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# Parallel computing

It is a form of computation in which many calculations are carried out simultaneously,[1] operating on the principle that large problems can often be divided into smaller ones, which are then solved concurrently ("in parallel"). There are several different forms of parallel computing: bit-level, instruction level, data, and task parallelism. Parallelism has been employed for many years, mainly in high-performance computing, but interest in it has grown lately due to the physical constraints preventing frequency scaling.[2] As power consumption (and consequently heat generation) by computers has become a concern in recent years,[3] parallel computing has become the dominant paradigm in computer architecture, mainly in the form of multicore processors.[4]

Parallel computers can be roughly classified according to the level at which the hardware supports parallelism—with multi-core and multi-processor computers having multiple processing elements within a single machine, while clusters, MPPs, and grids use multiple computers to work on the same task. Specialized parallel computer architectures are sometimes used alongside traditional processors, for accelerating specific tasks.

Parallel computer programs are more difficult to write than sequential ones,[5] because concurrency introduces several new classes of potential software bugs, of which race conditions are the most common. Communication and synchronization between the different subtasks are typically one of the greatest obstacles to getting good parallel program performance. The speed-up of a program as a result of parallelization is governed by Amdahl's law.

# Computer Museum



A **computer museum** is a museum devoted to the study of historic computer hardware and software, where a **museum** is a "permanent institution in the service of society and of its development, open to the public, which acquires, conserves, researches, communicates and exhibits the *tangible and intangible* heritage of humanity and its environment, for the purposes of education, study, and enjoyment", as defined by the International Council of Museums.

The term 'museum' has also been expanded, unofficially, to encompass solely online collections, in much the same way in which other activities have made the transition ( 'Online shopping', 'Online Gallery' etc. ) These online Museums range in type and quality from those which actually collate / preserve material to those who simply display photographs of hardware from other sources. They are distinct from traditional museums mainly in

that the exhibits can not be physically touched and interacted with in the traditional sense.

Some computer museums exist within a larger institution, such as the Science Museum in London and the Deutsches Museum in Munich. Others, such as the Computer History Museum in Mountain View, California, the Heinz Nixdorf Museum in Paderborn, and The National Museum of Computing at Bletchley Park, are dedicated specifically to computing. Some specialize in the early history of computing, others in the era that started with the first personal computers such as the Apple I and Altair 8800, Apple IIs, older Apple Macintoshes, Commodore Internationals, Amigas, IBM PCs and more rare computers such as the Osborne 1. Some concentrate more on research and conservation, others more on education and entertainment.

There are also some private collections. Microsoft have their own computer museum at their headquarters which is open to the public, and at one time Apple Computer also had a museum open to the public.

Bletchley Park conserves and exhibits equipment associated with British code-breaking activities during the Second World War.

The UK National Archive for the History of Computing in Manchester, England  concentrates on the preservation of historical documents related to computing, rather than on the computers themselves.

Other museums exist only in online form. There is an extensive hardware collection at old-computers.com, first opened online in 1995. As of 2006, it includes 935 computers, 84 consoles and 98 pongs. However, old-computers.com is missing many vintage systems such as the Macintosh Classic from 1990. Collections of software and documentation also exist online, for example at Bitsavers.

# Computer forensics

**Computer forensics** is a branch of forensic science pertaining to legal evidence found in computers and digital storage mediums. Computer forensics is also known as *digital forensics.*

The goal of computer forensics is to explain the current state of a *digital artifact.* The term digital artifact can include a computer system, a storage medium (such as a hard disk or CD-ROM), an electronic document (e.g. an email message or JPEG image) or even a sequence of packets moving over a computer network. The explanation can be as straightforward as "what information is here?" and as detailed as "what is the sequence of events responsible for the present situation?"

The field of computer forensics also has sub branches within it such as firewall forensics, network forensics, database forensics and mobile device forensics.

There are many reasons to employ the techniques of computer forensics:

- In legal cases, computer forensic techniques are frequently used to analyze computer systems belonging to defendants (in criminal cases) or litigants (in civil cases).
- To recover data in the event of a hardware or software failure.
- To analyze a computer system after a break-in, for example, to determine how the attacker gained access and what the attacker did.
- To gather evidence against an employee that an organization wishes to terminate.
- To gain information about how computer systems work for the purpose of debugging, performance optimization, or reverse-engineering.

Special measures should be taken when conducting a forensic investigation if it is desired for the results to be used in a court of law. One of the most important measures is to assure that the evidence has been accurately collected and that there is a clear chain of custody from the scene of the crime to the investigator---and ultimately to the court. In order to comply with the need to maintain the integrity of digital evidence, British examiners comply with the Association of Chief Police Officers (A.C.P.O.) guidelines[1]. These are made up of four principles as follows:-

Principle 1: No action taken by law enforcement agencies or their agents should change data held on a computer or storage media which may subsequently be relied upon in court.

Principle 2: In exceptional circumstances, where a person finds it necessary to access original data held on a computer or on storage media, that person must be competent to do so and be able to give evidence explaining the relevance and the implications of their actions.

Principle 3: An audit trail or other record of all processes applied to computer based electronic evidence should be created and preserved. An independent third party should be able to examine those processes and achieve the same result.

Principle 4: The person in charge of the investigation (the case officer) has overall responsibility for ensuring that the law and these principles are adhered to.

# University of Cambridge Computer Laboratory



The Computer Laboratory has been housed in the William Gates Building in West Cambridge since August 2001.

The **Computer Laboratory** is the computer science department of the University of Cambridge. As of 2007, it employs 35 academic staff, 25 support staff, 35 affiliated research staff, and about 155 research students. The current head of department is Professor Andy Hopper.

The Computer Laboratory built and operated the world's first practical stored program computer (EDSAC, 1949) and offered the world's first taught course in computer science in 1953. It currently offers a 3-year undergraduate course, a 1-year masters course in speech technology and plans to introduce a full computer science masters course in 2009. Recent research has focused on virtualization, security, usability, formal verification, formal semantics of programming languages, computer architecture, natural language processing, wireless networking, biometric identification, routing, positioning systems and has achieved the top ratings in recent UK Research Assessment Exercise evaluations. A new research focus is sustainability (*"Computing for the future of the planet"*). Members of the Computer Laboratory have been involved in the creation of many successful UK IT companies such as Acorn, ARM, nCipher and XenSource.

# Online Computer Library Center

**OCLC Online Computer Library Center, Inc.** is a "nonprofit, membership, computer library service and research organization dedicated to the public purpose of furthering access to the world's information and reducing information costs", according to its website. It was founded in 1967 as the **Ohio College Library Center**. More than 60,000 libraries in 112 countries and territories around the world use OCLC services to locate, acquire, catalog, lend and preserve library materials.[1] The organization was founded by Fred Kilgour, and its head office is located in Dublin, Ohio, U.S.

OCLC acquired NetLibrary, the largest electronic content provider, in 2002. OCLC owns 100% of the shares of OCLC PICA, a library automation systems and services company which has its headquarters in Leiden in the Netherlands and which was renamed "OCLC" at the end of 2007.[2] In June 2006, the Research Libraries Group (RLG) merged into OCLC. On January 11, 2008, OCLC announced that it had purchased EZproxy.

# Flash Animation
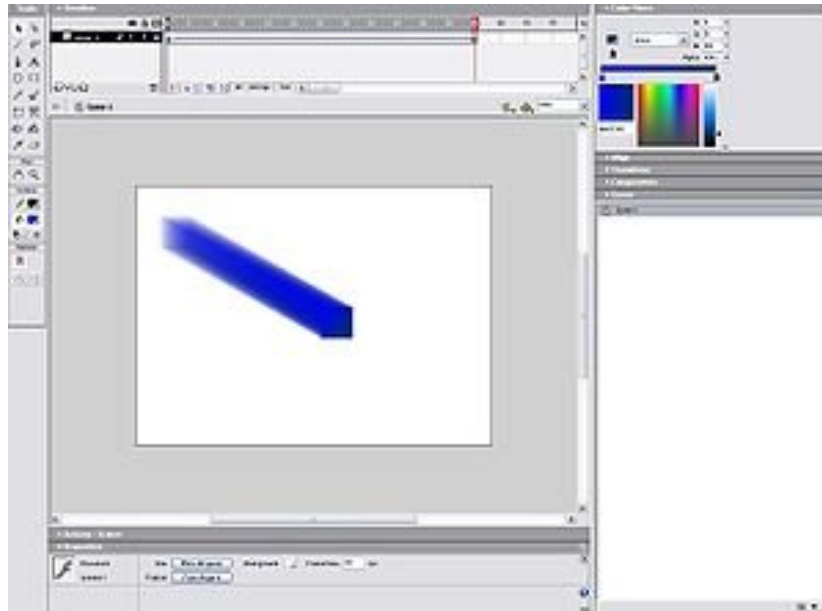
A **Flash animation** or **Flash cartoon** is an animated film which is created using Adobe Flash animation software and often distributed in the .swf file format. It can be created in Flash or with other programs capable of writing .swf files. The term Flash animation not only refers to the file format but to a certain kind of movement and visual style which, in many circles, is seen as simplistic or unpolished. However, with dozens of Flash animated television series, countless more Flash animated television commercials, and award-winning online shorts in circulation, Flash animation is enjoying a renaissance.

In the late 1990s, when for most Internet users, bandwidth was still at 56 kbit/s, many Flash animation artists employed limited animation or cutout animation when creating projects intended for web distribution. This allowed artists to release shorts and interactive experiences well under 1 MB, which could stream both audio and high-end animation. One example is the first episode of The Goddamn George Liquor Program released in 1999, rendered at only 628kB.

Some hallmarks of poorly-produced Flash animation are jerky natural movements (seen in walk-cycles and gestures), auto-tweened character movements, lip-sync without interpolation, and abrupt changes from front to profile view. Although Flash is able to integrate bitmaps and other raster-based art, as well as video, most Flash films are created using only vector-based drawings which often result in a somewhat clean graphic appearance.

Flash animations are typically distributed by way of the World Wide Web, in which case they are often referred to as **Internet cartoons**, **online cartoons**, or **webtoons**. Web Flash animations may be interactive and are often created in a **series**. A Flash animation is distinguished from a Webcomic, which is a comic strip distributed via the Web, rather than an animated cartoon.

The **Computing Technology Industry Association (CompTIA)**, a non-profit trade association, was created in 1982 as the Association of Better Computer Dealers, Inc. (ABCD) by representatives of five microcomputer dealerships. Over the course of a decade, ABCD laid the groundwork for many of CompTIA's initiatives and member benefits.

ABCD later changed its name to the Computing Technology Industry Association. The new name clearly reflected the association's evolving role in the computer industry and in the U.S. business landscape at large. The nineties were a period of extensive growth for the association as it broadened the scope of its activities to address the needs of the ever☐expanding computer industry. Its initiatives increased to include the networking, UNIX, imaging, mobile computing, and multimedia arenas. In an effort to monitor and take positions on public policy issues, the association added a full☐time Director of Public Policy position.

# Robotic Spacecraft
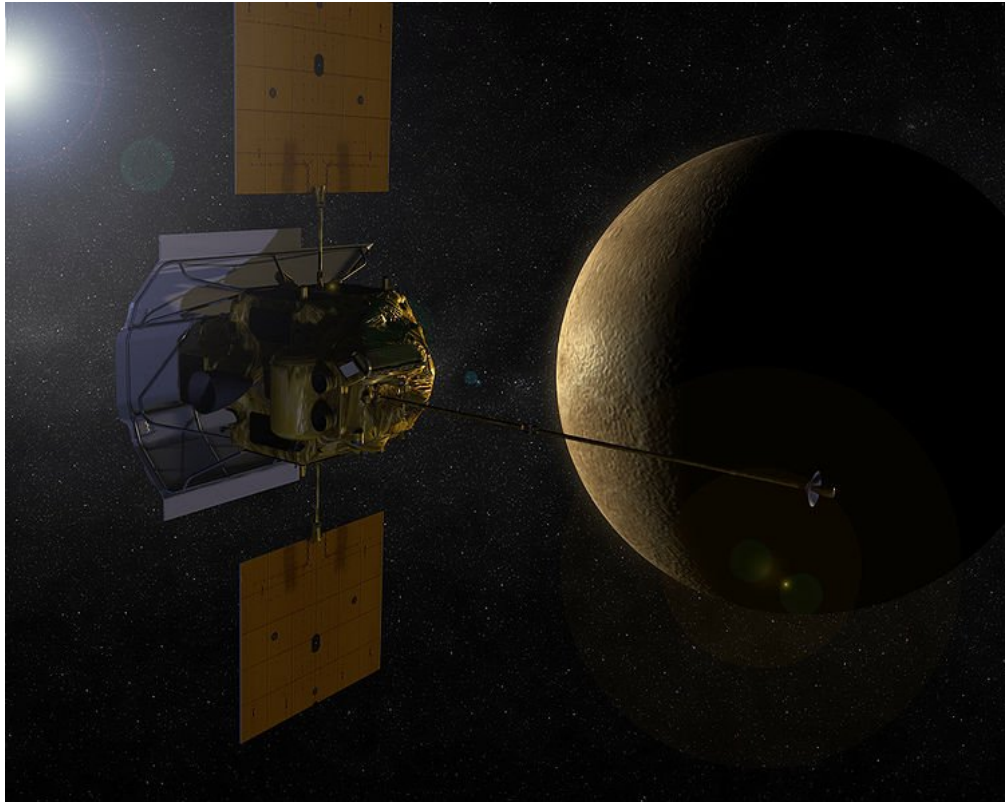


A **robotic spacecraft** is a spacecraft with no humans on board, that is usually under telerobotic control. A robotic spacecraft designed to make scientific research measurements is often called a space probe. Many space missions are more suited to telerobotic rather than crewed operation, due to lower cost and lower risk factors. In addition, some planetary destinations such as Venus or the vicinity of Jupiter are too hostile for human survival, given current technology. Outer planets such as Saturn, Uranus, and Neptune are too distant to reach with current crewed spaceflight technology, so telerobotic probes are the only way to explore them.