-c128-were-actually-sold/
2 https://www.pagetable.com/?p=547

James Tam

CPU: Amiga 500, 1000, 2000

- Clock speed is only a *rough measure* of a computer's performance
  - The CPU had a 7.18 MHz timing speed but it could operate on par with machines running MS-DOS machines with a much faster timing.
- It performed fewer operations than with other computers (e.g. arithmetic operations).
  - There were 4 other custom chips: Paula, Denise, Gary, Agnus that were designed to reduce CPU load by performing the following functions:
    - Paula: graphics
    - Denise: played real sound (early DOS machines only played 'bleeps' and 'blips'
    - Gary: input/output
    - Angus: memory management
    - This **division of labor among hardware** (and exclusive CPU access to Fast RAM gave the Amiga unparalleled multi-tasking performance.
  - And there were two types of RAM on these Amigas:
    - "Fast RAM": used only by the CPU for program and data storage.
    - "Chip RAM": used for graphics and sound but available to the CPU if fast Ram was used up.

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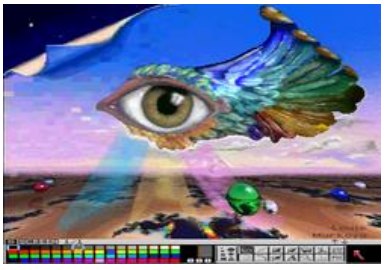
Commodore Business Machines (6): HAM Graphics (Simulation)

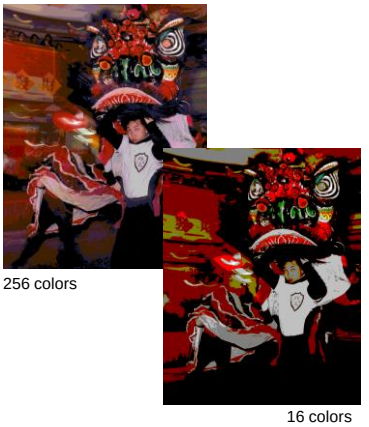
- Commodore (4096 color) HAM graphic



en.wikipedia.org

- The more common display mode was 64 colors (6 bit).
- US/Canadian display standard (NTSC)
  - ~640x400 resolution

- Microsoft VGA/EGA (256/16 color) graphics



256 colors

16 colors

James Tam

Commodore Business Machines (7)

- 1980s (1986 – 1987?)
  - Commodore launches its first IBM PC-compatible machines.
  - Also they launched the Amiga 2088 "Bridgeboard" in 1987
- 1990:
  - NewTek releases the Video Toaster, a professional quality hardware/software video effects tool for the Commodore Amiga 2000 (1 MB RAM), for US$1600.
  - The toaster allowed for professional quality video editing and the

Babylon 5 © Warner Brothers

Other notable uses of the VideoToaster:

•The Tonight Show

•SeaQuest DSV

•A later version was co-developed by actor Wil Wheaton

Star Trek © Paramount

James Tam

Commodore: Market Share

- Apple Computer shipped 600,000 Apple II computers
- Commodore:
  - Commodore has shipped 1 million VIC-20 computers .
  - Commodore 64 sales 17-22 million (total) units, the most sales for a particular model of computer.

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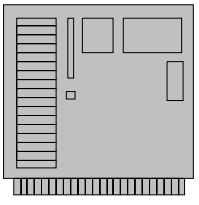
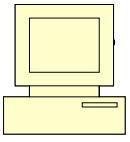
Birth Of The Microsoft OS (From Forbes[1])





1 https://www.forbes.com/sites/timbajarin/2021/08/25/attack-of-the-clones-how-ibm-lost-control-of-the-pc-market/?sh=1e6da2dd5b81

James Tam

Clipart: Microsoft

Birth Of The Microsoft OS (2)

- IBM approached two companies as possible vendors of an operating system to run its computers:
  - Digital Research (CP/M operating system was standard for Intel 8080 based systems)
    - (There soon to be a 16 bit extension coming but not far enough in development).
  - Microsoft (never wrote operating system software just a BASIC interpreter).
    - Microsoft: 7 million in annual sales
    - IBM: 30 billion in yearly revenues.
- IBM and Microsoft worked out an arrangement to have a version of Microsoft's DOS (*D*isk *O*perating *S*ystem) run IBM computers: PC-DOS.
  - MS-DOS was based on 86-DOS an OS written by Tim Paterson of Seattle Computer products (later Q-DOS)
- **Microsoft set up a non-exclusive arrangement with IBM** so it could (and eventually did) license its operating system to other computer manufacturers.

James Tam

The IBM PC (Personal Computer: 1981)

CPSC 231 python examples ~500 KB

CPSC 233 java examples ~1.5 MB

www.computerhistory.org

Specifications[1,2,] 4 :

- Processor: 4.77MHz (later 16 MHz) Intel (8088)
- Memory: 16K – 256K RAM (640K with expansion hardware)
- Graphics: CGA (4 color)
- Bus: 8 bit (8086), 16 bit (8088)
- Storage: cassette tape (upgradable to 2 double density floppy drives @360K each!)
- Cost: $1,565-$4,500 ~A cheap new car ~$5k

- IBM was a large company but a late comer into the microcomputer market.
- As mentioned its machines used an operating system produced by Microsoft.

1 https://www.pcmag.com/news/the-golden-age-of-ibm-pcs
2 https://www.ibm.com/history/personal-computer
3: https://www.pcworld.com/article/416011/inside-the-ibm-pc-5150-the-first-ever-ibm-pc.html

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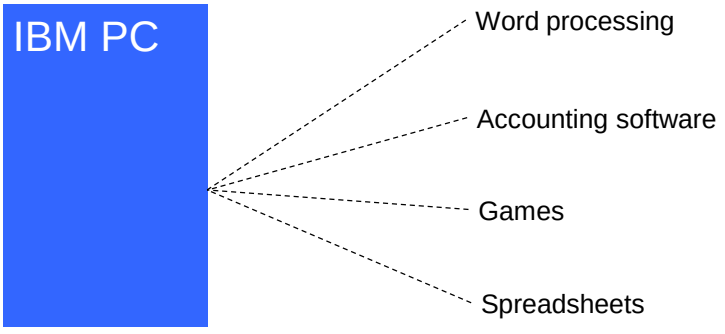
The IBM PC (Personal Computer: 1981): 2

- With the entry of IBM in the microcomputer market, many developers produced a plethora of software.



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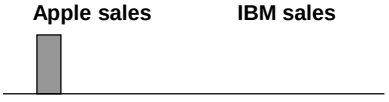
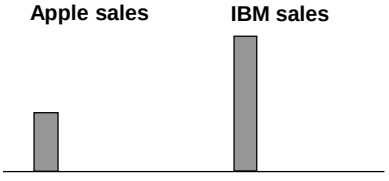
The IBM PC (Personal Computer: 1981): 3

- Apple entered the microcomputer market sooner and already had an established market when IBM began to first market the PC.



- Because of the prevalence of so much software the IBM-PC soon overtook Apple (and other vendors) in sales.



There were many other important microcomputer manufacturers (omitted here for brevity)

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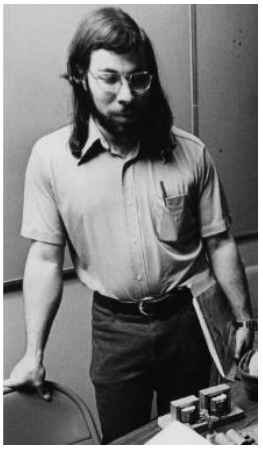
The History Of Apple Computers: Steve And Steve

- Apple was founded by Steven Jobs and Steve Wozniac in a Silicon Valley garage.

Steven Jobs



Steve Wozniac

James Tam

Apple: Steve And Steve

- Bill Fernandez (Wozniak's neighbour in Santa Clara California) introduced the 'Steves'.[1]
  - Stephen Gary Wozniak (16)
  - Steven Paul Jobs (21)
- They built their first computer out of parts that were discarded (for 'cosmetic' reasons) by computer manufacturers.
  - Named after their favourite drink: "The Cream Soda computer".
  - Jobs was marketing and business operations, Wozniak was the Engineer,

James Tam

1 "Corporations that changed the World: Apple Inc." (Jason D. O'Grady: Greenwood Press 2009)

Steve Jobs

- Born Feb 24, 1955 in San Francisco.
- Age 23: Made his first million
- Age 25 (1980): Worth approximately 100 million
- 2009: Worth approximately 6 billion
- Even at an early age he showed an aptitude for business and people over engineering.
  - "...he wasn't interested in getting his hands dirty", "...he was more interested in wondering about the people that owned the cars."[1]

James Tam

1"The little kingdom: The private story of Apple Computer" (Michael Moritz: William Morrow p. 38)

Steve Wozniak

- Born August 11 1950
- Commonly known by an abbreviation of his surname "The Woz"
- "Prolific tinkerer"[1]
- "From a technical standpoint, Woz was literally Apple Computer"[2]

1 "Corporations that changed the World: Apple Inc." (Jason D. O'Grady: Greenwood Press 2009)

2 "iWoz: From Computer Geek to Cult Icon: How I Invented the personal computer, Co-founded Apple, and had Fun Doing It" (Steve Wozniak with G. Smith: W.W. Norton 2006)

James Tam

Apple I (1977)

- 1976: Wozniak completed a prototype and took it the Homebrew Computer club.
- Jobs saw its immediate potential.
- It used a standard TV as a monitor.
- Due to Wozniak's design genius it used a minimal number of chips (to keep costs and complexity down).
- Boot code was in ROM.
- Data was saved on cassette tapes.

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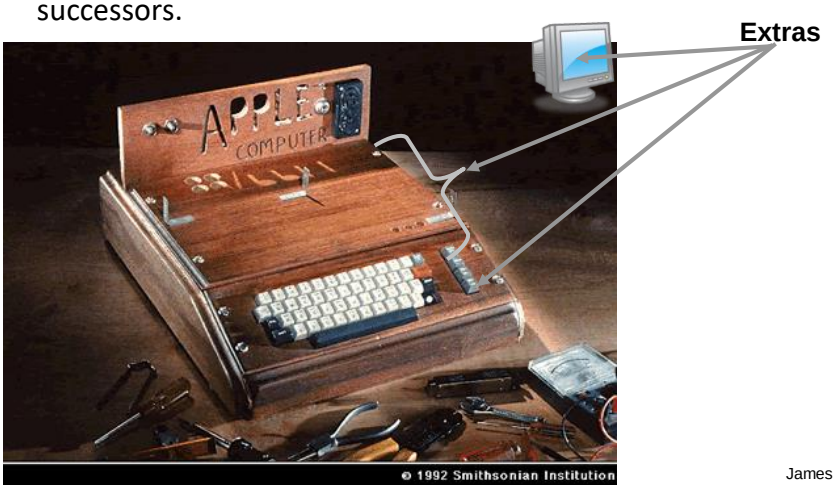
Apple I (2)

- The first Apple computer: significantly different from its successors.



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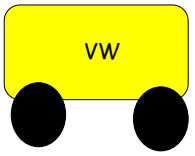
Clipart: Microsoft

Apple I: Marketing

- A local electronic shop owner immediately put in for an order of 50 computers.
- Cash was so tight for `Apple` that payment for the parts had to made on credit.
  - Even then personal sacrifices had to be made.



  - Wozniak`s friend: Ronald Wayne helped him assemble the computers in Wozniak`s living room.
    - Even this preassembly process the machine still required some assembly by the end customers.

James Tam

Apple I Specs [1,2]

- Processor: 1 MHz, 8 bits
- RAM: 4 or 8 KB
- Storage: magnetic cassette tape

1: https://www.applefritter.com/files/a1man.pdf

2: http://www.applefritter.com/node/2703

James Tam

Apple II (1977)

- Proceeds from the sale of the predecessor machine financed the construction of its successor.
- At this point Wayne sold his stake in company.
- The 'Steves' had trouble raising money.
  - Banks would not grant loans because they were skeptical of the marketability of a computer for the average person.
  - Finally after another person agreed to co-sign the bank loan ($250,000) there was enough capital to fund production of the Apple II and Apple Computer was formed April 1, 1976.
- Initially it ran a version of BASIC written by Wozniak.
- Later it used a licensed version of Microsoft BASIC.
  - The $10,000 fee was said to have saved Microsoft from insolvency.[1]

James Tam

1 "A History of Modern Computing" (Paul Ceruzzi: MIT Press 2003)

The Apple II (2)

Images
Apple II:
www.computerhistory.org

Donkey Kong:
www.donkeykong.gamebub.com

- It was a simpler and more powerful design than the Altair
- The color graphics were superior to larger and more expensive computers
- Strong selling points
  - Name
  - Appearance

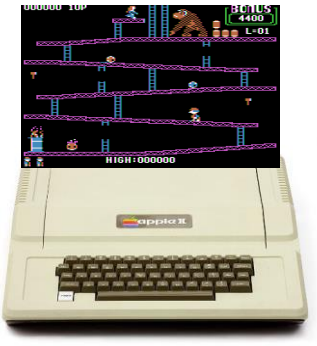
James Tam

Side Note: VisiCalc

- *Visi*ble *Calc*ulator was the first electronic spreadsheet.
- Dan Bricking conceived of the idea while he was a first year student at Harvard Business school.
- Enlisted the aid of a Harvard graduate and using a borrowed Apple II computer a working version was produced in 1978.

James Tam

The Apple II & VisiCalc



- VisiCalc: "*It was the software tail that wagged the hardware dog*"

Images
Apple II:
www.computerhistory.org

Donkey Kong:
www.donkeykong.gamebub.com

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Apple II Specs [1]

- Processor: 1 MHz, 8 bits
- RAM: 4 KB (some models came with 128 KB)
- Storage: magnetic cassette with optional floppy disk (3.5 or 5.25 inch)
- Graphics (for most machines): 15 colors + 1 (monochrome)
  - Low res: 40 columns x 48 rows
  - Hi res: 280 x 192
- Sound: internal (bleeps and blips)

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1: https://www.historytools.org/products/apple-ii-guide

Apple Goes Public

- IPO: December 12, 1980 (Open $22 per share, close at $29)
  - Apple raised more money that day than any company except for Ford.

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Apple III (1980)

- The Apple III failed as a product:
  - Apple became known for poor reliability.
  - IBM 'smelled blood' and quickly released the IBM PC (Personal Computer in 1981).
  - Customers flocked to (the IBM PC):
- Wozniak claimed it was a failure because marketing rather than engineering had designed it.

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Image: www.vintage-computer.com

Jacky Scully

- Recruited from Pepsi to work as CEO for Apple in 1983 by Steve Jobs.
  - At Pepsi he spearheaded a successful marketing campaign to challenge Coke: the "Pepsi challenge"
    - It was reputed however that Scully picked Coke over Pepsi in the challenge.
    - What finally motivated the transfer was a plea by Jobs.
    - "Do you want to sell sugared water for the rest of your life? Or do you want to come with me and change the world?[1]
- He was responsible for many changes:
  - A decision to compete directly against IBM in the business computer market (Apple III)
  - Removing Steve Jobs from development of an Apple microcomputer project.

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1 Triumph of the Nerds: The Transcripts, Part III

Lisa (1983)

Image © Mark Richards from www.computerhistory.org

- (1983).
  - 5 MHz 68000 processor
  - 1 MB RAM
- Unlike other Apple computers which were text-based, this one would employ a GUI.
  - It was inspired by a tour of the Xerox PARC (Palo Alto Research Center) laboratories.
    - It cost $1 million in Apple stock for a 3 day tour of Xerox.
    - The Lisa was a failure but laid the ground work for the successful Macintosh.
      - It) incorporated many of the features of the Xerox Star.
      - Like the Star it was expensive ($10K) and sales were weak

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The Apple Macintosh (1984)

Image © Mark Richards from www.computerhistory.org

- Apple's next computer was the Macintosh
- It incorporated many of the best features of the Lisa but was sold at a substantially lower price.
- Also features not present in the Lisa were added to the Macintosh
- Compared to the IBM-PC it was a speed vs. ease of use tradeoff

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The Apple Macintosh (1984): 2

- To prevent a repeat of the failures with the Apple III Jobs was diplomatically removed from this project.[1]
  - He eventually resigned and formed his own computer company NeXT
- Goal: produce an easy to use, inexpensive computer with all the features could need all in one package.
- Specifications:
  - Processor: ~7 MHz 68000 Motorola 32/16 bit.
  - Memory: 128 KB (upgradable – with some difficulty - to 512 KB).
  - Storage: 400 KB 3.5 magnetic floppy drive
    - No hard drive option
  - Resolution: 512 × 342

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1 "Corporations that changed the World: Apple Inc." (Jason D. O'Grady: Greenwood Press 2009)

Mac Vs. Microsoft

Image © Mark Richards from www.computerhistory.org

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Xerox Star

- 1981: Xerox introduced a microcomputer, 8010 Star Information System (Short form: Xerox Star).

http://www.digibarn.com

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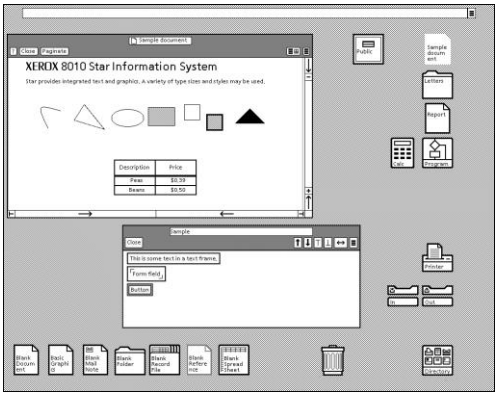
Xerox Star (2)

- The first GUI-driven microcomputer (1981 for the Xerox Star vs. 1984 for the Apple McIntosh and 1985 for the Commodore Amiga 1000).



http://www.aresluna.org

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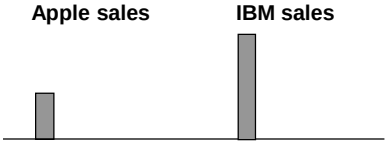
The Attack Of The Clones

- Although it was a late entry into the microcomputer market IBM eventually dominated.



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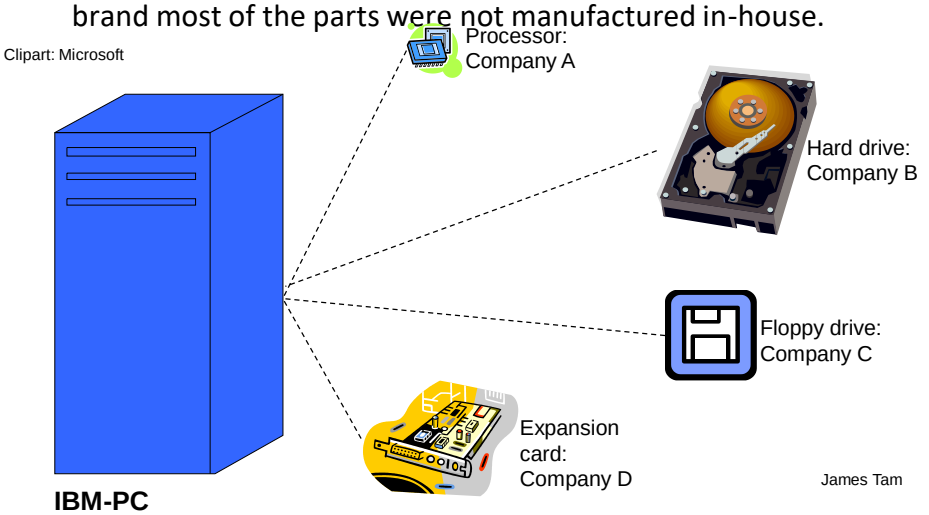
The Attack Of The Clones (2)

- Although the IBM-PC was marketed and sold under the IBM brand most of the parts were not manufactured in-house.



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The Attack Of The Clones (3)

- The parts manufacturers were free to sell their components to other companies.
- About the same time that the IBM-PC was sold, three ex-employees of Texas Instruments founded their own company: Compaq.
  - –They conceived of producing their own copy of the IBM-PC under their own brand name.
  - –It would run under MS-DOS and be 100% compatible with other software
  - –The first IBM-PC clone was delivered by Compaq in 1983.

IBM-PC

Compaq clone

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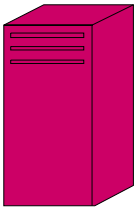
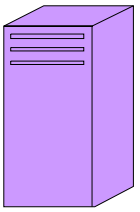
The Attack Of The Clones (4)

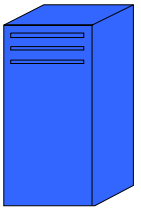
- This opened the flood gates for other computer manufacturers to produce their own clone computers.



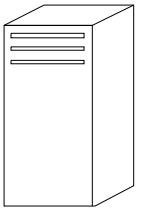
Compaq clone



Dell clone



IBM-PC



Mom and pop shop clone

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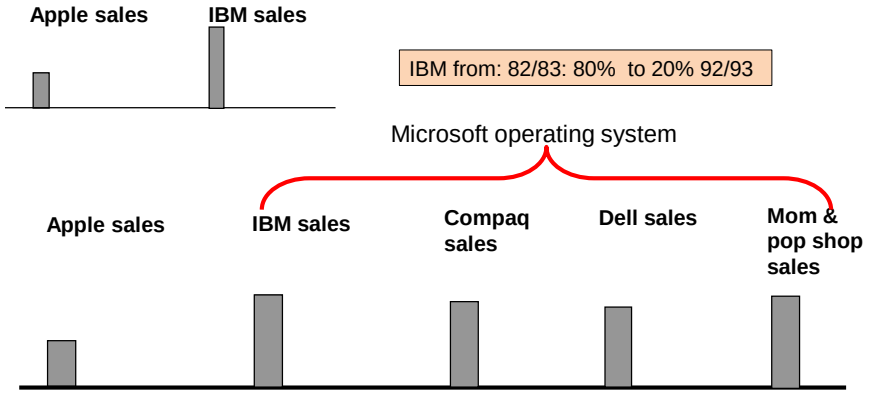
The Attack Of The Clones (5)

- The result was that IBM eventually lost control over the computer architecture that it developed and marketed.



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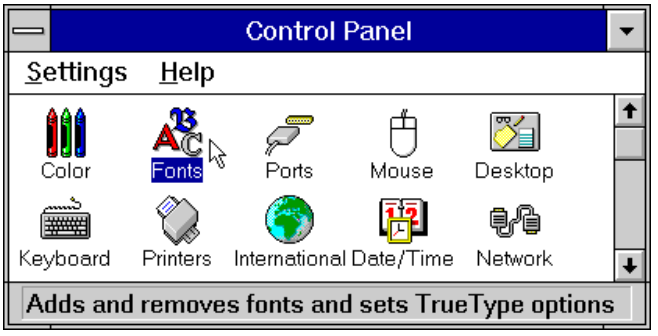
The Attack Of The Clones: The Rise Of Microsoft

- The loser of the clone war was IBM.
- The real winner of the clone war was Microsoft.
- By the 1990s Microsoft developed an interface for MS-DOS that incorporated some of the features of the MAC GUI.



Windows 3 image from www.microsoft.com

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Steve Jobs: Redux

- Jobs eventually returned to Apple after Apple bought NeXT in 1996.
- The NeXT operating system would become the foundation for Mac OS8.
- Apple sales and share prices continued to drop.
- Finally Steve Jobs was reappointed CEO.

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Changes Under Jobs II

- Changes that turned Apple around:
  - A (much-needed) infusion of $150 million from Microsoft.
    - Microsoft Office for MAC
  - Discontinuing of license agreements of Apple ROM and Apple OS to clone makers.
  - Release of the iMac computer.
    - All in one (like the Macintosh that he designed earlier).
    - A bright eye catching design (computers were not just beige clones).

www.imacworld.com

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Changes Under Jobs II (2)

- (Changes that turned Apple around continued)
  - Release of the iBook (first Mac with wireless support).
  - Release of a new professional desktop computer: Power Mac G4.
- Major changes which are regarded as leading to Apple's resurgence:
  - Mac OS X
  - Apple retail stores
  - iPod (JT: and the whole 'eye' series that followed and preceded it).

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Timelines

- 1974
  - MITS: Altair 8800
- 1976
  - Commodore: PET
  - Radio Shack: TRS-80
  - Apple I
- 1977
  - Apple: Apple II
- 1981
  - Commodore VIC-20
  - IBM PC

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Some Important Microcomputer Timelines

- 1983
  - Compaq IBM-clone
- 1984
  - Apple Macintosh
- 1985
  - Commodore Amiga 1000

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Comparison Of Early Microcomputers

	Altair 8800[1]	Apple I	TRS-80	Apple II
CPU	Intel 8080 2 – 3 MHz (8 bit)	MOS (MOS technology) 6502, 1 MHZ 8 bits	Zilog Z80 1.77 MHz	MOS (MOS technology) 6502, 1 MHZ 8 bits
RAM	256 bytes (expandable to 64 KB)	4 or 8 KB	4 KB (up to 16 KB)	4 KB (some models came with 128 KB)
Year	1974	1977	1977	1977

Comparison Of Slightly Later Microcomputers

	IBM PC XT (price ~ x3 of McIntosh or Amiga 2000)	MS-Do/Windows 3.X computer[2]	Apple Macintosh	Amiga 1000	Amiga 2000 HD
CPU	Intel 8088 4.77 MHZ	Intel 80386 25 – 33 MHz	Motorola 68000 ~7 MHz	Motorola 68000 7.14 MHz	Motorola 68000 7.14 MHz
RAM	128K – 640 K	4 MB	128 KB (typically 'that's it' but with extraordinary measures up to 512 KB	Chip RAM: 256 - 512 KB Max. Fast RAM: 8 MB (rarely 32 MB)	Chip RAM: 512 KB – 1 MB Max. Fast RAM: 8 MB (rarely 32 MB)
Graphics	CGA (640x200 max of 4 colors)	VGA (640x480 to 1024-768 max of 256 colors)	512 × 342	320x200 (non-interlaced) 640x400 (interlaced) 32/64/4096 colors	320x200 (non-interlaced) 640x400 (interlaced) 32/64/4096 colors

Comparison Of Slightly Later Microcomputers

	IBM PC XT (price ~ x3 of McIntosh or Amiga 2000)	MS-Do/Windows 3.X computer[2]	Apple Macintosh	Amiga 1000	Amiga 2000 HD
Portable storage	5.25 inch floppy 360 KB	3.5 or 5.25 inch floppy Drives	3.5 inch floppy disk (singular) at 400 KB	1 MB (up to 1.44 MB) 3.5 inch Floppy Drives (higher capacity than 5.25 inch)	1 MB (up to 1.44 MB) 3.5 inch Floppy Drives (higher capacity than 5.25 inch)
Hard drive	10 HD	40 – 80 MB	Not possible	Not included	~20 – 40 MB (unconfirmed)
Year released	1983	Early 1990s	1984	1985	1987

References

- These are the main references for these notes, there were other resources that were used only for one or two screens (source noted on that page).
- The Intel website: http://www.intel.com
- "A History of Modern Computing" (2nd Edition) Paul E. Ceruzzi
- Hard Drive: Bill Gates and the making of the Microsoft Empire" (Jim Wallace & Jim Erickson: Harper Business 1993)
- Corporations that changed the World: Apple Inc." (Jason D. O'Grady: Greenwood Press 2009)
- "The little kingdom: The private story of Apple Computer" (Michael Moritz: William Morrow p. 38)

James Tam

References (2)

- "iWoz: From Computer Geek to Cult Icon: How I Invented the personal computer, Co-founded Apple, and had Fun Doing It" (Steve Wozniak with G. Smith: W.W. Norton 2006)
- Triumph of the Nerds: The Transcripts, Part III

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After This Section You Should Now Know

- General knowledge
  - The general time that significant events (such as the creation of different computer models or technologies) occurred
  - The people and organizations/companies behind these events/technologies and their background
  - What companies produced which computers
  - The names, general appearance and basic technical specifications of the computers of this time
  - What were the specifications of the technologies of the day (such as the number of colors available with different graphical modes)
  - What (if any) were the distinguishing feature or features of a computer
  - How were these technologies or computers used

James Tam

After This Section You Should Now Know (2)

- How the invention of the microprocessor revolutionized computing
- What was the first computer that was targeted specifically for the home user
- What was the influence of Microsoft on microcomputers
- The history of the IBM-PC
- The foundation of Apple Computers
- The history of some of Apple's early computers: Apple I, Apple II, Lisa, Macintosh
- How IBM lost control over a computer architecture that it developed through the rise of clone computers

James Tam

After This Section You Should Now Know (3)

- How the rise of clone computers lead to the market dominance of Microsoft in the microcomputer market
- When the Xerox Star was made available as well its influence on microcomputers

James Tam