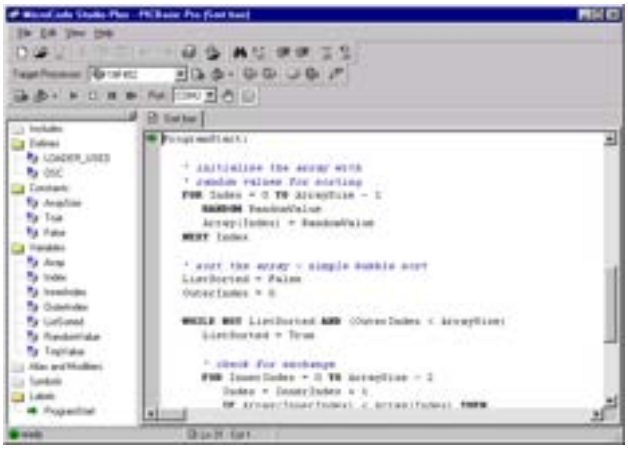
Microcode



In processor design, microcode is a technique that interposes an intermediate layer between the central processing unit (CPU) hardware and the programmer-visible instruction set architecture of a computer.Microcode is a layer of hardware-level instructions that implement higher-level machine code instructions or internal finite-state machine sequencing in many digital processing elements. Microcode is used in general-purpose central processing units, although in current desktop CPUs, it can be a fallback path for cases that the faster hardwired control unit cannot handle.Microcode typically resides in special high-speed memory and translates machine instructions, state machine data, or other input into sequences of detailed circuit-level operations. It separates the machine instructions from the underlying electronics so that instructions can be designed and altered more freely. It also facilitates the building of complex multi-step instructions, while reducing the complexity of computer circuits. Writing microcode is often called microprogramming and the microcode in a particular processor implementation is sometimes called a microprogram.

Microcomputer

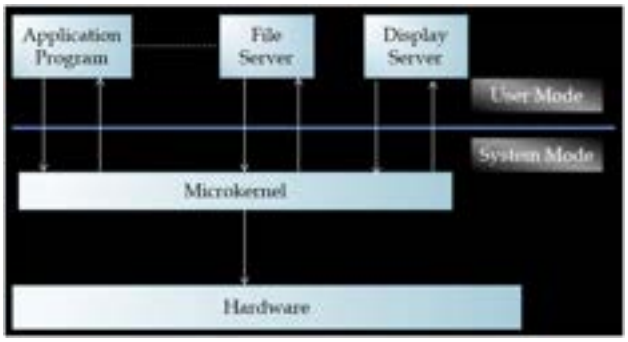
A microcomputer is a small, relatively inexpensive computer having a central processing unit (CPU) made out of a microprocessor. The computer also includes memory and input/output (I/O) circuitry together mounted on a printed circuit board (PCB). Microcomputers became popular in the 1970s and 1980s with the advent of increasingly powerful microprocessors. The predecessors to these computers, mainframes and minicomputers, were comparatively much larger and more expensive (though indeed present-day mainframes such as the IBM System z machines use one or more custom microprocessors as their CPUs). Many microcomputers (when equipped with a keyboard and screen for input and output) are also personal computers (in the generic sense). An early use of the term personal computer in 1962 predates microprocessor-based designs. (See "Personal Computer: Computers at Companies" reference below). A microcomputer used as an embedded control system may have no human-readable input and output devices. "Personal computer" may be used generically or may denote an IBM PC compatible machine.

Microcontroller

A microcontroller (MCU for microcontroller unit, also MC, UC, or ?C) is a small computer on a single VLSI integrated circuit (IC) chip. A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. Program memory in the form of ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips.

Microkernel

In computer science, a microkernel (often abbreviated as ?-kernel) is the near-minimum amount of software that can provide the mechanisms needed to implement an operating system (OS). These mechanisms include low-level address space management, thread management, and inter-process communication (IPC).



Microprocessor

A microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit (IC), or a small number of ICs. The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit (CPU). The IC is capable of interpreting and executing program instructions and performing arithmetic operations. The microprocessor is a multipurpose, clock-driven, register-based, digital integrated circuit that accepts binary data as input, processes it according to instructions stored in its memory, and provides results (also in binary form) as output. Microprocessors contain both combinational logic and sequential digital logic, and operate on numbers and symbols represented in the binary number system.

Microsoft

Microsoft Corporation is an American multinational technology corporation headquartered in Redmond, Washington, United States. Microsoft's best-known software products are the Windows line of operating systems, the Microsoft Office suite, and the Internet Explorer and Edge web browsers. Its flagship hardware products are the Xbox video game consoles and the Microsoft Surface lineup of touchscreen personal computers. Microsoft ranked No. 21 in the 2020 Fortune 500 rankings of the largest United States corporations by total revenue; it was the world's largest software maker by revenue as of 2019. It is one of the Big Five American information technology companies, alongside Alphabet (Google), Amazon, Apple, and Meta (Facebook).

Microsoft Windows

Windows is a group of several proprietary graphical operating system families developed and marketed by Microsoft. Each family caters to a certain sector of the computing industry. For example, Windows NT for consumers, Windows Server for servers, and Windows IoT for embedded systems. Defunct Windows families include Windows 9x, Windows Mobile, and Windows Phone.

Middleware

Middleware is a type of computer software that provides services to software applications beyond those available from the operating system. It can be described as "software glue".Middleware makes it easier for software developers to implement communication and input/output, so they can focus on the specific purpose of their application. It gained popularity in the 1980s as a solution to the problem of how to link newer applications to older legacy systems, although the term had been in use since 1968.

Midrange computer

Midrange computers, or midrange systems, were a class of computer systems that fell in between mainframe computers and microcomputers.This class of machine emerged in the 1960s, with models from Digital Equipment Corporation (PDP line), Data General (NOVA), Hewlett-Packard (HP3000) widely used in science and research as well as for business - and referred to as minicomputers.IBM favored the term "midrange computer" for their comparable, but more business-oriented systems.

Mihajlo D. Mesarovic

Mihajlo D. Mesarovic (Serbian Latin: Mihajlo D. Mesarovi?, Serbian Cyrillic: ??????? ?. ?????????; born 2 July 1928) is a Serbian scientist, who is a professor of Systems Engineering and Mathematics at Case Western Reserve University. Mesarovic has been a pioneer in the field of systems theory, he was UNESCO Scientific Advisor on Global change and also a member of the Club of Rome.

Mike Jackson (systems scientist)

Michael Christopher Jackson OBE (born 1951) is a British systems scientist, consultant and Emeritus Professor of Management Systems and former Dean of Hull University Business School, known for his work in the field of systems thinking and management.

Minicomputer

A minicomputer, or colloquially mini, is a class of smaller general purpose computers that developed in the mid-1960s and sold at a much lower price than mainframe and mid-size computers from IBM and its direct competitors. In a 1970 survey, The New York Times suggested a consensus definition of a minicomputer as a machine costing less than US$25,000 (equivalent to $174,000 in 2021), with an input-output device such as a teleprinter and at least four thousand words of memory, that is capable of running programs in a higher level language, such as Fortran or BASIC.The class formed a distinct group with its own software architectures and operating systems. Minis were designed for control, instrumentation, human interaction, and communication switching as distinct from calculation and record keeping. Many were sold indirectly to original equipment manufacturers (OEMs) for final end-use application. During the two-decade lifetime of the minicomputer class (1965?1985), almost 100 companies formed and only a half dozen remained.When single-chip CPU microprocessors appeared, beginning with the Intel 4004 in 1971, the term "minicomputer" came to mean a machine that lies in the middle range of the computing spectrum, in between the smallest mainframe computers and the microcomputers. The term "minicomputer" is seldom used today; the contemporary term for this class of system is "midrange computer", such as the higher-end SPARC from Oracle, Power ISA from IBM, and Itanium-based systems from Hewlett-Packard.

Minix 3

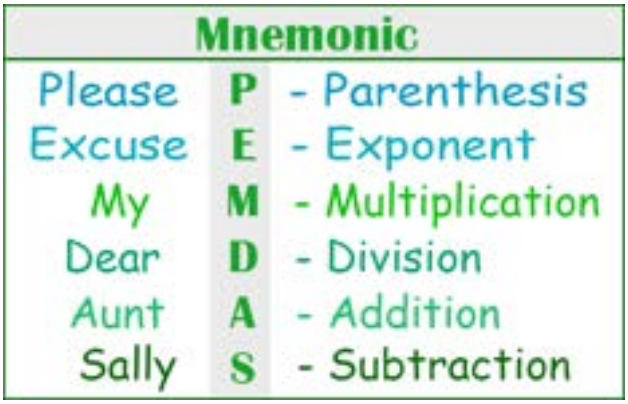
Minix 3 is a small, Unix-like operating system. It is published under a BSD-3-Clause license and is a successor project to the earlier versions, Minix 1 and 2.The project's main goal is for the system to be fault-tolerant by detecting and repairing its faults on the fly, with no user intervention. The main uses of the system are envisaged to be embedded systems and education.As of 2017, Minix 3 supports IA-32 and ARM architecture processors. It can also run on emulators or virtual machines, such as Bochs, VMware Workstation, Microsoft Virtual PC, Oracle VirtualBox, and QEMU. A port to PowerPC architecture is in development.The distribution comes on a live CD and does not support live USB installation.Minix 3 is believed to have inspired the Intel Management Engine (ME) OS found in Intel's Platform Controller Hub, starting with the introduction of ME 11, which is used with Skylake and Kaby Lake processors.It was debated that Minix could have been the most widely used OS on x86/AMD64 processors, with more installations than Microsoft Windows, Linux, or macOS, because of its use in the Intel ME.The project has been dormant since 2018, and the latest release is 3.4.0 rc6 from 2017, although the Minix 3 discussion group is still active.

Mixed reality

Mixed reality (MR) is a term used to describe the merging of a real-world environment and a computer-generated one. Physical and virtual objects may co-exist in mixed reality environments and interact in real time.

Mnemonic

A mnemonic device (nih-MON-ik), or memory device, is any learning technique that aids information retention or retrieval (remembering) in the human memory for better understanding.



Mobile device

A mobile device (or handheld computer) is a computer small enough to hold and operate in the hand. Mobile devices typically have a flat LCD or OLED screen, a touchscreen interface, and digital or physical buttons. They may also have a physical keyboard. Many such devices can connect to the Internet and connect with other devices such as car entertainment systems or headsets via Wi-Fi, Bluetooth, cellular networks or near field communication. Integrated cameras, the ability to place and receive voice and video telephone calls, video games, and Global Positioning System (GPS) capabilities are common. Power is typically provided by a lithium-ion battery. Mobile devices may run mobile operating systems that allow third-party applications to be installed and run.

Mobile operating system

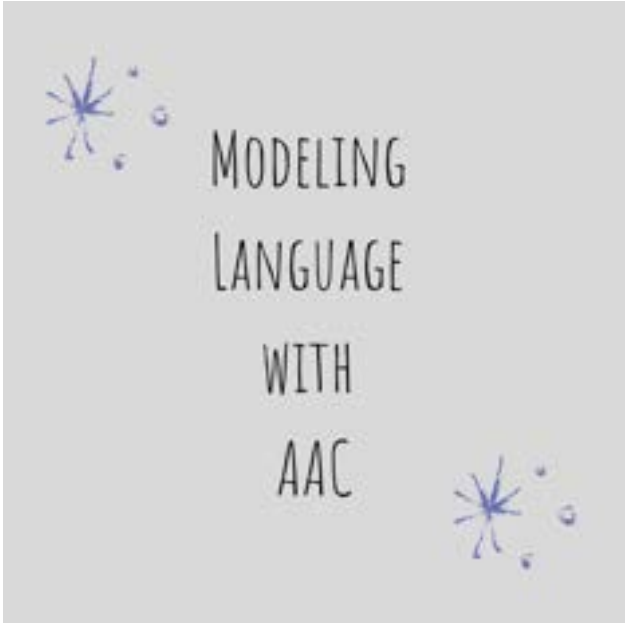
A mobile operating system is an operating system for smartphones, tablets, smartwatches, smartglasses, or other non-laptop personal mobile computing devices. While computers such as typical laptops are "mobile", the operating systems used on them are generally not considered mobile ones, as they were originally designed for desktop computers that historically did not have or need specific mobile features. This line distinguishing mobile and other forms has become blurred in recent years, due to the fact that newer devices have become smaller and more mobile unlike hardware of the past. Key notabilities blurring this line are the introduction of tablet computers and light-weight laptops and the hybridization of the two in 2-in-1 PCs.

Model of computation

In computer science, and more specifically in computability theory and computational complexity theory, a model of computation is a model which describes how an output of a mathematical function is computed given an input. A model describes how units of computations, memories, and communications are organized. The computational complexity of an algorithm can be measured given a model of computation. Using a model allows studying the performance of algorithms independently of the variations that are specific to particular implementations and specific technology.

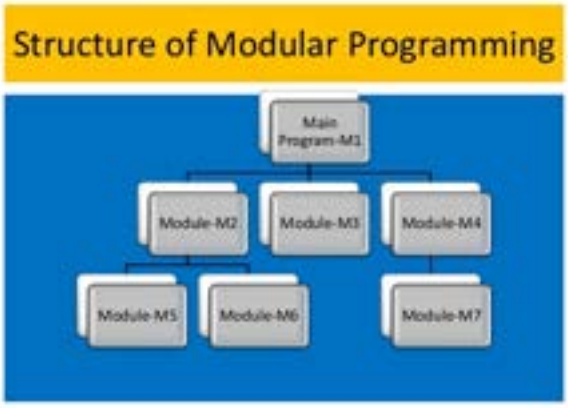
Modeling language

A modeling language is any artificial language that can be used to express information or knowledge or systems in a structure that is defined by a consistent set of rules. The rules are used for interpretation of the meaning of components in the structure Programing language.



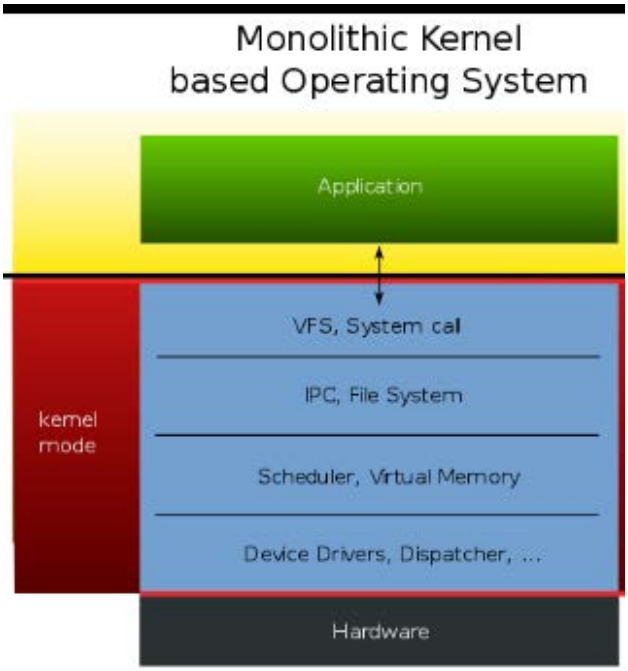
Modular programming

Modular programming is a software design technique that emphasizes separating the functionality of a program into independent, interchangeable modules, such that each contains everything necessary to execute only one aspect of the desired functionality.



Monolithic kernel

A monolithic kernel is an operating system architecture where the entire operating system is working in kernel space. The monolithic model differs from other operating system architectures (such as the microkernel architecture) in that it alone defines a high-level virtual interface over computer hardware. A set of primitives or system calls implement all operating system services such as process management, concurrency, and memory management. Device drivers can be added to the kernel as modules.



MontaVista

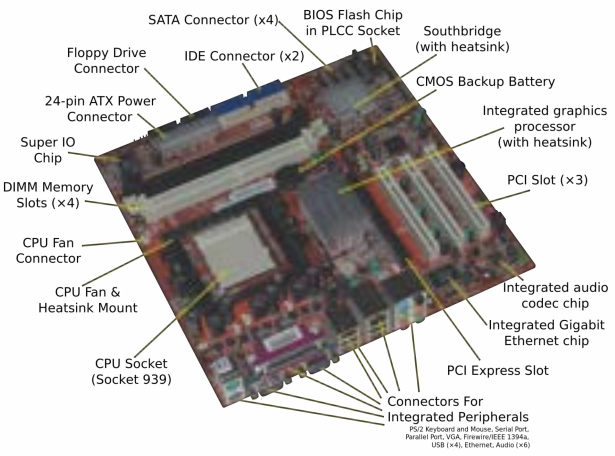
MontaVista Software is a company that develops embedded Linux system software, development tools, and related software. Its products are made for other corporations developing embedded systems such as automotive electronics, communications equipment, mobile phones, and other electronic devices and infrastructure.

MorphOS

MorphOS is an AmigaOS-like computer operating system (OS). It is a mixed proprietary and open source OS produced for the Pegasos PowerPC (PPC) processor based computer, PowerUP accelerator equipped Amiga computers, and a series of Freescale development boards that use the Genesi firmware, including the Efika and mobileGT. Since MorphOS 2.4, Apple's Mac mini G4 is supported as well, and with the release of MorphOS 2.5 and MorphOS 2.6 the eMac and Power Mac G4 models are respectively supported. The release of MorphOS 3.2 added limited support for Power Mac G5. The core, based on the Quark microkernel, is proprietary, although several libraries and other parts are open source, such as the Ambient desktop.

Motherboard

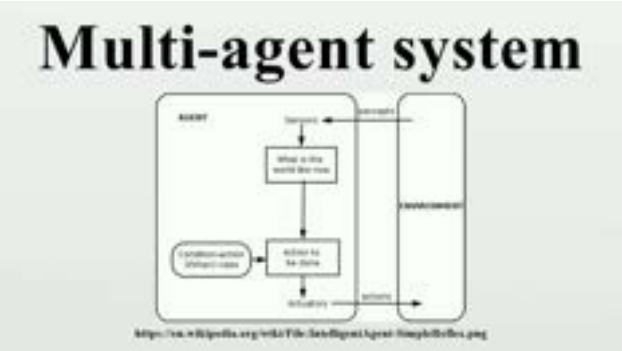
A motherboard (also called mainboard, main circuit board, mb, mboard, backplane board, base board, system board, logic board (only in Apple computers) or mobo) is the main printed circuit board (PCB) in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit (CPU) and memory, and provides connectors for other peripherals. Unlike a backplane, a motherboard usually contains significant sub-systems, such as the central processor, the chipset's input/output and memory controllers, interface connectors, and other components integrated for general use.



Mouse (computing)

A computer mouse (plural mice, also mouses) is a hand-held pointing device that detects two-dimensional motion relative to a surface. This motion is typically translated into the motion of a pointer on a display, which allows a smooth control of the graphical user interface of a computer.

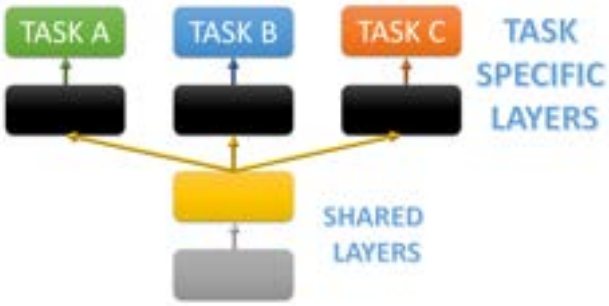
Multi-agent system



A multi-agent system (MAS or "self-organized system") is a computerized system composed of multiple interacting intelligent agents. Multi-agent systems can solve problems that are difficult or impossible for an individual agent or a monolithic system to solve. Intelligence may include methodic, functional, procedural approaches, algorithmic search or reinforcement learning.Despite considerable overlap, a multi-agent system is not always the same as an agent-based model (ABM). The goal of an ABM is to search for explanatory insight into the collective behavior of agents (which don't necessarily need to be "intelligent") obeying simple rules, typically in natural systems, rather than in solving specific practical or engineering problems. The terminology of ABM tends to be used more often in the science, and MAS in engineering and technology. Applications where multi-agent systems research may deliver an appropriate approach include online trading, disaster response, target surveillance and social structure modelling.

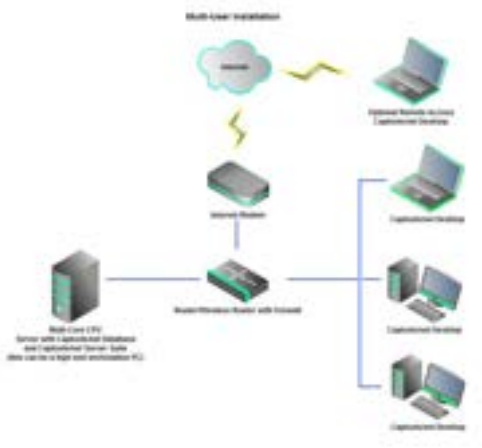
Multi-task learning

Multi-task learning (MTL) is a subfield of machine learning in which multiple learning tasks are solved at the same time, while exploiting commonalities and differences across tasks. This can result in improved learning efficiency and prediction accuracy for the task-specific models, when compared to training the models separately. Early versions of MTL were called "hints".

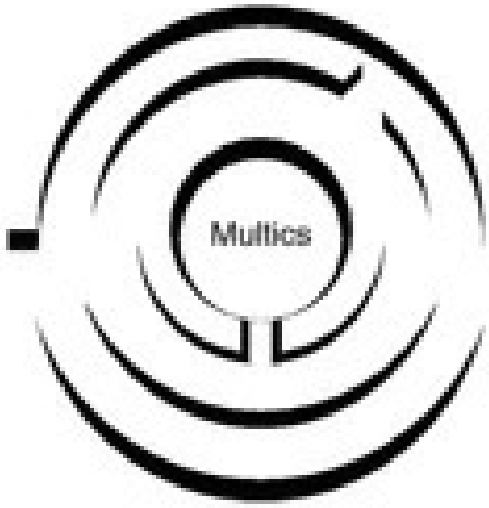


Multi-user

Multi-user software is computer software that allows access by multiple users of a computer. Time-sharing systems are multi-user systems. Most batch processing systems for mainframe computers may also be considered "multi-user", to avoid leaving the CPU idle while it waits for I/O operations to complete. However, the term "multitasking" is more common in this context.



Multics



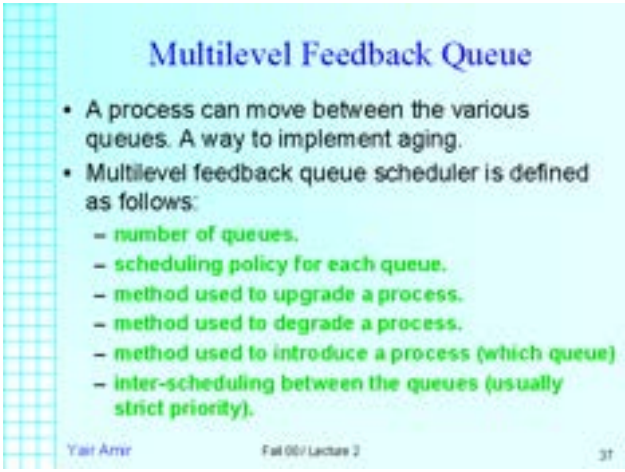
Multics ("Multiplexed Information and Computing Service") is an influential early time-sharing operating system based on the concept of a single-level memory. Nathan Gregory writes that Multics "has influenced all modern operating systems since, from microcomputers to mainframes."Initial planning and development for Multics started in 1964, in Cambridge, Massachusetts. Originally it was a cooperative project led by MIT (Project MAC with Fernando Corbat&#65533;) along with General Electric and Bell Labs. It was developed on the GE 645 computer, which was specially designed for it; the first one was delivered to MIT in January 1967. GE offered their earlier 635 systems with an early timesharing system known as "Mark I" and intended to offer the 645 with Multics as a larger successor. Bell withdrew from the project in 1969 as it became clear it would not deliver a working system in the short term. Shortly thereafter, GE decided to exit the computer industry entirely and sold the division to Honeywell in 1970. Honeywell offered Multics commercially, but with limited success.

Multikernel

A multikernel operating system treats a multi-core machine as a network of independent cores, as if it were a distributed system. It does not assume shared memory but rather implements inter-process communications as message-passing. Barrelfish was the first operating system to be described as a multikernel.

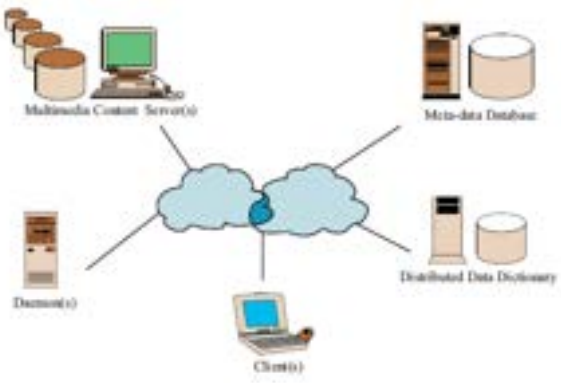
Multilevel feedback queue

In computer science, a multilevel feedback queue is a scheduling algorithm. Scheduling algorithms are designed to have some process running at all times to keep the central processing unit (CPU) busy. The multilevel feedback queue extends standard algorithms with the following design requirements:



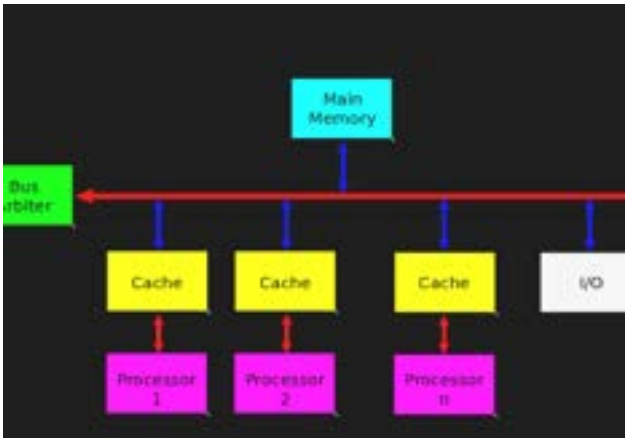
Multimedia database

A Multimedia database (MMDB) is a collection of related for multimedia data. The multimedia data include one or more primary media data types such as text, images, graphic objects (including drawings, sketches and illustrations) animation sequences, audio and video.



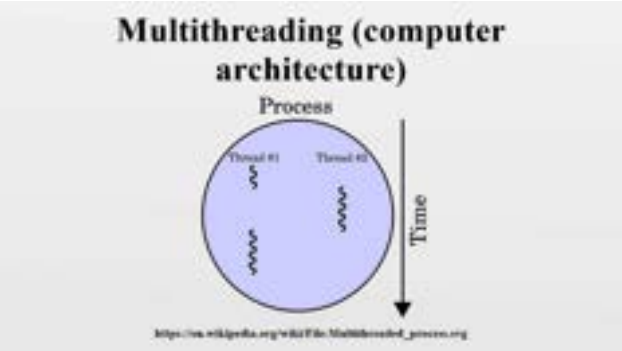
Multiprocessing

Multiprocessing is the use of two or more central processing units (CPUs) within a single computer system. The term also refers to the ability of a system to support more than one processor or the ability to allocate tasks between them. There are many variations on this basic theme, and the definition of multiprocessing can vary with context, mostly as a function of how CPUs are defined (multiple cores on one die, multiple dies in one package, multiple packages in one system unit, etc.).



Multithreading (computer architecture)

In computer architecture, multithreading is the ability of a central processing unit (CPU) (or a single core in a multi-core processor) to provide multiple threads of execution concurrently, supported by the operating system. This approach differs from multiprocessing. In a multithreaded application, the threads share the resources of a single or multiple cores, which include the computing units, the CPU caches, and the translation lookaside buffer (TLB).

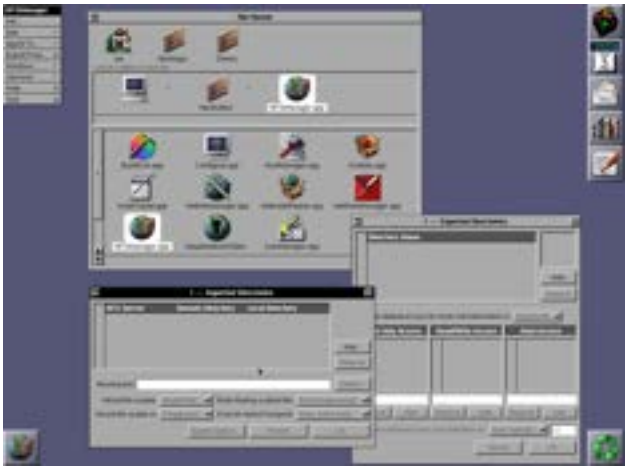


Murray Bowen

Murray Bowen (; January 31, 1913, in Waverly, Tennessee ? October 9, 1990) was an American psychiatrist and a professor in psychiatry at Georgetown University. Bowen was among the pioneers of family therapy and a noted founder of systemic therapy. Beginning in the 1950s he developed a systems theory of the family.

NEXTSTEP

NeXTSTEP is a discontinued object-oriented, multitasking operating system based on the Mach kernel and the UNIX-derived BSD. It was developed by NeXT Computer in the late 1980s and early 1990s and was initially used for its range of proprietary workstation computers such as the NeXTcube. It was later ported to several other computer architectures.



NOS (software)

NOS (Network Operating System) is a discontinued operating system with time-sharing capabilities, written by Control Data Corporation in the 1970s.NOS ran on the 60-bit CDC 6000 series of mainframe computers and their successors. NOS replaced the earlier CDC Kronos operating system of the 1970s. NOS was intended to be the sole operating system for all CDC machines, a fact CDC promoted heavily. NOS was replaced with NOS/VE on the 64-bit Cyber-180 systems in the mid-1980s.

NTFS

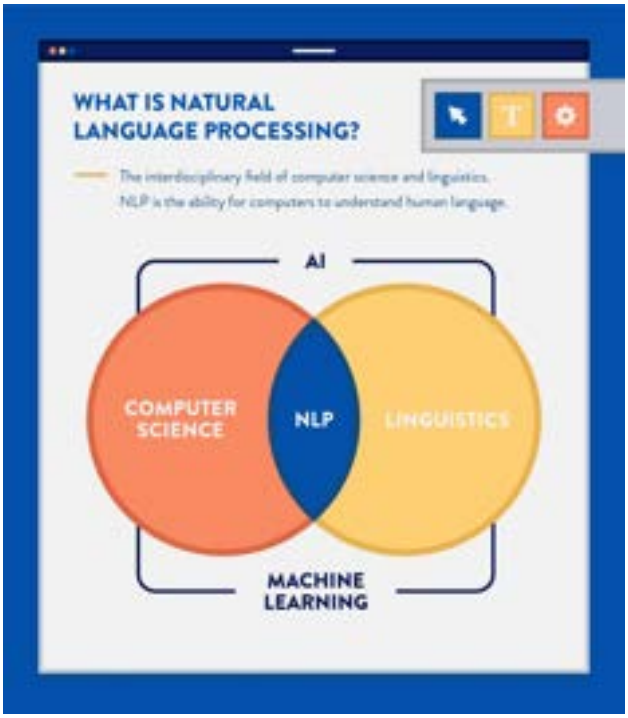
New Technology File System (NTFS) is a proprietary journaling file system developed by Microsoft. Starting with Windows NT 3.1, it is the default file system of the Windows NT family. It superseded File Allocation Table (FAT) as the preferred filesystem on Windows and is supported in Linux and BSD as well. NTFS reading and writing support is provided using a free and open-source kernel implementation known as NTFS3 in Linux and the NTFS-3G driver in BSD. By using the convert command, Windows can convert FAT32/16/12 into NTFS without the need to rewrite all files. NTFS uses several files typically hidden from the user to store metadata about other files stored on the drive which can help improve speed and performance when reading data. Unlike FAT and High Performance File System (HPFS), NTFS supports access control lists (ACLs), filesystem encryption, transparent compression, sparse files and file system journaling. NTFS also supports shadow copy to allow backups of a system while it is running, but the functionality of the shadow copies varies between different versions of Windows.

NTFS-3G

NTFS-3G is an open-source cross-platform implementation of the Microsoft Windows NTFS file system with read/write support. NTFS-3G often uses the FUSE file system interface, so it can run unmodified on many different operating systems. It is runnable on Linux, FreeBSD, NetBSD, OpenSolaris, illumos, BeOS, QNX, WinCE, Nucleus, VxWorks, Haiku, MorphOS, Minix, macOS and OpenBSD. It is licensed under the GNU General Public License. It is a partial fork of ntfsprogs and is under active maintenance and development.

Natural language processing

Natural language processing (NLP) is an interdisciplinary subfield of linguistics, computer science, and artificial intelligence concerned with the interactions between computers and human language, in particular how to program computers to process and analyze large amounts of natural language data. The goal is a computer capable of "understanding" the contents of documents, including the contextual nuances of the language within them. The technology can then accurately extract information and insights contained in the documents as well as categorize and organize the documents themselves.



NeXT

NeXT, Inc. (later NeXT Computer, Inc. and NeXT Software, Inc.) was an American technology company that specialized in computer workstations intended for higher education and business use. Based in Redwood City, California, and founded by Apple Computer co-founder and CEO Steve Jobs after he was forced out of Apple, the company introduced their first product, the NeXT Computer, in 1988, and then the smaller NeXTcube and NeXTstation in 1990. These computers had relatively limited sales, with only about 50,000 units shipped in total. Nevertheless, their object-oriented programming and graphical user interfaces were trendsetters of computer innovation, and highly influential.

NeXTSTEP

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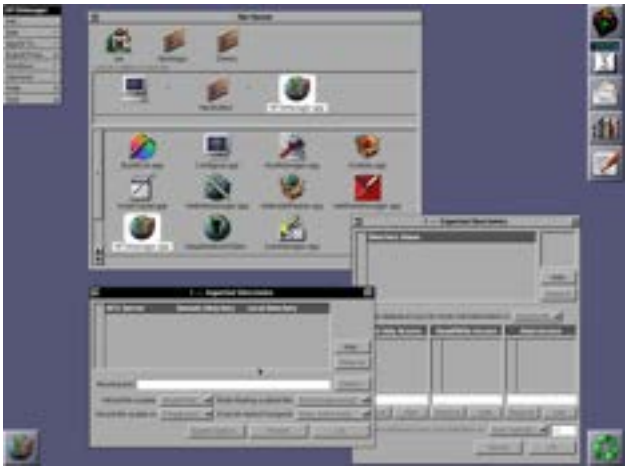


Negative feedback

Negative feedback (or balancing feedback) occurs when some function of the output of a system, process, or mechanism is fed back in a manner that tends to reduce the fluctuations in the output, whether caused by changes in the input or by other disturbances.

Nervous system

In biology, the nervous system is the highly complex part of an animal that coordinates its actions and sensory information by transmitting signals to and from different parts of its body. The nervous system detects environmental changes that impact the body, then works in tandem with the endocrine system to respond to such events. Nervous tissue first arose in wormlike organisms about 550 to 600 million years ago. In vertebrates it consists of two main parts, the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS consists of the brain and spinal cord. The PNS consists mainly of nerves, which are enclosed bundles of the long fibers or axons, that connect the CNS to every other part of the body. Nerves that transmit signals from the brain are called motor nerves or efferent nerves, while those nerves that transmit information from the body to the CNS are called sensory nerves or afferent. Spinal nerves are mixed nerves that serve both functions. The PNS is divided into three separate subsystems, the somatic, autonomic, and enteric nervous systems. Somatic nerves mediate voluntary movement. The autonomic nervous system is further subdivided into the sympathetic and the parasympathetic nervous systems. The sympathetic nervous system is activated in cases of emergencies to mobilize energy, while the parasympathetic nervous system is activated when organisms are in a relaxed state. The enteric nervous system functions to control the gastrointestinal system. Both autonomic and enteric nervous systems function involuntarily. Nerves that exit from the cranium are called cranial nerves while those exiting from the spinal cord are called spinal nerves.

NetBSD

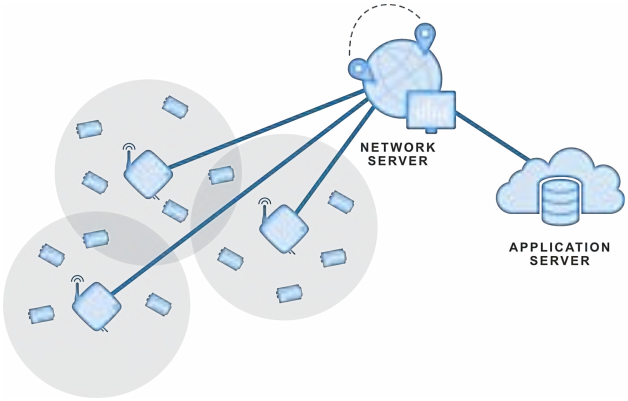
NetBSD is a free and open-source Unix operating system based on the Berkeley Software Distribution (BSD). It was the first open-source BSD descendant officially released after 386BSD was forked. It continues to be actively developed and is available for many platforms, including servers, desktops, handheld devices, and embedded systems.The NetBSD project focuses on code clarity, careful design, and portability across many computer architectures. Its source code is publicly available and permissively licensed.

Network File System

Network File System (NFS) is a distributed file system protocol originally developed by Sun Microsystems (Sun) in 1984, allowing a user on a client computer to access files over a computer network much like local storage is accessed. NFS, like many other protocols, builds on the Open Network Computing Remote Procedure Call (ONC RPC) system. NFS is an open IETF standard defined in a Request for Comments (RFC), allowing anyone to implement the protocol.

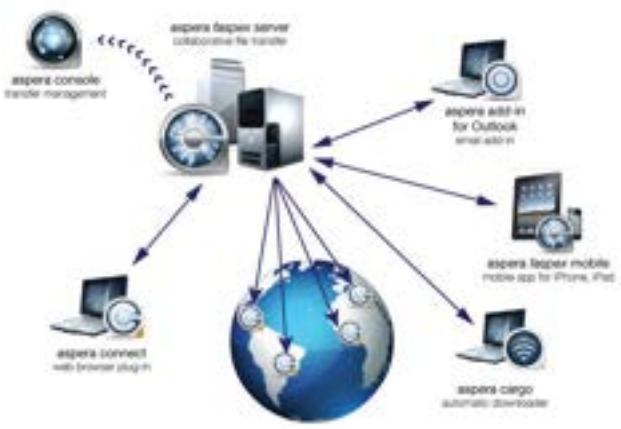
Network architecture

Network architecture is the design of a computer network. It is a framework for the specification of a network's physical components and their functional organization and configuration, its operational principles and procedures, as well as communication protocols used.



Network operating system

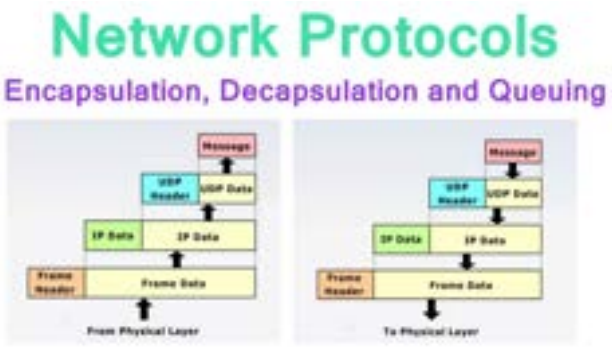
A network operating system (NOS) is a specialized operating system for a network device such as a router, switch or firewall.



Network performance

Network performance refers to measures of service quality of a network as seen by the customer.

Network protocol

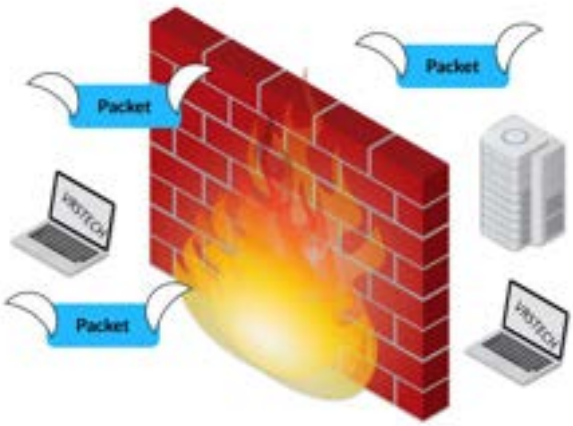


A communication protocol is a system of rules that allows two or more entities of a communications system to transmit information via any kind of variation of a physical quantity. The protocol defines the rules, syntax, semantics and synchronization of communication and possible error recovery methods. Protocols may be implemented by hardware, software, or a combination of both.Communicating systems use well-defined formats for exchanging various messages. Each message has an exact meaning intended to elicit a response from a range of possible responses pre-determined for that particular situation. The specified behavior is typically independent of how it is to be implemented. Communication protocols have to be agreed upon by the parties involved. To reach an agreement, a protocol may be developed into a technical standard. A programming language describes the same for computations, so there is a close analogy between protocols and programming languages: protocols are to communication what programming languages are to computations. An alternate formulation states that protocols are to communication what algorithms are to computation.Multiple protocols often describe different aspects of a single communication. A group of protocols designed to work together is known as a protocol suite; when implemented in software they are a protocol stack.

Network scheduler

A network scheduler, also called packet scheduler, queueing discipline (qdisc) or queueing algorithm, is an arbiter on a node in a packet switching communication network. It manages the sequence of network packets in the transmit and receive queues of the protocol stack and network interface controller. There are several network schedulers available for the different operating systems, that implement many of the existing network scheduling algorithms.

Network security



Network security consists of the policies, processes and practices adopted to prevent, detect and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources. Network security involves the authorization of access to data in a network, which is controlled by the network administrator. Users choose or are assigned an ID and password or other authenticating information that allows them access to information and programs within their authority. Network security covers a variety of computer networks, both public and private, that are used in everyday jobs: conducting transactions and communications among businesses, government agencies and individuals. Networks can be private, such as within a company, and others which might be open to public access. Network security is involved in organizations, enterprises, and other types of institutions. It does as its title explains: it secures the network, as well as protecting and overseeing operations being done. The most common and simple way of protecting a network resource is by assigning it a unique name and a corresponding password.

Network service

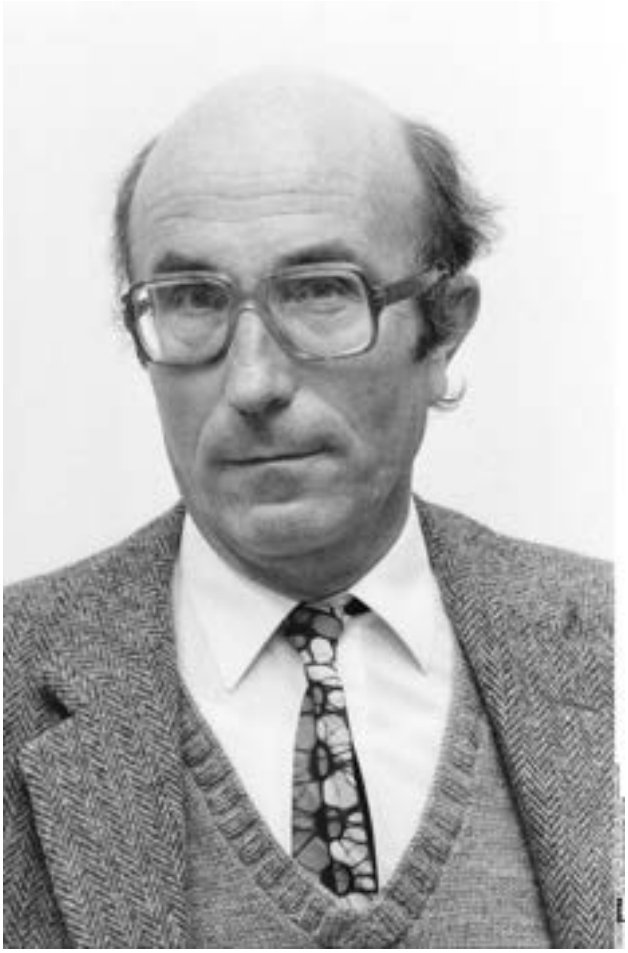
In computer networking, a network service is an application running at the network application layer and above, that provides data storage, manipulation, presentation, communication or other capability which is often implemented using a client?server or peer-to-peer architecture based on application layer network protocols.Each service is usually provided by a server component running on one or more computers (often a dedicated server computer offering multiple services) and accessed via a network by client components running on other devices. However, the client and server components can both be run on the same machine.

Networking hardware

Networking hardware, also known as network equipment or computer networking devices, are electronic devices which are required for communication and interaction between devices on a computer network. Specifically, they mediate data transmission in a computer network. Units which are the last receiver or generate data are called hosts, end systems or data terminal equipment.

Niklas Luhmann

Niklas Luhmann (; German: [?lu?man]; December 8, 1927 ? November 6, 1998) was a German sociologist, philosopher of social science, and a prominent thinker in systems theory.



Niklaus Wirth

Niklaus Emil Wirth (born 15 February 1934) is a Swiss computer scientist. He has designed several programming languages, including Pascal, and pioneered several classic topics in software engineering. In 1984, he won the Turing Award, generally recognized as the highest distinction in computer science, for developing a sequence of innovative computer languages.

Non-volatile memory

Non-volatile memory (NVM) or non-volatile storage is a type of computer memory that can retain stored information even after power is removed. In contrast, volatile memory needs constant power in order to retain data.

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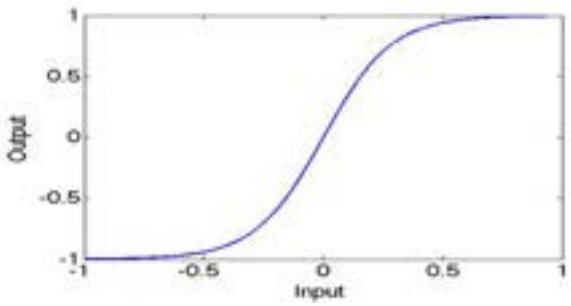
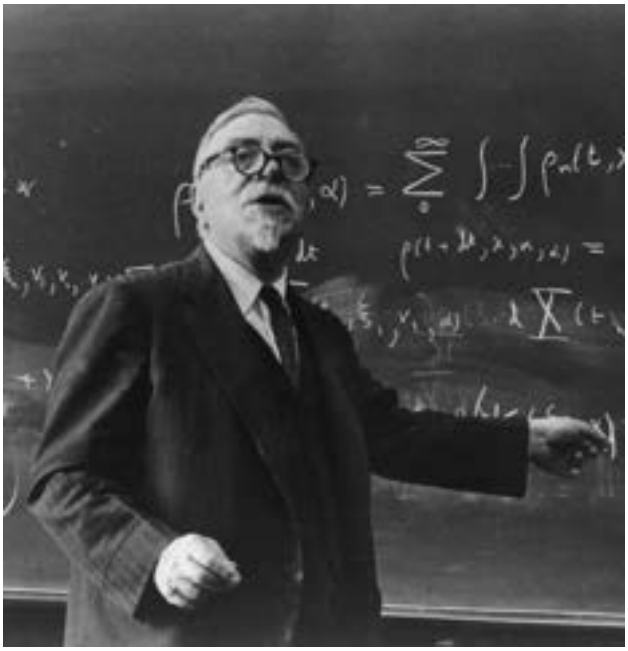
Nonlinear system

In mathematics and science, a nonlinear system is a system in which the change of the output is not proportional to the change of the input. Nonlinear problems are of interest to engineers, biologists, physicists, mathematicians, and many other scientists since most systems are inherently nonlinear in nature. Nonlinear dynamical systems, describing changes in variables over time, may appear chaotic, unpredictable, or counterintuitive, contrasting with much simpler linear systems.

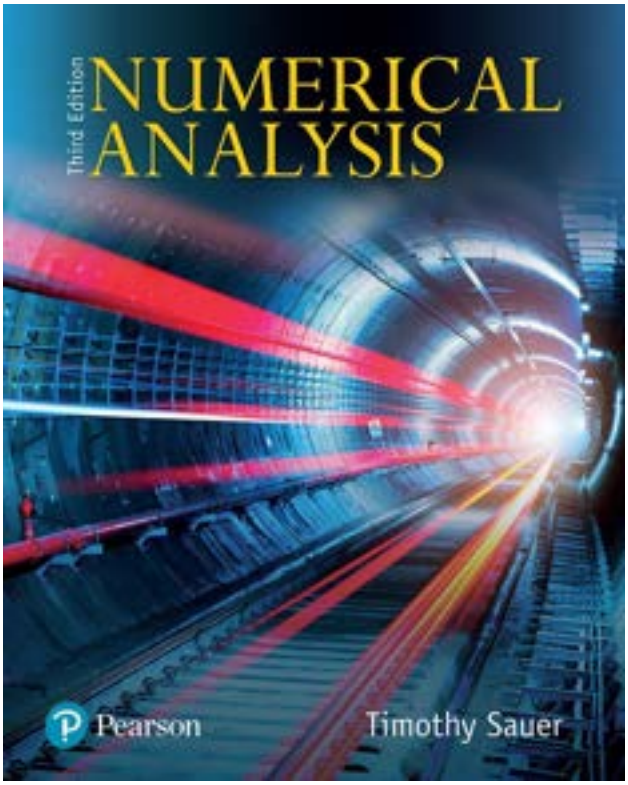


Norbert Wiener

Norbert Wiener (November 26, 1894 ? March 18, 1964) was an American mathematician and philosopher. He was a professor of mathematics at the Massachusetts Institute of Technology (MIT). A child prodigy, Wiener later became an early researcher in stochastic and mathematical noise processes, contributing work relevant to electronic engineering, electronic communication, and control systems.



Numerical analysis



Numerical analysis is the study of algorithms that use numerical approximation (as opposed to symbolic manipulations) for the problems of mathematical analysis (as distinguished from discrete mathematics). It is the study of numerical methods that attempt at finding approximate solutions of problems rather than the exact ones. Numerical analysis finds application in all fields of engineering and the physical sciences, and in the 21st century also the life and social sciences, medicine, business and even the arts. Current growth in computing power has enabled the use of more complex numerical analysis, providing detailed and realistic mathematical models in science and engineering. Examples of numerical analysis include: ordinary differential equations as found in celestial mechanics (predicting the motions of planets, stars and galaxies), numerical linear algebra in data analysis, and stochastic differential equations and Markov chains for simulating living cells in medicine and biology.

OEM

An original equipment manufacturer (OEM) is generally perceived as a company that produces non-aftermarket parts and equipment that may be marketed by another manufacturer. It is a common industry term recognized and used by many professional organizations such as SAE International, ISO, and others.

ORVYL

ORVYL is a time-sharing monitor developed by Stanford University for IBM System/360 and System/370 computers in 1967?68. ORVYL was one of the first time-sharing systems to be made available for IBM computers. Wylbur is a text editor and word processor program designed to work either without ORVYL, or in conjunction with ORVYL.

OS 2200

OS 2200 is the operating system for the Unisys ClearPath Dorado family of mainframe systems. The operating system kernel of OS 2200 is a lineal descendant of Exec 8 for the UNIVAC 1108.

OS/2

OS/2 (Operating System/2) is a series of computer operating systems, initially created by Microsoft and IBM under the leadership of IBM software designer Ed Iacobucci. As a result of a feud between the two companies over how to position OS/2 relative to Microsoft's new Windows 3.1 operating environment, the two companies severed the relationship in 1992 and OS/2 development fell to IBM exclusively. The name stands for "Operating System/2", because it was introduced as part of the same generation change release as IBM's "Personal System/2 (PS/2)" line of second-generation personal computers. The first version of OS/2 was released in December 1987 and newer versions were released until December 2001.

OS/360

OS/360, officially known as IBM System/360 Operating System, is a discontinued batch processing operating system developed by IBM for their then-new System/360 mainframe computer, announced in 1964; it was influenced by the earlier IBSYS/IBJOB and Input/Output Control System (IOCS) packages for the IBM 7090/7094 and even more so by the PR155 Operating System for the IBM 1410/7010 processors. It was one of the earliest operating systems to require the computer hardware to include at least one direct access storage device.

OS/360 and successors

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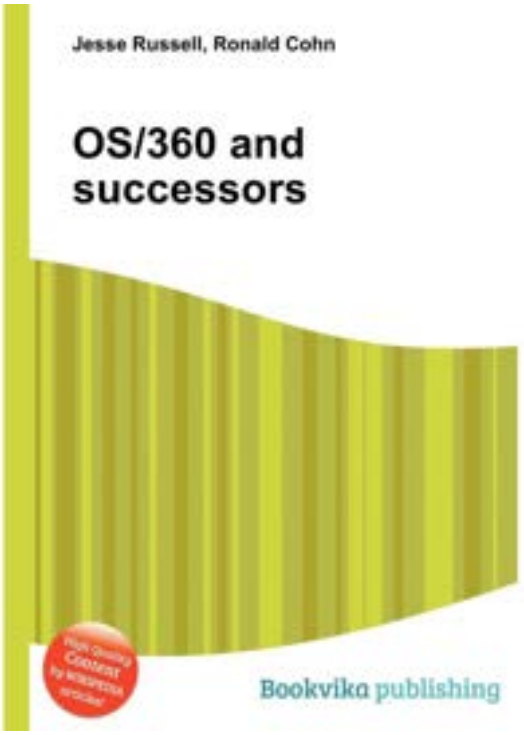
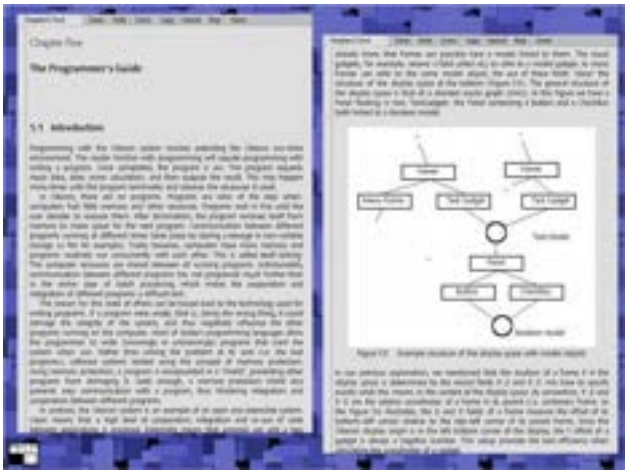


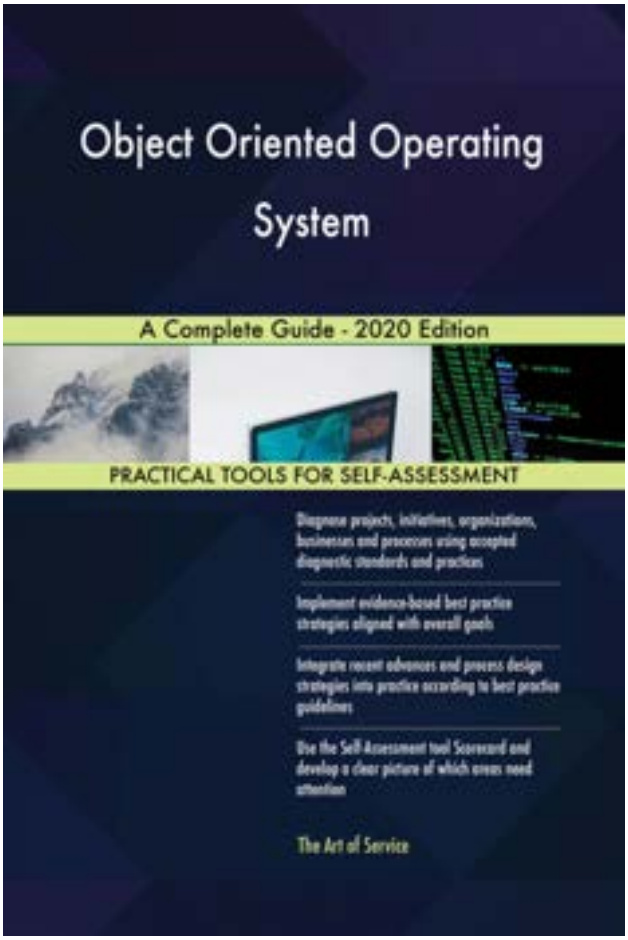
Oberon (operating system)

The Oberon System is a modular, single-user, single-process, multitasking operating system written in the programming language Oberon. It was originally developed in the late 1980s at ETH Zurich. The Oberon System has an unconventional visual text user interface (TUI) instead of a conventional command-line interface (CLI) or graphical user interface (GUI). This TUI was very innovative in its time and influenced the design of the Acme text editor for the Plan 9 from Bell Labs operating system.

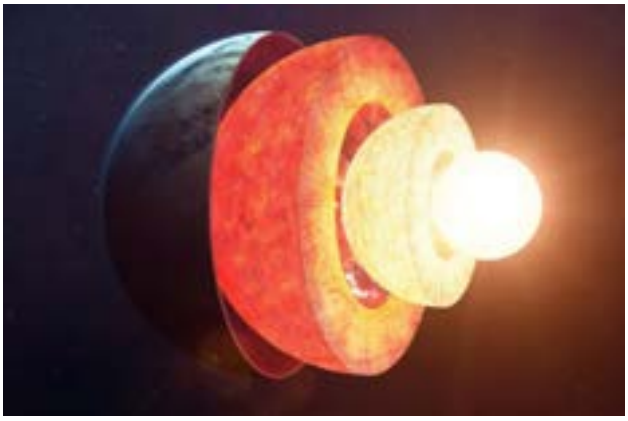


Object-oriented operating system

An object-oriented operating system is an operating system that is designed, structured, and operated using object-oriented programming principles.



Open core

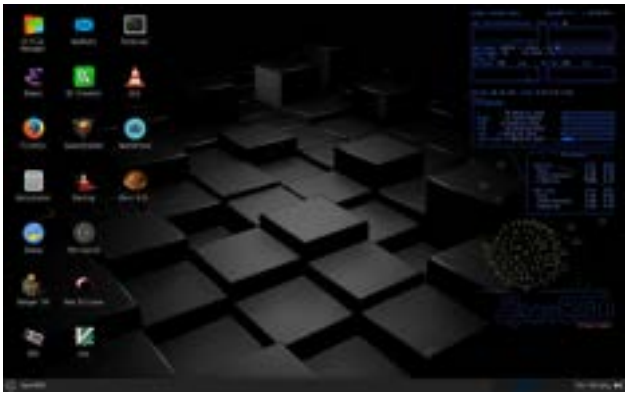


The open-core model is a business model for the monetization of commercially produced open-source software. Coined by Andrew Lampitt in 2008, the open-core model primarily involves offering a "core" or feature-limited version of a software product as free and open-source software, while offering "commercial" versions or add-ons as proprietary software.The concept of open-core software has proven to be controversial, as many developers do not consider the business model to be true open-source software. Despite this, open-core models are used by many open-source software companies.

Open-source software

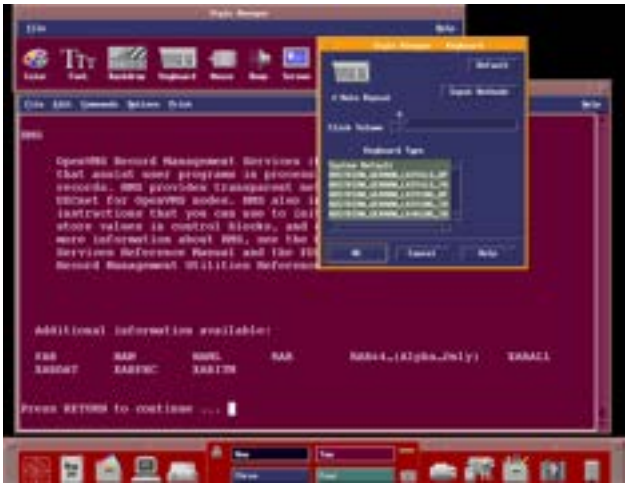
Open-source software (OSS) is computer software that is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software and its source code to anyone and for any purpose. Open-source software may be developed in a collaborative public manner. Open-source software is a prominent example of open collaboration, meaning any capable user is able to participate online in development, making the number of possible contributors indefinite. The ability to examine the code facilitates public trust in the software.Open-source software development can bring in diverse perspectives beyond those of a single company. A 2008 report by the Standish Group stated that adoption of open-source software models has resulted in savings of about $60 billion per year for consumers.Open source code can be used for studying and allows capable end users to adapt software to their personal needs in a similar way user scripts and custom style sheets allow for web sites, and eventually publish the modification as a fork for users with similar preferences, and directly submit possible improvements as pull requests.

OpenBSD



OpenBSD is a security-focused, free and open-source, Unix-like operating system based on the Berkeley Software Distribution (BSD). Theo de Raadt created OpenBSD in 1995 by forking NetBSD 1.0. According to the website, the OpenBSD project emphasizes "portability, standardization, correctness, proactive security and integrated cryptography."The OpenBSD project maintains portable versions of many subsystems as packages for other operating systems. Because of the project's preferred BSD license, many components are reused in proprietary and corporate-sponsored software projects. The firewall code in Apple's macOS is based on OpenBSD's PF firewall code, Android's Bionic C standard library is based on OpenBSD code, LLVM uses OpenBSD's regular expression library, and Windows 10 uses OpenSSH (OpenBSD Secure Shell) with LibreSSL.The word "open" in the name OpenBSD refers to the availability of the operating system source code on the Internet, although the word "open" in the name OpenSSH means "OpenBSD". It also refers to the wide range of hardware platforms the system supports.

OpenVMS



OpenVMS, often referred to as just VMS, is a multi-user, multiprocessing and virtual memory-based operating system. It is designed to support time-sharing, batch processing, transaction processing and workstation applications. Customers using OpenVMS include banks and financial services, hospitals and healthcare, telecommunications operators, network information services, and industrial manufacturers. During the 1990s and 2000s, there were approximately half a million VMS systems in operation worldwide.It was first announced by Digital Equipment Corporation (DEC) as VAX/VMS (Virtual Address eXtension/Virtual Memory System) alongside the VAX-11/780 minicomputer in 1977. OpenVMS has subsequently been ported to run on DEC Alpha systems, the Itanium-based HPE Integrity Servers, and select x86-64 hardware and hypervisors. Since 2014, OpenVMS is developed and supported by VMS Software Inc. (VSI). OpenVMS offers high availability through clustering ? the ability to distribute the system over multiple physical machines. This allows clustered applications and data to remain continuously available while operating system software and hardware maintenance and upgrades are performed, or if part of the cluster is destroyed. VMS cluster uptimes of 17 years have been reported.

Operating System Projects

OSP, an Environment for Operating System Projects, is a teaching operating system designed to provide an environment for an introductory course in operating systems. By selectively omitting specific modules of the operating system and having the students re-implement the missing functionality, an instructor can generate projects that require students to understand fundamental operating system concepts.

Operating environment

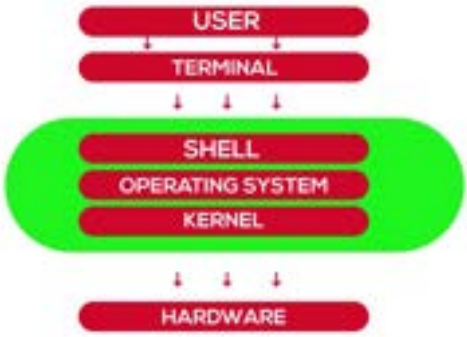
In computer software, an operating environment or integrated applications environment is the environment in which users run application software. The environment consists of a user interface provided by an applications manager and usually an application programming interface (API) to the applications manager.

Operating system

An operating system (OS) is system software that manages computer hardware and software resources, and provides common services for computer programs.

Operating system abstraction layer

An operating system abstraction layer (OSAL) provides an application programming interface (API) to an abstract operating system making it easier and quicker to develop code for multiple software or hardware platforms.



Operations research

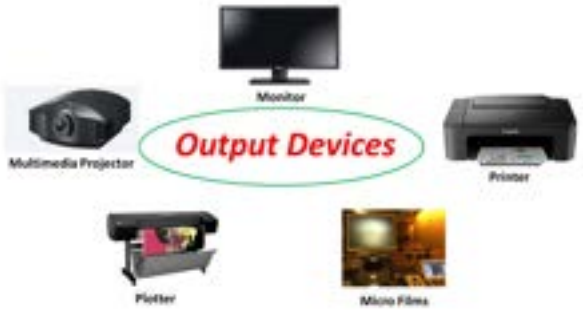
Operations research (British English: operational research) (U.S. Air Force Specialty Code: Operations Analysis), often shortened to the initialism OR, is a discipline that deals with the development and application of analytical methods to improve decision-making. It is considered to be a subfield of mathematical sciences. The term management science is occasionally used as a synonym.Employing techniques from other mathematical sciences, such as modeling, statistics, and optimization, operations research arrives at optimal or near-optimal solutions to decision-making problems. Because of its emphasis on practical applications, operations research has overlapped with many other disciplines, notably industrial engineering. Operations research is often concerned with determining the extreme values of some real-world objective: the maximum (of profit, performance, or yield) or minimum (of loss, risk, or cost). Originating in military efforts before World War II, its techniques have grown to concern problems in a variety of industries.

Outline of computer science

Computer science (also called computing science) is the study of the theoretical foundations of information and computation and their implementation and application in computer systems. One well known subject classification system for computer science is the ACM Computing Classification System devised by the Association for Computing Machinery.

Output device

An output device is any piece of computer hardware that converts information into a human-perceptible form or, historically, into a physical machine-readable form for use with other non-computerized equipment. It can be text, graphics, tactile, audio, or video. Examples include monitors, printers, speakers, headphones, projectors, GPS devices, optical mark readers, and braille readers.



P-code machine

In computer programming, a p-code machine (portable code machine) is a virtual machine designed to execute p-code (the assembly language or machine code of a hypothetical central processing unit (CPU)). This term is applied both generically to all such machines (such as the Java virtual machine (JVM) and MATLAB precompiled code), and to specific implementations, the most famous being the p-Machine of the Pascal-P system, particularly the UCSD Pascal implementation, among whose developers, the p in p-code was construed to mean pseudo more often than portable, thus pseudo-code meaning instructions for a pseudo-machine.

PC DOS

IBM PC DOS (also known as simply IBM DOS), an acronym for IBM Personal Computer Disk Operating System, is a discontinued disk operating system for the IBM Personal Computer, its successors, and IBM PC compatibles. It was manufactured and sold by IBM from the early 1980s into the 2000s. Developed by Microsoft, it was also sold by that company as MS-DOS. Both operating systems were identical or almost identical until 1993, when IBM began selling PC DOS 6.1 with new features. The collective shorthand for PC DOS and MS-DOS was DOS, which is also the generic term for disk operating system, and is shared with dozens of disk operating systems called DOS.

PDP-11

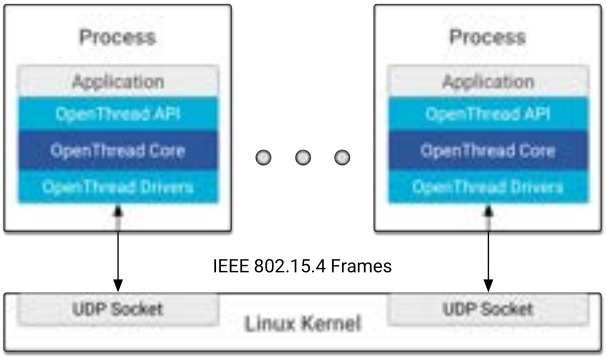
The PDP-11 is a series of 16-bit minicomputers sold by Digital Equipment Corporation (DEC) from 1970 into the late 1990s, one of a set of products in the Programmed Data Processor (PDP) series. In total, around 600,000 PDP-11s of all models were sold, making it one of DEC's most successful product lines. The PDP-11 is considered by some experts to be the most popular minicomputer.The PDP-11 included a number of innovative features in its instruction set and additional general-purpose registers that made it easier to program than earlier models in the PDP series. Further, the innovative Unibus system allowed external devices to be more easily interfaced to the system using direct memory access, opening the system to a wide variety of peripherals. The PDP-11 replaced the PDP-8 in many real-time computing applications, although both product lines lived in parallel for more than 10 years. The ease of programming of the PDP-11 made it popular for general-purpose computing.

PLATO (computer system)

PLATO (Programmed Logic for Automatic Teaching Operations) was the first generalized computer-assisted instruction system. Starting in 1960, it ran on the University of Illinois' ILLIAC I computer. By the late 1970s, it supported several thousand graphics terminals distributed worldwide, running on nearly a dozen different networked mainframe computers. Many modern concepts in multi-user computing were originally developed on PLATO, including forums, message boards, online testing, e-mail, chat rooms, picture languages, instant messaging, remote screen sharing, and multiplayer video games.

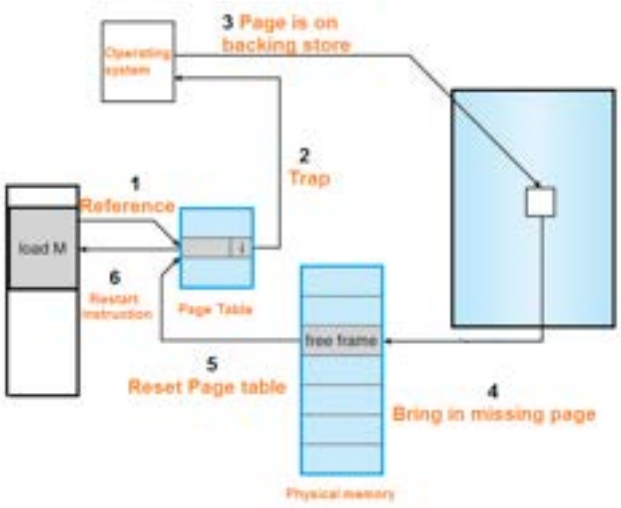
POSIX

The Portable Operating System Interface (POSIX, with pos pronounced as in positive, not as in pose) is a family of standards specified by the IEEE Computer Society for maintaining compatibility between operating systems. POSIX defines both the system and user-level application programming interfaces (APIs), along with command line shells and utility interfaces, for software compatibility (portability) with variants of Unix and other operating systems. POSIX is also a trademark of the IEEE. POSIX is intended to be used by both application and system developers.



Page fault

In computing, a page fault (sometimes called PF or hard fault) is an exception that the memory management unit (MMU) raises when a process accesses a memory page without proper preparations. Accessing the page requires a mapping to be added to the process's virtual address space. Besides, the actual page contents may need to be loaded from a backing store, such as a disk. The MMU detects the page fault, but the operating system's kernel handles the exception by making the required page accessible in the physical memory or denying an illegal memory access.



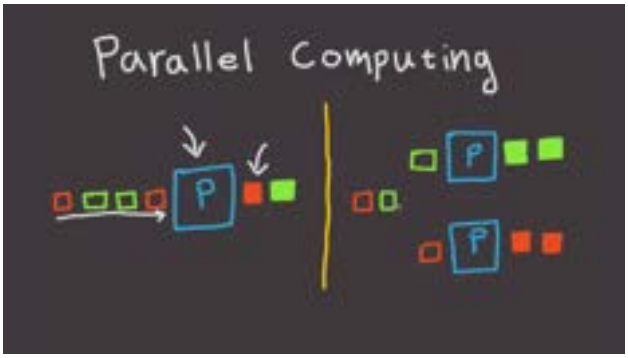
Paging

In computer operating systems, memory paging (or swapping on some Unix-like systems) is a memory management scheme by which a computer stores and retrieves data from secondary storage for use in main memory. In this scheme, the operating system retrieves data from secondary storage in same-size blocks called pages. Paging is an important part of virtual memory implementations in modern operating systems, using secondary storage to let programs exceed the size of available physical memory.

Palm OS

Palm OS (also known as Garnet OS) was a mobile operating system initially developed by Palm, Inc., for personal digital assistants (PDAs) in 1996. Palm OS was designed for ease of use with a touchscreen-based graphical user interface. It is provided with a suite of basic applications for personal information management. Later versions of the OS have been extended to support smartphones. The software appeared on the company's line of Palm devices while several other licensees have manufactured devices powered by Palm OS.

Parallel computing



Parallel computing is a type of computation in which many calculations or processes are carried out simultaneously. Large problems can often be divided into smaller ones, which can then be solved at the same time. There are several different forms of parallel computing: bit-level, instruction-level, data, and task parallelism. Parallelism has long been employed in high-performance computing, but has gained broader interest due to the physical constraints preventing frequency scaling. As power consumption (and consequently heat generation) by computers has become a concern in recent years, parallel computing has become the dominant paradigm in computer architecture, mainly in the form of multi-core processors.Parallel computing is closely related to concurrent computing?they are frequently used together, and often conflated, though the two are distinct: it is possible to have parallelism without concurrency, and concurrency without parallelism (such as multitasking by time-sharing on a single-core CPU). In parallel computing, a computational task is typically broken down into several, often many, very similar sub-tasks that can be processed independently and whose results are combined afterwards, upon completion. In contrast, in concurrent computing, the various processes often do not address related tasks; when they do, as is typical in distributed computing, the separate tasks may have a varied nature and often require some inter-process communication during execution.

Penguin

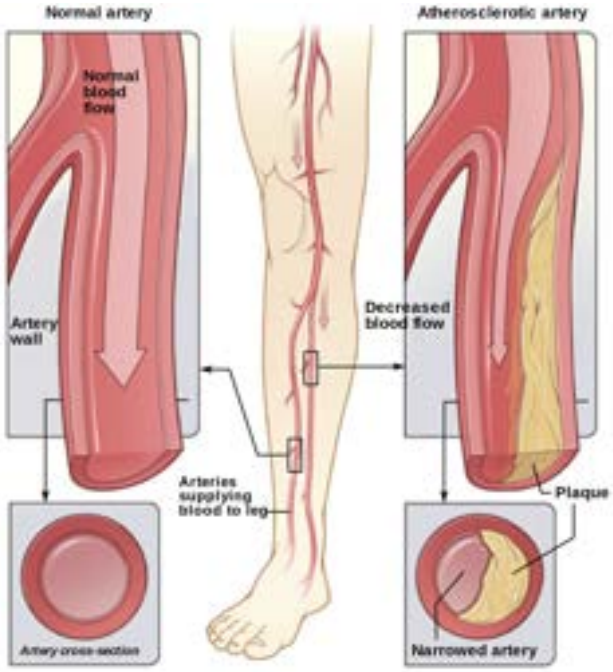
Penguins (order Sphenisciformes , family Spheniscidae) are a group of aquatic flightless birds. They live almost exclusively in the Southern Hemisphere: only one species, the Gal�pagos penguin, is found north of the Equator. Highly adapted for life in the water, penguins have countershaded dark and white plumage and flippers for swimming. Most penguins feed on krill, fish, squid and other forms of sea life which they catch with their bills and swallow whole while swimming. A penguin has a spiny tongue and powerful jaws to grip slippery prey.They spend roughly half of their lives on land and the other half in the sea. The largest living species is the emperor penguin (Aptenodytes forsteri): on average, adults are about 1.1 m (3 ft 7 in) tall and weigh 35 kg (77 lb). The smallest penguin species is the little blue penguin (Eudyptula minor), also known as the fairy penguin, which stands around 30?33 cm (12?13 in) tall and weighs 1.2?1.3 kg (2.6?2.9 lb). Today, larger penguins generally inhabit colder regions, and smaller penguins inhabit regions with temperate or tropical climates. Some prehistoric penguin species were enormous: as tall or heavy as an adult human. There was a great diversity of species in subantarctic regions, and at least one giant species in a region around 2,000 km south of the equator 35 mya, during the Late Eocene, a climate decidedly warmer than today.

Per Brinch Hansen

Per Brinch Hansen (13 November 1938 ? 31 July 2007) was a Danish-American computer scientist known for his work in operating systems, concurrent programming and parallel and distributed computing.

Peripheral

A peripheral device or peripheral is an auxiliary hardware device used to transfer information into and out of a computer. The term peripheral device refers to all hardware components that are attached to a computer and are controlled by the computer system, but they are not the core components of the computer.



Personal computer

A personal computer (PC) is a multi-purpose microcomputer whose size, capabilities, and price make it feasible for individual use. Personal computers are intended to be operated directly by an end user, rather than by a computer expert or technician. Unlike large, costly minicomputers and mainframes, time-sharing by many people at the same time is not used with personal computers. Primarily in the late 1970s and 1980s, the term home computer was also used.

Personal computer hardware

Computer hardware includes the physical parts of a computer, such as the case, central processing unit (CPU), random access memory (RAM), monitor, mouse, keyboard, computer data storage, graphics card, sound card, speakers and motherboard.By contrast, software is the set of instructions that can be stored and run by hardware. Hardware is so-termed because it is "hard" or rigid with respect to changes, whereas software is "soft" because it is easy to change.

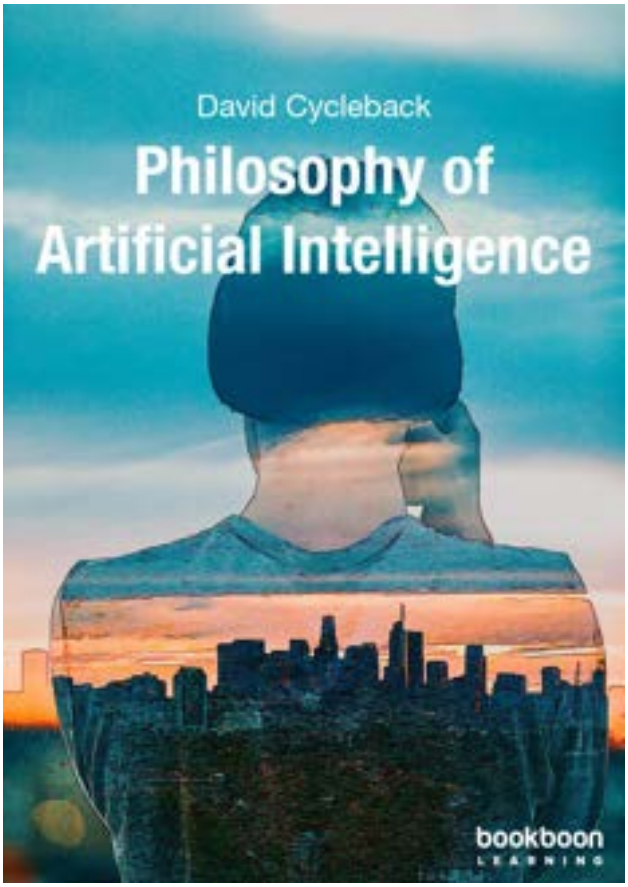
Personal digital assistant

A personal digital assistant (PDA), also known as a handheld PC, is a variety mobile device which functions as a personal information manager. PDAs have been mostly displaced by the widespread adoption of highly capable smartphones, in particular those based on iOS and Android, seeing a rapid decline in use after 2007.A PDA has an electronic visual display. Most models also have audio capabilities, allowing usage as a portable media player, and also enabling many of them to be used as telephones. By the early 2000's, nearly all PDA models had the ability access the Internet, intranets or extranets via Wi-Fi or Wireless WANs, and generally include a web browser. Sometimes, instead of buttons, PDAs employ touchscreen technology.

Peter Senge

Peter Michael Senge (born 1947) is an American systems scientist who is a senior lecturer at the MIT Sloan School of Management, co-faculty at the New England Complex Systems Institute, and the founder of the Society for Organizational Learning. He is known as the author of the book The Fifth Discipline: The Art and Practice of the Learning Organization (1990, rev. 2006).

Philosophy of artificial intelligence



The philosophy of artificial intelligence is a branch of the philosophy of technology that explores artificial intelligence and its implications for knowledge and understanding of intelligence, ethics, consciousness, epistemology, and free will. Furthermore, the technology is concerned with the creation of artificial animals or artificial people (or, at least, artificial creatures; see artificial life) so the discipline is of considerable interest to philosophers. These factors contributed to the emergence of the philosophy of artificial intelligence. Some scholars argue that the AI community's dismissal of philosophy is detrimental.The philosophy of artificial intelligence attempts to answer such questions as follows:

Photo manipulation

Photograph manipulation involves the transformation or alteration of a photograph. Some photograph manipulations are considered to be skillful artwork, while others are considered to be unethical practices, especially when used to deceive. Photographs may be manipulated for political propaganda, to improve the appearance of a subject, for entertainment, or as humor.

PikeOS

PikeOS is a commercial, hard real-time operating system (RTOS) that offers a separation kernel based hypervisor with multiple logical partition types for many other operating systems (OS), each called a GuestOS, and applications. It enables users to build certifiable smart devices for the Internet of things (IoT) according to the high quality, safety and security standards of different industries. For safety and security critical real-time applications on controller-based systems without memory management unit (MMU) but with memory protection unit (MPU) PikeOS for MPU is available.

Plan 9 from Bell Labs

Plan 9 from Bell Labs is a distributed operating system which originated from the Computing Science Research Center (CSRC) at Bell Labs in the mid-1980s and built on UNIX concepts first developed there in the late 1960s. Since 2000, Plan 9 has been free and open-source. The final official release was in early 2015.