

Tech Talks

Computers & Operating Systems

Glen Maxson

Center for Learning in Retirement

Spring 2020 – Session 1 of 6

Seniortechadvisor.com

What we'll cover in 6 weeks

- 1) Computers & Operating Systems
- 2) Applications & The Cloud
- 3) The Internet & The Web
- 4) Social Media
- 5) Security & Privacy
- 6) Entertainment & IoT

Let's talk about the weather...

Weather History Results for Doylestown, PA (18901) February 4th, 1960

[« Previous Day - 02/03/1960](#) •••• [02/05/1960 - Next Day »](#)

On February 4th, 1960, the closest available weather station to Doylestown, PA, reported the following conditions:

High Temp: 51.74°F

High Temp Time: 20:35 GMT

Low Temp: 24.23°F

Low Temp Time: 10:30 GMT

Dewpoint: 21.28°F

Sea Level Pressure: 1028.6 mb

Visibility: 8.88 miles

Wind Speed: 4.7 mph

Politics

Top 5 of Fortune 100 Companies Favored by Liberals

Source: SurveyMonkey

1. Amazon
2. Alphabet (Google)
3. Apple
4. Walt Disney
5. Microsoft

Top 5 Fortune 100 Companies Favored by Conservatives

Source: SurveyMonkey

1. Walt Disney
2. Amazon
3. Apple
4. Microsoft
5. Wal-Mart Stores

Today's Topic

- Computers & Operating Systems

But before we begin, a short history lesson is in order

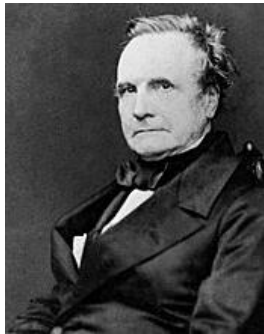
The Internet Age was created in 6 Days...

- Cyber-Genesis 1:1-31

In the Beginning – Day 1

- Someone had to invent the concept of ‘a Computer’
 - Credit goes to Charles Babbage and Ada, Countess of Lovelace

1837



Charles Babbage credited with inventing the first [mechanical computer](#)

1843



Ada, Countess of Lovelace, publishes "Notes" on Babbage's Analytical Engine.

[Charles Babbage](#) – mathematician, philosopher, inventor and engineer, he originated the concept of a digital programmable computer. Even though his [Difference Engine](#) wasn't completed in his life time, a finished machine built in 1991 proved it would have worked. Functioning digital computers became operational 100 years later – Babbage's work (1822-1849), functional computers (1944-1946)

[Ada \(Countess of Lovelace\)](#) – English mathematician and writer, worked with Babbage on the [Analytical Engine](#), regarded as the 1st to recognize the full potential of a [computing machine](#) and the 1st computer programmer - 1843

On the Second Day

- We had to figure out how to make computers useful – we needed programmers

1952



Grace Hopper develops first computer compiler.

- [Grace Hopper](#) and the '6 women of [ENIAC](#)

Dr. Grace Hopper told a reporter, programming was “just like planning a dinner. You have to plan ahead and schedule everything so that it’s ready when you need it.... Women are ‘naturals’ at computer programming.”



[Marlyn Meltzer](#)



[Ruth Lichterman](#)



[Betty Jennings](#)



[Kay McNulty](#)



[Betty Snyder](#)

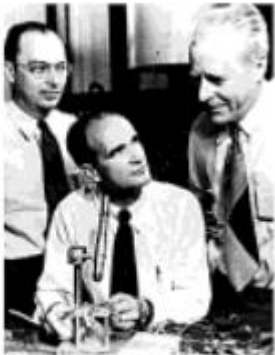


[Frances Bilas](#)

On the Third Day

- Someone needed to invent the ‘Transistor’
 - A **transistor** is a [semiconductor device](#) used to [amplify](#) or [switch electronic](#) signals and [electrical power](#). Today, transistors are packaged individually, but most are embedded in [integrated circuits](#).

1947



Transistor invented at Bell Labs.

John Bardeen
Walter Brattain
William Shockley

- [John Bardeen](#) – quantum theorist, tasked to explain why early experiments failed, then focus on new ‘surface state’ experiments
- [Walter Brattain](#) – the ‘lazy physicist’, deft experimentalist, working side-by-side with Bardeen
- December 16, 1947 – [Bell Labs](#) – a strip of gold foil, a chip of semiconducting material, and a bent paper clip – a working transistor had been invented by Bardeen and Brattain
- When Bardeen gets home, he tells his wife “**We discovered something important today.**” – *perhaps the understatement of the century...*



On the Fourth Day

- Someone had to invent the **integrated circuit** (also referred to as an **IC**, a **chip**, or a **microchip**) - a set of [electronic circuits](#) on one small flat piece (or "chip") of [semiconductor material](#), normally [silicon](#) ([video](#))

1958



Jack Kilby demonstrates integrated circuit, or microchip.



[Gordon Moore](#), [C. Sheldon Roberts](#), [Eugene Kleiner](#), [Robert Noyce](#), [Victor Grinich](#), [Julius Blank](#), [Jean Hoerni](#) and [Jay Last](#). (1960)

[Texas Instruments](#) – [Jack Kilby](#), September 1958 demonstrates the integrated circuit – “A new era in electronics had begun.”

[Fairchild Semiconductor](#) (established by the ‘[Traitorous Eight](#)’) funded by [Sherman Fairchild](#) – [Jean Hoerni](#), physicist, proposes building up an oxide layer on the surface of the transistor (dubbed ‘the planar process’), then engrave tiny windows in the oxide layer to diffuse impurities at precise spots to create desired semiconductor properties

On the Fifth Day

- Someone needed to create the Internet
 - The [Internet](#) was built in partnership among the military, universities, and private corporations – the military-industrial-academic complex
 - It is a global system of interconnected [computer networks](#) that use the [Internet protocol suite](#) (TCP/IP) to link devices worldwide. It is a network of networks.

1960



J. C. R. Licklider publishes "Man-Computer Symbiosis."

1966



Bob Taylor convinces ARPA chief Charles Herzfeld to fund ARPANET.

1968

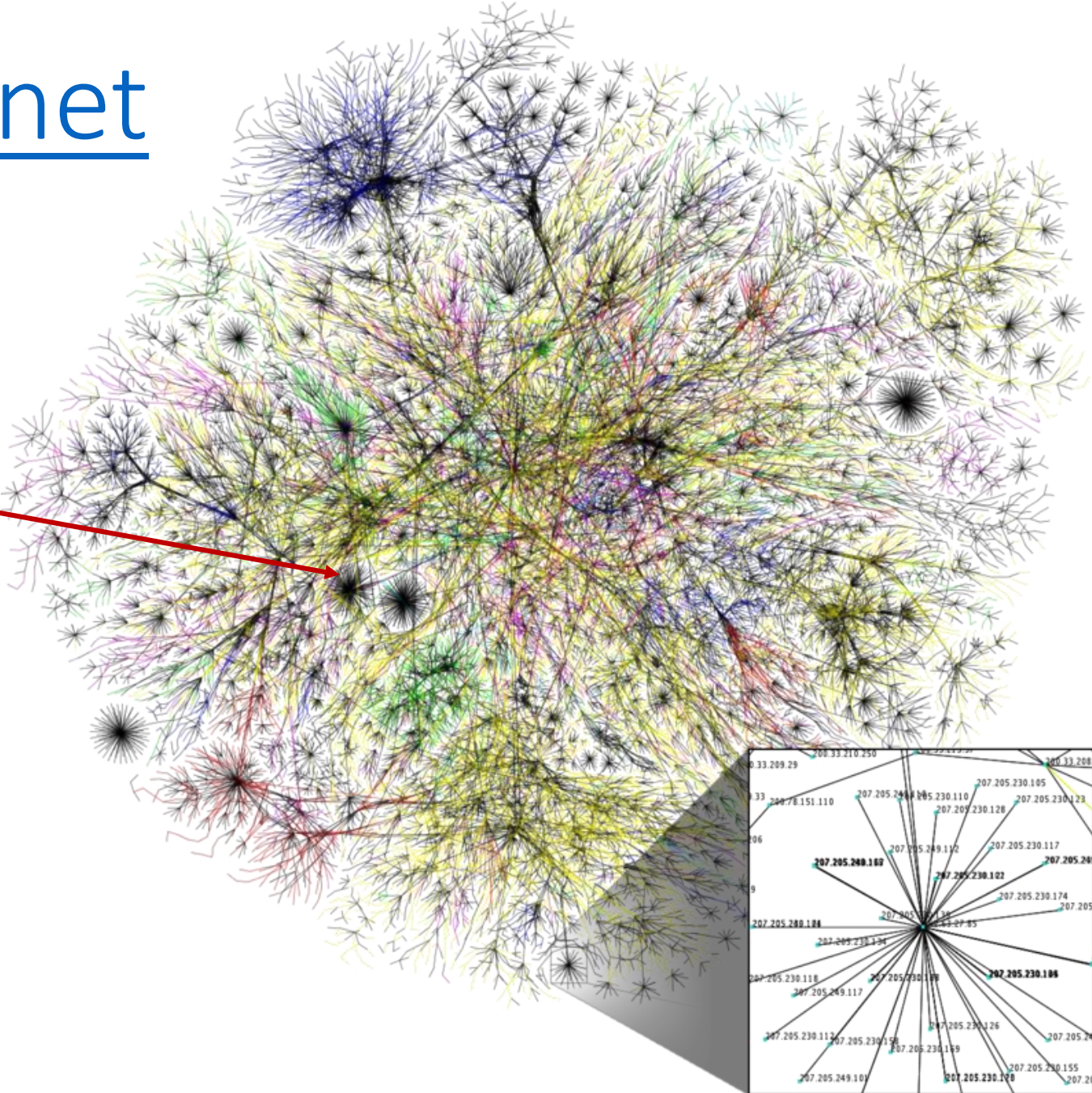
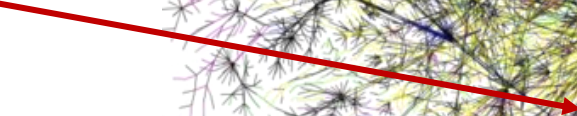


Larry Roberts sends out request for bids to build the ARPANET's IMPs.

- 1960 - [J. C. R. Licklider](#), American psychologist and computer scientist, known as 'computing's Johnny Appleseed', wrote '[Man-Computer Symbiosis](#)', then '[Intergalactic Computer Network](#)' in 1963
- 1966 - [Bob Taylor](#) (American Internet pioneer) and [Larry Roberts](#) (American scientist), together created ARPANET, which was the predecessor to the modern Internet

This is the Internet today

You are here



On the Sixth Day

- Someone needed to invent the ‘Personal Computer’
 - Personal computer - a mass-market consumer electronic device starting the [microcomputer revolution](#) of the 1980s with the launch of the [IBM Personal Computer](#) in 1981

1968



Engelbart stages the Mother of All Demos with Brand's help.

[Mother of All Demos](#)

1973



Alan Kay helps to create the Alto at Xerox PARC.

1975



Altair personal computer from MITS appears.

Ed Roberts

1975



Paul Allen and Bill Gates write BASIC for Altair, form Microsoft.

1975



Steve Jobs and Steve Wozniak launch the Apple I.

1980



IBM commissions Microsoft to develop an operating system for PC.

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1981 - IBM launched the IBM PC with Microsoft's operating system, which started the PC 'Revolution' and the rest of history

intel

revolution in evolution

Starts Here

Highlights from the Journey to 1 Billion PCs

1,000,000,000
900,000,000
800,000,000
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000

1,000,000,000
900,000,000
800,000,000
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000



1971 - Intel, founded by Robert Noyce, Gordon Moore and Andy Grove, introduces the world's first microprocessor and calls it the Intel® 4004.

1974 - Intel introduces the 8080 microprocessor, which was used in the first commercially successful personal computer - the Altair.

1976 - Apple Computer, Inc. releases the Apple I, the first single circuit board computer.¹ The following year, the company introduces the Apple II. A first for a personal computer, the Apple II featured colored graphics.¹



1981 - IBM introduces its first personal computer featuring the Intel® 8086 microprocessor. It sparked the PC revolution and set industry standards that still exist today. The IBM platform enabled hardware makers and software programmers to develop programs and add-on accessories. Until then, most PCs had been closed and proprietary.

1982 - Lotus Development Corporation introduces Lotus 1-2-3, which becomes a best-seller application.¹

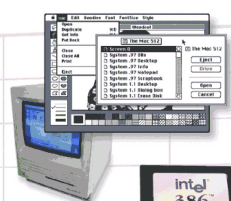
Shugart Associates introduces the hard drive, bringing high-capacity data storage to the PC.

Adam Osborne completes the first portable computer, the Osborne 1. It weighs 24 pounds and plugs into the wall!¹

1983 - The IBM PCXT establishes the IBM format PC featuring an Intel processor, Microsoft DOS and a hard drive as the most popular personal computing platform.

1984 - Apple introduces the Macintosh with a GUI. A GUI is a graphical user interface that provides visual representation for what was previously lines of DOS code, making PCs more usable for non-technical people.

1985 - Intel introduces the 386™ microprocessor featuring 275,000 transistors - more than 100 times as many as the original 4004. The 386™ microprocessor was a 32-bit chip that brought "multi-tasking" capabilities to the PC.

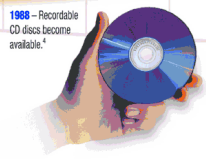


Microsoft ships the Windows® operating system with a graphical user interface.

America Online is founded.²

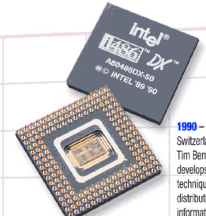
1986 - The number of PCs shipped worldwide reaches nearly 64 million and a 15-year period of continuous growth begins.²

1987 - Toshiba introduces the T1000 laptop PC, making portable computing more widely available.



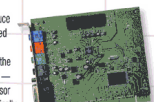
1988 - Recordable CD discs become available.⁴

1989 - The number of PCs shipped worldwide reaches nearly 120 million.²



1990 - In Geneva, Switzerland, Tim Berners-Lee develops a new technique for distributing information on the Internet, eventually called the World Wide Web.

Leading PC manufacturers begin to introduce laptops equipped with Microsoft Windows® and the Intel® 386SL™ - the first processor designed specifically for a mobile computer.



1991 - Creative Labs introduces a Multimedia Upgrade Kit containing a CD-ROM drive, CD-ROM board, speakers and multimedia software.



1992 - The number of PCs shipped worldwide reaches 202 million.²

1993 - Intel introduces the Pentium® processor and Microsoft introduces Windows® 3.1, providing a solid multimedia platform for consumer games and learning applications. Increased processing capabilities, coupled with the availability of affordable CD-ROM drives and sound cards, usher in multimedia on the PC.

Marc Andreessen creates an Internet browser called Netscape.⁶

PC gaming comes of age when id Software® unleashes DOOM, one of the most popular PC games ever.

DOOM also introduces multiplayer gaming to the masses, allowing players to compete in intense 4-player LAN or head-to-head modem competitions.³



1994 - The number of PCs shipped worldwide reaches nearly 288 million.²

The number of PCs shipped worldwide reaches more than 347 million.²

¹www.inventors.about.com
²Gartner Databquest
³www.idl.com
⁴www.discuss.com/dvd
⁵www.broadband.com
⁶www.microsoft.com
⁷Consumer Electronics Association

1995 - Microsoft launches Windows® 95 and its browser, Internet Explorer. Selling more than 1 million copies in the first four days, the operating system helps move PCs into more than 250 million homes, schools and businesses around the world.⁷

1996 - The Digital Versatile Disc (DVD) debuts at the Consumer Electronics Show.⁷ Fujitsu introduces the technology into the FMV Desktop series, powered by the Pentium® processor.⁸

The first 3-D graphics accelerators bring advanced PC gaming to the home.²

Approximately 40 million people are connected to the Internet and more than 1 billion dollars change hands online.¹⁰



1998 - Diamond Multimedia Systems, Inc. pioneers portable MP3 digital music technology with the launch of the Rio PMP 300.

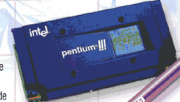
The number of PCs shipped worldwide reaches 590 million.²

The number of PCs shipped worldwide is nearly 706 million.²



1997 - Intel introduces the Pentium® II processor and the number of PCs shipped worldwide reaches more than 497 million.²

Recordable and re-writable DVD discs become available.⁴



1999 - Napster is founded and users share digital music online.¹⁰

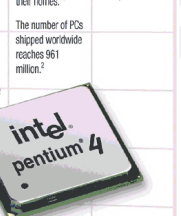
Intel introduces the Pentium® III processor.

Americans are sending 2.2 billion e-mail messages a day, compared with just 233 million pieces of first-class mail.¹¹

The number of PCs shipped worldwide reaches 961 million.²

2000 - Intel introduces the Pentium® 4 processor and an estimated 400 million people worldwide are connected to the Internet by the end of the year - more than double the number of people connected in September 1999.¹²

The number of PCs shipped worldwide reaches 961 million.²



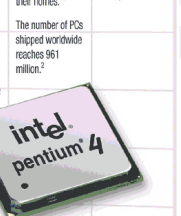
2001 - 20th anniversary of IBM's first personal computer, Microsoft introduces the Windows® XP operating system; Nearly half a billion people around the world have access to the Internet from their homes.¹³

The number of PCs shipped worldwide reaches 961 million.²



2002 - Intel introduces the Mobile Intel® Pentium® 4 Processor-M, bringing desktop performance to the laptop PC.

The PC industry ships the 1 billionth PC, according to industry analyst firm Gartner Databquest.²



2007-2008 - The number of PCs shipped worldwide may reach 2 billion, according to industry analyst firm Gartner Databquest.¹⁴



2008

For more information, please visit <http://www.intel.com>

Intel and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other names and brands may be claimed as the property of others.

⁷www.inventors.about.com
⁸Gartner Databquest
⁹www.idl.com
¹⁰www.napster.com
¹¹www.broadband.com
¹²Nova Internet Surveys, 12/00
¹³Nelson/AERatings, "Half Billion Can Surf From Homes," Reuters 3/02

And on the 7th day...

- Cyber-Genesis 2:1-2

Silicon Valley
created the 120-hour work-week

Here begins our lesson...

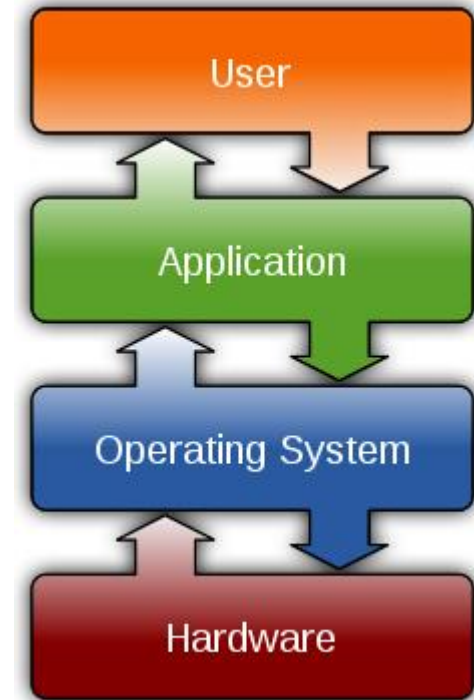
- Computers & Operating Systems

What Are We Talking About?

- A **Computer** (Hardware) is a device that can be instructed to carry out arbitrary sequences of arithmetic or logical operations automatically. It uses programs to perform a wide range of tasks.
- An **Operating System** (OS) is system software that manages computer hardware and software resources and provides common services for computer programs.

And later in our series...

- An **Application** program (or **app**) is a computer program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user (you).



Computers and Operating System Choices

- Common computer ‘form-factors’
 - **Desktop** – traditional ‘tower’ down to PC/104 (3.8” × 3.6” in motherboard)*
 - **Laptop/notebook** – traditional clamshell to ultra-portable, **ChromeBooks***, and ‘convertibles’*
 - **Tablet** – typically 7” to 13” touch interface, incl. ‘**phablets**’ and ‘**convertibles**’
 - **Smartphone** – typically 4.3” to 5.5” touch interface, incl. ‘phablets’ (5.5” – 7.9”)
- Operating system choices
 - **Desktop & Laptop** – Microsoft Windows, Apple OS X, Linux, Google Chrome OS, Google Android
 - **Tablet & Smartphone** – Apple iOS, Google Android
 - [Video](#) (Apple bashing Microsoft), and [Video](#) (Microsoft bashing Apple) – I think they’re even now...

Step 1 – Why Do I Want/Need Technology?

- Stay in touch with children and grand-children
- Find out what's going on in the world
- Check the weather
- Be able to ask questions and find answers
- Connect with my local library to access their resources
- Watch TV programs and movies
- Get access to (e)books or music that I like
- Stay connected while I travel
- Get directions... and a million other reasons!

Step 2 – How Do I Decide What to Buy?

Choices

Form Factor

Desktop

Laptop

?

Tablet

Smartphone

Operating System

Windows

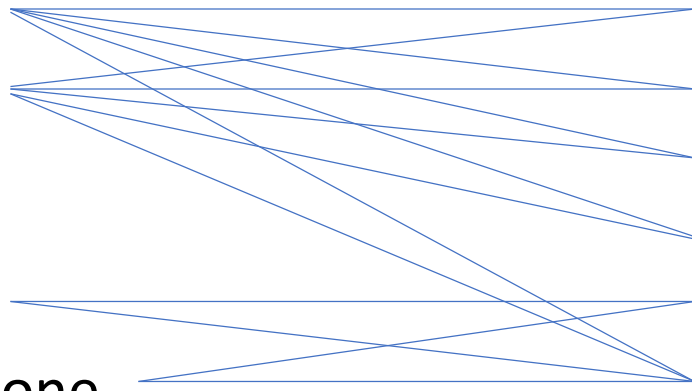
MacOS

Chrome OS

Linux

Apple iOS

Android



Step 3 – How Much Am I Willing to Spend?

PC/laptop = more complex/expensive \leftrightarrow less expensive/simpler = **tablet**

PC/laptop = more functionality \leftrightarrow less functionality = **tablet/smartphone**

- Greater functionality (and performance) usually means greater cost
- But complexity (how much effort you invest in care and feeding your device) has little or no relationship to cost

*You can't buy your way out of having to take care of your stuff,
but I have some ideas that might help...*

Step 4 – It's Time to Pay the Piper?

- Desktop, including All-In-1s
 - Windows – [Dell Deals](#)
 - iMac or Mac mini– [Apple Store](#)
 - Remember with desktop computers you still need a monitor, keyboard and mouse, also 8gb of memory and 1tb hard drive
- Laptop, including Chromebooks
 - Windows - [Dell Deals](#)
 - MacBook – [Apple Store](#)
 - Chromebook - [Amazon](#)
 - Screen size and weight are important considerations, plus memory and storage* (what's the difference you might ask)

Step 4 – It's Time to Pay the Piper? (continued)

- Tablet
 - Android – [trust the experts](#), Samsung consistently rated high
 - Apple (iOS) – various [iPad](#) configurations (best in class!)
 - Screen size is important, and minimum 32gb internal storage – SD card slot is a plus (not available on Apple tablets)
- Smartphone*
 - Android – [trust the experts](#), Motorola Moto [series](#) is my favorite
 - Apple (iOS) – the [iPhone](#) keeps getting better, and more expensive!
 - Screen size is important, and minimum 32gb internal storage – SD card slot is a plus (not available on Apple smartphones)

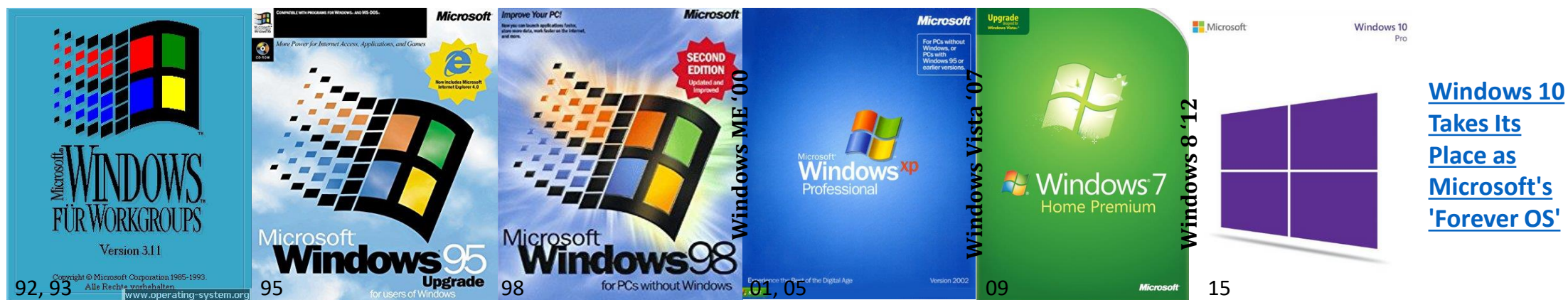
More about operating systems

Microsoft Windows

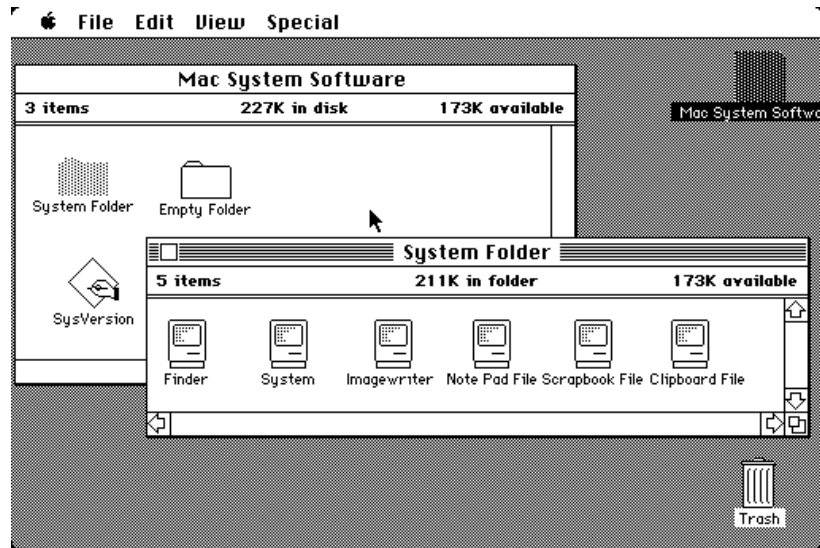


The first independent version of Microsoft Windows, version 1.0, released on November 20, 1985, achieved little popularity. The project was codenamed "Interface Manager" before the windowing system was developed - [Rowland Hanson](#), the head of marketing at Microsoft, convinced the company that the name *Windows* would be more appealing to customers.

Windows 1.0 was not a complete operating system, but rather an "operating environment" that extended [MS-DOS](#), and shared the latter's inherent flaws and problems.



Apple MacOS



1984

Apple released the [original Macintosh](#) on January 24, 1984; its [early system software](#) was partially based on the [Lisa OS](#) and the [Xerox PARC Alto](#) computer, which former Apple CEO [Steve Jobs](#) 'previewed'. It was originally named "System Software", or simply "System"; Apple rebranded it as "Mac OS" in 1996.

[macOS](#) (originally named "Mac OS X" until 2012 and then "OS X" until 2016) is the current Mac operating system that officially succeeded the classic Mac OS in 2001. It is a [Unix](#)-based operating system built on [NeXTSTEP](#) and other technology developed at [NeXT](#) from the late 1980s until early 1997, when Apple purchased the company and its CEO [Steve Jobs](#) returned to Apple.

2019

[macOS
10.15
Catalina](#)



What's the Difference Between Windows & Mac OS?

- Windows (aka PC)
 - Runs on many different hardware 'platforms'
 - In comparison to a Mac, tends to be less expensive but slightly more difficult to use and maintain, and in some cases, less reliable and less secure
 - PCs can often be 'upgraded' to improve performance over time
- Mac OS
 - Runs (only) on computers designed and built by Apple
 - In comparison to PCs, tends to be more expensive, more stable, more secure, and easier to use and maintain
 - Macs are more difficult and expensive to upgrade – Apple would prefer you don't upgrade at all but buy new [every few years](#)

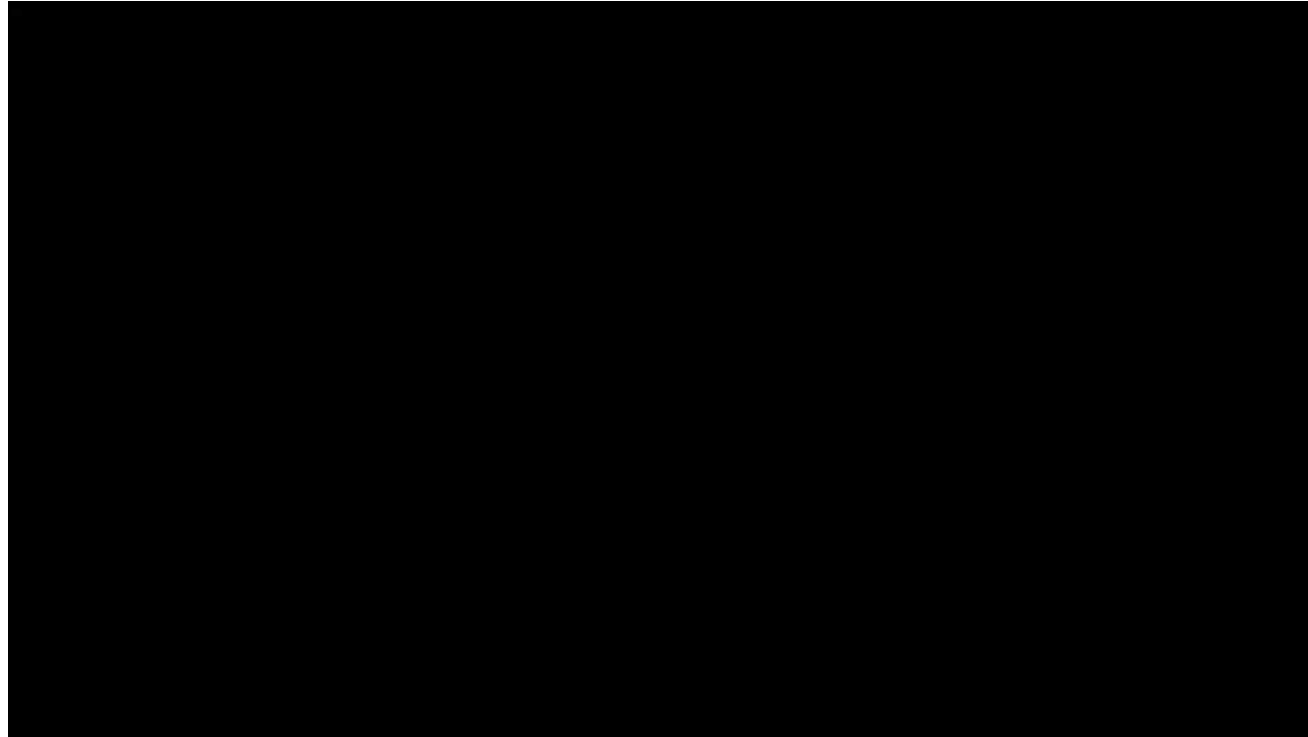
More reading: [Mac vs PC: Which should I buy?](#)

Tablets and Smartphones

- Operating Systems
 - Two choices: [Android](#) or [Apple](#) (iOS)
[Android vs. iOS - Differences That Matter](#)
- Devices
 - Some sites to help you choose:
[Best Smartphones 2019](#) – Toms Guide
+ [Cheap Smartphones \(Under \\$300\)](#)
[The Best Phones of 2019](#) – PCMag.com
[The Best Tablets of 2019](#) – Pcmag.com



\$599 to repair my iPhone! Really? ([source](#))



Linux ([source](#))



Linux is an [operating system](#) within the [free and open-source software](#) development and distribution model. Linux was first released in 1991 by [Linus Torvalds](#) as a [free operating system](#) for [personal computers](#) based on the [Intel x86](#) architecture, but has since been [ported](#) to more [platforms](#) than any other operating system. Because of the dominance of [Android](#) on [smartphones](#), Linux has the [largest installed base](#) of all general-purpose operating systems, including Chrome OS.

The development of Linux is one of the most prominent examples of free and open-source software collaboration. The underlying [source code](#) may be used, modified and distributed—commercially or non-commercially—by anyone under the terms of its respective licenses. Linux is [packaged](#) in a form known as a [Linux distribution](#) (or *distro* for short) for both desktop and server use. Some of the most popular Linux distributions include [CentOS](#), [Debian](#), [Fedora](#), [Linux Mint](#), [openSUSE](#) and [Ubuntu](#).

And **we care because?** **Linux is 'free' and runs on most older hardware that no longer supports Windows** (bloatware). With the low cost of building a Linux system comes somewhat higher complexity and a steeper learning curve.

Chrome OS ([source](#))



chrome

Chrome OS is an [operating system](#) designed by [Google](#) that is based on the [Linux kernel](#) and uses the [Google Chrome](#) web browser as its principal [user interface](#). As a result, Chrome OS primarily supports [web applications](#).

Google announced Chrome OS on July 7, 2009, describing it as an operating system in which both applications and user data reside in the [cloud](#).

And **why do we care?** Lower cost, less complex, medium functionality, good portability & battery life, nice keyboard, larger screen size than tablets.