

Zygmunt Ryznar - Time line of Computer operating systems (v.12-Eng)

Computer consists not only of technical devices (hardware) and application programs, but also must have the operating system, which governs the usage of them.
 The simplest early operating systems had only a few hundred instructions and mainly were dedicated to maintain the library of subroutines and to serve operator-machine communication. They occupied very small memory comparing to the current complex solutions.
 For example, George3 along with the Executive took up only 12K words, Master (CDC3300) needed 64K words (but provided very good multitasking performance). More complex systems enable full range of services: multi-access, multitasking, network communication, selfdiagnostics and I/O device allocation. So they need more ram and disk memory.
 The IBM360-91 operating system counted over one and a half million instructions.
 Multics, written in PL/I language, had volume about 300,000 lines of code. The price of this system was \$7 mill. at the beginning of commercial use. It had worked well, since the last working installation of Multics was closed not until 2000 - 30 years after its creation!

We mention in our list of software also the original Polish operating systems (MASTER, KAR-65, OS-141, CROOK, IPIX) developed for native Polish computers.

| No | Year | Company/Creator - NAME OF OPERATING SYSTEM |
|----|-----------|---|
| 1 | 1954 | MIT - Tape Director operating system for UNIVAC 1103 |
| 2 | 1955 | General Motors - GM Operating System for IBM 701 |
| 3 | 1956 | GM-NAA I/O for IBM 704, based on General Motors Operating System |
| 4 | 1957-1962 | Manchester University - Atlas Supervisor for Atlas computer |
| 5 | 1959 | IBM - SOS (Share Operating System) based on GM-NAA I/O |
| 6 | 1960 | Honeywell - Executive (multiprogram run feature) |
| 7 | 1961 | MIT - CTSS (Compatible Time-Sharing System) for IBM 7094), Burroughs - MCP (Master Control Program) |
| 8 | 1962 | General Electric - GECOS (later GCOS) |
| 9 | 1964-1965 | IBM - DOS/360 First line of /360 series; later DOS/VS (Virtual Storage) & DOS/VSE (VS Extended)-1979, z/VSE-2005,2007(64bit virtual memory) - for small configuration of mainframe Z. |
| 10 | 1964 | CP64 First version of IBM VM - system based on virtual memory. |
| 11 | 1965-1968 | RCA - TSOS Time Sharing Operating System for RCA Spectra 70/46 Version purchased by UNIVAC named as VS/9. Later became the base for ICL System 4 & BS2000 Siemens |
| 12 | 1965 | IBM - BOS/360 (Basic Operating System), TOS/360 (Tape Operating System) |
| 13 | 1966-1969 | IMM (Poland)-SO-41,SO-141 for Polish computer ZAM-41 with feature of 4 running programs simultaneously. Before: system "Dyrygent" for ZAM-2. |
| 14 | 1967 | CP-67 IBM - successor of CP-64 (more popular than CP-67) |
| 15 | 1969 | At MIT first commercial run of MULTICS with feature of access security . |
| 16 | 1969 | UNIX system created in AT&T of Bell (Kenneth Thompson, Rudd Conodai Dennis Ritchie) - probably partially based on co-authors experience of MULTICS project. First implementation of assembler written for PDP-7 & PDP-11/20. 1973 - software was rewritten in C (after uncesseful attempt to use of B & NB languages). may 1975 - UNIX-VI widely applied version of Unix. |
| 17 | 1969 | ICL GEORGE 3 for ICL 1900 series |
| 18 | 1970 | term UNIX created by Brian Kerninghan, probably to appreciate the fact, that system was able to work with 2 users (1969 - 1 user only) |
| 19 | 1971 | First official version of Unix. |
| 20 | 1972 | Digital (DEC)- RSX-11 for PDP computers (David Cutler was the team leader). Next years - system ULTRIX & OpenVMS for VAX computers. 1991 Digital OSF/1 (based on principles proposed - Open Software Foundation). Implemented in Alpha computers with relational dbase RDB and SQL. |
| 21 | 1972 | IBM- OS/VS System for mainframe (VS1 - single virtual storage)& (VS2/MVS multiple virt.storage) |
| 22 | 1972 | IFD UW i IBJ (Poland)- SO-KAR65 for computer Kar-65 (time-sharing mode, service of measurement devices of elementary particles stream) |
| 23 | 1973 | GUI first graphical interface for computer Xerox Alto. 1981 - first commercial GUI for computer Apple Lisa. 1983 Bill Gates presented "windows" overlay for MS DOS.2.0,and 2 years later - Windows1. |

| | | |
|----|-----------|---|
| 24 | 1973 | Redifon (ROCC) R800 System for Seecheck (made also in Poland as MERA9150) with advanced multiaccess for 32 input devices |
| 25 | 1973 | UNI X was granted to american universities. |
| 26 | 1974 | Gary Kildall (DRI - Digital Research Inc.) created CP/M - first operating system for computers with Intel 8080 |
| 27 | 1976 | Berkeley Unix - BSD Unix (Unix BSD-Berkeley Software Distribution) Unix made at Calif.Univ. by Bill Joy Berkeley based on extensions of AT&T Unix. One of new technologies of BSD was virtual file system VFS implemented in OSF/1. 1977-1981 version 1-4.1. which was the base for SunOS. 1893-1984 System V. |
| 28 | 1977 | IBM - MVS system for IBM mainframe with Multiple Virtual Storage-successor of OS/VS. |
| 29 | 197X/198X | Univ. of Technology Gdansk - Poland - CROOK system partially similar to Unix for Polish computers K-202 & MERA 400. |
| 30 | 1977-1979 | California Univ.- UCSD p-System experimental system using interpreter of p-code Wirth for Pascal language. Version 3 was developed by Western Digital. |
| 31 | 1980 | Digital (DEC)- VMS (Virtual Memory System) for VAX computers (first versions created in 1977 by David Cutler's team). In 1991 renamed to Open VMS (for example 64bit version OpenVMS7 for Alpha computers). Standard Unix with DCL statements, RMS files and graphical environment X11+Motif. 500 000 installations. |
| 32 | 1980 | Digital Research - DR-DOS for PC computers. |
| 33 | 1980 | Unix for 16bit processor Zilog & Motorola. |
| 34 | 1980 | Atari- DOS- for 8bit Atari |
| 35 | 1980 | Commodore - Dos for 8bit Commodore |
| 36 | 198X | DEMOSDialogowaja jEidinaja Mobilnaja Operacionnaja Sistiema) russian version of Unix for SM-4. |
| 37 | 1980-1981 | Tim Paterson - Seattle Computer Products 1980 - QDOS v0.10 (Quick'n'Dirty Operating System), 1981 - PC/DOS, MS/DOS for PC. Microsoft - T.Paterson work. Microsoft bought 86-DOS (based on QDOS) from SPC and sold to IBM including languages (BASIC, FORTRAN, Pascal, COBOL i 8086 Assembler). 12 August 1981 - IBM demonstrated IBM PC with IBM PCDOS 1.0 |
| 38 | 1982 | first unix server of HP |
| 39 | 1982 | Unix System III (named also System 3) was a discontinued version of the Unix operating system released by AT&T's Unix Support Group (USG). |
| 40 | 1983 | GNU-Hurd Richard Stallman -founder of FSF (Free Software Foundation)- began GNU(GNU Not Unix) and worked out kernel hurd (v.0.6 |
| 41 | 1983 | Windows1.0 - First version of Windows entirely based on DOS (Incl. drivers). 1985 - Windows1.01 -commercial version 1986 - windows1.02 |
| 42 | 1983 | At AT&T built Unix V This name was assigned to UNIX of Bell Labs. 1984 - Unix V/2) commercial versions |
| 43 | 198X | QNX Software Systems, BlackBerry - QNX unix based real time operating system with microkernel. |
| 44 | 1982 | Sun Microsystems SunOS Versions 1-4.1 based on BSD. Later - UNIX system V named Solaris. Dedicated for servers and workstations. |
| 45 | 1980-1982 | Microsoft-AT&T,Santa Cruz Operations xenix Unix (System V/2) for PC. Later - more popular was SCO-UNIX. |
| 46 | 1984 | HP-UX Unix HP based on Unix.V with the same class of openness as OpenVMS Digital. |
| 47 | 1984 | Apple - MacOS For PowerPc, MC68K processors (until 2001 r.)- GUI windows, extended menu, mouse cursor, bucket. GUI's concept was probably taken by Apple from Xerox laboratories (Palo Alto) where in 1973 was built "Alto" computer with GUI. |
| 48 | 1984 | MIT- X Window also named as X-Windows,X11, X GUI for net terminals (workstations) and PC. Derived from Athena (Massachusetts Institute of Technology) project and project W (Stanford Univ.). Later project W was taken by MIT and common project was named X. Since 1987 X11 implementation of v.11 net protocol. 1983- in Athena project Bob Scheifler and Jim Gettys created an universal network protocol working in client-server environment for all hardware (from PC to mainframes) and operating systems (Unix,DOS,VMS,MVS etc.) |
| 49 | 1985 | Commodore Int. AmigaOS1.0 multitask system for Amiga1000,500,2000,3000(32bit). 2004-2006 v.4.0, 2008-2014 v.4.1. (Hyperion & Amiga Inc.) for PowerPC processors. |

| | | |
|----|-----------|---|
| 50 | 1986 | IBM AIX Advanced Interactive Executive UNIX based on Unix.V-SVR2+4.3BSD. Dynamic construction of kernel with journal of changes, |
| 51 | 1985-1994 | Carnegie Mellon MACH Modern project of unix kernel - improvement of Accent kernel. Supported by ARPA(Advanced Research Project Agency). Base for kernels: NeXTSTEP, Darwin, Mac OS X , iOS. Many innovative solutions: virtual memory, multi processors communication, multithreads (within process), distributed processing. Object oriented approach. Commercially applied first time for NEXT computers. |
| 52 | 1986 | CNPSS MERASTER Katowice [Poland] - MASTER-MultiAccess System for TimeSharing Efficient Resources usage -for MERA-60 working in multiaccess mode with external transistor memory. |
| 53 | 1987-1996 | IBM OS/2 32-bit system for PC. 1987-OS/2.0 developed by IBM & Microsoft team (leader: Ed Iacobucci). 1992 - Microsoft began work on NT system OS/2.1. based on OS/2 kernel). 1996 - OS/2.4 Warp with features: Virtual DOS Machines (VDM), FAT & HPFS file systems. The last official version 4.51.(2001) was very popular in ATM. |
| 54 | 1987 | Vrije Universiteit Amsterdam Amoeba – system for distributed processing. Partial emulation of UNIX. Programming language Python invented for Amoeba development. |
| 55 | 1987 | Netherlands MINIX Andrew S. Tanenbaum created 16bit unixlike system for use in universities. System was not approved due to difficulties to convert for 32bit Intel procesors.Source code was accesible and probably Linus Torvald could see it despite he had built system Linux from scratch. |
| 56 | 1987 | Microsoft Windows-2 for VGA (16 colours, 640x480) and first versions of Word and Excel. |
| 57 | 1984-1988 | IPI PAN [Poland] - IPIX Unix (based on System-SVR2 standards), written in C language for KRAK-86 (IBM PC type) |
| 58 | 1989 | SOLARI S1.0 Wersja SunOS4.0 |
| 59 | 1988 | OS/400 obecnie iS/OS for AS/400 (iSeries) |
| 60 | 198X | Santa Cruz Operations -SCO Unix successor of Xenix |
| 61 | 1990 | Next Computer NextStep system Unix based on Mach. |
| 62 | 1990 | Microsoft - Windows 3.0 multitasking Windows 3.1:multimedia (sound recording, CD player), TrueType fonts. History:1985 - Windows 1 (based entirely on DOS) 1987 Windows 2.0 graphic mode applications – Excel i Word for Windows. |
| 63 | 1991-1994 | OSF - OSF/1 Unix (based on AT&T) code Open Software Foundation (members: Bull, DEC, Hewlett-Packard, IBM, Nixdorf, Siemens, Apollo) |
| 64 | 1991 | Sun - Solaris (based on Unix SVR4) |
| 65 | 1991 | Linux 0.02 published in net by Linus Torwald |
| 66 | 1992 | first Unix in BSD (Berkeley Software Design) family |
| 67 | 1993 | first linux distros (Debian, Slackweare) czyli |
| 68 | 1994 | Founded RedHat - company of commercial linux distros |
| 69 | 1990-1993 | Microsoft - Windows- 3.0. i 3.11. 16bit. MS-DOS plus graphical interface. Multitasking. Windows3.11 - P2P network, TCP/IP protocol, TrueType fonts. |
| 70 | 1990-1992 | Berkeley Softworks(GeoWorks)- PC/GEOS i PEN/GEOS PC/GEOS (with DOS) for computers PEN/GEOS for phones (NOKIA Communicator) and palmtops with handwriting recognition. 2001 - 4.0 v. (Breadbox Ensemble) developed by Breadbox Computer. |
| 71 | 1993-1997 | Apple Inc.- Newton OS for Newton PDA palmtop - software "CalliGrapher" (ParaGraph International Inc) later "Rosetta and Mondello" (Apple) for handwriting recognition, GUI, rotational screen |
| 72 | 1993 | Microsoft Windows NT3.1. – 32bit. NewTechnology(NT) created by team of David Cutler (passed from DEC where he was a chief designer of RSX-11M for PDP-11 and VMS for Vax). Includes "Virtual" DOS (client). MS DOS and OS/2 compatibility. NTFS. Adnanced multitasking. DLL library. Client-Server mode. Extended register. For Intel, MIPS R4000, DEC Alpha processors. For RISC computers in emulation mode. |
| 73 | 1993 | Common Open Software Environment COSE - OSF & UI as a common group. |
| 74 | 1994 | LINUX 1.0 |
| 75 | 1993-1995 | IBM OS/390 (for mainframe IBM/390) - based on previous poprzedni MVS (Multiple Virtual Storage) system. |
| 76 | 1995 | Microsoft - Windows 95 32-bit. system with extended GUI(start, my computer, task bar,..) zadań..), ini.files moved to the register, FAT32, API for DirectX, plug&play. MS-DOS environment remained for compatibility. |

| | | |
|-----|------------------------|--|
| 77 | 1995 | Be Inc. created BeOs 2001 copywrite sold to Palm. Be Inc. acquisition by Access Co. BeOs concepts implemented in HAIKU system based on BeOs API (BeBook) documentation from Access . |
| 78 | 1996 | Microsoft - WIN NT4.0 WinNT derived from first version of OS/2 system, developed wit cooperation with IBM. For (x86, x64,ARM, AMD ..) processors. Used mostly in client-serve applications. |
| 79 | 1996 | Debian1.0 (GNU/Linux) |
| 80 | 1996 | JavaOS Unsuccessful attempt to built operating system based on Java (no multitasking,slow) |
| 81 | 1998 | Microsoft - Windows 98 successor of Windows95, first operating system with Windows Driver Model(WDM, full USB service, ACPI, Winsock2, no 64KB limit for register. |
| 82 | 1998 | Symbian Ltd,Nokia - Symbian For phones (Nokia,Ericsson, Motorola). Based EPOC system (1997) of Psion. 2014 - Nokia acquisition by Microsoft. Symbian project stopped. Sailfish of Lolla to be used instead of Symbian. |
| 83 | 1998/1999 | Unix Monterey 1998/99 group (IBM, Compaq, SCO) founded to develop new cversion of Unix called Monterey. |
| 84 | 1999-2002 | Apple OS X (Mac OS X) for Macintosh computers with unix GUI. |
| 85 | 1999 | WebOs Inc.- WebOS WebOs Inc. bought copywrite for system from Duke University (that took it from Berkeley Univ.). Afterwards WeobOS passed to Palm and was dedicated for smartphones. 2010 - Aquisition of Palm by HP and project stopped. 2013 - WebOs purchased by LG. |
| 86 | 199X | Novell Netware system for netserver. 1993 - v.4 NDS (Netware Directory Service) - eDirectory. v.6 hybrid kernel(Netware 6.5 & Linux) known as Open Enterprise Server. |
| 87 | 2000-2001 2013,2019 | IBM z/OSv.1 64 bit system for "z" mainframe, 2013-z/OSv.2 2019 - v.2.4. extended version. Compatible with UNIX (Single UNIX Specification) API and UNIX System Services. zFS file system and UNIX/Linux-style hierarchic H |
| 88 | 2000 | Hard Hat Linux 2.0 |
| 89 | 2000 | Microsoft - WindowsME - Hidden DOS, uniwersal Plug & Play,drivers WIA, ... |
| 90 | 1999-2000 | Microsoft - Windows2000 - Windows NT family, NTFS-3, FAT32, IrDA. Environment for applications assigned to (win32, NT Virtual DOS Machine, OS/2,POSIX.1). |
| 91 | 2000 | Microsoft - WindowsMobilestart version -system based on Windows CE kernel for PocketPC palmtop, palmphone and smartphones. 2009-2010 next versions (up to 6.5.3). Later replaced by WindowsPhone. |
| 92 | 2001 | Lindows Attemp to make system WINDOWS+IINUX. First version was unstable and not reliable. Several years later system was improved. 1993-1994 More successful project Wine (initiated by Boba Amstadt, Eric Youngdale, Alexandre Julliard) with WinAPI (dll library) for X11 environment and 16bit programs. Dedicated to run Windows 3.x programs in Linux. Project has been continued. |
| 93 | 2001 | Apple - Mac OS X Based on Darwin kernel and MAC kernel. |
| 94 | 2001 | Microsoft - WINDOWS XP based on WIN NT kernel, GUI Luna, firewall, IE7, WMP8-9, Directx8, Genuine Advantage), ClearType fonts, Wifi ... |
| 95 | 2002 | Tinfoil Hat Linux |
| 96 | 2003 | Terry A. Davis (1969–2018)TempleOS Very lite system (distro.iso-16MB) with advanced features: multitasking, multicore environment. Simple GUI(640-480 VGA). Product of one person! |
| 97 | 2003 | Red Hat Enterprise Linux (commercial version of Linux) |
| 98 | 2003 | Linux Fedora Core (free version financed by Red Hat) |
| 99 | 2004 | Photon Microsoft began WindowsPhone project named Photon. |
| 100 | 2004-2005 | Ubuntu GNU/Linux version- based on drbian distro ddeveloped by Canonical Ltd founded by M.Shuttleworth. |
| 101 | 2005 | Android - 11 June 2005 - Android project and Android Inc.(founded in 2003 by Andy Rubin, Rich Miner and Nick Sears) were bought for 50 ml \$ by Google. |
| 102 | 2006 | Linux Mint - (GNU/Linux based on Ubuntu i Debian) |
| 103 | 2006-2007 | Microsoft - Vista (next after Windows XP) Media Center (wmp11), UAC, Windows Aero Glass, Sidebar. |
| 104 | 2007 | Apple Inc.iPhone OS for Apple mobile devices. 2010 - renamed to iOS. |
| 105 | 2007 | Apple - Mac OS X For Apple mobile devices. 2008 - iphoneOS, 2010 - iOS. |

| | | |
|-----|------------|--|
| 106 | 2007-2008 | Android Inc.(first creator)- Google (2005 - aquisition of .Android Inc.) Android system based on linuxkernel for mobile devices with touch screen. 2007 - Astro & Bender - beta versions 2008 - 1.0(Apple Pie), 1.1(Banana Bread),Donut (1.6),Eclair (2.0-2.1). HTC Dream (G1) was the first smartphone with Android . 2007 - Open Handset Alliance group (34 telecommunication companies) announced Android as open source product. |
| 107 | 2009 | Microsoft - Windows7 (Windows NT 6.1) |
| 108 | 2009 | Microsoft - Windows Phone start version . 2010 - v.7, 2013 - v.8, 2014 - v8.1 |
| 109 | 2009 | Google- Chromium (Chrom OS) |
| 110 | 2010 | WindowsPhone 7 Metro GUI. Based on WindowsCE kernel. No service for multicore processors and micro SD. Integrated with MS Office,Outlook, OneDrive & Bing. |
| 111 | 2010 | Android v.2.2 - Froyo (Linux 2.6.32 kernel) |
| 112 | 2010-2011 | Android v.3 - Gingerbread (Linux 2.6.35 kernel) |
| 113 | 2011-2012 | Android v.4 - Ice Cream Sandwich (Linux 3.0.1 kernel) |
| 114 | 2011-2012 | Android v.4.1.-2 - Jelly Bean (Linux 3.3 kernel) |
| 115 | 2012 | Microsoft - Windows8 touchscreen service (Modern application). |
| 116 | 2012 | Microsoft - WindowsPhone8 based on Windows NT kernel. NFC. For ARM processors. Max. 3,4% of global market,at the end less then 1%). 2017 - stop of project and support. |
| 117 | 2013-2017 | Jolla - Finland Sailfish 2017-v.2.1. for smartphones and tablets (based on GNU/Linux), Dalvik layer (native multitasking). Considered as a successor of Symbian. |
| 118 | 2013 | Android v.4.4.4 - Kitkat |
| 119 | 2014 | Android 5 (Lollipop) |
| 120 | Google2014 | Android One Android's Basic standard for hardware and software . |
| 121 | po 2014 | wearable Android for IoT (Internet of Things), ex.watch band & smartwatch: Android Wear, Apple Watch, Samsung Tizen, Pebble3.... Firefox OS for mobile devices & Panasonic TV WebOs for LG TV |
| 122 | 2015 | Android 6 (Marshmallow) New: more extended uninstll, SD card may be used as internal memory, better battery management by Doze function. |
| 123 | 2015 | Microsoft - Windows10 Continuum function, Edge internet browser. |
| 124 | 2016 | UnaOS (Android6) for smartphones UnaPhone Zenith. No google applications. Coded memory. ADB excluded. |
| 125 | 2016 | Remix OS Android for desktop computers X86. May be used as pendrive portable version. |
| 126 | 2016 | Android 7 Nougat New features: screen divided (shared) for 2 applications. interface Vulkan (mobile version of DirectX12), new visualisation of notifications & answers to be done directly from the screen. |
| 127 | 2017 | Android8 Oreo Devices Independent Modularity (update related mostly on Google, not manufacturers). |
| 128 | 2017 | KaiOS For smartphones (ex.Nokia 8110) based on FirefoxOS with linux kernel, application written in HTML5. |
| 129 | 2018 | Android 9.0 Pie New features:gestures for navigation tools of Google Wellbeing. |
| 130 | 2019 | Android 10 (Q) New features:live caption, smart reply, sound amplifier, new gestures, family link, more private security, more motives etc. |
| 131 | 2020 | Android 11 New features: Google Pay in power button, more functions in application control, airplane mode does not switch off bluetooth, screen video recording. |
| 132 | 2021 | Windows11 announced 24 June 2021 Additional Requirements: chip TPM2.0 (Trusted Platform Module), BIOS:UEFI, disk:NVMe min.1TB, wifi6E |

The mainstreams of presented above table are Unix (and its derivatives like Linux, Android) and Microsoft's Windows. UNIX "stream" has involved large computer companies as well as prominent computer scientists (and in the case of Linux also a lot of volunteers) and . It should not be forgotten the financial support of the U.S. Department of Defense inDARPA project (along with earlier funding of the MULTICS system).

The UNIX system gained a lot of recognition. Already 5 years after the creation of the "mature" version (system V) there were about 350000 installations of the system in the world. Several companies and universities contributed mostly to achieve it. AT&T (Research Bell Lab.) and Berkeley Univ. started to develop Unix at the turn of the 1960s/70s.

Of great importance was MACH - an innovative Unix kernel project realized in Carnegie Mellon University.

Subsequently, the work on Unix was joined (among others, by the OSF organization) intensively companies such as Digital, Sun and HP. Many variations were quickly created: Ultrix, Xenix, Venix, Tunis, Sinix, MUNIX, OSF/1, Unixware, SCO Unix, Sun Solaris, HP-UX, OpenVMS, etc.

Linux runs on "everything" including Top500 list supercomputers, servers, personal computers, and mobile devices.

Among the creators of the Unix Linus Torvalds certainly stands out as the Linux creator. In 1988 he entered the University of Helsinki and here in 1990 he learned a C language and he began to write his own operating system based on Unix and MINIX (a small clone of UNIX developed by Andrew Tanenbaum in the Netherlands to teach students).

Already in 1991 the initial kernel of the system was released, which was initially named Freax (Free uniX) but at the suggestion of friend Ari Lemmke the name was changed to Linux (LINUS uniX). Linux quickly gained popularity. In 1997 it was already being used on more than 3 million computers, and two years later there were already 7 million.

Torvalds was employed in the USA on a full-time at the OSDL (Open Source Development Lab), founded in 2000 by a consortium of computer companies. Torvalds was responsible for final decisions on submitted modifications and additions. He delegated some authority to colleagues such as Alan Cox, Andrew Morton and Marcelo Tosatti.

Torvalds owns the Linux brand, although the software itself is licensed as open source (GPL), which does not preclude the commercial sale of distribution products (distros) based on it.

Work on Linux systems has been carried out by companies, organizations and volunteers (mainly under the GPL), while implementations concerned all categories of computers and computer-based devices, ranging from smartphones to mainframes. There are many versions of Linux on personal computers. Worth mentioning are (among others) Ubuntu, Elementary OS Luna and Zorin, oriented towards former Windows and OS X users (they have a friendly desktop among other things).

There are also more modest versions like Mint or lesslinux (used in rescue CDs), and specialized ones like JoliOS running in the cloud and focused on social networking (Google plus, Facebook). A counterpart to system is the early Google Chromium OS. There are many Linux distros: Ubuntu (including spin-offs: Xubuntu, Kubuntu, Lubuntu, Gnomebuntu, Edubuntu), Mint, Debian, Fedora, Arch, openSUSE, PCLinuxOS, Zorin, Elementary, Mageia, Slackware, Gentoo, Puppy, Makulu, Peppermint, Manjaro, Point Linux, Crunchbang, Kali, Bodhi, Knoppix, SLAX, SolydXK, Antix, Chakra, OS4, Korora, Sailfish, KWheezy, SparkyLinux, MX.

The number of desktop Linux users has been increasing until 2016.

(2008-1%, 2014-1.7%, 2016-4.6%) but the 4.6% barely matches the declining number of Windows XP users (2015 - 180 million, 2017 - 100 million). Despite the abundance of versions Linux is not widespread - as of the end of 2018 (NetMarketShare) it accounted for just less than 3% of installed operating systems, after Win10 (almost 40%), Win7 (37%), XP (4.54%), Win8.1 (4.45%).

Almost 90% of users have computers running Windows (10, 7, 8, 8.1, XP).

The table does not include the niche systems like ReactOS (Windows style), Haiku (based on openBeOS), Syllabus ... which are mostly in the Alpha/Beta development phase.

We should also mention the work on GNU-HURD - a server services kernel - which has been for 30 years mostly as an off-hours hobby for programmers and was predicted as a replacement for the Linux kernel.

Operating systems are characterized by varying degrees of openness. Most systems have specific requirements for the BIOS, BIOS and operating system. requirements for BIOS, processors, file systems, boot methods, and device drivers. Not all the best solutions have survived.

For example, the BeOs of the 1990s BeOs, for example, had a modern BFS file system with advanced indexing capabilities through extensive attributes (metadata) and had low hardware requirements. hardware requirements. Maybe it posed a threat to Microsoft since it led to bankruptcy BeOs Inc.

The development of operating systems sometimes is not proceeding smoothly. We can mention the patent battles (between iOS and Android) between Apple and Google over the rights to multitouch, touch gestures or even the shape of the screen.

In recent years, systems based on the Linux kernel have been developed quite rapidly, including Android systems. The latter are used on more than 2 billion devices (smartphones, phablets, tablets) produced by many manufacturers, using various hardware (processors, screens, BT, etc.) each of which each requires a different version of the Android installation system.

Separate "Android" systems are Cyanogenmod and CyanogenOS developed between 2013 and 2016 by Cyanogen Inc. and offered as open source software.

Operating systems are not simple software. They must take into account the requirements of standards in terms of openness (portability), hardware and technology (e.g. client-server server, transactional monitors) and databases and programming languages.

There wasn't room for "everything" in our list of systems. We did not include e.g. transaction monitors used in systems working not in usual terminal technology technology, but in client-server mode, requiring rollback and preserving ACID properties. They could be treated as a special type of operating systems or as an overlay or an integral part of the system (as in Unixware by Novell).

There were many operating systems, but relatively few transaction monitors: IBM: CICS (VMS, AIX, HP-UX, OS/2, OS/400, NT), IMS/TP, Encina; BEA: Tuxedo; Tandem: Pathway, AT&T - Top End. Some monitors (built to X/Open DTP, OSI-TP standards or equipped with special interface modules) were open and could be installed in various operating systems, e.g. Tuxedo (several dozen Unix platforms), CICS (in connection with iTRAN) and support various databases (DB2, ORACLE, Informix, Sybase, MS-SQL, MySql, NonStop-SQL, etc.).

From the very beginning, operating systems were not isolated from each other. In the days of DOS popularity, Unix systems (such as SCO Xenix) used ODT (Open DeskTop) with the X-Window integration tool and an interface to DOS commands (they could be called directly under a Unix prompt). Xterminal emulator - Xsight - is also known. It is a PC emulator that serves as an Xwindows server at the interface between SCO Unix and DOS systems.

Nowadays, it is almost a standard to place several operating systems on one computer - either directly or via virtual box and virtual PC virtual machines. There are also friendly solutions such as Sailfish OS cooperating with Android through Dalvik layer.

As a curiosity we can mention the Lindows system (distro Linspire, Freespire), which started in 2001, then after several years of building became mature version. This project is a "combination" of features of Linux (Debian or Ubuntu) and Windows (by using Wine API).

Also noteworthy is the "microsystem" TempleOS by Terry A. Davis (1969-2018) developed by him alone for 10 years and created mainly for programmers, featuring support for multitasking and multi-core processors. TempleOS can be installed on almost anything on a computer or bootable from a media such as a pendrive, CD or DVD. The system is based on 8-bit ASCII code and supports 2D and 3D graphics libraries that run at 640 x 480 (VGA) resolution under Windows systems (10,7,8,8.1,XP).