

RESEARCH PAPER

ON

OPERATING SYSTEMS - EVOLUTION



BY

MICHEAL TADESE

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1. INTRODUCTION TO OPERATING SYSTEMS

An operating system (OS) is a software program that enables the computer hardware communicate and interact with the computer software. It acts as a communication agent between the system hardware and the end-user. Without a computer operating system, a computer would be useless.

An operating system consists of many parts. One of the most important components is the kernel, which controls low-level processes that the average user usually cannot see - it controls how memory is read and written, the order in which processes are executed, how information is received and sent by devices like the monitor, keyboard and mouse, and decides how to interpret information received from networks.

The user interface is a component that interacts with the computer user directly, allowing them to control and use programs. The user interface may be graphical with icons and a desktop, or textual, with a command line. Application Programming Interfaces (APIs) provide services and code libraries that let application developers write modular code reusing well defined programming sequences in user space libraries or in the operating system itself. Which features are considered part of the operating system is defined differently in various operating systems. For example, Microsoft Windows considers its user interface to be part of the operating system, while many versions of Linux do not.

2. HISTORY OF OPERATING SYSTEMS

In the 1940s, the earliest electronic digital systems had no operating systems. Electronic systems at this time were so primitive compared to those of today that instructions were often entered into the system one bit at a time on rows of mechanical switches or by jumper wires on plug boards. These were special-purpose systems that, for example, generated ballistics tables for the military or controlled the printing of payroll checks from data on punched paper cards. After programmable general purpose computers were invented, machine languages (consisting of strings of the binary digits 0 and 1 on punched paper tape) were introduced that speed up the programming process (Stern, 1981).

Some of the earliest Operating Systems include:

- i. DOS (MS-DOS, PC-DOS, Free-DOS, ROMDOS, Novell-DOS)s
- ii. IBM OS/2
- iii. Unix OS

3. TYPES OF OPERATING SYSTEM

As computers have progressed and developed, so have the operating systems. Below is a basic list of the different operating systems and a few examples of operating systems that fall into each of the categories. Many computer operating systems will fall into more than one of the below categories.

i. **Multi-user**

A multi-user operating system allows for multiple users to use the same computer at the same time or different times. It allows multiple users to access a computer system concurrently. Time-sharing systems can be classified as multi-user systems as they enable a multiple user access to a computer through the sharing of time. Examples are Microsoft Windows Operating Systems

ii. **Single-user**

Single-user operating systems, as opposed to multi-user operating systems, are usable by a single user at a time. Example is MS-DOS

iii. **Single-tasking**

When only a single program is allowed to run at a time, the system is grouped under a single-tasking system.

iv. **Multi-tasking**

When the operating system allows the execution of multiple tasks at one time, it is classified as a multi-tasking operating system. Multi-tasking can be of two types: pre-emptive or co-operative. In pre-emptive multitasking, the operating system slices the CPU time and dedicates one slot to each of the programs. Unix-like operating systems such as Solaris and Linux support pre-emptive multitasking, as does AmigaOS. Cooperative multitasking is achieved by relying on each process to give time to the other processes in a defined manner. MS Windows prior to Windows 2000 and Mac OS prior to OS X used to support cooperative multitasking

v. **Real-time**

A real-time operating system is a multitasking operating system that aims at executing real-time applications. Real-time operating systems often use specialized scheduling algorithms so that they can achieve a deterministic nature of behavior. The main objective of real-time operating systems is their quick and predictable response to events. They have an event-driven or time-sharing design and often aspects of both. An event-driven system switches between tasks based on their priorities or external events while time-sharing operating systems switch tasks based on clock interrupts.

vi. Distributed

A distributed operating system manages a group of independent computers and makes them appear to be a single computer. The development of networked computers that could be linked and communicate with each other gave rise to distributed computing. Distributed computations are carried out on more than one machine. When computers in a group work in cooperation, they make a distributed system.

vii. Embedded

Embedded operating systems are designed to be used in embedded computer systems. They are designed to operate on small machines like PDAs with less autonomy. They are able to operate with a limited number of resources. They are very compact and extremely efficient by design. Windows CE, Windows Mobile and Minix 3 are some examples of embedded operating systems.

viii. Multi-processing

Operating systems capable of supporting and utilizing more than one computer processor.

ix. Multi-threading

Operating systems that allow different parts of software program to run concurrently.

4. DOS (DISK OPERATING SYSTEM)

DOS, short for "Disk Operating System", is an acronym for several closely related operating systems that dominated the IBM PC compatible market between 1981 and 1995, or until about 2000 if one includes the partially DOS-based Microsoft Windows versions 95, 98, and Millennium Edition.

Related systems include MS-DOS, PC-DOS, DR-DOS, FreeDOS, PTS-DOS, ROM-DOS, Novell DOS, OpenDOS and several others.

i. Ms-DOS

Ms-DOS is a disk operating system made by Microsoft. It is a Command Line Interface operating system technology which allows you to perform all tasks by typing lines of codes unto the system. It basically uses the keyboard as the main (only) input device. It was the dominant operating system for the PC compatible platform during the 1980s. It has gradually been replaced on consumer desktop computers with various generations of the Windows operating system.

Ms-DOS was originally released in 1981 and had eight major versions released before Microsoft stopped development in 2000. It was the key product in Microsoft's growth from a programming language company to a diverse software development firm, providing the company with essential revenue and marketing resources.

```

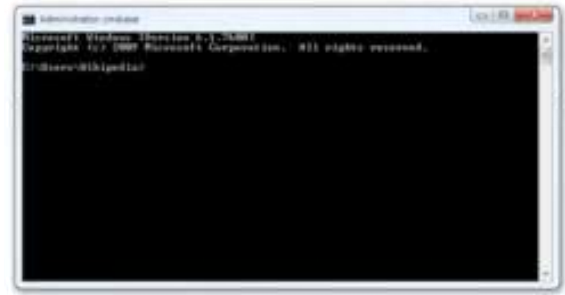
Welcome to FreeDOS
-----
SafeMode v1.0.1 alpha 1 (FreeDOS)
Installed at 25-2 part
C:\>ver
FreeDos version 0.82 of 3-2003_Snap (Rev. 10-2003) 06:03:211
C:\>dir
Welcome in Drive C to FREEDOS_CMS
Diskette Serial Number is 8047-10E3
Directory of C:\

FREEOS             (DIR)   08-26-04  6,123p
FREEDOS_BAT        435   08-26-04  6,124p
FREEDOS_BIH        532   08-26-04  6,123p
COMMOND_CMD       83,863  08-26-04  6,124p
CONFID_VVS        381   08-26-04  6,124p
FREEOS_BIH        532   08-26-04  6,124p
FREEOS_VVS        45,015  04-17-04  9,110p
0 files(s)        147,839 bytes free
1 dir(s)         1,004,517,632 bytes free

C:\>

```

FreeDOS screenshot showing the command line interface, directory structure and version information.



CMD.EXE, the DOS-styled command prompt used in Microsoft-NT-based Windows.

ii. History

MS-DOS was created by computer manufacturer Seattle Computer Products (SCP) in 1980 as QDOS (for Quick and Dirty Operating System), but was renamed 86-DOS because it was designed to run on the Intel 8086 processor. In a sequence of events that would later inspire much folklore, Microsoft licensed QDOS to IBM on behalf of SCP. Microsoft acquired the system for only \$50,000 from SCP shortly before the PC's release.

iii. Benefits of DOS

- It operates on really small systems. (ENTIRE OS could be placed on a SINGLE MODERN ROM chip!)
- It gives you more "direct" control of the processes.
- Due to its small size, it "boots" much faster than ANY windows version.
- It's easier to write "special purpose" programs with it, so long as they don't require "fancy" graphics.
- It allows you to make use of the "old, slow" system you hid in the closet when you bought the "new" one.

iv. Shortcomings Of DOS

- Very few "new" programs available, therefore you need to be able to write programs of older versions.
- Not nearly as fancy in the graphics interface.

- Not compatible with current "browsers" and most internet.

v. Versions Of Ms-DOS

Year	Version Release
1981	MS-DOS 1.0 was released August
1982	MS-DOS 1.25 was released August
1983	MS-DOS 2.0 was released March
1984	Microsoft introduces MS-DOS 3.0 for the IBM PC AT and MS-DOS 3.1 for networks.
1986	MS-DOS 3.2 was released April
1987	MS-DOS 3.3 was released April
1988	MS-DOS 4.0 was released July
1988	MS-DOS 4.01 was released November
1991	MS-DOS 5.0 was released June
1993	MS-DOS 6.0 was released August
1993	MS-DOS 6.2 was released November
1994	MS-DOS 6.21 was released March
1994	MS-DOS 6.22 was released April

5. MICROSOFT WINDOWS OPERATING SYSTEMS



Official Microsoft Logo



Official Microsoft Windows 7 Logo



Windows 7 Desktop



Windows Vista Desktop

Microsoft Windows is a series of operating systems produced by Microsoft. Microsoft Windows is one of the most popular Graphical User Interface operating systems around the world, and has been for many years. As with technology in general, the Windows operating system has evolved over the years. In 1985, the original version of Windows was introduced as Windows 1.0, and later followed by Windows 3, which had several versions, such as 3.0, 3.1, and 3.11. These were actually operating environments, and not systems in themselves. They simply enhanced the DOS operating system, making it more user-friendly.

Microsoft introduced an operating environment named *Windows* on November 20, 1985 as an add-on to MS-DOS in response to the growing interest in graphical user interfaces (GUIs). Microsoft Windows came to dominate the world's personal computer market, overtaking Mac OS, which had been introduced in 1984.

The most recent client version of Windows is Windows 7; the most recent server version is Windows Server 2008 R2; the most recent mobile version is Windows Phone 7.

i. BENEFITS OF WINDOWS OVER OTHER OPERATING SYSTEMS

- a. Microsoft has made several advancements and changes that have made it a much easier to use Operating System, and although arguably it may not be the easiest Operating System, it is still easier than Linux.
- b. Because of the large amount of Microsoft Windows users, there is a much larger selection of available software programs, utilities, and games for Windows.
- c. Microsoft Windows includes its own help section, has vast amount of available online documentation and help, as well as books on each of the versions of Windows.
- d. New programs are almost always available for Windows, and often, they're available to Windows users first.
- e. As the most functional GUI, Windows requires no knowledge of programming or DOS commands in order operate and little knowledge of programming and DOS commands in order to optimize.
- f. High Level of Security

ii. SHORTCOMINGS OF WINDOWS

- a. Although Microsoft Windows has made great improvements in reliability over the last few versions of Windows, it still cannot match the reliability of Linux.
- b. Although Windows does have software programs, utilities, and games for free, the majority of the programs are still sold at high prices.
- c. Although Microsoft has made great improvements over the years with security on their Operating System, their Operating System continues to be the most vulnerable to viruses and other attacks.



Windows Touchscreen technology



Windows 7 Start Menu Interface

iii. MICROSOFT WINDOWS VERSIONS

Year	Versions Released
1983	Bill Gates announces Microsoft Windows November 10
1985	Microsoft Windows 1.0 is introduced in November 20, 1985
1987	Microsoft Windows 2.0 was released December 9, 1987
1987	Microsoft Windows/386 or Windows 386 is introduced December 9, 1987
1988	Microsoft Windows/286 or Windows 286 is introduced June, 1988
1990	Microsoft Windows 3.0 was released May, 22
1991	Microsoft changes the name of OS/2 to Windows NT.
1991	Microsoft Windows 3.0 or Windows 3.0a with multimedia was released October.
1992	Microsoft Windows 3.1 was released April, 1992
1992	Microsoft Windows for Workgroups 3.1 was released October
1993	Microsoft Windows NT 3.1 was released July 27
1993	Microsoft Windows 3.11, an update to Windows 3.1 is released December 31
1994	Microsoft Windows for Workgroups 3.11 was released February
1994	Microsoft Windows NT 3.5 was released September 21
1995	Microsoft Windows NT 3.51 was released May 30
1995	Microsoft Windows 95 was released August 24
1996	Microsoft Windows NT 4.0 was released July 29
1996	Microsoft Windows 95 with FAT32 and MMX support is released August 24
1996	Microsoft Windows CE 1.0 was released November
1997	Microsoft Windows CE 2.0 was released November

1997	Microsoft Windows 95 (4.00.950C) aka OSR2.5 is released November 26
1998	Microsoft Windows 98 was released June
1998	Microsoft Windows CE 2.1 was released July
1999	Microsoft Windows 98 SE (Second Edition) was released May 5
1999	Microsoft Windows CE 3.0 was released
2000	Microsoft Windows 2000 was released February 17
2000	Microsoft Windows ME (Millennium) released June 19
2001	Microsoft Windows XP is released October 25
2001	Microsoft Windows XP 64-Bit Edition is released March 28
2003	Microsoft Windows Server 2003 is released March 28
2003	Microsoft Windows XP 64-Bit Edition is released on March 28
2003	Microsoft Windows XP Media Center Edition 2003 is released on December 18
2004	Microsoft Windows XP Media Center Edition 2005 is released on October 12
2005	Microsoft Windows XP Professional x64 Edition is released on April 24
2006	Microsoft releases Microsoft Windows Vista to corporations on November 30
2007	Microsoft releases Microsoft Windows Server 2008
2009	Microsoft releases Windows 7 October 22

iv. MAJOR ENHANCEMENTS OF WINDOWS 7 OVER WINDOWS VISTA

a. Multi-touch in Win 7

With touch technology becoming the latest trend after Apple's revolutionary multi-touch iPhone, Windows 7 has multi-touch for all the supported hardware. HP Touchsmart series is one of them.

b. Performance and User Friendliness

Windows 7 will tremendously reduce the time to install an app. Also, now Windows will be less annoying with very less UAC (User Access Control) prompt.

c. Media Center

Win 7 comes with enhanced Media Center experience. It will have Internet TV which will telecast MSN channels by default and will have a desktop sidebar gadget for the same too



d. New Taskbar

Windows 7 desktop will look different now because of the new taskbar. You can now reorder the opened Window buttons. It has Jump Lists feature which will allow you to access common programs very easily. And you can see the full screen preview before switching to a window.



e. Start button search

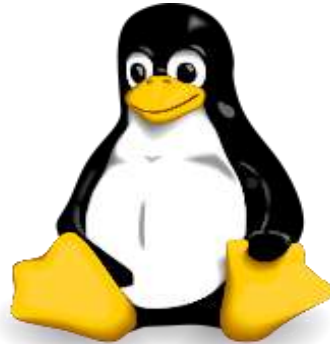
The Start button search facility introduced with Windows Vista has been given a spruce up that makes it a genuine timesaver. Instead of merely hunting for exact filename and application matches, the search is more intelligent.

Search for "disk" for example, and not only do applications such as Disk Cleanup and Disk Defragmenter appear as they would in Vista, but also Control Panel tasks such as "Create and format hard disk partitions" and "Create a password reset disk".

f. iTunes support in Windows Media Player

- g. Windows Media Player now offers support for the iTunes AAC format. Not only does this mean you don't have to open up iTunes on your PC to play those tracks, but you can also play back iTunes libraries on other PCs over the network without having the Apple software installed on your system

6. UNIX, LINUX OPERATING SYSTEMS



Official Linux Logo

Linux is a Unix-like computer operating system assembled under the model of free and open source software development and distribution. The defining component of Linux is the Linux kernel, an operating system kernel first released October 5, 1991 by Linus Torvalds.

i. HISTORY OF LINUX

a. UNIX

The Unix operating system was conceived and implemented in 1969 at AT&T's Bell Laboratories in the United States by Ken Thompson, Dennis Ritchie, Douglas McIlroy, and Joe Ossanna. It was first released in 1971 and was initially entirely written in assembly language, a common practice at the time. Later, in a key pioneering approach in 1973, Unix was re-written in the programming language C by Dennis Ritchie (with exceptions to the kernel and I/O). The availability of an operating system written in a high-level language allowed easier portability to different computer platforms. With a legal glitch forcing AT&T to license the operating system's source code to anyone who asked, Unix quickly grew and became widely adopted by academic institutions and businesses. In 1984, AT&T divested itself of Bell Labs. Free of the legal glitch requiring free licensing, Bell Labs began selling Unix as a proprietary product.

b. GNU

The GNU Project, started in 1983 by Richard Stallman, had the goal of creating a "complete Unix-compatible software system" composed entirely of free software. Work began in 1984. Later, in 1985, Stallman started the Free Software Foundation and wrote the GNU General Public License (GNU GPL) in 1989. By the early 1990s, many of the programs required in an operating system (such as libraries, compilers, text editors, a Unix shell, and a windowing system) were completed, although low-level elements such as device drivers, daemons, and the kernel were stalled and incomplete. Linus Torvalds had said that if the GNU kernel had been available at the time (1991), he would not have decided to write his own.

c. BSD

Although not released until 1992 due to legal complications, development of 386BSD, from which NetBSD and FreeBSD descended, predated that of Linux. Linus Torvalds said if 386BSD had been available at the time, he probably would not have created Linux.

d. MINIX

MINIX is an inexpensive minimal Unix-like operating system, designed for education in computer science, written by Andrew S. Tanenbaum. Starting with version 3, MINIX was free and redesigned for "serious" use.

In 1991 while attending the University of Helsinki, Torvalds became curious about the operating systems and frustrated by the licensing of MINIX, which limited it to educational use only and prevented any commercial use. He began to work on his own operating system which eventually became the Linux kernel.

Torvalds began the development of the Linux kernel on MINIX, and applications written for MINIX were also used on Linux. Later Linux matured and further Linux development took place on Linux systems. GNU applications also replaced all MINIX components, because it was advantageous to use the freely available code from the GNU project with the fledgling operating system. (Code licensed under the GNU GPL can be reused in other projects as long as they also are released under the same or a compatible license.) In order to make Linux available for commercial use, Torvalds initiated a switch from his original license, which prohibited commercial redistribution, to the GNU GPL. Developers worked to integrate GNU components with Linux to make a fully functional and free operating system.



Richard Stallman, founder of
the GNU project



Andrew S. Tanenbaum,
author of the MINIX
operating system



Linus Torvalds, principal
author of the Linux kernel

Linux runs on a wide variety of computer hardware, including mobile phones, tablet computers, network routers, televisions, video game consoles, desktop computers, mainframes and supercomputers. Linux is a leading server operating system, and runs the 10 fastest supercomputers in the world. In addition, more than 90% of today's supercomputers run some variant of Linux.

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 licenses such as the GNU General Public License. Typically, Linux is packaged in a format known as a *Linux distribution* for desktop and server use. Some popular mainstream Linux distributions include Debian (and its derivatives such as Ubuntu), Fedora and openSUSE. Linux distributions include the Linux kernel, supporting utilities and libraries and usually a large amount of application software to fulfill the distribution's intended use.



Ubuntu, a popular Linux distribution

ii. BENEFITS OF LINUX OS OVER OTHER SYSTEMS

- a. **Low cost:** You don't need to spend time and money to obtain licenses since Linux and much of its software comes with the GNU General Public License. You can start to work immediately

without worrying that your software may stop working anytime because the free trial version expires. Additionally, there are large repositories from which you can freely download high quality software for almost any task you can think of.

- b. **Stability:** Linux doesn't need to be rebooted periodically to maintain performance levels. It doesn't freeze up or slow down over time due to memory leaks and such. Continuous up-times of hundreds of days (up to a year or more) are usual.
- c. **Performance:** Linux provides persistent high performance on workstations and on networks. It can handle unusually large numbers of users simultaneously, and can make old computers sufficiently responsive to be useful again.
- d. **Network friendliness:** Linux was developed by a group of programmers over the Internet and has therefore strong support for network functionality – client and server systems can be easily set up on any computer running Linux. It can perform tasks such as network backups faster and more reliably than alternative systems.
- e. **Flexibility:** Linux can be used for high performance server applications, desktop applications, and embedded systems. You can save disk space by only installing the components needed for a particular use. You can restrict the use of specific computers by installing for example only selected office applications instead of the whole suite.
- f. **Compatibility:** It runs all common Unix software packages and can process all common file formats.
- g. **Choice:** The large number of Linux distributions gives you a choice. Each distribution is developed and supported by a different organization. You can pick the one you like best; the core functionalities are the same; most software runs on most distributions.
- h. **Fast and easy installation:** Most Linux distributions come with user-friendly installation and setup programs. Popular Linux distributions come with tools that make installation of additional software very user-friendly as well.
- i. **Security:** Linux is one of the most secure operating systems. “Walls” and flexible file access permission systems prevent access by unwanted visitors or viruses. Linux users have the option to select and safely download software freely from online repositories containing thousands of high quality packages. No purchase transactions requiring credit card numbers or other sensitive personal information are necessary.

- j. **Open Source:** If you develop software that requires knowledge or modification of the operating system code, Linux's source code is at your fingertips. Most Linux applications are Open Source as well.

iii. SHORTCOMINGS OF LINUX

- Although the majority Linux variants have improved dramatically in ease of use, Windows is still much easier to use for new computer users.
- Linux has a large variety of available software programs, utilities, and games. However, Windows has a much larger selection of available software.
- Linux companies and hardware manufacturers have made great advancements in hardware support for Linux and today Linux will support most hardware devices. However, many companies still do not offer drivers or support for their hardware in Linux.

iv. LINUX DESKTOP INTERFACES



GNOME



KDE



Xfce



LXDE

v. UNIX, LINUX VERSIONS

Year	Event
1969	Summer 1969 Unix was developed.
1971	First edition of Unix released 11/03/1971.
1972	Second edition of Unix released December 06
1973	Third edition of Unix released February
1973	Forth edition of Unix released November
1974	Fifth edition of Unix released June

1975	Sixth edition of Unix released May
1979	Seventh edition of Unix released January
1985	Eighth edition of Unix released February
1986	Ninth edition of Unix released September
1989	Tenth edition of Unix released October
2004	The first release of Linux Ubuntu is released October 20

7. APPLE MACINTOSH OS



Apple Inc. Logo



Original 1984 Macintosh desktop

Mac OS is a series of graphical user interface-based operating systems developed by Apple Inc. (formerly Apple Computer, Inc.) for their Macintosh line of computer systems. The Macintosh user experience is credited with popularizing the graphical user interface. The original form of what Apple would later name the "Mac OS" was the integral and unnamed system software first introduced in 1984 with the original Macintosh, usually referred to simply as the System Software.

Mac OS X, an advancement to the Mac OS is a series of Unix-based operating systems and graphical user interfaces developed, marketed, and sold by Apple Inc. Since 2002, Mac OS X has been included with all new Macintosh computer systems. With the introduction of OS X Mountain Lion in February 2012, Apple dropped the "Mac" prefix from the name, calling it just OS X.



Box artwork for Mac OS X. Left to right: Cheetah/Puma (1), Jaguar (2), Panther (3), Tiger (4), Leopard (5), Snow Leopard (6), Lion (7), Mountain Lion (8).

i. Benefits of Apple Computers over other Operating Systems

- a. **Security:** Apple computers are much more secure than Windows PCs. Viruses, adware and malware designed for a Windows-based processor simply will not run on a Mac. The main reason for this is simply that there are much fewer Macs in use. People who make malicious software want to have it spread to as many people as possible and designing a virus for a Mac simply will not accomplish this.
- b. **Reliability:** The people who make Mac software are the same people who make the Mac hardware. While Windows programmers have to take into account nearly infinite variations in hardware, Mac OS is designed to be used on a very limited amount of computers – those built by Apple. The software is designed specifically to run on the hardware. This means that the operating system is much more stable.
- c. **Macs are convenient:** Do you own an iPod? An iPhone? Do you listen to music with iTunes? Do you appreciate how simple, elegant and easy to use these products are? Apple applies all of the things you like about these products to their computers. Yes, there will be a time of adjustment to using Mac OS, but once you are used to it, you will love it.
- d. **Advanced technology:** The current generation of Macbook Pro features LED monitors, multi-touch mouse trackpad and a CNC machined aluminium case. Desktop Mac Pro features up to 8 core processors and up to 4 Terabyte (4000GB) of storage.

ii. Shortcomings of Mac OS

- a. They're only more secure because fewer people use them. If everybody used Macs, there would be a lot more viruses and malware for them. If Apple computers became more popular, they would become less secure.
- b. Cannot be upgraded nor customized. There are upgrade options when you buy a Mac, but unlike a Windows PC, you cannot mix and match components. The easiest way to upgrade a Mac is to buy a new one.

- c. Mac operating systems are very expensive.
- d. Playing games requires Windows. There are very few games available for the Mac. If you are a gamer, a Mac is probably not the best choice. You could run Bootcamp, but if you are going to spend most of your time on a Mac running Windows, you have to ask yourself if it is worth it. Another option is to play games on a video game console, such as a PS3 or Wii, and simply use your computer for computing.



Screenshot of OS X v10.8 "Mountain Lion"

iii. Apple OS Versions

Year	Versions Released
1978	Apple introduces Apple DOS 3.1 In June, for the Apple computers.
1984	Apple introduces System 1.
1985	Apple introduces System 2.
1986	Apple introduces System 3.
1987	Apple introduces System 4.
1988	Apple introduces System 6.
1991	Apple introduces System 7 operating system May 13
1997	Apple introduces Mac OS 8.
1999	Apple introduces Mac OS 9.

2001	Apple introduces Mac OS X 10.0 code named Cheetah March 24
2001	Apple introduces Mac OS X 10.1 code named Puma September 25
2002	Apple introduces Mac OS X 10.2 code named Jaguar August 23
2003	Apple introduces Mac OS X 10.3 code named Panther October 25
2004	Apple introduces Mac OS X 10.4 code named Tiger June 28
2007	Apple introduces Mac OS X 10.5 code named Leopard October 26
2008	Apple introduces Mac OS X 10.6 code named Snow Leopard and MobileMe June 9
2011	Mac OS X v10.7 "Lion" - July 20, 2011

8. OTHER OPERATING SYSTEMS

i. SOLARIS (OPERATING SYSTEM)



Official Solaris Logo

Solaris is a Unix operating system originally developed by Sun Microsystems. It superseded their earlier SunOS in 1993. Oracle Solaris, as it is now known, has been owned by Oracle Corporation since Oracle's acquisition of Sun in January 2010.

Solaris is known for its scalability, especially on SPARC systems, and for originating many innovative features such as DTrace, ZFS and Time Slider. Solaris supports SPARC-based and x86-based workstations and servers from Sun and other vendors, with efforts underway to port to additional platforms. Solaris is registered as compliant with the Single Unix Specification.

ii. CISCO IOS



Official Cisco Logo

Cisco IOS (originally Internetwork Operating System) is the software used on the vast majority of Cisco System routers and current Cisco network switches. (*Earlier switches ran CatOS.*) IOS is a package of routing, switching, internetworking and telecommunications functions tightly integrated with a multitasking operating system.

The IOS CLI provides a fixed set of multiple-word commands — the set available is determined by the "mode" and the privilege level of the current user. "Global configuration mode" provides commands to change the system's configuration, and "interface configuration mode" provides commands to change the configuration of a specific interface. All commands are assigned a *privilege level*, from 0 to 15, and can only be accessed by users with the necessary privilege. Through the CLI, the commands available to each privilege level can be defined.

iii. ANDROID Operating System



Official Android Logo

Android Operating System is an OS mainly designed for mobile devices and is owned by Google. It is presently the world's most popular mobile platform and it powers millions of phones, tablets and other mobile devices.

9. FUTURE OF OPERATING SYSTEMS

i. FUTURE OF WINDOWS



Screenshot of **Windows 8** startscreen (Somewhat similar to the Xbox 360 dashboard (as of December 7th, 2011))



Bootable **Windows To Go** USB flash drive

Windows 8, the successor to Windows 7, is currently in the market. Microsoft's CEO announced that Windows 8 will also run on ARM CPUs. This Windows version will also be more suitable for tablets and netbooks featuring a more touch-friendly interface. Several new features will also be introduced such as support for USB 3.0 and the ability to run Windows from USB devices (like USB Hard Disks or USB Flash drives) with **Windows To Go**.

ii. FUTURE OF LINUX OS



Integration of the Android Technology into Linux OS

The future of Linux OS will revolve around the use of Android platform from Google. Google is taking interest in introducing the Android technology to the next build of Linux operating system. Google's migration into the operating system business has been so gradual that many industry watchers have shrugged it off. When the company announced its Android OS for phones, it looked interesting. There was nothing new about the idea of using Linux on a handset and (apart from Google's

involvement) little reason to expect it would carve out substantial market share in the competitive smartphone arena. But with about 20 distinct Android handsets in the hands of more than three million users worldwide and about 30 more devices expected to roll out in 2010, Google's mobile OS is now looking like a force to be reckoned with.

What's most striking about Google's apparent success in the OS market is that it has chosen not to fight Microsoft where it is strongest (on the desktop), but where it is waning. While Windows Mobile 6.5 is a competent mobile OS, Microsoft has failed to generate genuine excitement for users who've been dazzled by the far more compelling iPhone OS. Simultaneously, Microsoft has not managed to convert its dominance in the data center into a serious challenge to RIM's BlackBerry devices among business users.

iii. FUTURE OF APPLE MAC OS

Version 10.8: "Mountain Lion"



On the left is Lion (10.7) & on the right is Mountain Lion (10.8) Notice how Apple took the word "Mac" away from the title on Mountain Lion.

OS X v10.8 "Mountain Lion" was announced on February 16, 2012. It will incorporate some features seen in iOS 5. These include Game Centre, support for iMessage in the new Messages messaging application, and Reminders as a to-do list app separate from iCal. It also includes support for storing iWork documents in iCloud. It is scheduled to be released in late summer 2012. re, which makes its debut in Mountain Lion, is a desktop version similar to the one in iOS 5.0 and higher. Application pop-ups are now concentrated on the corner of the screen, and the Centre itself is pulled from the right side of the screen. Mountain Lion also includes more Chinese features including support for Baidu as an option for Safari search engine, QQ, 163.com and 126.com services for Mail, Contacts and Calendar, Youku, Tudou and Sina Weibo are integrated into share sheets.

10. CONCLUSION

The design of operating systems evolved over the past 30 to 40 years. However, the continuous change in these systems development is inevitable and while the present major OS vendors like Microsoft Apple Inc. keep improving on their products, newer vendors like Google are also rising to the challenge and getting more interests from the OS consumer.

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