

# Cheapskate Tech

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Osher Lifelong Learning Institute at Temple University

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[seniortechadvisor.com](http://seniortechadvisor.com)

# What We'll Cover in 6 Weeks

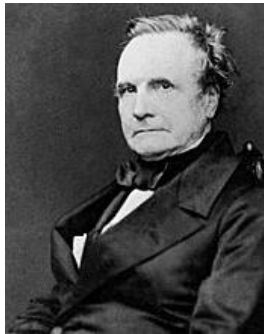
- ~~• Overview, plus Shopping tips~~
- Devices and Apps
- Internet of Things
- Chromebooks
- Linux...

Let's start with a VERY brief history lesson

# 1837 – the computer was ‘invented’

- 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.

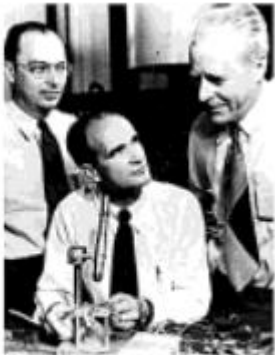
[Charles Babbage](#) – mathematician, philosopher, inventor and engineer, he originated the concept of a digital programmable computer. Even though his [Difference Engine](#) wasn't completed in his life time, a finished machine built in 1991 proved it would have worked. Functioning digital computers 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 1<sup>st</sup> to recognize the full potential of a [computing machine](#) and the 1<sup>st</sup> computer programmer - 1843

# 1947 – the transistor was invented

- 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...*



# 1952 – programming was invented

- 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](#)

# 1958 – the integrated circuit was invented

- 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

# 1960 – the internet was invented

- 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



# 1968 – the ‘personal’ computer was invented

- 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.

# 1981 – the personal computer became ‘real’

intel®

## revolution in evolution

Starts Here

Highlights from the Journey to 1 Billion PCs

1,000,000,000  
900,000,000  
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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.

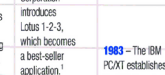
**1976** – Apple Computer, Inc. releases the Apple I, the first single circuit board computer.<sup>1</sup> The following year, the company introduces the Apple II. A first for a personal computer, the Apple II featured colored graphics.<sup>1</sup>



**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.<sup>1</sup> Shugart Associates introduces the hard drive, bringing high-capacity data storage to the PC.



**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.

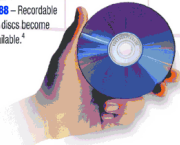


**1985** – Intel introduces the 386™ microprocessor featuring 275,000 transistors – more than 100 times as many as the original 4004. The 386™ microprocessor was a 32-bit chip that brought “multi-tasking” capabilities to the PC.



**1986** – The number of PCs shipped worldwide reaches nearly 64 million and a 15-year period of continuous growth begins.<sup>2</sup>

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



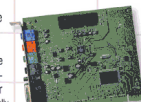
**1988** – Recordable CD discs become available.<sup>4</sup>



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



**1989** – The number of PCs shipped worldwide reaches nearly 120 million.<sup>2</sup>



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



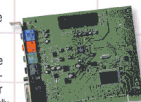
**1992** – The number of PCs shipped worldwide reaches 202 million.<sup>2</sup>



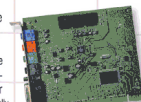
**1993** – Intel introduces the Pentium® processor and Microsoft introduces Windows® 3.1, providing a solid multimedia platform for consumer games and learning applications. Increased processing capabilities, coupled with the availability of affordable CD-ROM drives and sound cards, usher in multimedia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



**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.<sup>3</sup>



**1994** – The number of PCs shipped worldwide reaches nearly 288 million.<sup>2</sup>



<sup>1</sup>inventors.about.com  
<sup>2</sup>Gartner Database  
<sup>3</sup>www.idc.com  
<sup>4</sup>www.discuss.com/dvd

<sup>5</sup>www.netratings.com  
<sup>6</sup>www.reputer.com  
<sup>7</sup>www.stadman.com  
<sup>8</sup>Nova Internet Surveys, 12/00  
<sup>9</sup>Nelson/AERatings, “Half Billion Can Surf From Home,” Reuters 3/02

**2007-2008** – The number of PCs shipped worldwide may reach 2 billion, according to industry analyst firm Gartner Dataquest.<sup>1</sup>

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



**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.<sup>10</sup> The number of PCs shipped worldwide reaches 961 million.<sup>2</sup>



**1999** – Napster is founded and users share digital music online.<sup>13</sup> 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.<sup>11</sup> The number of PCs shipped worldwide reaches 590 million.<sup>2</sup> The number of PCs shipped worldwide is nearly 706 million.<sup>2</sup>



**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.<sup>2</sup>



**1997** – Intel introduces the Pentium® II processor and the number of PCs shipped worldwide reaches more than 497 million.<sup>2</sup> Recordable and re-writable DVD discs become available.<sup>4</sup>



**1996** – The Digital Versatile Disc (DVD) debuts at the Consumer Electronics Show.<sup>7</sup> Fujitsu introduces the technology into the FMV Desktop series, powered by the Pentium® processor.<sup>8</sup> The first 3-D graphics accelerators bring advanced PC gaming to the home.<sup>2</sup> Approximately 40 million people are connected to the Internet and more than 1 billion dollars change hands online.<sup>9</sup>



**1995** – The number of PCs shipped worldwide reaches more than 347 million.<sup>2</sup>



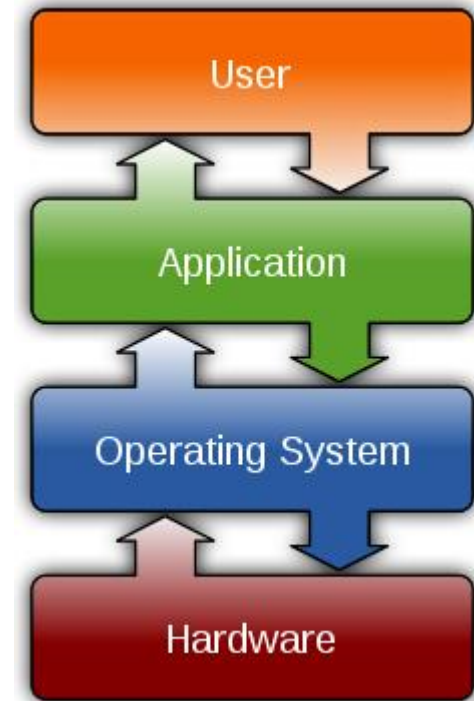
<sup>10</sup>www.inet.com  
<sup>11</sup>www.reputer.com  
<sup>12</sup>www.stadman.com  
<sup>13</sup>Nova Internet Surveys, 12/00  
<sup>14</sup>Nelson/AERatings, “Half Billion Can Surf From Home,” Reuters 3/02

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

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# And here we are today – computers everywhere

- 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.
- 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

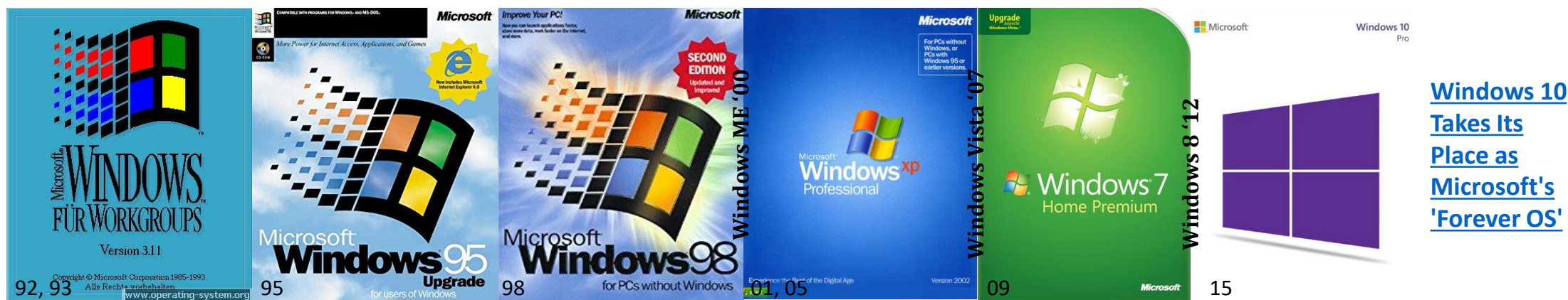
- Common computer ‘form-factors’
  - **Desktop** – traditional ‘tower’ down to PC/104 (3.8” × 3.6” in motherboard)\*
  - **Laptop/notebook** – traditional clamshell to ultra-portable, **ChromeBooks\***, and ‘convertibles’\*
  - **Tablet** – typically 7” to 13” touch interface, incl. ‘**phablets**’ and ‘**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...

# Microsoft Windows

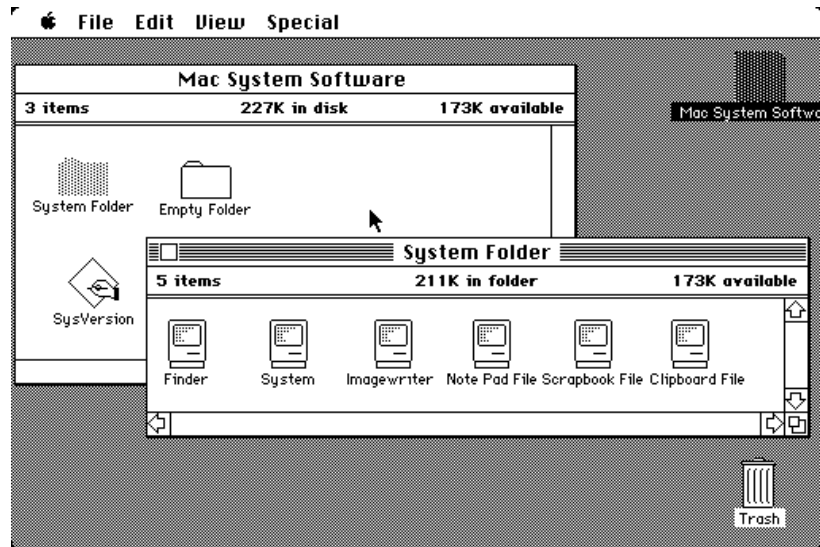


The first independent version of Microsoft Windows, version 1.0, released on November 20, 1985, achieved little popularity. The project was codenamed "Interface Manager" before the windowing system was developed - [Rowland Hanson](#), the head of marketing at Microsoft, convinced the company that the 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 Phones in 2020](#) – Toms Guide
    - [Best Cheap Phones in 2020](#)
    - [Best Cheap Tablets for 2020](#)





## 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.

Applications (aka Software)

# Software. What is it?

- Computer software, or simply software, is a part of a computer system that consists of data or computer instructions, in contrast to the physical hardware - software is usually written in high-level programming languages
- Software examples include application software, system software, and malicious software or malware

Before we begin, a brief history lesson

# 1843 – Ada's algorithm\*

\*a process or set of rules to be followed in calculations or other problem-solving operations

- Ada wrote the first piece of software (an algorithm) in the 19<sup>th</sup> century for Babbage's Analytical Engine
- Alan Turing wrote his theory about software in 1935 ([Computable numbers with an application to the Entscheidungsproblem](#)\*)
- Programs stored in memory of digital computers became possible after 1948 – [very limited](#)

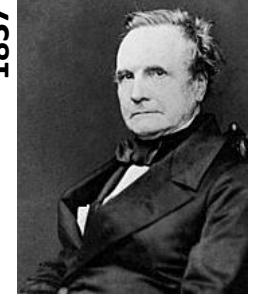
\*[Entscheidungsproblem](#) – (German for "decision problem") is a challenge posed by [David Hilbert](#) in 1928. The problem asks for an [algorithm](#) that takes as input a statement of a [first-order logic](#) and answers "Yes" or "No" according to whether the statement is *universally valid*.

1843



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

1837



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

1937



Alan Turing publishes "On Computable Numbers," describing a universal computer.

# 1951 - Mercury (delay line) memory of UNIVAC I



Operates at 104 °F  
Started with 16 delay lines each holding 560 bits (about 9000 bits total)  
The memory subsystem required its own 'room' to operate

Memory Card  
Class 10 1024 GB

1tb Memory Card 1024gb tf Card Micro sdxc sd Card Holder sd Card Reader :  
Card Flash Memory Card  
★★★★☆ 33  
\$19.99 ~~549.99~~  
prime FREE One-Day  
Get it Tomorrow, Oct 22  
Only 2 left in stock - order soon.

If a byte is 8 bits, and this micro-SD card holds 1024 terabytes, that's a 11,428,571,328.57% increase!

**Computer memory** is a temporary storage area. It holds the data and instructions that the Central Processing Unit (CPU) needs. Before a program can run, the program is loaded from storage into the **memory**.

# 1975 – BASIC (users can write their own programs)

- The advent of ‘personal computer’ software made the hardware ‘useful’, starting with the BASIC interpreter written by Gates and Allen for the Altair 8800, allowing users to create their own programs – this effort launched the PC software industry! The year was 1975...
- 1979 - [Dan Bricklin](#) - “The Father of the Spreadsheet” – co-invented VisiCalc with [Bob Frankston](#), available on Tandy TRS-80... for \$100 – awarded a patent for [VisiCalc](#) in 1981

1975



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

1979



Dan Bricklin  
Creates  
VisiCalc



# Software Today

- Most software today is ‘downloaded’ to your computer where it is ‘installed’ and run
- Many software publishers are moving to a rent vs. buy ‘subscription’ model which has 2 primary benefits:
  - Supplier – increased revenue since subscriptions need to be renewed and distribution costs are reduced
  - End user – new versions and updates available to subscribers immediately

# Application Software ([source](#))

An **application program** (app) is a [computer program](#) designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user. Examples of an application include a [word processor](#), a [spreadsheet](#), an [accounting application](#), a [web browser](#), a [media player](#), a [flight simulator](#), a [console game](#) or a [photo editor](#). The [collective noun](#) **application software** refers to all applications collectively. This contrasts with [system software](#), which is mainly involved with running the computer.

Applications may be [bundled](#) with the computer and its system software or published separately, and may be coded as [proprietary](#) or [open-source](#).

## Top paid/proprietary apps for PCs and laptops

- [Microsoft Office 365](#) – Microsoft's office applications [subscription](#)
- [Adobe Creative Cloud](#) – everything Adobe [subscription](#)
- [Carbonite](#) – PC backup software
- [Bitdefender Antivirus Plus 2020](#) – antivirus
- [Malwarebytes](#) (paid version) – malware detection

# Top 10(+) 'free' apps for PCs and laptops

- [LibreOffice](#) or [OpenOffice](#) – office applications
- [Audacity](#) – audio editor
- [Google Chrome](#) or [Firefox](#) - browsers
- [VLC Player](#) – media player
- [GIMP](#) – photo editor
- [Adobe Reader](#) – PDF reader
- [7-Zip](#) – file archiver
- [Kaspersky Free Antivirus](#) - antivirus
- [Malwarebytes](#) (free version) – malware detection
- [OpenShot](#) – video editor
- Plus [OBS Studio](#) – video recording and live streaming

# Top 10 'free' apps for tablets and smartphones

- [Color Note](#) – notepad
- [Google Mail](#) (Gmail) – e-mail
- [CamScanner](#) – document scanner
- [Google Maps](#) – GPS navigation
- [Google Hangouts](#) – Google chat and phone
- [Total Commander](#) – file manager
- [Today Weather](#) – weather
- [Pandora](#) – music
- [WhatsApp](#) – worldwide chat and voice communication
- [SwiftKey](#) – alternate keyboard
  
- Another source: [Best Android apps of 2019](#)

# Top 10 'free' apps for Chromebooks

- (Microsoft) [Office Online](#) – cloud based Office apps
- [Pocket](#) – content syncing service
- [Overdrive](#) and [RB Digital](#) – eBook and audio book reader
- [Evernote](#) – cloud note-taking
- [Roboform](#) – (free version) password manager
- [Kindle Cloud Reader](#) – eBook reader
- [Weather.com](#) – weather
- [Pandora](#) – music
- [Polarr](#) – photo editor
- [VLC for Chrome OS](#) – media player
  
- Another source: [Best Chrome Apps](#)

# Apps for your Smartphone

- 'Essential' Apps (top 10)

	<u>Apple</u>	<u>Android</u>
• <b>App Store</b>	Apple App Store	(Google) Play Store
• <b>Email</b>	(Apple) Mail*	Gmail
• <b>Contact list</b>	(Apple) Contacts*	(Google) Contacts
• <b>Browser</b>	Safari, <a href="#">Chrome</a>	Chrome
• <b>Weather</b>	(Apple) Weather*	<a href="#">The Weather Channel</a>
• <b>Music</b>	(Apple) Music*	Pandora
• <b>Maps</b>	(Apple) Maps*	(Google) Maps
• <b>Calendar</b>	(Apple) Calendar*	(Google) Calendar
• <b>Photos</b>	(Apple) Photos*	(Google) Photos
• <b>Voice Assistant</b>	Siri*	Google Assistant

# Apps for your Smartphone (continued)

- 'Nice to Have' Apps (top 10)

	<u>Apple</u>	<u>Android</u>
• <b>Note-taker</b>	(Apple) iNote, <a href="#">EverNote</a>	<a href="#">ColorNote</a> , <a href="#">Evernote</a>
• <b>Document Scanner</b>	<a href="#">CamScanner</a>	<a href="#">CamScanner</a>
• <b>File Manager +</b>	(Apple) Files*	ES File Explorer
• <b>Video-calling*</b>	(Apple) FaceTime*	(Google) Hangouts
• <b>Wireless File Transfer</b>	<a href="#">Air Transfer</a>	<a href="#">WiFi File Transfer</a>
• <b>Social Media</b>	FaceBook, Instagram, YouTube, Twitter, LinkedIn...	
• <b>Hands-Free Auto</b>	(Apple) <a href="#">CarPlay</a> **	<a href="#">Android Auto</a>
• <b>VLC Media Player</b>	<a href="#">VLC Media Player</a>	<a href="#">VLC Media Player</a> *
• <b>Keyboard Mod</b>	<a href="#">SwiftKey</a>	<a href="#">Swype</a> (default)
• <b>Level</b>	<a href="#">Bubble Level +</a>	<a href="#">Clinometer</a>