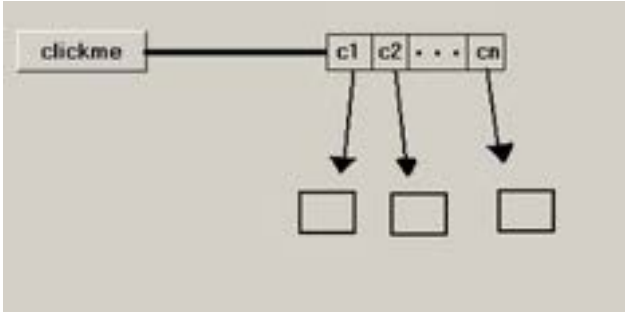
Eric Trist

Eric Lansdown Trist (11 September 1909 ? 4 June 1993) was an English scientist and leading figure in the field of organizational development (OD). He was one of the founders of the Tavistock Institute for Social Research in London.

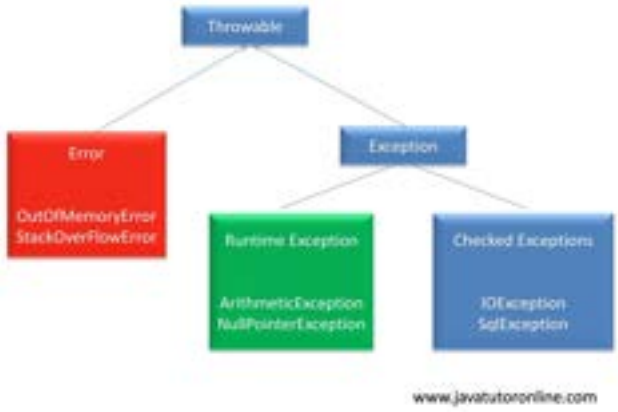
Event (computing)

In programming and software design, an event is an action or occurrence recognized by software, often originating asynchronously from the external environment, that may be handled by the software. Computer events can be generated or triggered by the system, by the user, or in other ways. Typically, events are handled synchronously with the program flow; that is, the software may have one or more dedicated places where events are handled, frequently an event loop.

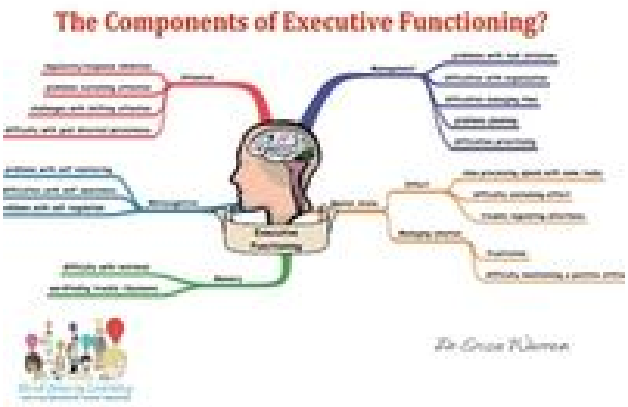


Exception handling

In computing and computer programming, exception handling is the process of responding to the occurrence of exceptions ? anomalous or exceptional conditions requiring special processing ? during the execution of a program. In general, an exception breaks the normal flow of execution and executes a pre-registered exception handler; the details of how this is done depend on whether it is a hardware or software exception and how the software exception is implemented. Exception handling, if provided, is facilitated by specialized programming language constructs, hardware mechanisms like interrupts, or operating system (OS) inter-process communication (IPC) facilities like signals. Some exceptions, especially hardware ones, may be handled so gracefully that execution can resume where it was interrupted.



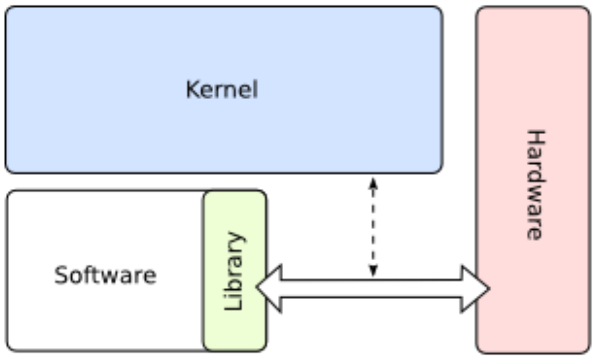
Executive Systems Problem Oriented Language



The Executive Systems Problem Oriented Language (ESPOL) is a programming language, a superset of ALGOL 60, that provides abilities of what would later be termed a system programming language or machine oriented high order language (mohol), such as interrupting a processor on a multiprocessing system (the Burroughs large systems were multiprocessor systems). ESPOL was used to write the Master Control Program (MCP) on Burroughs computer systems from the B5000 to the B6700. The single-pass compiler for ESPOL could compile over 250 lines per second.

Exokernel

Exokernel is an operating system kernel developed by the MIT Parallel and Distributed Operating Systems group, and also a class of similar operating systems.



Ext3

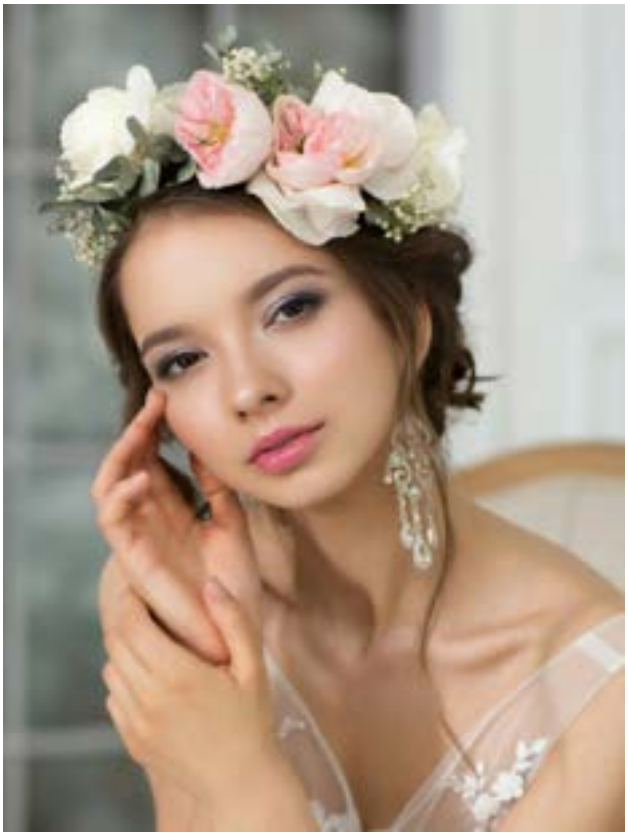
ext3, or third extended filesystem, is a journaled file system that is commonly used by the Linux kernel. It used to be the default file system for many popular Linux distributions. Stephen Tweedie first revealed that he was working on extending ext2 in Journaling the Linux ext2fs Filesystem in a 1998 paper, and later in a February 1999 kernel mailing list posting. The filesystem was merged with the mainline Linux kernel in November 2001 from 2.4.15 onward. Its main advantage over ext2 is journaling, which improves reliability and eliminates the need to check the file system after an unclean shutdown. Its successor is ext4.

Ext4

ext4 (fourth extended filesystem) is a journaling file system for Linux, developed as the successor to ext3.

Faina Mihajlovna Kirillova

Faina Mihajlovna Kirillova (29 September 1931) is a Belarusian scientist in the field of mathematical theory of optimal control. She was the winner of the USSR Council of Ministers Prize (1986) "for the development and implementation of multi-purpose software tools for engineering calculations."

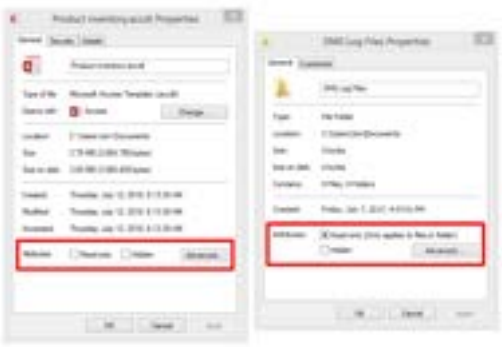


Federal Information Processing Standards

The Federal Information Processing Standards (FIPS) of the United States are a set of publicly announced standards that the National Institute of Standards and Technology (NIST) has developed for use in computer systems of non-military, American government agencies and contractors. FIPS standards establish requirements for ensuring computer security and interoperability, and are intended for cases in which suitable industry standards do not already exist. Many FIPS specifications are modified versions of standards the technical communities use, such as the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), and the International Organization for Standardization (ISO).

File attribute

File attributes are a type of meta-data that describe and may modify how files and/or directories in a filesystem behave. Typical file attributes may, for example, indicate or specify whether a file is visible, modifiable, compressed, or encrypted. The availability of most file attributes depends on support by the underlying filesystem (such as FAT, NTFS, ext4)



File locking

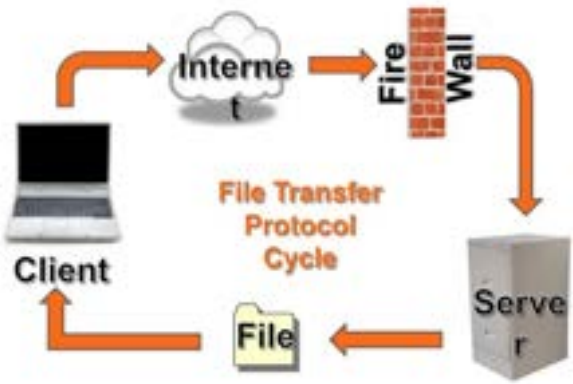
File locking is a mechanism that restricts access to a computer file, or to a region of a file, by allowing only one user or process to modify or delete it at a specific time and to prevent reading of the file while it's being modified or deleted.

File system

In computing, a file system or filesystem (often abbreviated to fs) is a method and data structure that the operating system uses to control how data is stored and retrieved. Without a file system, data placed in a storage medium would be one large body of data with no way to tell where one piece of data stopped and the next began, or where any piece of data was located when it was time to retrieve it. By separating the data into pieces and giving each piece a name, the data are easily isolated and identified. Taking its name from the way a paper-based data management system is named, each group of data is called a "file". The structure and logic rules used to manage the groups of data and their names is called a "file system."

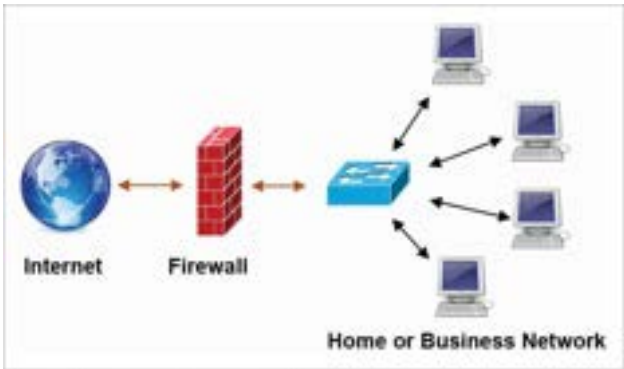
File transfer protocol

The File Transfer Protocol (FTP) is a standard communication protocol used for the transfer of computer files from a server to a client on a computer network. FTP is built on a client?server model architecture using separate control and data connections between the client and the server. FTP users may authenticate themselves with a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it. For secure transmission that protects the username and password, and encrypts the content, FTP is often secured with SSL/TLS (FTPS) or replaced with SSH File Transfer Protocol (SFTP).

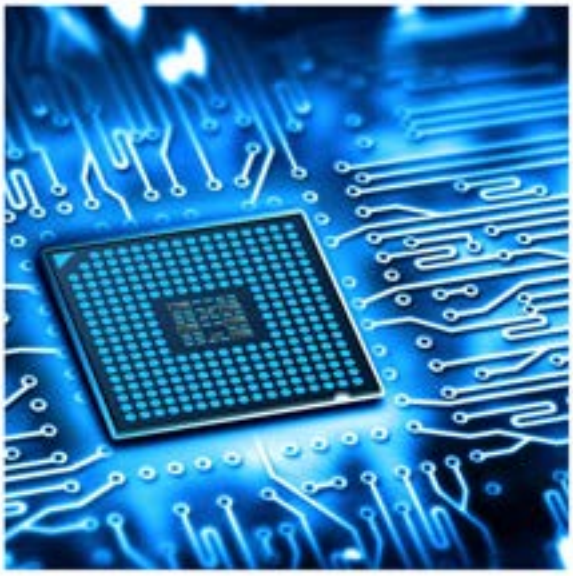


Firewall (networking)

In computing, a firewall is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. A firewall typically establishes a barrier between a trusted network and an untrusted network, such as the Internet.



Firmware



In computing, firmware is a specific class of computer software that provides the low-level control for a device's specific hardware. Firmware, such as the BIOS of a personal computer, may contain basic functions of a device, and may provide hardware abstraction services to higher-level software such as operating systems. For less complex devices, firmware may act as the device's complete operating system, performing all control, monitoring and data manipulation functions. Typical examples of devices containing firmware are embedded systems (running embedded software), home and personal-use appliances, computers, and computer peripherals.

Fixed-priority pre-emptive scheduling

Fixed-priority preemptive scheduling is a scheduling system commonly used in real-time systems. With fixed priority preemptive scheduling, the scheduler ensures that at any given time, the processor executes the highest priority task of all those tasks that are currently ready to execute.

In Proc. of the 17th International Conference on Real-Time and Network Systems
RTNS'2009, Paris, ECE, 26-27 October, 2009

Quantifying the Sub-optimality of Uniprocessor Fixed Priority Pre-emptive Scheduling for Sporadic Tasksets with Arbitrary Deadlines

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Abstract

This paper examines the relative effectiveness of fixed priority pre-emptive scheduling in a uniprocessor system, compared to an optimal algorithm such as Earliest Deadline First (EDF). The quantitative metric used in this comparison is the processor speedup factor, defined as the factor by which processor speed needs to increase to ensure that any taskset that is schedulable according to an optimal scheduling algorithm can be scheduled using fixed priority pre-emptive scheduling. For implicit-deadline tasksets, the speedup factor is 1/Ω(2)=1.44270. For constrained-deadline tasksets, the speedup factor is 1/Ω=1.76322. In this paper, we show that for arbitrary-deadline tasksets, the speedup factor is lower bounded by 1/Ω=1.76322 and upper bounded by 2. Further, when deadline monotonic priority assignment is used, we show that the speedup factor is exactly 2.

1. Introduction

In this paper, we are interested in determining the largest factor by which the processing speed of a uniprocessor would need to be increased, such that any feasible taskset (that was previously schedulable according to an optimal scheduling algorithm) could be guaranteed to be schedulable according to fixed priority pre-emptive scheduling. We refer to this resource augmentation factor as the *processor speedup factor* [14].

In 1973, Liu and Layland [14] considered fixed priority pre-emptive scheduling of 'synchronous' tasksets comprising independent periodic tasks, with bounded execution times, and deadlines equal to their periods. We refer to such tasksets as *implicit-deadline tasksets*. Liu and Layland showed that *rate monotonic* priority ordering (RMPO) is the optimal fixed priority assignment policy for implicit-deadline tasksets, and that using rate monotonic priority ordering, fixed priority pre-emptive scheduling can schedule any implicit-deadline taskset with a total utilisation $U \leq \ln(2) \approx 0.693$.

Liu and Layland also showed that Earliest Deadline First (EDF) is an optimal dynamic priority scheduling algorithm for implicit-deadline tasksets, and that EDF can schedule any such taskset with a total utilisation $U \leq 1$.

In 1974, Dertouzos [11], showed that EDF is in fact an optimal pre-emptive uniprocessor scheduling algorithm, in the sense that if a valid schedule exists for a taskset, then the schedule produced by EDF will also meet all deadlines.

Combining the result of Dertouzos [11] with the results of Liu and Layland [14] for both EDF and fixed priority pre-emptive scheduling, we can see that the processor speedup factor required to guarantee that fixed priority pre-emptive scheduling can schedule any feasible implicit-deadline taskset is $1/\Omega(2) \approx 1.44270$.

Research into real-time scheduling during the 1980's and early 1990's focussed on lifting many of the restrictions of the Liu and Layland task model. Task arrivals were generalised to be sporadic, with known

Forensic software engineering

Forensic software engineering refers to the discipline of analyzing (and sometimes reconstructing) the functionality of software applications or services that have become defunct; are no longer accompanied by, or previously lacked, documentation; or for which the original engineers are no longer available.

Formal language

In logic, mathematics, computer science, and linguistics, a formal language consists of words whose letters are taken from an alphabet and are well-formed according to a specific set of rules.

	in the language	*not in the language*
second-to-last symbol is a	aa bbbab bbbbbbbbbababab	a aaaba bbbbbbbbbbbbb
equal numbers of a and b	ba bbaaba aaaabbbbbbbaaaba	a bbbaa abababababababa
palindromes	a aba abaabaabaaba	ab bbbba abababababababab
contain the pattern abba	abba abaabaabbabbabaabbba bbbbbbbbbbabbabbbbb	abb bbabaab aaaaaaaaaaaaaaaaa
number of bs is divisible by 3	bbb baaaaabaaaab bbbabbaaabaaabababaaa	bb ababab aaaaaaaaaaaaaaaab

Formal methods

In computer science, formal methods are mathematically rigorous techniques for the specification, development, analysis, and verification of software and hardware systems. The use of formal methods for software and hardware design is motivated by the expectation that, as in other engineering disciplines, performing appropriate mathematical analysis can contribute to the reliability and robustness of a design.Formal methods employ a variety of theoretical computer science fundamentals, including logic calculi, formal languages, automata theory, control theory, program semantics, type systems, and type theory.

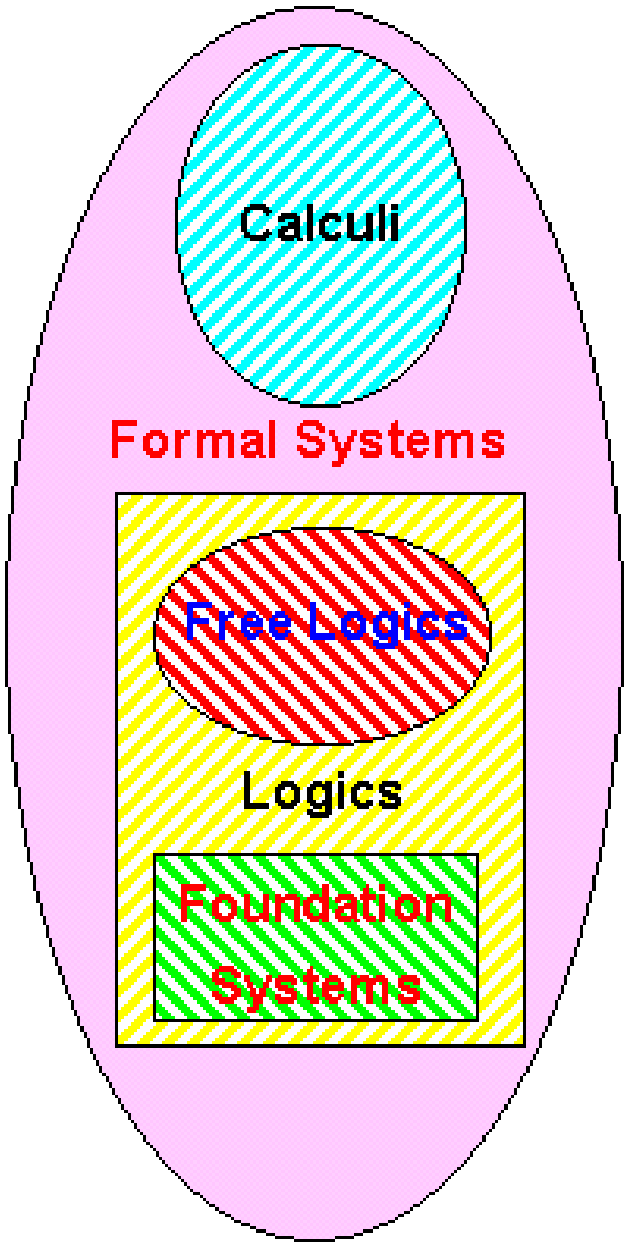
Seven More Myths of Formal Methods

JONATHAN P. BOWEN, Oxford University
MICHAEL G. HINCHEY, University of Cambridge

◆ *New myths about formal methods are gaining tacit acceptance both outside and inside the system-development community. The authors address and dispel these myths based on their observations of industrial projects.*

Formal system

A formal system is an abstract structure used for inferring theorems from axioms according to a set of rules. These rules, which are used for carrying out the inference of theorems from axioms, are the logical calculus of the formal system.



Francisco Varela

Francisco Javier Varela Garc&#65533;a (September 7, 1946 ? May 28, 2001) was a Chilean biologist, philosopher, cybernetician, and neuroscientist who, together with his mentor Humberto Maturana, is best known for introducing the concept of autopoiesis to biology, and for co-founding the Mind and Life Institute to promote dialog between science and Buddhism.

Fred Emery

Frederick Edmund Emery (27 August 1925 ? 10 April 1997) was an Australian psychologist. He was one of the pioneers in the field of organizational development, particularly in the development of the theory around participative work design structures such as self-managing teams. He was widely regarded as one of the finest social scientists of his generation.

Free Software Foundation

The Free Software Foundation (FSF) is a 501(c)(3) non-profit organization founded by Richard Stallman on October 4, 1985, to support the free software movement, with the organization's preference for software being distributed under copyleft ("share alike") terms, such as with its own GNU General Public License. The FSF was incorporated in Boston, Massachusetts, US, where it is also based.From its founding until the mid-1990s, FSF's funds were mostly used to employ software developers to write free software for the GNU Project. Since the mid-1990s, the FSF's employees and volunteers have mostly worked on legal and structural issues for the free software movement and the free software community.

Free software

Free software or libre software is computer software distributed under terms that allow users to run the software for any purpose as well as to study, change, and distribute it and any adapted versions. Free software is a matter of liberty, not price; all users are legally free to do what they want with their copies of a free software (including profiting from them) regardless of how much is paid to obtain the program. Computer programs are deemed "free" if they give end-users (not just the developer) ultimate control over the software and, subsequently, over their devices.The right to study and modify a computer program entails that source code? the preferred format for making changes?be made available to users of that program. While this is often called "access to source code" or "public availability", the Free Software Foundation (FSF) recommends against thinking in those terms, because it might give the impression that users have an obligation (as opposed to a right) to give non-users a copy of the program.

FreeBSD

FreeBSD is a free and open-source Unix-like operating system descended from the Berkeley Software Distribution (BSD), which was based on Research Unix. The first version of FreeBSD was released in 1993. In 2005, FreeBSD was the most popular open-source BSD operating system, accounting for more than three-quarters of all installed and permissively licensed BSD systems.FreeBSD has similarities with Linux, with two major differences in scope and licensing: FreeBSD maintains a complete system, i.e. the project delivers a kernel, device drivers, userland utilities, and documentation, as opposed to Linux only delivering a kernel and drivers, and relying on third-parties for system software; FreeBSD source code is generally released under a permissive BSD license, as opposed to the copyleft GPL used by Linux.

FreeMint

MiNT is Now TOS (MiNT) is a free software alternative operating system kernel for the Atari ST system and its successors. It is a multi-tasking alternative to TOS and MagiC. Together with the free system components fVDI device drivers, XaAES graphical user interface widgets, and TeraDesk file manager, MiNT provides a free TOS compatible replacement OS that can multitask.

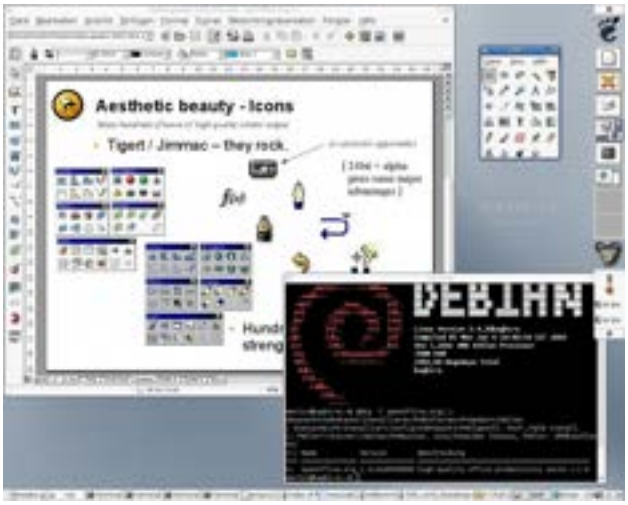
GM-NAA I/O

The GM-NAA I/O input/output system of General Motors and North American Aviation was the first operating system for the IBM 704 computer.It was created in 1956 by Robert L. Patrick of General Motors Research and Owen Mock of North American Aviation. It was based on a system monitor created in 1955 by programmers of General Motors for its IBM 701.

GNOME

GNOME (), originally an acronym for GNU Network Object Model Environment, is a free and open-source desktop environment for Linux and other Unix-like operating systems.

GNU Hurd



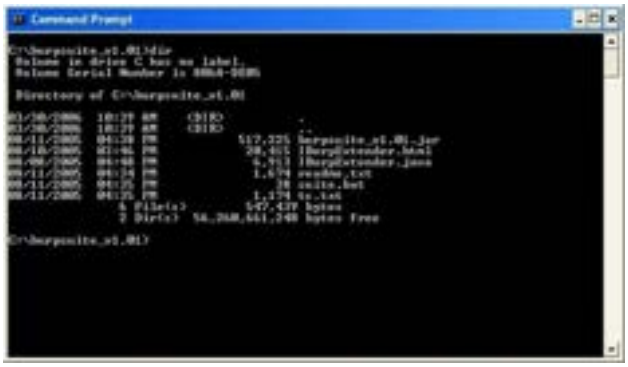
GNU Hurd is a collection of microkernel servers written as part of GNU, for the GNU Mach microkernel. It has been under development since 1990 by the GNU Project of the Free Software Foundation, designed as a replacement for the Unix kernel, and released as free software under the GNU General Public License. When the Linux kernel proved to be a viable solution, development of GNU Hurd slowed, at times alternating between stasis and renewed activity and interest.The Hurd's design consists of a set of protocols and server processes (or daemons, in Unix terminology) that run on the GNU Mach microkernel. The Hurd aims to surpass the Unix kernel in functionality, security, and stability, while remaining largely compatible with it. The GNU Project chose the multiserver microkernel for the operating system, due to perceived advantages over the traditional Unix monolithic kernel architecture, a view that had been advocated by some developers in the 1980s.

GNU Project

The GNU Project ((listen)) is a free software, mass collaboration project announced by Richard Stallman on September 27, 1983. Its goal is to give computer users freedom and control in their use of their computers and computing devices by collaboratively developing and publishing software that gives everyone the rights to freely run the software, copy and distribute it, study it, and modify it. GNU software grants these rights in its license.

General Comprehensive Operating System

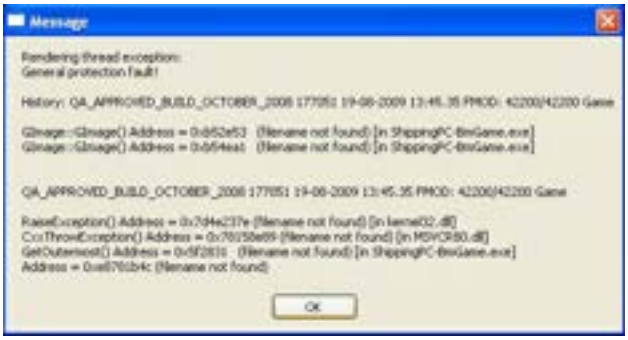
General Comprehensive Operating System (GCOS, ; originally GECOS, General Electric Comprehensive Operating Supervisor) is a family of operating systems oriented toward the 36-bit GE/Honeywell mainframe computers.The original version of GCOS was developed by General Electric beginning in 1962. The operating system is still used today in its most recent versions (GCOS 7 and GCOS 8) on servers and mainframes produced by Groupe Bull, primarily through emulation, to provide continuity with legacy mainframe environments. GCOS 7 and GCOS 8 are separate branches of the operating system and continue to be developed alongside each other.



General Electric

General Electric Company (GE) is an American multinational conglomerate founded in 1892, and incorporated in New York state and headquartered in Boston.

General protection fault



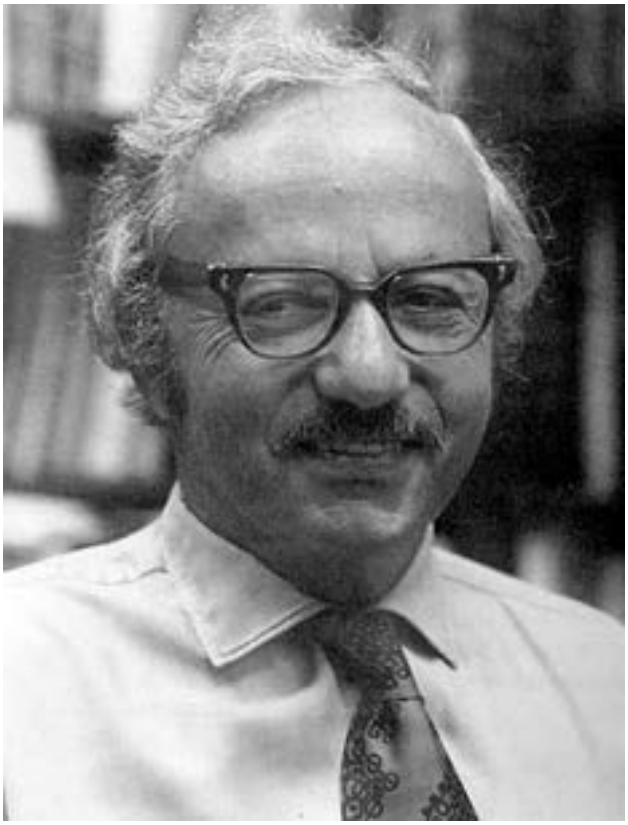
A general protection fault (GPF) in the x86 instruction set architectures (ISAs) is a fault (a type of interrupt) initiated by ISA-defined protection mechanisms in response to an access violation caused by some running code, either in the kernel or a user program. The mechanism is first described in Intel manuals and datasheets for the Intel 80286 CPU, which was introduced in 1983; it is also described in section 9.8.13 in the Intel 80386 programmer's reference manual from 1986. A general protection fault is implemented as an interrupt (vector number 13 (0Dh)). Some operating systems may also classify some exceptions not related to access violations, such as illegal opcode exceptions, as general protection faults, even though they have nothing to do with memory protection. If a CPU detects a protection violation, it stops executing the code and sends a GPF interrupt. In most cases, the operating system removes the failing process from the execution queue, signals the user, and continues executing other processes. If, however, the operating system fails to catch the general protection fault, i.e. another protection violation occurs before the operating system returns from the previous GPF interrupt, the CPU signals a double fault, stopping the operating system. If yet another failure (triple fault) occurs, the CPU is unable to recover; since 80286, the CPU enters a special halt state called "Shutdown", which can only be exited through a hardware reset. The IBM PC AT, the first PC-compatible system to contain an 80286, has hardware that detects the Shutdown state and automatically resets the CPU when it occurs. All descendants of the PC AT do the same, so in a PC, a triple fault causes an immediate system reset.

Geographic information system

A geographic information system (GIS) consists of integrated computer hardware and software that store, manage, analyze, edit, output, and visualize geographic data. Much of this often happens within a spatial database, however, this is not essential to meet the definition of a GIS. In a broader sense, one may consider such a system also to include human users and support staff, procedures and workflows, the body of knowledge of relevant concepts and methods, and institutional organizations.

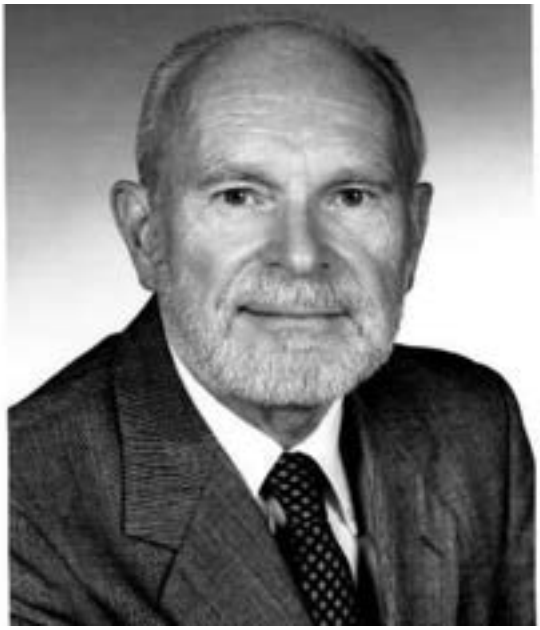
George Dantzig

George Bernard Dantzig (; November 8, 1914 ? May 13, 2005) was an American mathematical scientist who made contributions to industrial engineering, operations research, computer science, economics, and statistics.



George Klir

George Ji? Klir (April 22, 1932 ? May 27, 2016) was a Czech-American computer scientist and professor of systems sciences at Binghamton University in Binghamton, New York.



Glossary of operating systems terms

This page is a glossary of Operating systems terminology.

Heat and Sensor Technology®

Glossary

[illegible]	[illegible]
1 ph voltage	[illegible]
3 ph voltage	[illegible]
3 phase delta	[illegible]
ASTM	[illegible]
Accounts payable	[illegible]
Accounts Receivable	[illegible]
Alloy	[illegible]
ambient air	[illegible]
Amps	[illegible]
Amps Per Core	[illegible]
annealing	[illegible]
Armor	[illegible]
Assembly	[illegible]
Barrel nut	[illegible]
Band strip	[illegible]
Black bushing	[illegible]
Braid	[illegible]
Braid ring	[illegible]
Brake	[illegible]

Google

Google LLC ((listen)) is an American multinational technology company focusing on online advertising, search engine technology, cloud computing, computer software, quantum computing, e-commerce, artificial intelligence, and consumer electronics. It has been referred to as "the most powerful company in the world" and one of the world's most valuable brands due to its market dominance, data collection, and technological advantages in the area of artificial intelligence. Its parent company Alphabet is considered one of the Big Five American information technology companies, alongside Amazon, Apple, Meta, and Microsoft.

Government of the United States

The federal government of the United States (U.S. federal government or U.S. government) is the national government of the United States, a federal republic located primarily in North America, composed of 50 states, a city within a federal district (the city of Washington in the District of Columbia, where most of the federal government is based), five major self-governing territories and several island possessions. The federal government, sometimes simply referred to as Washington, is composed of three distinct branches: legislative, executive, and judicial, whose powers are vested by the U.S. Constitution in the Congress, the president and the federal courts, respectively. The powers and duties of these branches are further defined by acts of Congress, including the creation of executive departments and courts inferior to the Supreme Court.

Graphical user interface

The GUI (JEE-yoo-EYE or GOO-ee), graphical user interface, is a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicator such as primary notation, instead of text-based UIs, typed command labels or text navigation. GUIs were introduced in reaction to the perceived steep learning curve of CLIs (command-line interfaces), which require commands to be typed on a computer keyboard.

Graphics processing unit

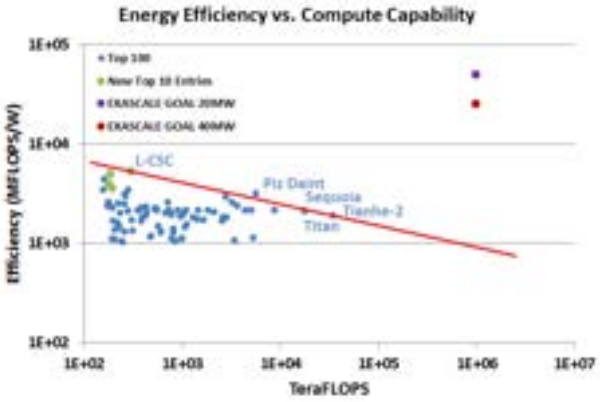
A graphics processing unit (GPU) is a specialized electronic circuit designed to manipulate and alter memory to accelerate the creation of images in a frame buffer intended for output to a display device. GPUs are used in embedded systems, mobile phones, personal computers, workstations, and game consoles.

Green computing

Green computing, green IT, or ICT sustainability, is the study and practice of environmentally sustainable computing or IT.

Green500

The Green500 is a biannual ranking of supercomputers, from the TOP500 list of supercomputers, in terms of energy efficiency. The list measures performance per watt using the TOP500 measure of high performance LINPACK benchmarks at double-precision floating-point format.



Gregory Bateson

Gregory Bateson (9 May 1904 ? 4 July 1980) was an English anthropologist, social scientist, linguist, visual anthropologist, semiotician, and cyberneticist whose work intersected that of many other fields. His writings include Steps to an Ecology of Mind (1972) and Mind and Nature (1979).

HP-UX

HP-UX (from "Hewlett Packard Unix") is Hewlett Packard Enterprise's proprietary implementation of the Unix operating system, based on Unix System V (initially System III) and first released in 1984. Current versions support HPE Integrity Servers, based on Intel's Itanium architecture.

HP-UX (from

Haiku (operating system)

Haiku is a free and open-source operating system capable of running applications written for the now-discontinued BeOS. Its development began in 2001, and the operating system became self-hosting in 2008. The first alpha release was made in September 2009, and the last was November 2012; the first beta was released in September 2018, followed by beta 2 in June 2020, then beta 3 in July 2021. The fourth beta was released on December 23, 2022, still keeping BeOS 5 compatibility in its x86 32-bit images, with much increased number of modern drivers, GTK3 apps and Wine ported, as well as Xlib (X11) and Wayland compatibility layers.Haiku is supported by Haiku, Inc., a non-profit organization based in Rochester, New York, United States, founded in 2003 by former project leader Michael Phipps. During the most recent release cycle, Haiku, Inc. employed a developer.

Hard disk drive

A hard disk drive (HDD), hard disk, hard drive, or fixed disk, is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage with one or more rigid rapidly rotating platters coated with magnetic material. The platters are paired with magnetic heads, usually arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored and retrieved in any order. HDDs are a type of non-volatile storage, retaining stored data when powered off. Modern HDDs are typically in the form of a small rectangular box.

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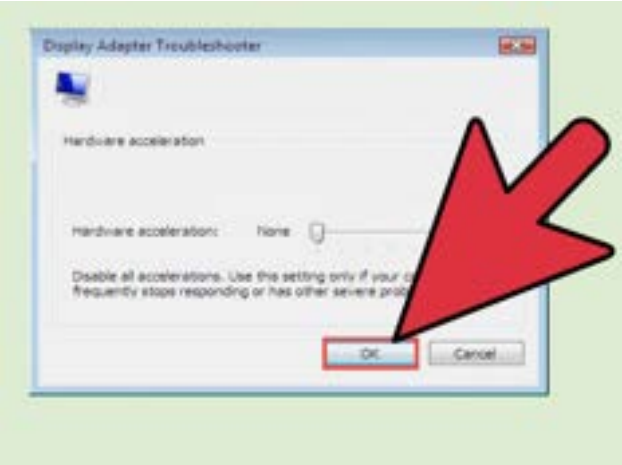
Hardware abstraction

Hardware abstractions are sets of routines in software that provide programs with access to hardware resources through programming interfaces. The programming interface allows all devices in a particular class C of hardware devices to be accessed through identical interfaces even though C may contain different subclasses of devices that each provide a different hardware interface.

Hardware acceleration

Hardware acceleration is the use of computer hardware designed to perform specific functions more efficiently when compared to software running on a general-purpose central processing unit (CPU). Any transformation of data that can be calculated in software running on a generic CPU can also be calculated in custom-made hardware, or in some mix of both.



Health informatics

Health informatics is the field of science and engineering that aims at developing methods and technologies for the acquisition, processing, and study of patient data, which can come from different sources and modalities, such as electronic health records, diagnostic test results, medical scans. The health domain provides an extremely wide variety of problems that can be tackled using computational techniques.Health informatics is a spectrum of multidisciplinary fields that includes study of the design, development and application of computational innovations to improve health care. The disciplines involved combines medicine fields with computing fields, in particular computer engineering, software engineering, information engineering, bioinformatics, bio-inspired computing, theoretical computer science, information systems, data science, information technology, autonomic computing, and behavior informatics. In academic institutions, medical informatics research focus on applications of artificial intelligence in healthcare and designing medical devices based on embedded systems. In some countries term informatics is also used in the context of applying library science to data management in hospitals.

Heinz von Foerster

Heinz von Foerster (German spelling: Heinz von F�rster; November 13, 1911 ? October 2, 2002) was an Austrian American scientist combining physics and philosophy, and widely attributed as the originator of Second-order cybernetics. He was twice a Guggenheim fellow (1956?57 and 1963?64) and also was a fellow of the American Association for the Advancement of Science, 1980. He is well known for his 1960 Doomsday equation formula published in Science predicting future population growth.As a polymath, he wrote nearly two hundred professional papers, gaining renown in fields from computer science and artificial intelligence to epistemology, and researched high-speed electronics and electro-optics switching devices as a physicist, and in biophysics, the study of memory and knowledge. He worked on cognition based on neurophysiology, mathematics, and philosophy and was called "one of the most consequential thinkers in the history of cybernetics". He came to the United States, and stayed after meeting with Warren Sturgis McCulloch, where he received funding from The Pentagon to establish the Biological Computer Laboratory, which built the first parallel computer, the Numa-Rete. Working with William Ross Ashby, one of the original Ratio Club members, and together with Warren McCulloch, Norbert Wiener, John von Neumann and Lawrence J. Fogel, Heinz von Foerster was an architect of cybernetics and one of the members of the Macy conferences, eventually becoming editor of its early proceedings alongside Hans-Lukas Teuber and Margaret Mead.

Hexadecimal

In mathematics and computing, the hexadecimal (also base-16 or simply hex) numeral system is a positional numeral system that represents numbers using a radix (base) of 16. Unlike the decimal system representing numbers using 10 symbols, hexadecimal uses 16 distinct symbols, most often the symbols "0"?"9" to represent values 0 to 9, and "A"?"F" (or alternatively "a"?"f") to represent values from 10 to 15.

DECIMAL	HEX	BINARY
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

History of IBM mainframe operating systems

The history of IBM mainframe operating systems is significant within the history of mainframe operating systems, because of IBM's long-standing position as the world's largest hardware supplier of mainframe computers. IBM mainframes run operating systems supplied by IBM and by third parties.

History of operating systems

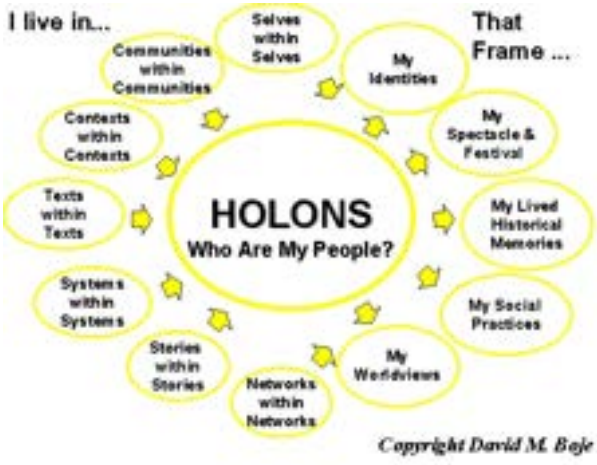
Computer operating systems (OSes) provide a set of functions needed and used by most application programs on a computer, and the links needed to control and synchronize computer hardware. On the first computers, with no operating system, every program needed the full hardware specification to run correctly and perform standard tasks, and its own drivers for peripheral devices like printers and punched paper card readers. The growing complexity of hardware and application programs eventually made operating systems a necessity for everyday use.

Hobbyist operating system

The development of a hobbyist operating system is one of the more involved and technical options for a computer hobbyist.

Holon (philosophy)

A holon (Greek: ????, from ????, holos, 'whole' and -??, -on, 'part') is something that is simultaneously a whole in and of itself, as well as a part of a larger whole. In other words, holons can be understood as the constituent part?wholes of a hierarchy.The holon represents a way to overcome the dichotomy between parts and wholes, as well as a way to account for both the self-assertive and the integrative tendencies of organisms. The term was coined by Arthur Koestler in The Ghost in the Machine (1967). In Koestler's formulations, a holon is something that has integrity and identity while simultaneously being a part of a larger system; it is a subsystem of a greater system.Holons are sometimes discussed in the context of self-organizing holarchic open (SOHO) systems.



Homebrew Computer Club

The Homebrew Computer Club was an early computer hobbyist group in Menlo Park, California, which met from March 1975 to December 1986. The club had an influential role in the development of the microcomputer revolution and the rise of that aspect of the Silicon Valley information technology industrial complex.

Honeywell

Honeywell International Inc. is an American publicly traded, multinational conglomerate corporation headquartered in Charlotte, North Carolina. It primarily operates in four areas of business: aerospace, building technologies, performance materials and technologies (PMT), and safety and productivity solutions (SPS).Honeywell is a Fortune 100 company, ranked 94th in 2021. In 2022 the corporation had a global workforce of approximately 97,000 employees, down from 113,000 in 2019. The current chairman and chief executive officer (CEO) is Darius Adamczyk.The corporation's current name, Honeywell International Inc., is a product of the merger of Honeywell Inc. and AlliedSignal in 1999. The corporation headquarters were consolidated with AlliedSignal's headquarters in Morristown, New Jersey; however, the combined company chose the name "Honeywell" because of the considerable brand recognition. Honeywell was a component of the Dow Jones Industrial Average index from 1999 to 2008. Prior to 1999, its corporate predecessors were included dating back to 1925, including early entrants in the computing and thermostat industries.In 2020, Honeywell rejoined the Dow Jones Industrial Average index and the following year moved its stock listing from the New York Stock Exchange to the Nasdaq.

Howard T. Odum

Howard Thomas Odum (September 1, 1924 ? September 11, 2002), usually cited as H. T. Odum, was an American ecologist. He is known for his pioneering work on ecosystem ecology, and for his provocative proposals for additional laws of thermodynamics, informed by his work on general systems theory.

Human body

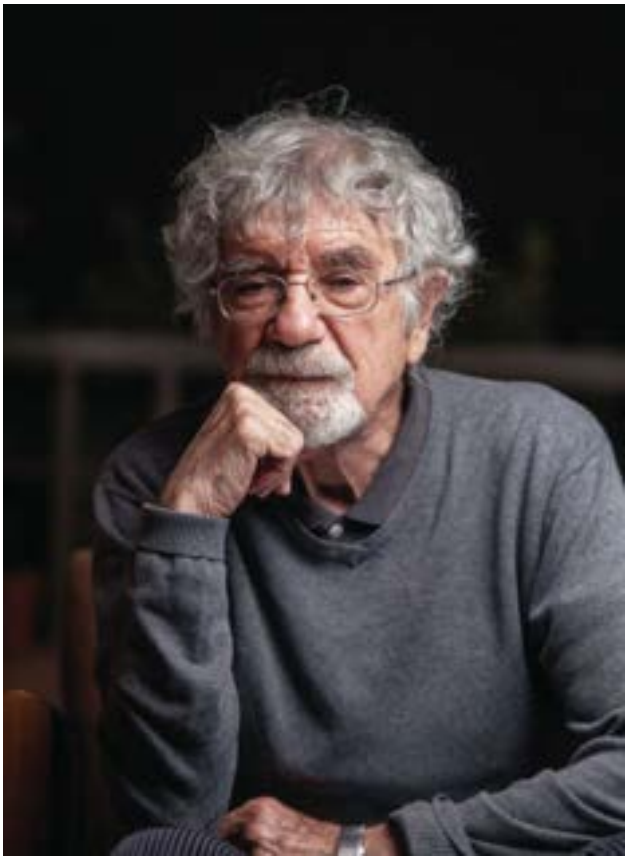
The human body is the structure of a human being. It is composed of many different types of cells that together create tissues and subsequently organ systems. They ensure homeostasis and the viability of the human body.

Human?computer interaction

Human?computer interaction (HCI) is research in the design and the use of computer technology, which focuses on the interfaces between people (users) and computers. HCI researchers observe the ways humans interact with computers and design technologies that allow humans to interact with computers in novel ways. A device that allows interaction between human being and a computer is known as a "Human-computer Interface (HCI)".

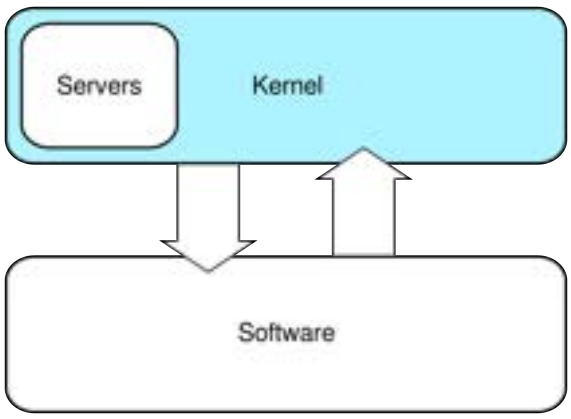
Humberto Maturana

Humberto Maturana Romes﷽n (September 14, 1928 ? May 6, 2021) was a Chilean biologist and philosopher. Many consider him a member of a group of second-order cybernetics theoreticians such as Heinz von Foerster, Gordon Pask, Herbert Br﷽n and Ernst von Glasersfeld.



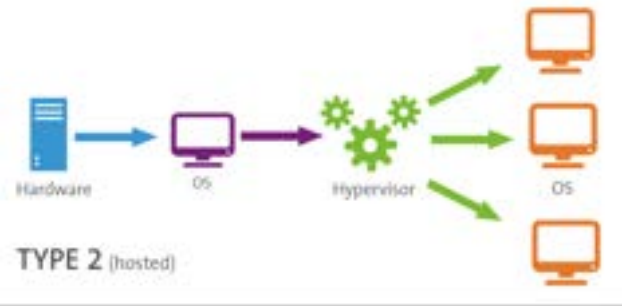
Hybrid kernel

A hybrid kernel is an operating system kernel architecture that attempts to combine aspects and benefits of microkernel and monolithic kernel architectures used in computer operating systems.



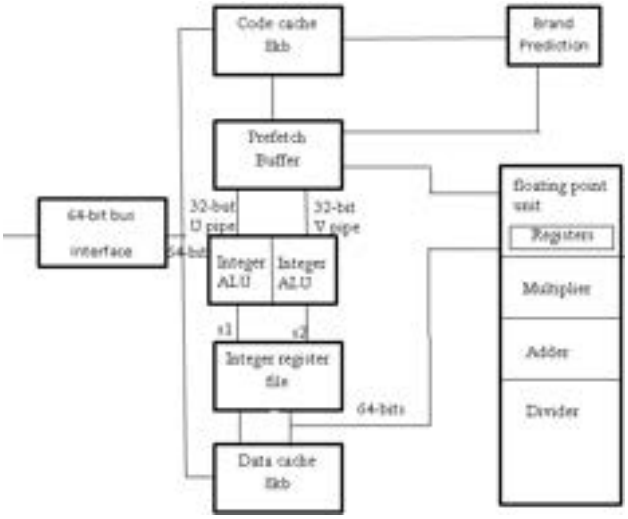
Hypervisor

A hypervisor (also known as a virtual machine monitor, VMM, or virtualizer) is a type of computer software, firmware or hardware that creates and runs virtual machines. A computer on which a hypervisor runs one or more virtual machines is called a host machine, and each virtual machine is called a guest machine. The hypervisor presents the guest operating systems with a virtual operating platform and manages the execution of the guest operating systems. Unlike an emulator, the guest executes most instructions on the native hardware. Multiple instances of a variety of operating systems may share the virtualized hardware resources: for example, Linux, Windows, and macOS instances can all run on a single physical x86 machine. This contrasts with operating-system?level virtualization, where all instances (usually called containers) must share a single kernel, though the guest operating systems can differ in user space, such as different Linux distributions with the same kernel.



IA-32

IA-32 (short for "Intel Architecture, 32-bit", commonly called i386) is the 32-bit version of the x86 instruction set architecture, designed by Intel and first implemented in the 80386 microprocessor in 1985. IA-32 is the first incarnation of x86 that supports 32-bit computing; as a result, the "IA-32" term may be used as a metonym to refer to all x86 versions that support 32-bit computing.Within various programming language directives, IA-32 is still sometimes referred to as the "i386" architecture. In some other contexts, certain iterations of the IA-32 ISA are sometimes labelled i486, i586 and i686, referring to the instruction supersets offered by the 80486, the P5 and the P6 microarchitectures respectively. These updates offered numerous additions alongside the base IA-32 set including floating-point capabilities and the MMX extensions.



IBM

The International Business Machines Corporation (IBM), nicknamed Big Blue, is an American multinational technology corporation headquartered in Armonk, New York and present in over 175 countries. It specializes in computer hardware, middleware, and software, and provides hosting and consulting services in areas ranging from mainframe computers to nanotechnology. IBM is the largest industrial research organization in the world, with 19 research facilities across a dozen countries, and has held the record for most annual U.S. patents generated by a business for 29 consecutive years from 1993 to 2021.IBM was founded in 1911 as the Computing-Tabulating-Recording Company (CTR), a holding company of manufacturers of record-keeping and measuring systems. It was renamed "International Business Machines" in 1924 and soon became the leading manufacturer of punch-card tabulating systems. For the next several decades, IBM would become an industry leader in several emerging technologies, including electric typewriters, electromechanical calculators, and personal computers. During the 1960s and 1970s, the IBM mainframe, exemplified by the System/360, was the dominant computing platform, and the company produced 80 percent of computers in the U.S. and 70 percent of computers worldwide.After pioneering the multipurpose microcomputer in the 1980s, which set the standard for personal computers, IBM began losing its market dominance to emerging competitors. Beginning in the 1990s, the company began downsizing its operations and divesting from commodity production, most notably selling its personal computer division to the Lenovo Group in 2005. IBM has since concentrated on computer services, software, supercomputers, and scientific research.

IBM 1410

The IBM 1410, a member of the IBM 1400 series, was a decimal computer with variable word length that was announced by IBM on September 12, 1960 and marketed as a midrange business computer. It was withdrawn on March 30, 1970.

IBM 7010

The IBM 700/7000 series is a series of large-scale (mainframe) computer systems that were made by IBM through the 1950s and early 1960s. The series includes several different, incompatible processor architectures. The 700s use vacuum-tube logic and were made obsolete by the introduction of the transistorized 7000s. The 7000s, in turn, were eventually replaced with System/360, which was announced in 1964. However the 360/65, the first 360 powerful enough to replace 7000s, did not become available until November 1965. Early problems with OS/360 and the high cost of converting software kept many 7000s in service for years afterward.

IBM 704

The IBM 704 is a large digital mainframe computer introduced by IBM in 1954. It was the first mass-produced computer with hardware for floating-point arithmetic. The IBM 704 Manual of operation states:

IBM 7040

The IBM 7040 was a historic but short-lived model of transistor computer built in the 1960s.

IBM 709

The IBM 709 was a computer system, initially announced by IBM in January 1957 and first installed during August 1958. The 709 was an improved version of its predecessor, the IBM 704, and was the third of the IBM 700/7000 series of scientific computers. The improvements included overlapped input/output, indirect addressing, and three "convert" instructions which provided support for decimal arithmetic, leading zero suppression, and several other operations. The 709 had 32,768 words of 36-bit magnetic core memory and could execute 42,000 add or subtract instructions per second. It could multiply two 36-bit integers at a rate of 5000 per second.An optional hardware emulator executed old IBM 704 programs on the IBM 709. This was the first commercially available emulator. Registers and most 704 instructions were emulated in 709 hardware. Complex 704 instructions such as floating point trap and input-output routines were emulated in 709 software.

IBM 7090

The IBM 7090 is a second-generation transistorized version of the earlier IBM 709 vacuum tube mainframe computer that was designed for "large-scale scientific and technological applications". The 7090 is the fourth member of the IBM 700/7000 series scientific computers. The first 7090 installation was in December 1959. In 1960, a typical system sold for $2.9 million (equivalent to $21 million in 2021) or could be rented for $63,500 a month (equivalent to $452,000 in 2021).

IBM 7090/94 IBSYS

IBSYS is the discontinued tape-based operating system that IBM supplied with its IBM 709, IBM 7090 and IBM 7094 computers. A similar operating system (but with several significant differences), also called IBSYS, was provided with IBM 7040 and IBM 7044 computers. IBSYS was based on FORTRAN Monitor System (FMS) and (more likely) Bell Labs' "BESYS" rather than the SHARE Operating System.

IBM AIX

AIX (Advanced Interactive eXecutive, pronounced , "ay-eye-ex") is a series of proprietary Unix operating systems developed and sold by IBM for several of its computer platforms.

IBM Airline Control Program

IBM Airline Control Program, or ACP, is a discontinued operating system developed by IBM beginning about 1965. In contrast to previous airline transaction processing systems, the most notable aspect of ACP is that it was designed to run on most models of the IBM System/360 mainframe computer family. This departed from the earlier model in which each airline had a different, machine-specific transaction system.

IBM Personal Computer

The IBM Personal Computer (model 5150, commonly known as the IBM PC) is the first microcomputer released in the IBM PC model line and the basis for the IBM PC compatible de facto standard. Released on August 12, 1981, it was created by a team of engineers and designers directed by Don Estridge in Boca Raton, Florida.

IBM Power Systems

IBM Power Systems is a family of server computers from IBM that are based on its Power processors. It was created in 2008 as a merger of the System p and System i product lines.

IBM System/360

The IBM System/360 (S/360) is a family of mainframe computer systems that was announced by IBM on April 7, 1964, and delivered between 1965 and 1978. It was the first family of computers designed to cover both commercial and scientific applications and to cover a complete range of applications from small to large. The design distinguished between architecture and implementation, allowing IBM to release a suite of compatible designs at different prices. All but the only partially compatible Model 44 and the most expensive systems use microcode to implement the instruction set, which features 8-bit byte addressing and binary, decimal, and hexadecimal floating-point calculations.

IBM System/360 Model 67

The IBM System/360 Model 67 (S/360-67) was an important IBM mainframe model in the late 1960s. Unlike the rest of the S/360 series, it included features to facilitate time-sharing applications, notably a Dynamic Address Translation unit, the "DAT box", to support virtual memory, 32-bit addressing and the 2846 Channel Controller to allow sharing channels between processors. The S/360-67 was otherwise compatible with the rest of the S/360 series.

IBM i

IBM i (the i standing for integrated) is an operating system developed by IBM for IBM Power Systems. It was originally released in 1988 as OS/400, as the sole operating system of the IBM AS/400 line of systems. It was renamed to i5/OS in 2004, before being renamed a second time to IBM i in 2008. It is an evolution of the System/38 CPF operating system, with compatibility layers for System/36 SSP and AIX applications. It inherits a number of distinctive features from the System/38 platform, including the Machine Interface, the implementation of object-based addressing on top of a single-level store, and the tight integration of a relational database into the operating system.

INT (x86 instruction)

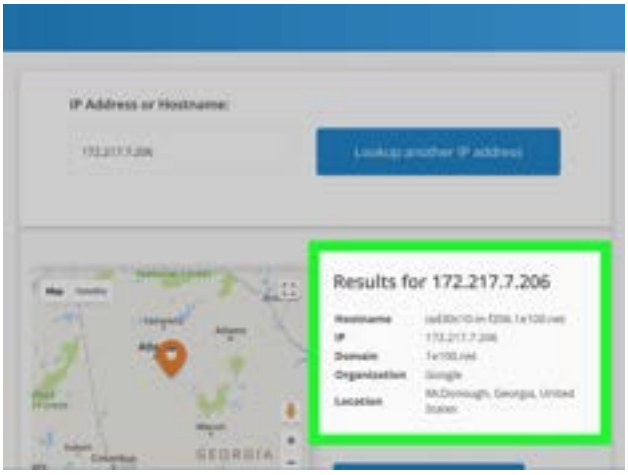
INT is an assembly language instruction for x86 processors that generates a software interrupt. It takes the interrupt number formatted as a byte value.When written in assembly language, the instruction is written like this:

IOS

iOS (formerly iPhone OS) is a mobile operating system developed by Apple Inc. exclusively for its hardware. It is the operating system that powers many of the company's mobile devices, including the iPhone; the term also includes the system software for iPads predating iPadOS?which was introduced in 2019?as well as on the iPod Touch devices?which were discontinued in mid-2022. It is the world's second-most widely installed mobile operating system, after Android. It is the basis for three other operating systems made by Apple: iPadOS, tvOS, and watchOS. It is proprietary software, although some parts of it are open source under the Apple Public Source License and other licenses.Unveiled in 2007 for the first-generation iPhone, iOS has since been extended to support other Apple devices such as the iPod Touch (September 2007) and the iPad (introduced: January 2010; availability: April 2010.) As of March 2018, Apple's App Store contains more than 2.1 million iOS applications, 1 million of which are native for iPads. These mobile apps have collectively been downloaded more than 130 billion times.

IP address

An Internet Protocol address (IP address) is a numerical label such as 192.0.2.1 that is connected to a computer network that uses the Internet Protocol for communication. An IP address serves two main functions: network interface identification and location addressing.

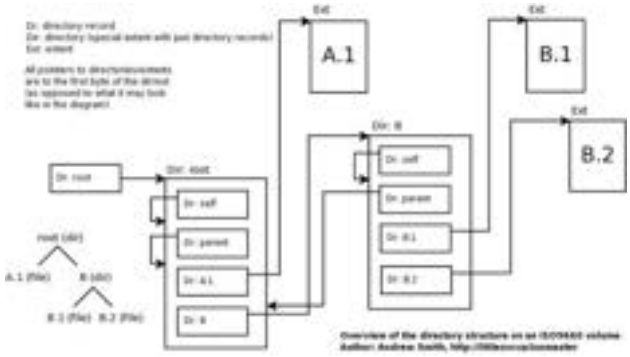


ISBN (identifier)

The International Standard Book Number (ISBN) is a numeric commercial book identifier that is intended to be unique. Publishers purchase or receive ISBNs from an affiliate of the International ISBN Agency.An ISBN is assigned to each separate edition and variation (except reprintings) of a publication. For example, an e-book, a paperback and a hardcover edition of the same book will each have a different ISBN. The ISBN is ten digits long if assigned before 2007, and thirteen digits long if assigned on or after 1 January 2007. The method of assigning an ISBN is nation-specific and varies between countries, often depending on how large the publishing industry is within a country.

ISO 9660

ISO 9660 (also known as ECMA-119) is a file system for optical disc media. The file system is an international standard available from the International Organization for Standardization (ISO). Since the specification is available for anybody to purchase, implementations have been written for many operating systems.



Ilya Prigogine

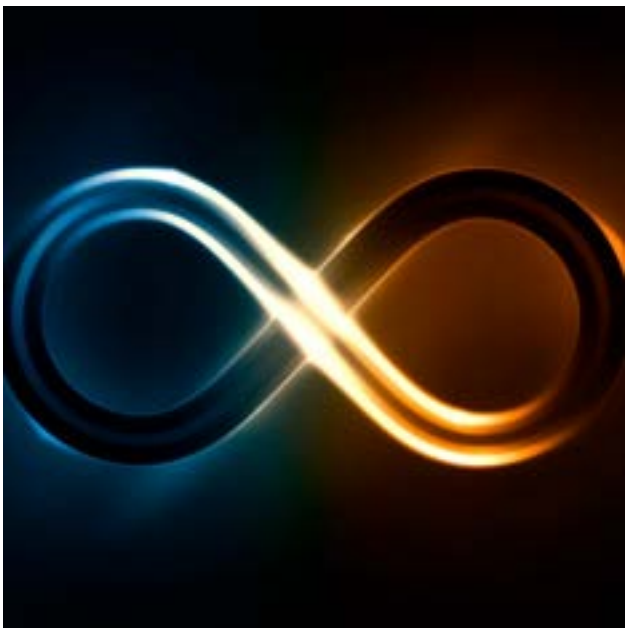
Viscount Ilya Romanovich Prigogine (; Russian: ????? ?????????? ?????????; 25 January [O.S. 12 January] 1917 ? 28 May 2003) was a Russian-born Belgian physical chemist and Nobel laureate noted for his work on dissipative structures, complex systems, and irreversibility.

Image compression

Image compression is a type of data compression applied to digital images, to reduce their cost for storage or transmission. Algorithms may take advantage of visual perception and the statistical properties of image data to provide superior results compared with generic data compression methods which are used for other digital data.

Infinite loop

In computer programming, an infinite loop (or endless loop) is a sequence of instructions that, as written, will continue endlessly, unless an external intervention occurs ("pull the plug"). It may be intentional.



Information retrieval

Information retrieval (IR) in computing and information science is the process of obtaining information system resources that are relevant to an information need from a collection of those resources. Searches can be based on full-text or other content-based indexing. Information retrieval is the science of searching for information in a document, searching for documents themselves, and also searching for the metadata that describes data, and for databases of texts, images or sounds.

Information security

Information security, sometimes shortened to InfoSec, is the practice of protecting information by mitigating information risks. It is part of information risk management. It typically involves preventing or reducing the probability of unauthorized/inappropriate access to data, or the unlawful use, disclosure, disruption, deletion, corruption, modification, inspection, recording, or devaluation of information. It also involves actions intended to reduce the adverse impacts of such incidents. Protected information may take any form, e.g. electronic or physical, tangible (e.g. paperwork) or intangible (e.g. knowledge). Information security's primary focus is the balanced protection of the confidentiality, integrity, and availability of data (also known as the CIA triad) while maintaining a focus on efficient policy implementation, all without hampering organization productivity. This is largely achieved through a structured risk management process that involves:

Information system

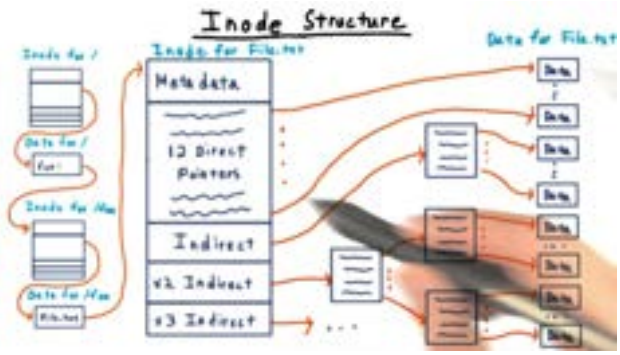
An information system (IS) is a formal, sociotechnical, organizational system designed to collect, process, store, and distribute information. From a sociotechnical perspective, information systems are composed by four components: task, people, structure (or roles), and technology. Information systems can be defined as an integration of components for collection, storage and processing of data of which the data is used to provide information, contribute to knowledge as well as digital products that facilitate decision making.A computer information system is a system that is composed of people and computers that processes or interprets information. The term is also sometimes used to simply refer to a computer system with software installed.

Information theory

Information theory is the scientific study of the quantification, storage, and communication of information. The field was originally established by the works of Harry Nyquist and Ralph Hartley, in the 1920s, and Claude Shannon in the 1940s.:?vii? The field is at the intersection of probability theory, statistics, computer science, statistical mechanics, information engineering, and electrical engineering.

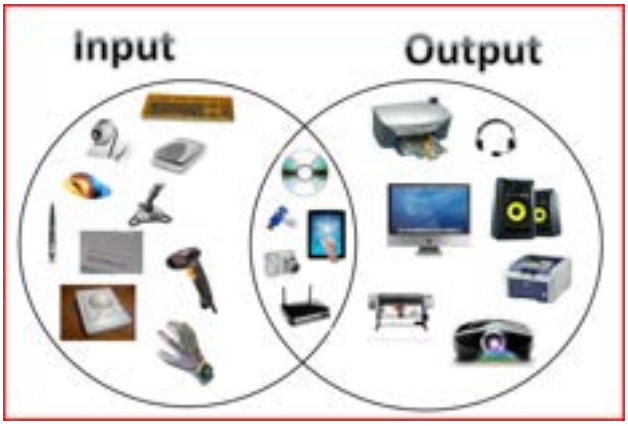
Inode

The inode (index node) is a data structure in a Unix-style file system that describes a file-system object such as a file or a directory. Each inode stores the attributes and disk block locations of the object's data. File-system object attributes may include metadata (times of last change, access, modification), as well as owner and permission data.A directory is a list of inodes with their assigned names. The list includes an entry for itself, its parent, and each of its children.



Input and output

In computing, input/output (I/O, i/o, or informally io or IO) is the communication between an information processing system, such as a computer, and the outside world, possibly a human or another information processing system. Inputs are the signals or data received by the system and outputs are the signals or data sent from it. The term can also be used as part of an action; to "perform I/O" is to perform an input or output operation.



Input device

In computing, an input device is a piece of equipment used to provide data and control signals to an information processing system, such as a computer or information appliance. Examples of input devices include keyboards, mouse, scanners, cameras, joysticks, and microphones.

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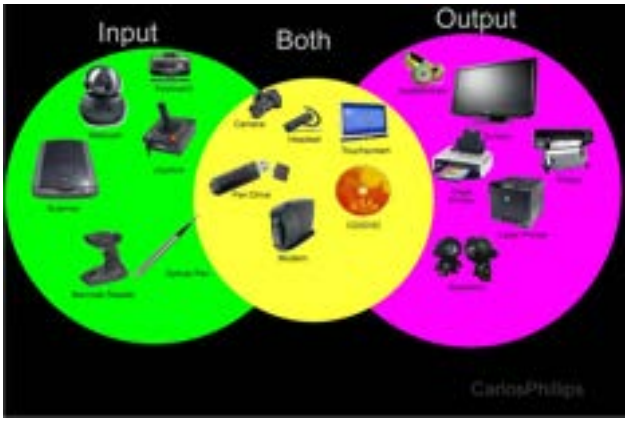

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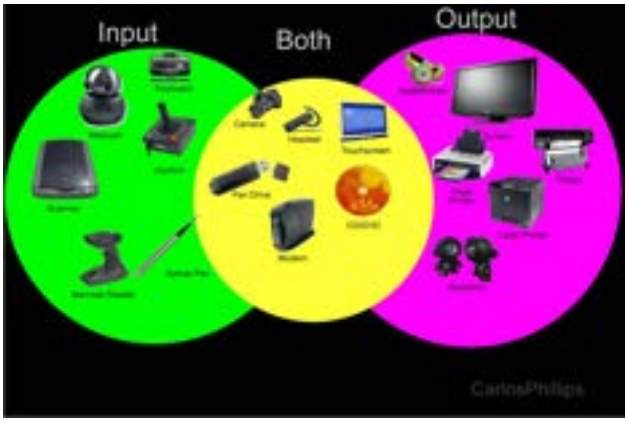
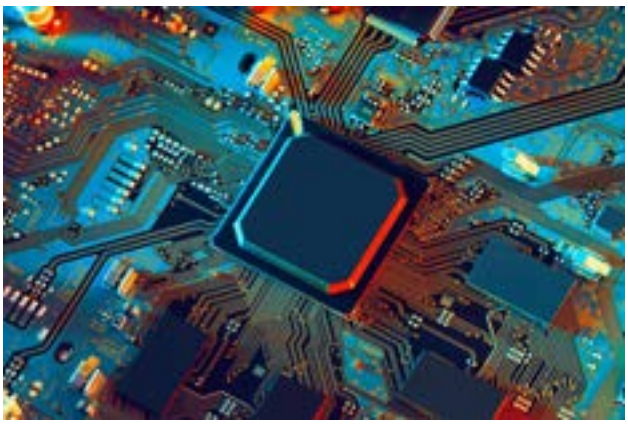


Institution of Engineering and Technology

The Institution of Engineering and Technology (IET) is a multidisciplinary professional engineering institution. The IET was formed in 2006 from two separate institutions: the Institution of Electrical Engineers (IEE), dating back to 1871, and the Institution of Incorporated Engineers (IIE) dating back to 1884. Its worldwide membership is currently in excess of 158,000 in 153 countries. The IET's main offices are in Savoy Place in London, England, and at Michael Faraday House in Stevenage, England.

Integrated circuit



An integrated circuit or monolithic integrated circuit (also referred to as an IC, a chip, or a microchip) is a set of electronic circuits on one small flat piece (or "chip") of semiconductor material, usually silicon. Large numbers of miniaturized transistors and other electronic components are integrated together on the chip. This results in circuits that are orders of magnitude smaller, faster, and less expensive than those constructed of discrete components, allowing a large transistor count. The IC's mass production capability, reliability, and building-block approach to integrated circuit design has ensured the rapid adoption of standardized ICs in place of designs using discrete transistors. ICs are now used in virtually all electronic equipment and have revolutionized the world of electronics. Computers, mobile phones and other home appliances are now inextricable parts of the structure of modern societies, made possible by the small size and low cost of ICs such as modern computer processors and microcontrollers.