COMPUTER INFO-GALLERY

VOLUME - 2

Student's Assignments as IT Encyclopedia

PREFACE

This book is intended to make the new-comers to the Department of Computer Science, who do not have the ideas regarding the basics of the Computer and its terminologies. It can also help the students from computer backdrop, to make a review regarding IT concepts. Already Volume I has been launched in the academic year 2012-13.

The thought of publishing this book arises as a sparkle to make the Student's Assignments, in an organized manner. I had an idea that, if the topics given to the students to prepare their Assignments are non-repetitive, then they may do it without copying others' content. Then, I thought why not we club it together in the form of a book, which will help other students also. That is how this book got emerged. This is Volume II for the academic year 2013-14 with some other useful contents to make the students very well equipped in the foundation level.

The copy of this book will be maintained in the Department Library. I hereby deliver my heartfelt thanks to the most respected Correspondent Sir, the Principal Sir, and the H.O.D. (CS) Mr.P.Ramesh sir, who gave me the freedom, to conduct an activity of this kind. I thank my colleagues and my senior staff members who have given me a moral support. I also thank my dear students for their co-operation. I hereby assure that the Department of Computer Science (UG) will always find ways for the betterment of the students.

Thanking You,

INFO- GALLRY IN-CHARGE

(R.Sundar Raj)

CONTENT

BEST WISHES

To all of your present and future innovations for the betterment of our institution……

H.O.D **Principal** **Correspondent**

Assignment Contributions

Class : I B.Sc (CS) - 'A'

S.NO	NAME	TOPIC NO.
1	M.PAVITHRA	1
2	S.VAISHNAVI	2
3	B.SATHYAA	3
4	V.KEERTHANA	4
5	R.NAVEEN KUMAR	5
6	S.ARUN PRASATH	6
7	P.ANANDHARAJ	7

UNDER THE GUIDANCE OF : **Ms. S.Gowthami**

Class : I B.Sc (CS) - 'B'

S.NO	NAME	TOPIC NO.
1	K.DEEPIKA	8
2	K.GOMATHI	9
3	S. SYED ALI FATHIMA	10
4	L.RANJITH KHANNAA	11
5	S.P.MEENA	12
6	A.NANDHINI	13
7	M.VIGNESHWARAN	14

UNDER THE GUIDANCE OF : **Ms. P.Akilandeshwari**

Class : I B.Sc (CS) - 'C'

S.NO	NAME	TOPIC NO.
1	G.MANIKANDAKARTHIK	15
2	S.DINESH BALAJI	16
3	P.ASHOK RAJA	17
4	K.VIGNESH	18
5	S.SIBICHAKKARAVARTHI	19
6	S.MOHAN RAJ	20
7	M.RATHNA PRIYA	21

UNDER THE GUIDANCE OF : **Mr.T.Velumani**

Class : II B.Sc (CS) - 'A'

S.NO	NAME	TOPIC NO.
1	M.ABDUL KHADHI	22
2	S.JANANI	23
3	K.KAPILESWARN	24
4	M.SATHYA	25
5	S.MANI BHARATHI	26
6	M.PAVITHRA	27
7	V.PRABHAKARAN	28

UNDER THE GUIDANCE OF : **Mrs.R.Pushpalatha**

Class : II B.Sc (CS) - 'B'

S.NO	NAME	TOPIC NO.
1	R.JAYA SHREE	29
2	J.MITHRA SUPRAJA	30
3	D.BOOBALAN	31
4	K.SELVA KUMAR	32
5	M.T.GOMATHI	33
6	V.PAVITHRA	34
7	C.KARTHIK	35

UNDER THE GUIDANCE OF : **Mrs.R.Saveetha**

Class : II B.Sc (CS) - 'C'

S.NO	NAME	TOPIC NO.
1	P.SWETHA	36
2	S.SANTHOSH KUMAR	37
3	M.MUTHUKUMAR	38
4	P.KRISHNAH KUMAAR	39
5	S.THARIQ IQSHAN	40
6	S.ARAVIND	41
7	S.SUGANESH	42
8	S.YAMINI DEVI	43
9	D.ARUNA	44

UNDER THE GUIDANCE OF : **Mr.R.Sundar Raj**

Class : III B.Sc (CS) - 'A'

S.NO	NAME	TOPIC NO.
1	K.K.NANDHINI	45
2	S.MATHIARASU	46
3	K.POORNIMA DEVI	47
4	S.SABARINATH	48
5	D.SATHISH KUMAR	49
6	T.DEEPIKA	50
7	S.SUREKA	51

UNDER THE GUIDANCE OF : **Mr.A.R.Karthekeyan**

Class : III B.Sc (CS) - 'B'

S.NO	NAME	TOPIC NO.
1	S.PRIYANGA	52
2	R.ANU PRIYA	53
3	P.DEEPAK	54
4	C.RAJA	55
5	S.KUPPURAJ	56
6	T.NIVETHA	57
7	G.AISHWARYA	58

UNDER THE GUIDANCE OF : **Mrs. K.Gomathy**

LOGO DESIGNERS:

1. M.Muthu Kumar II B.Sc(CS)-C
2. K.Nirmal Kumar II B.Sc(CS)-C

STACK

Stack is a particular kind of abstract data type or collection in which the principal operations on the collection are the addition of an entity to the collection, known as ***push*** and removal of an entity, known as ***pop*.** The relation between the push and pop operations is such that the stack is a Last-In-First-Out (LIFO) data structure.

In a LIFO data structure, the last element added to the structure must be the first one to be removed. This is equivalent to the requirement that, considered as a linear data structure, or more abstractly a sequential collection, the push and pop operations occur only at one end of the structure, referred to as the *top* of the stack. Often a *peek* or *top* operation is also implemented, returning the value of the top element without removing it. A stack may be implemented to have a bounded capacity. If the stack is full and does not contain enough space to accept an entity to be pushed, the stack is then considered to be in an overflow state. The pop operation removes an item from the top of the stack. A pop either reveals previously concealed items or results in an empty stack, but, if the stack is empty, it goes into underflow state, which means no items are present in stack to be removed.

Basic Operations Performed on Stack

1. Create
2. Push
3. Pop

Creating Stack

- Stack can be created by declaring the structure with two members.
- One member can be store the actual data in the form of array.
- Another member can store the position of the top most element.

Syntax

typedef struct stack

{

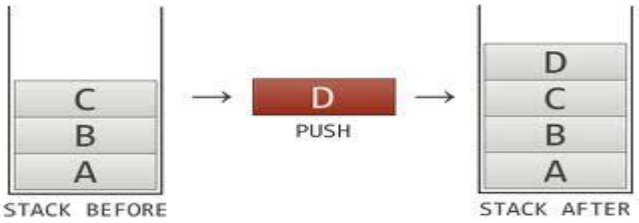
int data[MAX];

int top;

}stack;

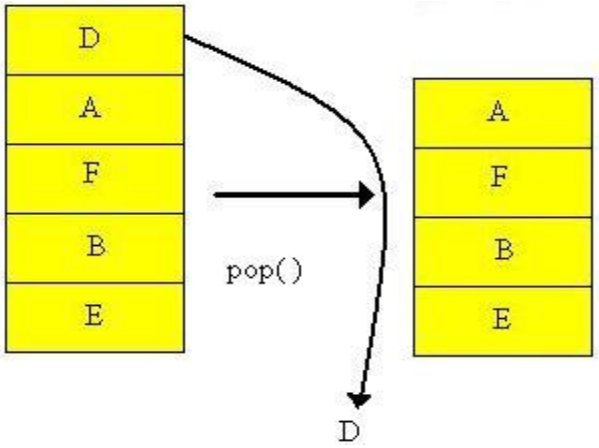
Push Operation on Stack

To add any element in the 'data' array then it will be called as "Pushing Data on the Stack".



Pop Operation on Stack

To remove element from the stack this operation is called as POP Operation on stack.



QUEUE

What Is Queue?

A queue is an ordered collection of items where the addition of new items happens at one end, called the "rear," and the removal of existing items occurs at the other end, commonly called the "front." As an element enters the queue it starts at the rear and makes its way toward the front, waiting until that time when it is the next element to be removed.

The most recently added item in the queue must wait at the end of the collection. The item that has been in the collection the longest is at the front. This ordering principle is sometimes called **FIFO**, **first-in first-out**. It is also known as "first-come first-served."

Figure 1: A Queue of Python Data Objects

In addition to printing queues, operating systems use a number of different queues to control processes within a computer. The scheduling of what gets done next is typically based on a queuing algorithm that tries to execute programs as quickly as possible and serve as many users as it can.

The Queue Abstract Data Type

The queue abstract data type is defined by the following structure and operations. A queue is structured, as described above, as an ordered collection of items which are added at one end, called the "rear," and removed from the other end, called the "front." Queues maintain a FIFO ordering property. The queue operations are given below.

- Queue() creates a new queue that is empty. It needs no parameters and returns an empty queue.
- enqueue(item) adds a new item to the rear of the queue. It needs the item and returns nothing.

- dequeue() removes the front item from the queue. It needs no parameters and returns the item. The queue is modified.
- isEmpty() tests to see whether the queue is empty. It needs no parameters and returns a boolean value.

As an example, to assume that q is a queue that has been created and is currently empty, then *Table 1* shows the results of a sequence of queue operations. The queue contents are shown such that the front is on the right. 4 was the first item enqueued so it is the first item returned by dequeue.

Table 1: Example Queue Operations

Queue Operation	Queue Contents	Return Value
q.isEmpty()	[]	True
q.enqueue(4)	[4]	
q.enqueue('dog')	['dog',4]	
q.enqueue(True)	[True,'dog',4]	
q.size()	[True,'dog',4]	3
q.isEmpty()	[True,'dog',4]	False
q.enqueue(8.4)	[8.4,True,'dog',4]	
q.dequeue()	[8.4,True,'dog']	4
q.dequeue()	[8.4,True]	'dog'

Implementing a Queue in Python

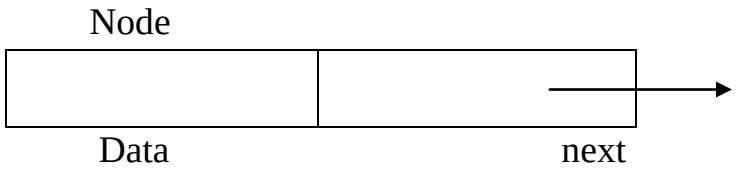
To decide which end of the list to use as the rear and which to use as the front. The implementation shown in *Listing 1* assumes that the rear is at position 0 in the list. This allows us to use the insert function on lists to add new elements to the rear of the queue. The pop operation can be used to remove the front element (the last element of the list). Recall that this also means that enqueue will be O(n) and dequeue will be O(1).

LINKED LIST

Introduction

Linked list is an ordered collection of series of structures. The elements of a linked list need not necessarily be stored in adjacent memory locations as in arrays. Each element in the list contains a field called a link or pointer which holds the address of next element in the list. It is a linear collection of data elements called nodes, where the linear order is implemented by means of pointers. Each node in the list contains two fields: data, which holds list element and next, which stores the address of next node in list.

- The node at the end of the list stores NULL in its next field.
- A pointer to the head of the list is used to gain access to the list itself and the end of the list is denoted by the NULL pointer.



Creation of a Node

A node is created by allocating memory to a structure.

"struct test struct*ptr= (struct test struct*) malloc (size of (struct test struct));"

The pointer 'ptr' now contains address of a newly created node. If the linked list is empty and first node is created then it is also known as head node. Once a node is created, then it can be assigned the value (that it is created to hold) and its next pointer is assigned the address of next node. If no next node exists (or if it's the last node) then as already discussed, a NULL is assigned.

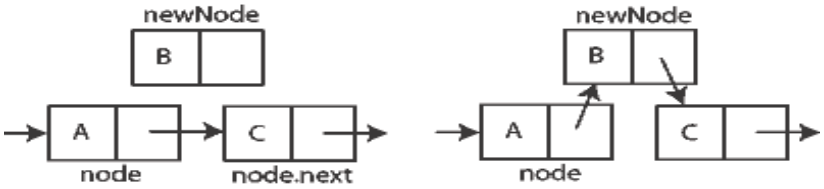
Search a Node in a Linked List

Searching a node means finding the node that contains the value being searched. One just needs to start with the first node and then compare the value which is being searched with the value contained in this node. If the value does not match then through the 'next' pointer (which contains the address of next node) the next node is accessed and same value comparison is done there. The

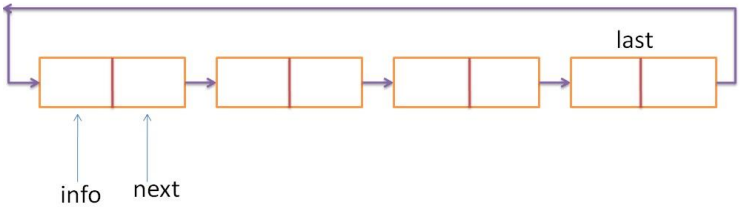
search goes on until last node is accessed or node is found whose value is equal to the value being searched.

Types of Linked List

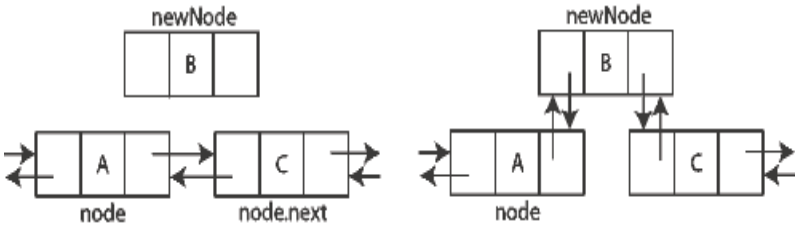
Singly Linked List: A linked list in which each node has a single link to its next node is called a singly linked list.



Circular Linked List: A linked list in which the last node points to the header node or start node is called a circular linked list. The circular linked lists have neither a beginning nor an end. A slight change in the structure of linked list is made, that is the next field of last node is made to point to the first node rather than a NULL pointer.



Doubly Linked List: A doubly linked list is one in which all nodes are linked together by double links. Each node in a doubly linked list uses two pointers, one pointing to the next node and the other pointer to the preceding node. It can be traversed in two directions either from the beginning of the list to the end or in the backward direction from end of the beginning.



DATABASE

Definition

Database means a collection of data fields that make up a record. This information is easily updated and/or edited. You can create charts for presentations using the records of a database.

Database Types

Based on the conceptual structures, the databases can be classified as follows:

1. Flat-file database.

2. Relational database.

3.Object-oriented database.

4. Network database.

5. Hierarchical database.

Flat File Database

The flat-file style of database are ideal for small amounts of data that needs to be human readable or edited by hand such as address lists or inventories The typical flat-file database is split up using a comma delimiter.

Disadvantages of Flat File Database

One of the main problems with using flat files for even a semi-active database is the fact that it is very prone to corruption. There is no inherent locking mechanism that detects when a file is being used or modified, and so this has to be done on the script level.

Even if care is taken to lock and unlock the file on each access, a busy script can cause a "race condition" and it is possible for a file to be wiped clean by two or more processes that are fighting for the lock; the timing of your file locks will become more and more important as a site gets busy.

Relational Database

The relational databases such as My SQL, Microsoft SQL Server and Oracle, have a much more logical structure in the way that it stores data. Tables

can be used to represent real world objects, each field acting like an attribute. For example, a table called books could have the columns title, author and ISBN, which describe the details of each book where each row in the table is a new book.

Object Oriented Database

An object oriented database is a newer structure that has been generating a great deal of interest in reason years. It represents very different approach to the way data is treated by database developers and users.

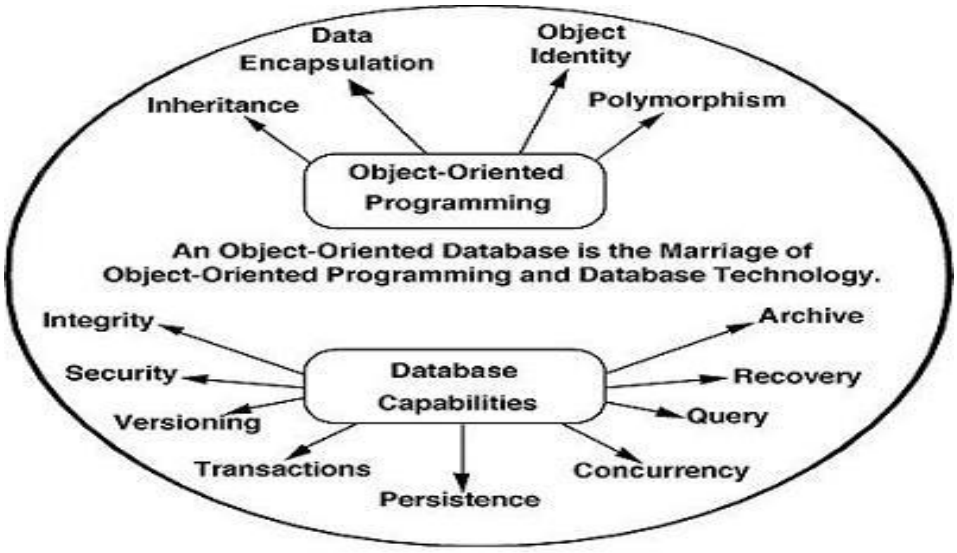


Figure 1. Makeup of an Object-Oriented Database

Network Database

The network database is very similar to the hierarchical structure except that any one record type can relate to any number of other record types.

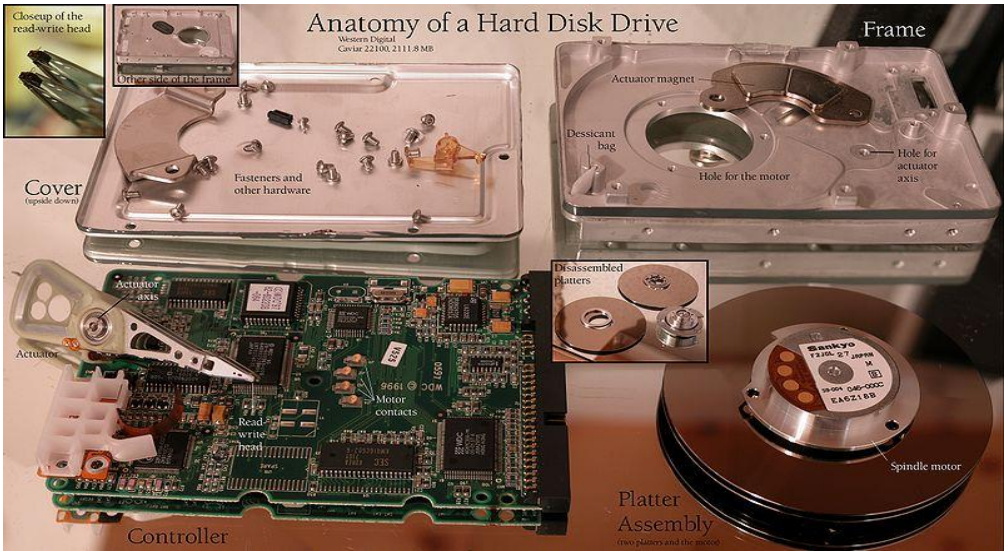
Hierarchical Database

The hierarchical database structures were primarily used on main frame computers. In hierarchical databases, records are organized in a tree like structure by type. The relationship between record types is said to be a parent-child relationship, in which any child type relates only to a single parent type.

HARD DISK

A hard disk is a data storage device used for storing and retrieving digital information using rapidly rotating disks (platters) coated with magnetic material. An HDD(Hard Disk Drive) retains its data even when powered off. Data is read in a random-access manner, meaning individual blocks of data can be stored or retrieved in any order rather than sequentially. An HDD consists of one or more rigid ("hard") rapidly rotating disks (platters) with magnetic heads arranged on a moving actuator arm to read and write data to the surfaces.

Introduced by IBM in 1956, HDDs became the dominant secondary storage device for general purpose computers by the early 1960s. Continuously improved, HDDs have maintained this position into the modern era of servers and personal computers. More than 200 companies have produced HDD units, though most current units are manufactured by Seagate, Toshiba and Western Digital.



History

HDDs were introduced in 1956 as data storage for an IBM real-time transaction processing computer and were developed for use with general purpose mainframe and minicomputers. The first IBM drive, the 350 RAMAC, was approximately the size of two refrigerators and stored 5 million 6-bit characters (the equivalent of 3.75 million 8-bit bytes or 3.75 MB or megabytes) on a stack of 50 disks.

In 1961 IBM introduced the model 1311 disk drive, which was about the size of a washing machine and stored two million characters on a removable

disk pack. Users could buy additional packs and interchange them as needed, much like reels of magnetic tape

Magnetic recording

An HDD records data by magnetizing a thin film of ferromagnetic material on a disk. Sequential changes in the direction of magnetization represent binary data bits. User data is encoded using an encoding scheme, such as run-length limited encoding, which determines how the data is represented by the magnetic transitions.

A typical HDD design consists of a spindle that holds flat circular disks, also called platters, which hold the recorded data. The platters are made from a non-magnetic material, usually aluminium alloy, glass, or ceramic, and are coated with a shallow layer of magnetic material typically 10–20 nm in depth, with an outer layer of carbon for protection

Components

A typical HDD has two electric motors; a spindle motor that spins the disks and an actuator (motor) that positions the read/write head assembly across the spinning disks. The disk motor has an external rotor attached to the disks; the stator windings are fixed in place. Opposite the actuator at the end of the head support arm is the read-write head; thin printed-circuit cables connect the read-write heads to amplifier electronics mounted at the pivot of the actuator. The head support arm is very light, but also stiff; in modern drives.

Future development

HDD areal densities have shown a long term compound annual growth rate not substantively different from Moore's Law, most recently in the range of 20-25% annually, with desktop 3.5" drives estimated to hit 12 TB around 2016.

- Heat-assisted magnetic recording (HAMR)
- Bit-patterned recording (BPR)
- Current Perpendicular to Plane giant magneto-resistance (CPP/GMR) heads
- Shingled magnetic recording (SMR)

DISK DRIVE

Definition

Disk storage is a general category of storage mechanisms where data are recorded by various electronic, magnetic, optical, or mechanical changes to a surface layer of one or more rotating **disks**. A disk drive is a device implementing such a storage mechanism and is usually distinguished from the disk medium. Notable types are the hard disk drive (HDD) containing a non-removable disk, the floppy disk drive (FDD) and its removable floppy disk, and various optical disc drives and associated optical disc media.

Background

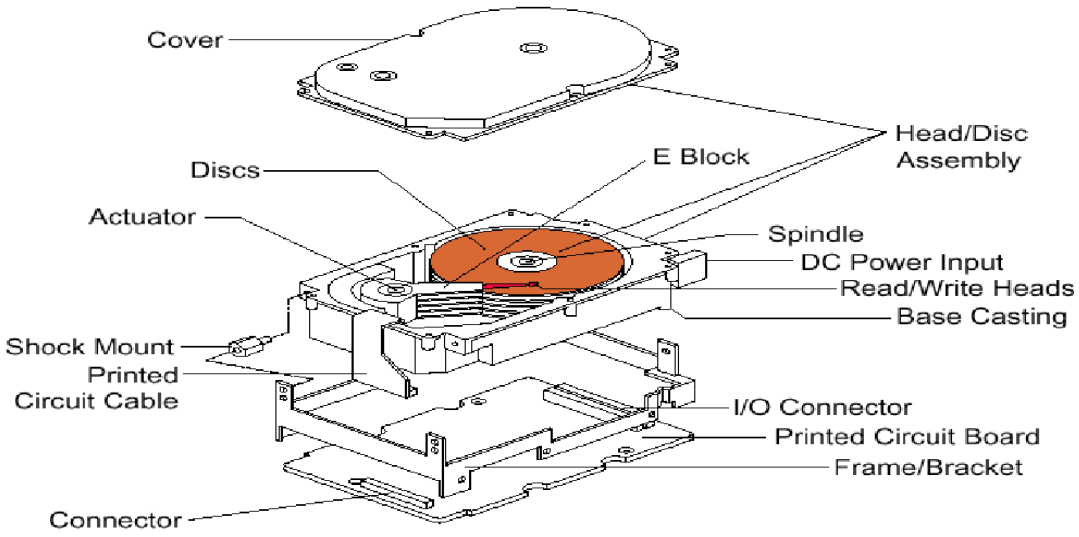
Musical and audio information was originally recorded by analog methods . Similarly the first video disc used an analog recording method. In the music industry, analog recording has been mostly replaced by digital optical technology where the data is recorded in a digital format with optical information.

The first commercial digital disk storage device was the IBM 350 which shipped in 1956 as a part of the IBM 305 RAMAC computing system. The random-access, low-density storage of disks was developed to complement the already used sequential-access, high-density storage provided by tape drives using magnetic tape. Vigorous innovation in disk storage technology, coupled with less vigorous innovation in tape storage, has reduced the difference in acquisition cost per terabyte between disk storage and tape storage; however, the total cost of ownership of data on disk including power and management remains larger than that of tape.

Access methods

Digital disk drives are block storage devices. Each disk is divided into logical blocks (collection of sectors). Blocks are addressed using their logical

block addresses (LBA). Read from or writing to disk happens at the granularity of blocks.



There are two types of disk rotation methods:

- Constant linear velocity (used mainly in optical storage) varies the rotational speed of the optical disc depending upon the position of the head, and
- Constant angular velocity (used in HDDs, standard FDDs, a few optical disc systems, and vinyl audio records) spins the media at one constant speed regardless of where the head is positioned.

Track positioning also follows two different methods across disk storage devices. Storage devices focused on holding computer data, e.g., HDDs, FDDs, Iomega zip drives, use concentric tracks to store data. During a sequential read or write operation, after the drive accesses all the sectors in a track it repositions the head(s) to the next track. This will cause a momentary delay in the flow of data between the device and the computer. In contrast, optical audio and video discs use a single spiral track that starts at the inner most point on the disc and flows continuously to the outer edge.

When reading or writing data, there is no need to stop the flow of data to switch tracks. This is similar to vinyl records except vinyl records started at the outer edge and spiraled in toward the center.

FREEWARE

Definition

Freeware is computer software that is made available free of charge, but which is copyrighted by its developer, who retains the rights to control its distribution, modify it and sell it in the future. It is typically distributed without its source code, thus preventing modification by its users. Source code is the version of software as it is originally written by a human in plain text and before it is converted into its final, executable form by a compiler. Source code can be written in any of numerous programming languages, some of the most popular of which are C, C++, Java, Perl, PHP and Tcl/Tk.

Freeware is usually distributed with a license that permits its redistribution to some extent, for example allowing users to give copies to friends. However, there may be restrictions, such as limitations on its commercial use. Some licenses permit the software to be freely copied but not sold. Another common provision is the prohibition of use by the military

Comparison With Other Types of Software:

Freeware is very different from free software. The latter term generally refers to software that is free not only in a monetary sense but also in that there are no restrictions on its use, including the rights to modify it and redistribute the modified forms.

Freeware is also different from open source software. The latter term refers to software for which the source code is made freely available and for which there are very minimal restrictions on its use. Open source software is

usually also free in a monetary sense, and thus in most cases is the same thing as free software.

The most frequently used license for free software is the GNU General Public License (GPL). The GPL requires (1) that the source code be made freely available for any GPL-licensed software, including modified versions of such software, that is redistributed and (2) that the text of the copyrighted GPL license itself be included with any redistribution.

BSD style licenses are even less restrictive than the GPL in that they only require the original copyright notice to be kept intact and do not require the source code to be made available for redistributions of modified versions. Among the best known examples of software released under such license are FreeBSD and the other BSD operating systems.

Adobe's Photoshop LE and its successor, Photoshop Elements, can be considered liteware. They could be considered freeware only in the sense that they are bundled with the purchase of some scanners, and thus in effect are free to such purchasers; unlike most freeware, they were never available as free downloads.

Motivations For Releasing Software as Freeware:

There are several reasons that developers might make their software available as freeware. They include

(1) To serve as a loss leader in order to attract customers to other services or products that they provide for a fee,

(2) Because other methods of distribution are unlikely to make a profit or because the software is outdated and is no longer worth selling.

(3) Out of a genuine desire to do good and help make the world a better place.

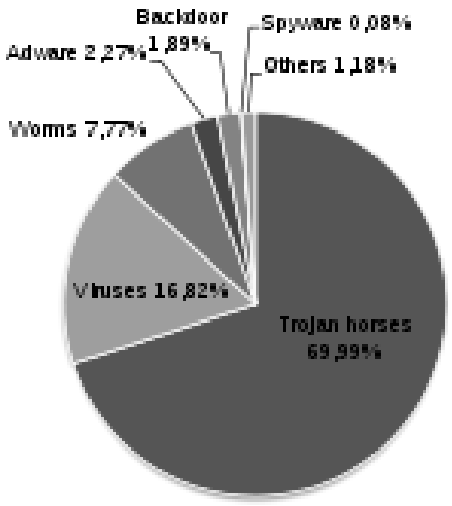
MALWARE

Malware, short for **malicious software**, is software used to disrupt computer operation, gather sensitive information, or gain access to private computer systems. It can appear in the form of code, scripts, active content, and other software.

'Malware' is a general term used to refer to a variety of forms of hostile or intrusive software.Malware includes computer viruses, ransomware, worms, trojan horses, rootkits, keyloggers, dialers, spyware, adware, malicious BHOs, rogue security software and other malicious programs; the majority of active malware threats are usually worms or trojans rather than viruses. In law, malware is sometimes known as a **computer contaminant**, as in the legal codes of several U.S. states.

Malware is different from defective software, which is a legitimate software but contains harmful bugs that were not corrected before release. However, some malware is disguised as genuine software, and may come from an official company website in the form of a useful or attractive program which has the harmful malware embedded in it along with additional tracking software that gathers marketing statistics. Software such as anti-virus, anti-malware, and firewalls are relied upon by users at home, small and large organizations around the globe to safeguard against malware attacks which helps in identifying and preventing the further spread of malware in the network.

Purposes



Malware by categories March 16, 2011

Many early infectious programs, including the first Internet Worm, were written as experiments or pranks. Today, malware is used primarily to steal . Malware used broadly against government or corporate websites to gather guarded information, or to disrupt their operation in general. However, malware is often used against individuals to gain personal information such as social security numbers, bank or credit card numbers, and so on. Left unguarded, personal and networked computers can be at considerable risk against these threats. (These are most frequently counter-acted by various types of firewalls, anti-virus software, and network hardware).

Since the rise of widespread broadband Internet access, malicious software has more frequently been designed for profit. Since 2003, the majority of widespread viruses and worms have been designed to take control of users' computers for black-market exploitation. Infected "zombie computers" are used to send email spam, to host contraband data such as child pornography or to engage in distributed denial-of-service attacks as a form of extortion.

Another strictly for-profit category of malware has emerged, called spyware. These programs are designed to monitor users' web browsing, display unsolicited advertisements, or redirect affiliate marketing revenues to the spyware creator. Spyware programs do not spread like viruses; instead they are generally installed by exploiting security holes. They can also be packaged together with user-installed software, such as peer-to-peer applications.

Proliferation

Preliminary results from Symantec published in 2008 suggested that "the release rate of malicious code and other unwanted programs may be exceeding that of legitimate software applications. The prevalence of malware as a vehicle for Internet crime, along with the challenge of anti-malware software to keep up with the continuous stream of new malware, has seen the adoption of a new mindset for individuals and businesses using the Internet. With the amount of malware currently being distributed, some percentage of computers will always be infected. For businesses, especially those that sell mainly over the Internet, this means they need to find a way to operate despite security concerns.

FIRMWARE

Origin of the term:

Ascher Opler coined the term "firmware" in a 1967 ***Datamation*** article.

Firmware:

Firmware is a software program permanently etched into a hardware device such as a keyboards, hard drive, BIOS, or video cards. It is programmed to give permanent instructions to communicate with other devices and perform functions like basic input/output tasks. It can be **erased and rewritten**. Firmware is a combination of software and hardware. Computer chips that have data or programs recorded on them are firmware. These chips commonly include the following:

- ROMs (read-only memory)
- PROMs (programmable read-only memory)
- EPROMs (erasable programmable read-only memory)

Firmware in PROM or EPROM is designed to be updated through a software update.Common reasons for updating firmware include fixing bugs or adding features to the device. This may require physically changing ROM integrated circuitsFirmware such as the ROM BIOS of a personal computer may contain only elementary basic functions of a device and may only provide services to higher-level software.

ROM BIOS firmware on a Baby AT motherboard

Before integrated circuits, other firmware devices included a discrete semiconductor diode matrix. The Apollo guidance computer had

firmware consisting of a specially manufactured core memory plane, called "core rope memory", where data was stored by physically threading wires through (1) or around (0) the core storing each data bit.Firmware such as the program of an embedded system may be the only program that will run on the system and provide all of its functions.

Typical examples of devices containing firmware are embedded systems (such as traffic lights, consumer appliances, and digital watches), computers, computer peripherals, mobile phones, and digital cameras. The firmware contained in these devices provides the control program for the device.

Levels of firmware:

1. **Low Level Firmware**: This is found in ROM, OTP/PROM and PLA structures. Low level firmware is often read-only memory and cannot be changed or updated. It is sometimes referred to as hardware.
2. **High Level Firmware**: This is used in flash memory for updates that is often considered as software.
3. **Subsystems**: These have their own fixed microcode embedded in flash chips, CPUs and LCD units. A subsystem is usually considered part of the hardware device as well as high level firmware.

Examples of firmware:

In consumer products:

- Timing and control systems for *washing machines*
- Controlling sound and video attributes, as well as the channel list, in modern TVs

In computers:

- The BIOS found in IBM-compatible personal computers
- The (U)EFI-compliant firmware used on Itanium systems, Intel-based computers from Apple, and many Intel desktop computer motherboards

GUI

The graphical user interface is presented (displayed) on the computer screen. It is the result of processed user input and usually the primary interface for human-machine interaction. The touch user interfaces popular on small mobile devices are an overlay of the visual output to the visual input. In computing, **graphical user interface** (**GUI**, sometimes pronounced 'gooey') is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, as opposed to text-based interfaces, typed command labels or text navigation. GUIs were introduced in reaction to the perceived steep learning curve of command-line interfaces (CLI), which require commands to be typed on the keyboard.

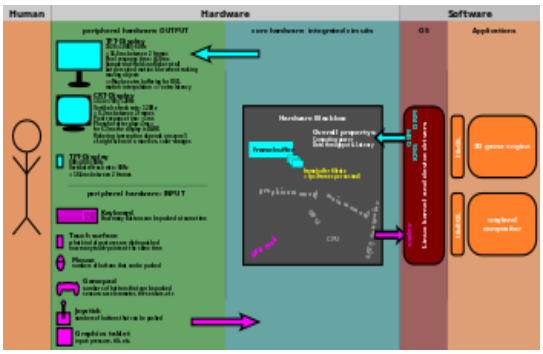


Figure 1

The actions in GUI are usually performed through manipulation of the graphical elements. Besides in computers, GUIs can be found in hand-held devices such as MP3 players, portable media players, gaming devices, household appliances, office, and industry equipment. The term ***GUI*** is usually not applied to other low-resolution types with display resolutions, such as video games(where HUD is preferred), or not restricted to flat screens, like volumetric[because the term is restricted to the scope of two-dimensional display screens able to describe generic information, in the tradition of the computer science research at the PARC (Palo Alto Research Center)

User Interface and Interaction Design

Designing the visual composition and temporal behavior of GUI is an important part of software application programming in the area of human. Its goal is to enhance the efficiency and ease of use for the underlying logical design of a stored program, a design discipline known as usability. Methods

of user-centered design are used to ensure that the visual language introduced in the design is well tailored to the tasks.

The visible graphical interface features of an application are sometimes referred to as "chrome" or "Gui" (Goo-ee). Typically, the user interacts with information by manipulating visual widgets that allow for interactions appropriate to the kind of data they hold. The widgets of a well-designed interface are selected to support the actions necessary to achieve the goals of the user. A model-view-controller allows for a flexible structure in which the interface is independent from and indirectly linked to application functionality, so the GUI can be easily customized. This allows the user to select or design a different *skin* at will, and eases the designer's work to change the interface as the user needs evolve. Good user interface design relates to the user, not the system architecture.

Large widgets, such as windows, usually provide a frame or container for the main presentation content such as a web page, email message or drawing. Smaller ones usually act as a user-input tool.

A GUI may be designed for the requirements of a vertical market as application-specific graphical user interfaces. Examples of application-specific GUIs are:

- Automated teller machines (ATM)
- Point-Of-Sale touch screens at restaurants
- Self-service checkouts used in a retail store
- Airline self-ticketing and check-in
- Information kiosks in a public space, like a train station or a museum
- Monitors or control screens in an embedded industrial application which employ a real time operating system (RTOS).

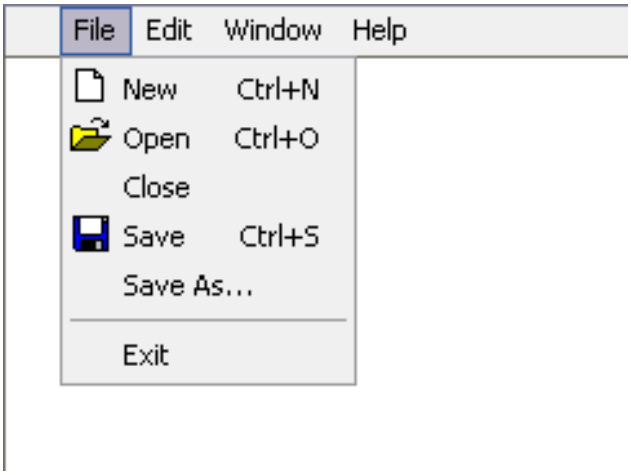
The latest cell phones and handheld game systems also employ application specific touch screen GUIs. Newer automobiles use GUIs in their navigation systems and touch screen multimedia centers.

A GUI uses a combination of technologies and devices to provide a platform that the user can interact with, for the tasks of gathering and producing information.

MENUS AND MENU ITEMS

In computing and telecommunications, a menu is a list of options or commands presented to an operator by a computer or communications system. Choices given from a menu may be selected by the operator by a number of methods (called interfaces):

1. Entering the identifier for the desired menu item from a keyboard
2. Positioning a cursor or reverse video bar by using a keyboard, mouse, or remote control D-pad
3. Using an electromechanical input device, such as a light pen
4. Touching the display screen with a finger
5. Speaking to a voice-recognition system



A computer using a command line interface may present a list of relevant commands as a memory aid to the operator. The operator may then enter a selection from the menu at the command line.

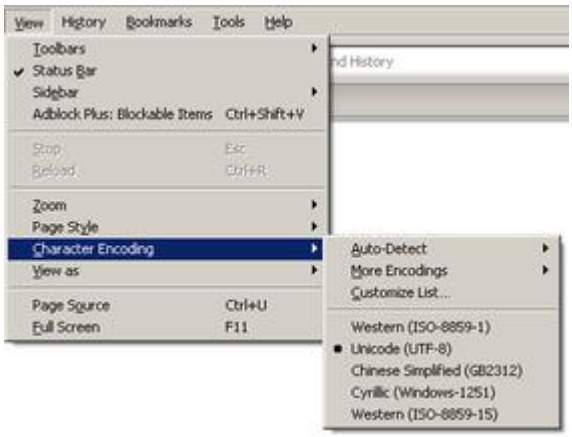
A computer using a graphical user interface presents menus with a combination of text and symbols to represent choices. By ***clicking*** on one of the symbols or text, the operator is selecting the instruction that the symbol represents.

A context menu is a menu in which the choices presented to the operator are automatically modified according to the current context in which the operator is working.

A common use of menus is to provide convenient access to various operations such as saving or opening a file, quitting a program, or manipulating data. Most widget toolkits provide some form of pull-down or pop-up menu. Pull-down menus are the type commonly used in menu bars (usually near the top of a window or screen), which are most often used for performing actions,

whereas pop-up (or "fly-out") menus are more likely to be used for setting a value, and might appear anywhere in a window.

Sub-menus



Menu and expanded sub-menu

Menus are sometimes hierarchically organized, allowing navigation through different levels of the menu structure. Selecting a menu entry with an arrow will expand it, showing a second menu (the sub-menu) with options related to the selected entry.

Usability of sub-menus has been criticized as difficult, because of the narrow height that must be crossed by the pointer. The steering law predicts that this movement will be slow, and any error in touching the boundaries of the parent menu entry will hide the sub-menu. Some techniques proposed to alleviate these errors are keeping the sub-menu open while moving the pointer in diagonal, and using Mega Drop-Down menus designed to enhance scannability and categorization of its contents.

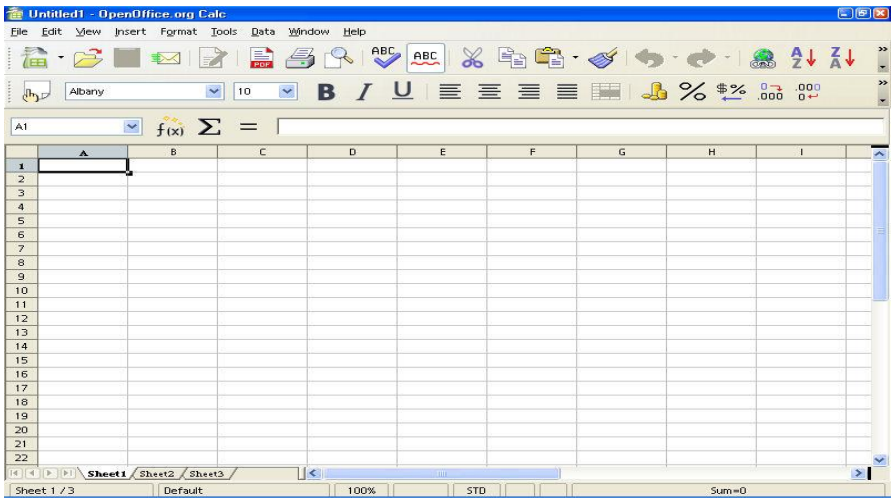
According to traditional human interface guidelines, menu names were always supposed to be ***verbs,*** such as "file", "edit" and so on.[1] This has been largely ignored in subsequent user interface developments. A single-word verb however is sometimes unclear, and so as to allow for multiple word menu names, the idea of a vertical menu was invented, as seen in NeXTSTEP.

Menus are now also seen in consumer electronics, starting with TV sets and VCRs that gained on-screen displays in the early 1990s, and extending into computer monitors and DVD players. Menus allow the control of settings like tint, brightness, contrast, bass and treble, and other functions such as channel memory and closed captioning. Other electronics with text-only displays can also have menus, anything from business telephone systems with digital telephones, to weather radios that can be set to respond only to specific weather warnings in a specific area. Other more recent electronics in the 2000s also have menus, such as digital media players.

SPREAD SHEET

A Spreadsheet application is a computer program such as excel, Open office, calc or Google Docs Spreadsheet .It has a number of built in features and tools, such as functions , formulas , charts and data analysis tools that make it easier to work with large amount of data. The term is also used to refer to the computer file created by the above mentioned program.

In this sense, a spreadsheet is a file used to store various types of data. The basic storage unit for spreadsheet file is a table. In a table data is arranged in rows and columns to make it easier to store, organize and analyze the information.



In excel an individual spreadsheet file is referred to as a workbook. A term related to this is worksheet, which, in excel, refers to a single page or sheet in a workbook. By default, excel has **three worksheet per workbook**.

So to put it all together a spreadsheet program such as, excel, is used to create a workbook file that contains one or more worksheets containing data.

Spreadsheet applications:

1. Payment of bills
2. Income tax calculations
3. Inventory control
4. Invoices or bills
5. Account statements
6. Cost-benefits analysis

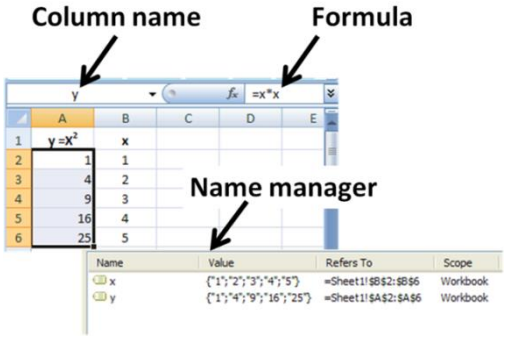
7. Financial accounting
8. Tender evaluation
9. Result analysis of students

Advantage of using electronic spreadsheet:

1. The electronic spreadsheet offers several advantages over the manual one. The following are some of the main advantages of electronic spreadsheet:
2. Calculations are automated through the build-in mathematical, financial and statistical functions.
3. Accurate results to any desired level of decimal points are possible.
4. Worksheet can be quite big in size.
5. Any part of the worksheet can be viewed or edited
6. Worksheet can be saved and retrieved later
7. Any part or whole of an existing worksheet can be merged with any existing or new worksheet.

Popular spreadsheet software:

The popular spreadsheet programs are "Excel from Microsoft Corporation, Quattro Pro from Borland International, Improve from Lotus Corporation and Star office Calc from Sun Microsystems."



In the first figure is the spreadsheet. At the top of the window is the Menu bar. Below the menu bar is the Main toolbar. Below the main toolbar are the Function bar and the Object bar. Below these bars is the Formula bar. Below the formula bar are the column headings of the worksheet. Next to it are the row headings. The data area is in the middle of the window. At the extreme bottom are the Status Bar and Scroll Bar.

COMPUTER VIRUS

Computer viruses are small software programs that are designed to spread from one computer to another and to interfere with computer operation.

What do computer viruses do?

Through the course of using the Internet and your computer, you may have come in to contact with computer viruses. Many computer viruses are stopped before they can start, but there is still an ever growing concern as to what do computer viruses do and the list of common computer virus symptoms. A computer virus might corrupt or delete data on your computer, use your email program to spread itself to other computers, or even erase everything on your hard disk.

Computer viruses are often spread by attachments in email messages or instant messaging messages. That is why it is essential that you never open email attachments unless you know who it's from and you are expecting it.Computer viruses currently cause billions of dollars worth of economic damage each year, due to causing systems failure, wasting computer resources, corrupting data, increasing maintenance costs, etc. In response, free, open-source anti-virus tools have been developed, and a multi-billion dollar industry

of anti-virus software vendors has cropped up, selling virus protection to Windows users. Unfortunately, no currently existing anti-virus software is able to catch all computer viruses (especially new ones); computer security researchers are actively searching for new ways to enable antivirus solutions to more effectively detect emerging viruses, before they have already become widely distributed. Viruses can be disguised as attachments of funny images, greeting cards, or audio and video files. Computer viruses also spread through downloads on the Internet. They can be hidden in illicit software or other files or programs you might download.

Resident vs. non-resident viruses

A ***memory-resident virus*** (or simply "resident virus") installs itself as part of the operating system when executed, after which it remains in RAM from the time the computer is booted up to when it is shut down. In contrast, a ***non-memory-resident virus*** (or "non-resident virus"), when executed, scans the disk for targets, infects them, and then exits (i.e. it does not remain in memory after it is done executing).

Macro viruses

Many common applications, such as Microsoft Outlook and Microsoft Word, allow macro programs to be embedded in documents or emails, so that the programs may be run automatically when the document is opened. A ***macro virus*** (or "document virus") is a virus that is written in a macro language, and embedded into these documents so that when users open the file, the virus code is executed, and can infect the user's computer. This is one of the reasons that it is dangerous to open unexpected attachments in e-mails.

SYSTEM CRASH AND STEPS TO AVOID IT

A **crash** (or **system crash**) in computing is when a computer or a program (such as a software application or an operating system) stops functioning properly. Oftentimes, it will then exit after encountering these errors. The program responsible may appear to freeze until a crash reporting service documents the details of the crash. If the program is a critical part of the operating system kernel, the entire computer may crash, often resulting in a fatal system error.

Many crashes are the result of the execution of single or multiple machine instructions. Typical causes are when the program counter is set to an incorrect address or a buffer overflow overwrites a portion of program code due to an earlier bug. In either case, it is common for the CPU to attempt to execute data or random memory values. Since all data values are possible but only some values are valid instructions, this often results in an illegal instruction exception. By chance, such data or random values could be valid (though unplanned) instructions. The original program problem (software bug) is considered as what "caused" the crash, but the actual fault was an illegal instruction. The art of debugging such crashes is connecting the actual cause of the crash with the code that set off the chain of events. This is often very far from obvious; the original bug is usually perfectly valid code to the processor.

In earlier personal computers, it was possible to cause hardware damage through attempting to write to hardware addresses outside of the system's main memory.

There are many factors that can contribute to the state of a computer being considered “unhealthy”, many of which can lead to slow performance and crashes. It is important that you follow routine maintenance of your computer

in order to ensure that it performs optimally and to ultimately prevent crashes from occurring. The following tips are a good place to start.

1) **Upgrade your Operating System** – Microsoft regularly releases incremental software updates for security, fixes and feature enhancements, and Service Packs, a single installable collection of the incremental updates. Keep "Automatic Updates" enabled will make sure that these are automatically downloaded and applied.

Windows XP users can find this by clicking Start -> Control Panel -> Automatic Updates, or you can manually update only critical updates by browsing to:

2) **Reduce memory usage** – The more applications you have running in the background the more likely you are to overload your computer's resources and to potentially cause a crash. Close programs if they're not in use, uninstall applications that you don't need, and prevent programs from automatically launching upon Startup.

3**)** **Update your device drivers** – Drivers can be described as software that allow your computer to communicate with its various devices, including the devices that power your display, sound, or external devices such as your printer or external hard drive. Device manufacturers also frequently update their drivers for fixes and enhancements. You can find the latest drivers by visiting your PC or device manufacturers' website.

4) **Keep your Registry clean** – The Windows Registry is a database that keeps track of various settings and options for Windows and 3rd party programs. Installing unnecessary programs, improper removal, or failed uninstallations can all contribute to a bloated Registry. A registry optimization tool, such as ChicPC-fix, can keep your registry optimized by removing invalid and redundant entries.

5 Reasons Your PC Might Crash

1. Corrupted System Registry Files
2. Disorganized Files
3. Malicious Software
4. Too Little Available Memory
5. Overheating

DIRECTORIES AND SUB DIRECTORIES

Directories

In computing, a directory is a file system cataloging structure in which references to other computer files, and possibly other directories, are kept. On many computers directories are known as folders, catalogs (used on the Apple II, the Commodore 128 and some other early home computers as a command for displaying disk contents - the filesystems used by these DOS did not support hierarchal directories), or drawersto provide some relevancy to a workbench or the traditional office file cabinet.

On Microsoft Windows, the terms ***folder*** and ***directory*** are used interchangeably.

Files are organized by storing related files in the same directory. In a hierarchicalfilesystem (that is, one in which files and directories are organized in a manner that resembles a tree), a directory contained inside another directory is called a subdirectory.

The terms parent and child are often used to describe the relationship between a subdirectory and the directory in which it is cataloged, the latter being the parent. The top-most directory in such a filesystem, which does not have a parent of its own, is called the root directory.

An organizational unit, or container, used to organize folders and files into a hierarchical structure. Directories contain bookkeeping information about files that are, figuratively speaking, beneath them in the hierarchy.

You can think of a directory as a file cabinet that contains folders that contain files. Many graphical user interfaces use the term ***folder*** instead of ***directory.***

The topmost directory in any file is called the ***root directory.*** A directory that is below another directory is called a ***subdirectory.*** A directory above a subdirectory is called the ***parent directory.*** Under DOS and Windows, the root directory is a back slash (\).

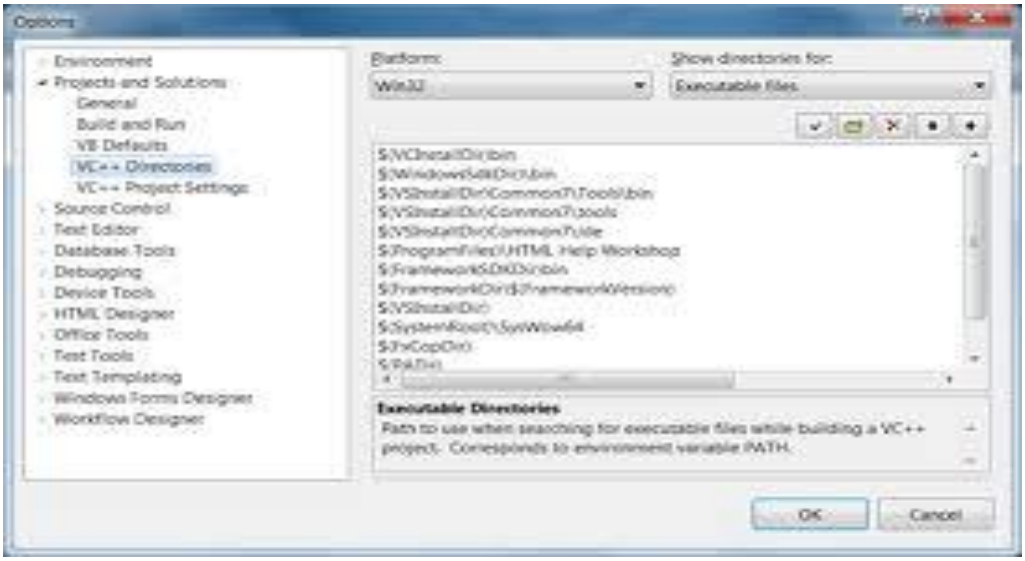
To read information from, or write information into, a directory, you must use an operating system command. You cannot directly edit directory files. For

example, the DIR command in DOS reads a directory file and displays its contents.

Sub-Directories

An organizational unit, or container, used to organize folders and files into a hierarchical structure. Directories contain bookkeeping information about files that are, figuratively speaking, beneath them in the hierarchy.

You can think of a directory as a file cabinet that contains folders that contain files. Many graphical user interfaces use the term ***folder*** instead of ***directory.*** Computer manuals often describe directories and file structures in terms of an ***inverted tree.*** The files and directories at any level are contained in the directory above them.



To access a file, you may need to specify the names of all the directories above it. You do this by specifying a ***path.*** The topmost directory in any file is called the ***root directory.*** A directory that is below another directory is called a ***subdirectory.*** A directory above a subdirectory is called the ***parent directory.*** Under DOS and Windows, the root directory is a back slash (\).

To read information from, or write information into, a directory, you must use an operating systemcommand. You cannot directly edit directory files. For example, the DIR command in DOS reads a directory file and displays its contents.

RECYCLE BIN

Recycle Bin overview

The Recycle Bin provides a safety net when deleting files or folders. When you delete any of these items from your hard disk, Windows places it in the Recycle Bin and the Recycle Bin icon changes from empty to full. Items deleted from a floppy disk or a network drive are permanently deleted and are not sent to the Recycle Bin.

Items in the Recycle Bin remain there until you decide to permanently delete them from your computer. These items still take up hard disk space and can be undeleted or restored back to their original location. When it fills up, Windows automatically cleans out enough space in the Recycle Bin to accommodate the most recently deleted files and folders.

If you're running low on hard disk space, always remember to empty the Recycle Bin. You can also restrict the size of the Recycle Bin to limit the amount of hard disk space it takes up.

Windows allocates one Recycle Bin for each partition or hard disk. If your hard disk is partitioned, or if you have more than one hard disk in your computer, you can specify a different size for each Recycle Bin.

There are five more points about the recycle bin,

- **To change the storage capacity of the Recycle Bin**

1. On the desktop, right-click **Recycle Bin**, and then click **Properties**.
2. Move the slider to increase or decrease the amount of disk space that is reserved for storing deleted items.

- **To remove items permanently when you delete them**

1. On the desktop, right-click **Recycle Bin**, and then click **Properties**.
2. Select the **Do not move files to the Recycle Bin** check box.

- **To delete or restore files in the Recycle Bin**
    1. On the desktop, double-click **Recycle Bin**.

- Do one of the following:
    - To restore an item, right-click it, and then click **Restore**.
    - To restore all of the items, on the **Edit** menu, click **Select All**, and then on the **File** menu, click **Restore**.
    - To delete an item, right-click it, and then click **Delete**.
    - To delete all of the items, on the **File** menu, click **Empty Recycle Bin**.
- **To prevent delete confirmation messages from appearing**

1. On the desktop, right-click **Recycle Bin**, and then click **Properties**.
2. Clear the **Display delete confirmation dialog** check box.

- **To empty the Recycle Bin**

1. On the desktop, double-click Recycle Bin.
2. On the File menu, click Empty Recycle Bin.

SPAM & TRASH IN MAIL

Trash Mail

Trash Mail (TrashMail.net) is a free disposable e-mail address service created in 2002 by Stephan Ferraro, a computer science student at Epitech Paris which belongs now to Ferraro Ltd.. The idea was to create temporary email addresses to protect against spam mail. It mainly forwards emails to a real hidden email address.

TrashMail receives emails and forwards them to a real hidden email address. On account creation there is the option to set a number of total forwards and a date when the disposable email expires. For each forwarded email the counter is decreased by 1. When the counter reaches 0 or the date limit is expired then the temporary email address will be deleted.

After the temporary email address is deleted, any incoming email is rejected by the SMTP code 550 5.1.1. TrashMail also provides a free Mozilla Firefox add-on which is open source and downloadable on the official Mozilla Firefox website. The email registration and community forum are provided by HTTPS (SSL over HTTP) access to protect privacy. Additionally the SMTP server communication has TLS enabled.

As many spammers rely on harvested email addresses, the best method of avoiding spam is not to publish your real email address.[3] By providing a temporary address, TrashMail allows users to protect their real email.

TrashMail can be used by its homepage on www.trashmail.net. However an API is provided and documented on the forum which explains how to write custom software to use for the free service.

Trash Mail differs from other disposable email address services in its possibility to use the Challenge-Response System for each free disposable email address. Additionally it provides real-time spam stats on its main page. It is possible to verify the current incoming spam amount on this site.

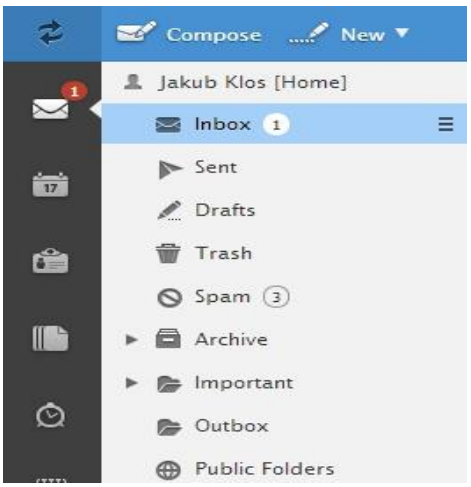
Spam

The first major commercial spam incident started on March 5, 1994, when a husband and wife team of lawyers, Laurence Canter and Martha Siegel, began using bulk Usenet posting to advertise immigration law services. The incident was commonly termed the "Green Card spam", after the subject line of the postings.

Spreading beyond the centrally managed social networking platforms, user-generated content increasingly appears on business, government, and nonprofit websites worldwide. Fake accounts and comments planted by computers programmed to issue social spam can infiltrate these websites. Well-meaning and malicious human users can break websites' policies by submitting profanity, insults, hate speech, and violent messages.

Electronic spamming is the use of electronic messaging systems to send unsolicited bulk messages (**spam**), especially advertising, indiscriminately. While the most widely recognized form of spam is e-mail spam, the term is applied to similar abuses in other media: instant messaging spam, Usenet newsgroup spam, Web search engine spam, spam in blogs, wiki spam, online classified ads spam, mobile phone messaging spam, Internet forum spam, junk fax transmissions, social networking spam, social spam, television advertising and file sharing spam. It is named after Spam, a luncheon meat, by way of a Monty Python sketch in which Spam is included in almost every dish.

Spamming remains economically viable because advertisers have no operating costs beyond the management of their mailing lists, and it is difficult to hold senders accountable for their mass mailings. Because the barrier to entry is so low, spammers are numerous, and the volume of unsolicited mail has become very high. In the year 2011, the estimated figure for spam messages is around seven trillion. The costs, such as lost productivity and fraud, are borne by the public and by Internet service providers, which have been forced to add extra capacity to cope with the deluge. Spamming has been the subject of legislation in many jurisdictions.



SCREENSAVER & WALLPAPER MECHANISM

Introduction:

Wallpaper (also **desktop picture** and **desktop background**) is an image used as a background of a graphical user interface on a computer screen or mobile communications device. On a computer it is usually for the desktop, while for a mobile phone it is usually the background for the 'home' or 'idle' screen. Though most devices comes with a default picture, users can usually change it to files of their choosing.

A **screensaver** is a computer program that blanks the screen or fills it with moving images or patterns when the computer is not in use. Initially designed to prevent phosphor burn-in on CRT and plasma computer monitors (hence the name), screensavers are now used primarily for entertainment, security or to display system status information.

Screensavers are Dynamic:

The initial purpose of a screensaver was to tackle the problem of "screen burn-in", the damage done to a computer display when a non-moving image, if left unchanged for a long period of time, would slowly be burned into the screen, leaving behind a permanent so-called "ghost image".

By constantly changing the pixels used on the screen, for example by displaying a sequence of photographs, screensavers would prevent any image from appearing on the screen long enough to cause screen-burn. As such, screensavers are dynamic by nature. At the same time, they allow you to instantly return to your desktop simply by moving your mouse or pressing a button on your keyboard.

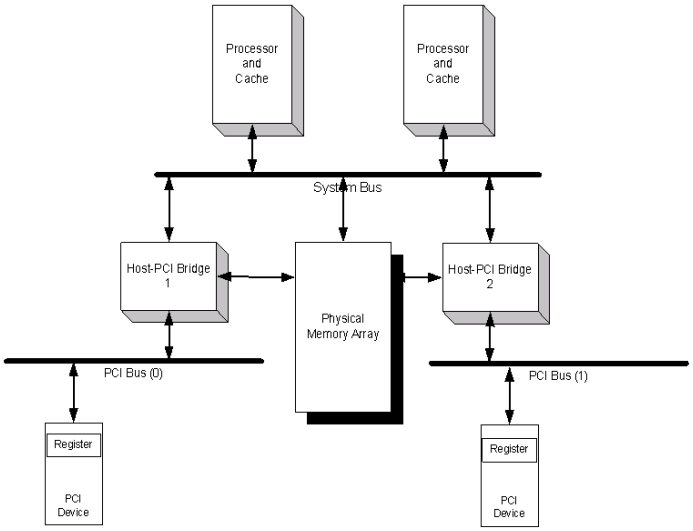
Wallpaper is static:

As the demonstration shows, your desktop wallpaper, sometimes called a "desktop picture" or "background picture", is generally an unchanging image or pattern. While it is possible to automatically rotate through multiple backgrounds on some operating systems, such as Windows Vista and 7, there is generally no inherent animation, and you can use practically any image as your wallpaper.

Considering that, for most of the time, you do not even see your wallpaper when you actively use your computer, any animation would be a waste of your computer's resources.

REGISTERS

In a computer, a register is one of a small set of data holding places that are part of a computer processor . A register may hold a computer instruction , a storage address, or any kind of data (such as a bit sequence or individual characters). Some instructions specify registers as part of the instruction. For example, an instruction may specify that the contents of two defined registers be added together and then placed in a specified register.



A register must be large enough to hold an instruction - for example, in a 32-bit instruction computer, a register must be 32 bits in length. In some computer designs, there are smaller registers - for example, half-registers - for shorter instructions. Depending on the processor design and language rules, registers may be numbered or have arbitrary names.

1) **Fetch**: The Fetch Operation is used for taking the instructions those are given by the user and the Instructions those are stored into the Main Memory will be fetch by using Registers.

2) **Decode**: The Decode Operation is used for interpreting the Instructions means the Instructions are decoded means the CPU will find out which Operation is to be performed on the Instructions.

3) **Execute**: The Execute Operation is performed by the CPU. And Results those are produced by the CPU are then Stored into the Memory and after that they are displayed on the user Screen.

Types of Registers

Accumulator Register:-

This Register is used for storing the Results those are produced by the System. When the CPU will generate Some Results after the Processing then all the Results will be Stored into the **AC Register**.

Memory Data Register (MDR):-

MDR is the register of a computer's control unit that contains the data to be stored in the computer storage (e.g. RAM), or the data after a fetch from the computer storage.

It acts like a buffer and holds anything that is copied from the memory ready for the processor to use it. MDR hold the information before it goes to the decoder.

The Memory Data Register is half of a minimal interface between a micro program and computer storage, the other half is a memory address register.

Index Register:-

A hardware element which holds a number that can be added to (or, in some cases, subtracted from) the address portion of a computer instruction to form an effective address. Also known as **base register**.

An index register in a computer's CPU is a processor register used for modifying operand addresses during the run of a program.

Memory Buffer Register:-

MBR stand for **Memory Buffer Register**. This register holds the contents of data or instruction read from, or written in memory. It means that this register is used to store data/instruction coming from the memory or going to the memory.

Data Register:-

A register used in microcomputers to temporarily store data being transmitted to or from a peripheral device.

JPEG

Joint Photographic Experts Group (.JPG file extension, pronounced Jay Peg). This is the right format for those photo images which must be very small files, for example, for web sites or for email. JPG is often used on digital camera memory cards, but RAW or TIF format may be offered too, to avoid it. The JPG file is wonderfully small, often compressed to perhaps only 1/10 of the size of the original data, which is a good thing when modems are involved.

However, this fantastic compression efficiency comes with a high price. JPG uses lossy compression (lossy meaning "with losses to quality"). Lossy means that some image quality is lost when the JPG data is compressed and saved, and this quality can never be recovered.

File compression methods for most other file formats are lossless,

Lossless compression always returns the original data, bit-for-bit identical without any question about differences (losses). We are used to saving data to a file, and getting it all back when we next open that file. Our Word and Excel documents, our Quicken data, any data at all, we cannot imagine NOT getting back exactly the original data.

TIF, PNG, GIF, BMP and most other image file formats are lossless too. This integrity requirement does limit efficiency, limiting compression of photo image data to maybe only 10% to 40% reduction in practice (graphics can be smaller). But most compression methods have full lossless recoverability as the first requirement.

JPG files don't work that way.

JPG is a big exception. JPG compression is not lossless. JPG compression is lossy. Lossy means "with losses" to image quality. JPG compression has very high efficiency (relatively tiny files) because it is intentionally designed to be lossy, designed to give very small files without the requirement for full recoverability.

JPG modifies the image pixel data (color values) to be more convenient for its compression method. Tiny detail that doesn't compress well (minor color changes) can be ignored (not retained). This allows amazing size reductions on the remainder, but when we open the file and expand the data to access it again, it is no longer the same data as before. This lost data is like lost purity or integrity. It can vary in degree, it can be fairly good, but it is always unrecoverable corruption of the data. This makes JPG be quite different from all

the other usual file format choices. This will sound preachy, but if your use is critical, you need a really good reason to use JPG.

Digital cameras also offer JPG quality choices too. Large image files do fill memory cards fast. You can buy more and larger cards, or you can compromise by sacrificing image quality for small file size (but I hope you won't go overboard with this). The camera menu will have two kinds of resizing choices.

One size choice actually creates a smaller image size (pixels), resampled smaller from the original standard size of the CCD chip, for example perhaps to half size in pixel dimensions. The correct image size in pixels is related to your goal for using the image. For example you may need enough pixels to print 8x10 inches on paper (6 megapixels), or you may only want a small image for video screen viewing (1 megapixel).

Regardless of that selected image size in pixels, the camera menu will also offer a smaller file size choice in bytes, related to quality, via JPG file compression. This menu will offer a best quality setting which is the largest file, and maybe intermediate sizes, and a smallest but worst quality choice.

My Nikon D70 offers three JPG file size choices of Fine (about 1/4 size in bytes), Norm (about 1/8 size in bytes), or Basic (about 1/16 size in bytes), comparing compressed file size to the uncompressed size. The best (largest) JPG file size will still contain JPG artifacts, but very mild, essentially undetectable, vastly better than the smallest file choice. Even better, some cameras also offer a RAW or TIF format to bypass JPG problems all together. These images may be large, but memory cards are becoming less expensive, and larger or multiple cards are by far the best quality solution.

Since each image varies a little, the file size is only a crude indicator of JPG quality, however it is a rough guide. For ordinary color images (24 bit RGB), the uncompressed image size when opened in memory is always 3 bytes per pixel.

For example, an image size of 3000x2000 pixels is 6 megapixels, and therefore by definition, when uncompressed (when opened), this memory size is 3X that in bytes, or 18 MB. That is simply how large the 24 bit data is. The compressed JPG file size will be smaller (same pixels, but fewer bytes).

GIF FORMAT

Introduction

The **Graphics Interchange Format** (better known by its acronym **GIF** is a bitmap image format that was introduced by CompuServe in 1987 and has since come into widespread usage on the World Wide Web due to its wide support and portability.

The format supports up to 8 bits per pixel for each image, allowing a single image to reference its own palette of up to 256 different colors chosen from the 24-bit RGB color space. It also supports animations and allows a separate palette of up to 256 colors for each frame. These palette limitations make the GIF format unsuitable for reproducing color photographs and other images with continuous color, but it is well-suited for simpler images such as graphics or logos with solid areas of color.

History

CompuServe introduced the GIF format in 1987 to provide a color image format for their file downloading areas, replacing their earlier run-length encoding (RLE) format, which was GIF became popular because it used LZW data compression, which was more efficient than the run-length encoding that formats such as PCX and MacPaint used, and fairly large images could therefore be downloaded in a reasonably short time, even with very slow modems.

Usage

- GIFs are suitable for sharp-edged line art (such as logos) with a limited number of colors. This takes advantage of the format's lossless compression, which favors flat areas of uniform color with well defined edges.
- GIFs can be used to store low-color sprite data for games.
- GIFs can be used for small animations and low-resolution film clips.
- Since a single GIF image palette is limited to 256 colors, it is not usually used as a format for digital photography. Digital photographers use image file formats capable of reproducing a greater range of colors, such as TIFF, RAW or JPEG.

Conclusion

One of the first things a reader remembers after having read a piece of writing is the last words the writer uses. For that reason, a writer should understand and take advantage of the power of an effective conclusion. **Effective conclusions** are particularly important in persuasive essays since they are the last chance the writer has to convince the reader. The following is a collection of **suggestions for writing effective conclusions**.

PNG FORMAT

What is PNG?

PNG stands for Portable Network Graphics. It's a lossless bitmap image format that is popular on the World Wide Web and elsewhere. PNG was largely developed to deal with some of the shortcomings of the GIF format and allows storage of images with greater color depth and other important information.

PNG Specification:

If you want to convert PNG to TIFF, JPEG, BMP or other graphic formats tryTotal Image Converter. It converts PNG images in batch and you save time. The output quality is always great.

History and Development:

The motivation for creating the PNG format was in early 1995, after it became known that the Lempel–Ziv–Welch (LZW) data compression algorithm used in the Graphics Interchange Format (GIF) format was patented by Unisys. There were also other problems with the GIF format that made a replacement desirable, notably its limit of 256 colors at a time when computers able to display far more than 256 colors were growing common.

Portable Network Graphics	
PNG	
	
Filename extension	.png
Internet media type	image/png

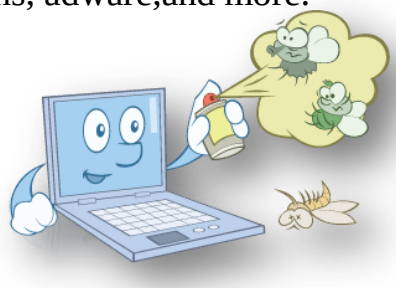
Type code	PNGf PNG
Uniform Type Identifier	public.png
Magic number	89 50 4e 47 0d 0a 1a 0a
Developed by	PNG Development Group (donated to W3C)
Initial release	1 October 1996
Type of format	lossless bitmap image format
Extended to	APNG, JNG and MNG
Standard(s)	ISO/IEC 15948, IETF RFC 2083
Open format?	Yes

Portable Network Graphics (PNG), or PNG's Not GIF,is a raster graphics file format that supports lossless data compression. PNG was created as an improved, non-patented replacement for Graphics Interchange Format (GIF), and is the most used lossless image compression format on the Internet.

ANTI-VIRUS MECHANISM AND ITS FUNCTIONS

What is Anti-Virus Software?

Anti-virus software is a program or set of programs that are designed to prevent, search for, detect, and remove software viruses, and other malicious software like worms, Trojans, adware,and more.



These tools are critical for users to have installed and up-to-date because a computer without anti-virus software installed will be infected within minutes of connecting to the internet. The bombardment is constant, with anti-virus companies update their detection tools constantly to deal with the more than 60,000 new pieces of malware created daily.

There are several different companies that build and offer anti-virus software and what each offers can vary but all perform some basic functions:

- Scan specific files or directories for any malware or known malicious patterns
- Allow you to schedule scans to automatically run for you
- Allow you to initiate a scan of a specific file or of your computer, or of a CD or flash drive at any time.

How to prevent computer from virus?

To prevent viruses from entering a system there are basically just two options. The first of these is to place the computer in a protective 'bubble'. This in practice means isolating the machine; disconnecting it from the Internet or any other network, not using any floppy disks, CD-ROMs or any other removable disks. This way you can be sure that no virus will get into your computer.

The second option is to install an antivirus program. These are designed to give you the peace of mind that no malicious code can enter your PC. But how do they do it? How does the program let you install a game, but prevent a virus from copying itself to disk? Well, this is how it works....

An antivirus program is no more than a system for analyzing information and then, if it finds that something is infected, it disinfects it. The information is analyzed (or scanned) in different ways depending on where it comes from. An antivirus will operate differently when monitoring floppy disk operations than when monitoring e-mail traffic or movements over a LAN. The principal is the same but there are subtle differences.
Once the information has been scanned, using either method, if a threat has been detected, two operations are performed:

Antivirus programs offer a high level of protection and prevent any nasty surprises. It is as simple as putting XXX dollars in a box to get peace of mind. I'm sure that now you don't have any serious doubts...

Scan Engines:

The information can be scanned in two ways. One method involves comparing the information received with a virus database (known as 'virus signatures'). If the information matches any of the virus signatures, the antivirus concludes that the file is infected by a virus.

The other way of finding out if the information being scanned is dangerous, without knowing if it actually contains a virus or not, is the method known as 'heuristic scanning'. This method involves analysing how the information acts and comparing it with a list of dangerous activity patterns.

Permanent and on demand scans:

When describing antivirus programs, it is important to clearly distinguish between the two types of protection on offer. The first is permanent scans, which are more complex and essential. These scans constantly monitor the operations performed on the computer to prevent any kind of intrusion.The other type of protection available is on demand scans.

These use the same scan engine as the permanent protection and check any parts of the system whenever the user wants. These are normally used under special circumstances. For example, a user may want to perform an on demand scan when using a new floppy disk or to check information stored on the computer that hasn't been used for a while.

BACKUP & RECOVERY

Backup:

Backup is the activity of copying files or databases so that they will be preserved in case of equipment failure or other catastrophe. Backup is usually a routine part of the operation of large businesses with mainframes as well as the administrators of smaller business computers. For personal computer users, backup is also necessary but often neglected. The retrieval of files you backed up is called ***restoring*** them.

Use of Back up:

During long-term power outages many rely on portable generators for emergency power. The popularity of portable electric generators has grown with homes and small businesses across the nation. But it's estimated only a small percentage are hooked up correctly. If installed and operated correctly, use of standby or portable electric generators poses little danger, but improper installation or use could be dangerous to you and threaten the lives of your family, friends, neighbors and electric utility crews trying to restore service. PPL Electric Utilities urges consumers to understand the proper safety steps that must be taken. Properly connecting the generator into the system is a critical step for safe and effective use. A licensed professional should install a permanent, standby electric generator and can help with proper equipment for safely using a portable generator.

How to take Back up:

Plug the device into your computer**.** Using a USB cable or other method of connection, plug the storage device into the computer you wish to back up. Inserting the device should automatically bring up a dialog box asking what you'd like to do with it. One of the options should be to use the device as a backup and open File History. Choose this option.

In the event that this dialogue does not open automatically, you can set up the backup manually by going to the search and looking up File History. It can alternatively be found through the Control Panel.

Configure Advanced Settings**.** Once the program has opened, you may wish to alter some of the settings in the Advanced Settings section, accessed on the left. This will allow you to change how often the computer makes a backup, how long files are kept, and how much space is allowed to be taken up.

Data Recovery:

Data Recovery is the process of salvaging data from damaged, failed, corrupted, or inaccessible secondary storage media when it cannot be accessed normally. Often the data are being salvaged from storage media such as internal or external hard disk drives, solid-state drives (SSD), USB flash drive, storage tapes, CDs, DVDs, RAID, and other electronics. Recovery may be required due to physical damage to the storage device or logical damage to the file system that prevents it from being mounted by the host operating system (OS).

Recovery techniques:

Recovering data from physically damaged hardware can involve multiple techniques. Some damage can be repaired by replacing parts in the hard disk. This alone may make the disk usable, but there may still be logical damage. A specialized disk-imaging procedure is used to recover every readable bit from the surface. Once this image is acquired and saved on a reliable medium, the image can be safely analyzed for logical damage and will possibly allow much of the original file system to be reconstructed.

Recovery Phases:

It is important to understand the four phases of data recovery. Each phase stands for different level and range of data recovery capabilities, each phase requires different hdd repair tools and data recovery tools to work with and each phase must be treated properly to make sure the maximum data is finally to be recovered.

Phase 1: Repair the hard drive

Phase 2: Image the drive to a new drive.

Phase 3: Logical recovery of files, partition, MBR, and MFT.

Phase 4: Repair the damaged files that were retrieved.

DESKTOP PUBLISHING

Desktop publishing – An Introduction:

Desktop publishing (abbreviated DTP) is the creation of documents using page layout skills on a personal computer. Desktop publishing software can generate layouts and produce typographic quality text and images comparable to traditional typography and printing. This technology allows individuals, businesses, and other organizations to self-publish a wide range of printed matter. Desktop publishing is also the main reference for digital typography. When used skilfully desktop publishing allows the user to produce a wide variety of materials, from menus to magazines and books, without the expense of commercial printing.

History of Desktop Publishing:

Desktop publishing began in **1983** with a program developed by **James Bessen** at a community newspaper in Philadelphia.Desktop *typesetting*, with only limited page makeup facilities, had arrived in 1978–9 with the introduction of TeX, and was extended in the early 1980s by LaTeX.) The DTP market exploded in 1985 with the introduction in January of the AppleLaserWriter printer, and later in July with the introduction of PageMaker software from Aldus which rapidly became the DTP industry standard software.

A particularly important feature of desktop publishing systems is that they enable you to see on the display screen exactly how the document will appear when printed. Systems that support this feature are called *WYSIWYGs **(what you see is what you get)***.The term "desktop publishing" is attributed to Aldus Corporationfounder Paul Brainerd, who sought a marketing catch-phrase to describe the small size and relative affordability of this suite of products in contrast to the expensive commercial phototypesetting equipment of the day. During its early years, desktop publishing acquired a bad reputation as a result of untrained users who created poorly organized ransom note effect layouts —

similar criticism would be levied again against early Web publishers a decade later. However, some were able to realize truly professional results.

DTP applications:

- ✓ Adobe Frame Maker
- ✓ Adobe InDesign
- ✓ Adobe PageMaker
- ✓ Adobe Home Publisher
- ✓ Aldus Personal Press
- ✓ Apple Pages 4.x
- ✓ Corel Ventura

Desktop Publishing Software:

Desktop publishing software can help you create a multitude of beautiful print projects, ranging from colourful and dazzling to serious and formal. With the wide-ranging variety of excellent desktop publishing software available today, you can forget about paying ridiculously high prices to a professional shop for designing and printing the paper items you need.

Instead, if you are a small business owner, you can prepare and customize your own professional looking business cards, company brochures, posters, letterhead stationery and much more. In addition to adding your own individual and fun flourishes to printed materials, you can save a considerable amount of money by doing the designing and printing yourself rather than using a commercial printing service.

Advantage* of using *Desktop Publishing:

- ➢ There is more control over the way text is arranged and formatted.
- ➢ DTP can be used to bring lots of different files together on the same document.

You can import images into a DTP document from a scanner, graphics from a drawing package, frames from a video camera and text from a word processor .

QUERY & ITS TYPES

Query is another word for question. In fact, outside of computing terminology, the words "query" and "question" can be used interchangeably. For example, if you need additional information from someone, you might say, "I have a query for you." In computing, queries are also used to retrieve information. However, computer queries are sent to a computer system and are processed by a software program rather than a person.

One type of query, which many people perform multiple times a day, is a search query. Each time you search for something using a search engine, you perform a search query. When you press Enter, the keywords are sent to the search engine and are processed using an algorithm that retrieves related results from the search index. The results of your query appear on a search engine results page, or SERP.

1. SelectQuery

The select query is the simplest and most common type of query available in MS-Access. Such queries may be used to select and display data from either one or more table(s) depending upon the requirement. The user-determined criteria convey to the database about the selection of records from table(s). After the select query is called, it creates a "virtual" table where the data can be changed one record at a time.

2. Crosstab Query

Crosstab queries are useful for summarizing information, calculating statistics, spotting bad data and looking for trends. The results of a crosstab query are read-only - data cannot be added, edited or deleted in a crosstab result. An aggregate function, such as sum or count, is used to help summarize the data.

Append Query:

The append query takes the set results of a query and "appends" them to an existing table. In other words, we can say that, an append query copies specified or all the records from one table to the bottom of another table. This query is useful when two different tables with similar structures are used.

Delete Query:

The delete query deletes all records in an underlying table from the set results of a query. In simpler terms, we can say that, the delete query is used to delete a group of records that meets specific search criteria. The process for setting up a delete query depends on whether the user wants to delete records from single table or from multiple tables that have an established and valid relationship among them.

Make Table Query:

The make table query creates a table based on the set results of a query. In simpler terms, we can say that, the make table query is used to create a new table and populate it with data from one or more existing tables.

3.Action Query

Action query is used to create new table(s), delete rows from existing table(s) and update records or creating entirely new ones in a table(s). When the action query is called, the database undergoes a specific action depending on what was specified in the query itself. Action queries are very popular in data management because they allow for many records to be changed at one time unlike only single record in a select query. There may be four sub-types of action queries

4.ParameterQuery

A parameter query is used to pass a parameter to a different query such as an action or a select query. The parameter can either be a value or a condition. This parameter conveys to the other
query what is supposed to be done. It allows for a dialog box where the end user can enter whatever parameter value they wish each time the query is run

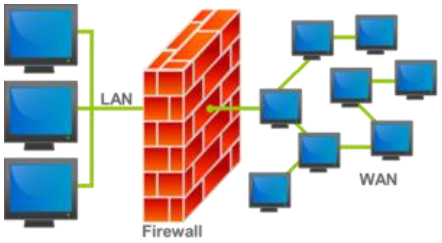
5.AggregateQuery

Aggregate query is a special type of query which works on other queries such as selection, action or parameter but instead of passing a parameter to another query it totals up the items by selected groups. It essentially creates a summation of any selected attribute in a table.

FIREWALL

Introduction

The term firewall originally referred to a wall intended to confine a fire or potential fire within a building. Later uses refer to similar structures, such as the metal sheet separating the engine compartment of a vehicle or aircraft from the passenger compartment.



First generation: packet filters

The first paper published on firewall technology was in 1988, when engineers from Digital Equipment Corporation (**DEC**) developed filter systems known as **packet filter** firewalls. Packet filters act by inspecting the "packets" which transfer between computers on the Internet. This type of packet filtering pays no attention to whether a packet is part of an existing stream of traffic (i.e. it stores no information on connection "state"). Instead, it filters each packet based only on information contained in the packet itself (most commonly using a combination of the packet's source and destination address, its protocol, and, for TCP and UDP traffic, the port number).

TCP and UDP protocols constitute most communication over the Internet, and because TCP and UDP traffic by convention uses well known ports for particular types of traffic, a "stateless" packet filter can distinguish between, and thus control, those types of traffic (such as web browsing, remote printing, email transmission, file transfer), unless the machines on each side of the packet filter are both using the same non-standard ports.

Second generation: "stateful" filters

Second-generation firewalls perform the work of their first-generation predecessors but operate up to layer 4 (transport layer) of the OSI model. This is achieved by retaining packets until enough information is available to make a judgment about its state. Known asstateful packet inspection, it records all connections passing through it and determines whether a packet is the start of a new connection, a part of an existing connection, or not part of any connection.

Though static rules are still used, these rules can now contain connection state as one of their test criteria.

Certain denial-of-service attacks bombard the firewall with thousands of fake connection packets in an attempt to overwhelm it by filling its connection state memory.

Third generation: application layer

Marcus Ranum, Wei Xu, and Peter Churchyard developed an Application Firewall known as Toolkit (FWTK). In June 1994, Wei Xu extended the FWTK with the Kernel enhancement of IP filter and socket transparent. This was known as the first transparent Application firewall, released as a commercial product of Gauntlet firewall at TIS. Gauntlet firewall was rated one of the number 1 firewalls during 1995-1998.

Network layer or packet filters

Network layer firewalls, also called packet filters, operate at a relatively low level of the TCP/IP protocol stack, not allowing packets to pass through the firewall unless they match the established rule set. The firewall administrator may define the rules; or default rules may apply. The term "packet filter" originated in the context of BSD operating systems.

Application-layer

Application-layer firewalls work on the application level of the TCP/IP stack (i.e., all browser traffic, or all telnet or ftp traffic), and may intercept all packets traveling to or from an application. They block other packets (usually dropping them without acknowledgment to the sender).

On inspecting all packets for improper content, firewalls can restrict or prevent outright the spread of networked computer worms andtrojans. The additional inspection criteria can add extra latency to the forwarding of packets to their destination.

Proxies

A proxy server (running either on dedicated hardware or as software on a general-purpose machine) may act as a firewall by responding to input packets (connection requests, for example) in the manner of an application, while blocking other packets. A proxy server is a gateway from one network to another for a specific network application, in the sense that it functions as a proxy on behalf of the network user.

THICK AND THIN CLIENT

As with many "new" technologies, (like cloud computing) some have roots in early computing technologies. Take the concept of thin computing. Before the days of powerful desktop hardware, computer systems were comprised of a powerful mainframe computer and much less powerful terminals. The mainframe would do all the processing of data and the "dumb terminals" would simply display the input and output. This growing trend in business computing, heralds the days of the mainframe with very fast servers providing the data storage and processing for low cost, low performance clients.

Fat Clients (Thick)

Today, most people have fat clients, or computers with fast processors (to quickly crunch data), large hard drives (to store applications and files), memory (to run applications), and video cards (to display complex and 3D graphics). A thick client can be a desktop, laptop, netbook, or tablet computer. A thick client stores and runs its own operating system and applications.

It is made of expensive technology like multi-core processors, lots of RAM, large hard drives, and video cards with dedicated processors and memory.

Thin Clients

Thin clients are terminals that run an operating system and some applications. They connect to servers which host data and other applications. Thin clients are capable of storing some files locally and running some applications but rely on the server to store large data files and complex applications. They can be found as all-in-one (monitor and computer in one box), desktops (very small form factor), and laptops.

Thin clients have slower processors, less memory, and less capable video cards than fat clients. However, they are cheaper. They also may not have any moving parts – no spinning hard drive and no cooling fans – due to flash memory and low power processors. Because of this, they can safely operate in more harsh environments than fat clients.

ZeroClients

A zero client is a terminal which does not run an operating system or applications. It runs a kernel which initiates the hardware and networking components and requires the servers to provide all the data and applications for the user. Like thin clients, zero clients can be found as all-in-one (monitor and computer in one box), desktops (very small form factor), and laptops.Like thin clients, the hardware is cheaper and can operate in harsher environments.

Benefits of Thin and Zero Clients

The benefits of thin and zero clients include cost savings, ongoing upkeep, centralization, scalability, and reliability. Businesses can save money with thin and zero clients because they cost less per device than fat clients. They also use less power and create less heat than fat clients.

Conclusion

There are many benefits to thin and zero clients including cost savings, ongoing upkeep, centralization, scalability, and reliability. However, they are not appropriate for every situation and critical examination must be completed before jumping in with two feet.

SUPER COMPUTERS

Supercomputers were introduced in the 1960s, made initially and, for decades, primarily by Seymour Cray at Control Data Corporation (CDC), Cray researches and subsequent companies bearing his name or monogram. While the supercomputers of the 1970s used only a few processors, in the 1990s machines with thousands of processors began to appear and, by the end of the 20th century, massively parallel supercomputers with tens of thousands of "off-the-shelf" processors were the norm. As of November 2013, China's Tianhe-2 supercomputer is the fastest in the world at 33.86 petaFLOPS.

Systems with massive numbers of processors generally take one of two paths: In one approach (e.g., distributed computing), a large number of discrete computers (e.g., laptops) distributed across a network (e.g., the internet) devote some or all of their time to solving a common problem; each individual computer (client) receives and completes many small tasks, reporting the results to a central server which integrates the task results from all the clients into the overall solution. In another approach, a large number of dedicated processors are placed in close proximity to each other (e.g. in a computer cluster); this saves considerable time moving data around and makes it possible for the processors to work together (rather than on separate tasks), for example in mesh and hyper tube architecture.

The use of multi-core processors combined with centralization is an emerging trend; one can think of this as a small cluster (the multicoreprocessor in a smartphone, tablet, laptop etc.) that both depends upon and contributes to the cloud.

Applications

Supercomputers play an important role in the field of computational science, and are used for a wide range of computationally intensive tasks in various fields, including quantum mechanics, weather forecasting, climate research, oil and gas exploration, molecular modeling, (computing the structures and properties of chemical compounds, biological macro molecules, polymers, and crystals), and physical simulations (such as simulations of the early moments of the universe, airplane and spacecraft aerodynamics, the detonation of nuclear weapons, and nuclear fusion). Throughout their history, they have been essential in the field of cryptanalysis.

Hardware and Architecture

A blue gene /L cabinet showing the stacked blades each holding many processors

Approaches to supercomputer architecture have taken dramatic turns since the earliest systems were introduced in the 1960s. Early supercomputer architectures pioneered by Seymour Cray relied on compact innovative designs and local parallelism to achieve superior computational peak performance. However, in time the demand for increased computational power ushered in the age of massively parallel systems.

While the supercomputers of the 1970s used only a few processors, in the 1990s, machines with thousands of processors began to appear and by the end of the 20th century, massively parallel supercomputers with tens of thousands of "off-the-shelf" processors were the norm. Supercomputers of the 21st century can use over 100,000 processors (some being graphic units) connected by fast connections.

Throughout the decades, the management of heat density has remained a key issue for most centralized supercomputer. The large amount of heat generated by a system may also have other effects, e.g. reducing the lifetime of other system component. There have been diverse approaches to heat management, from pumping fluorinert through the system, to a hybrid liquid-air cooling system or air cooling with normal air conditioning temperature.

MAINFRAME COMPUTERS

Invention:

The first mainframe appeared in 1944 at the Moore school. Known as Eniac, an acronym for electronic numerical integrator and calculator, the computer possessed 30 separate units and weighed over 30 tons.

Definition:

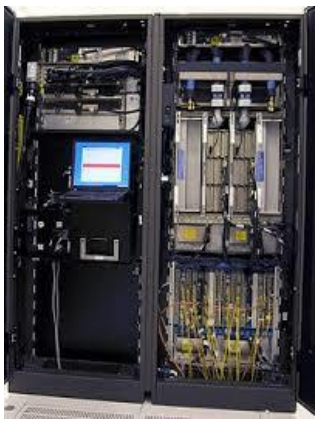
A data processing system employed mainly in large organizations for various applications, including bulk data processing, process control, industries and customer statistics, enter price resource planning and financial transaction processing. Mainframes are so called because the earliest ones were housed in large metal frames.

Description:

Modern mainframe design is generally less defined by single-task computational speed redundant internal engineering resulting in high reliability and security

- Extensive input-output facilities with the ability to offload to separate engines
- Strict backward compatibility with older software
- High hardware and computational utilization rates through virtualization to support massive throughput

Their high stability and reliability enables these machines to run uninterrupted for decades.

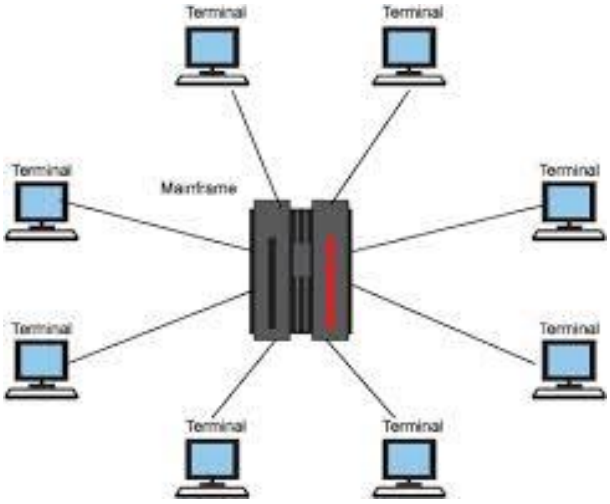


Characteristics:

It supports workload sharing so that one system can take over another's application while it is being refreshed. Mainframes are defined by high availability, one of the main reasons for their longevity.

The term reliability, availability, serviceability (RAS) is a defining characteristic of mainframe computers.

Mainframe computer



Advantages:

- Mainframe computers offer enough processing power and storage space to handle large-scale corporate operations.
- These hefty computers, which are generally stored in a central, climate-controlled location, are capable of supporting numerous network users
- . Businesses and large institutions often use mainframe computers as network servers for their personnel workstations.
- Mainframe computers offer enough processing power and storage space to handle large-scale corporate operations.

Disadvantages:

- Requires backwards-compatibility with Mainframe Operating Systems.
- Dedicated staffs are needed to run the system.
- Initial start-up costs can be high, compared to client-server networks - which can start small and be expanded later. A small client-server system might be all you need.
- By default, there is no geographical distribution built into the system, and this is something that client-server networks are designed for.
- They can take up a lot of space and require dedicated environmental management, for example, cooling systems.

MINI COMPUTERS

A **minicomputer**, or colloquially **mini**, is a class of smaller computers that evolved in the mid-1960s and sold for much less 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 25 000 USD, with an input-output device such as a tele-printer and at least 4K 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 CPUs 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 little used today; the contemporary term for this class of system is "midrange computer", such as the higher-end SPARC, Power Architecture and Itanium-based systems from Oracle, IBM and Hewlett-Packard.

History:

The term "minicomputer" evolved in the 1960s to describe the smaller computers that became possible with the use of transistors and core memory technologies, minimal instructions sets and less expensive peripherals such as the ubiquitous Teletype Model 33 ASR. They usually took up one or a few 19-inch rack cabinets, compared with the large mainframes that could fill a room.

The first minicomputer was created in the USSR in 1958–1962. The computer, designated UM-1NKh, was produced at the Leningrad Electromechanical Plant (LEMZ) from 1963. The first successful Western minicomputer was Digital Equipment Corporation's 12-bit PDP-8, which was built using discrete transistors and cost from US$16,000 upwards when launched in 1964.

HIGH-LEVEL LANGUAGES

In computer science, a high-level programming language is a programming language with strong abstraction from the details of the computer. In comparison to low-level programming languages, it may use natural language elements, be easier to use, or may automate (or even hide entirely) significant areas of computing systems (e.g. memory management), making the process of developing a program simpler and more understandable relative to a lower-level language. The amount of abstraction provided defines how "high-level" a programming language is. Examples of high-level programming languages include Java, Lisp, R, Python and Ruby.

Features

"High-level language" refers to the higher level of abstraction from machine language. Rather than dealing with registers, memory addresses and call stacks, high-level languages deal with variables, arrays, objects, complex arithmetic or boolean expressions, subroutines and functions, loops, threads, locks, and other abstract computer science concepts, with a focus on usability over optimal program efficiency.

Unlike low-level assembly languages, high-level languages have few, if any, language elements that translate directly into a machine's native opcodes. Other features, such as string handling routines, object-oriented language features, and file input/output, may also be present.

Execution models

There are three general models of execution for modern high-level languages:

Interpreted

Interpreted languages are read and then executed directly, with no compilation stage. A program called an interpreter reads each program statement following the program flow, decides what to do, and does it. A hybrid of an interpreter and a compiler will compile the statement into machine code and execute that; the machine code is then discarded, to be interpreted anew if the line is executed again. Interpreters are commonly the simplest implementations, compared to the other two variants listed here.

Compiled

Compiled languages are transformed into an executable form before running. There are two types of compilation:

Machine code generation:

Some compilers compile source code directly into machine code. This is the original mode of compilation, and languages that are directly and completely transformed to machine-native code in this way may be called "truly compiled" languages. See assembly language.

Intermediate representations:

When a language is compiled to an intermediate representation, it can be optimized or saved. It is used for later execution without the need to re-read the source file. When the intermediate representation is saved, it is often represented as byte code. The intermediate representation must then be interpreted or further compiled to execute it.

Translated or Trans-compiled:

A language may be translated into a lower-level programming language for which native code compilers are already widely available. The C programming language is a common target for such translators. See Chicken Scheme and the Eiffel (programming language) as examples. In Eiffel, the "Translated" process is referred to as Trans-compiling or Trans-compiled, and the Eiffel compiler as a Trans-compiler.

MIDDLE LEVEL LANGUAGES

Introduction:

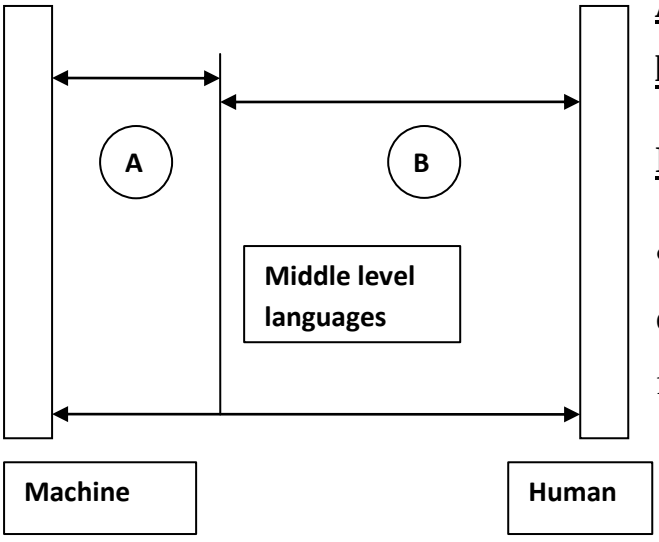
The language that has both the properties of a high level language and low level language is referred to as middle level language. These languages are mostly close to the machine and little ahead from the human mind. Let us see about middle level languages in detail.

Definition:

A middle level structured language is somewhere in between being user-friendly and being machine-friendly. Machine code and assembly is low level and everything else is high level. For example: C is said to be middle level language.

Characteristics of middle level languages:

- High level abstractions such as objects (or functional).
- Static typing.
- Virtual machines.
- Easy to reason about program flow.



A diagram of middle level language:

Explanation from diagram:

- These languages are very close to machines but they are far from human mind.
- The programmer has to write more codes.

- These languages are easy to write machine level codes.

Advantages and disadvantages of middle level languages:

- Middle-level languages have been developed in recent years to fill the gap between high- and low-level languages.
- Many of these languages fall in the "object-oriented" category, and the list includes such languages as C#, C++ and Java.
- These languages are helpful in developing graphical user interfaces that run on personal computers, providing a "front end" for the legacy mainframe applications that they connect to.
- This helps the programmer to "put a pretty face" on a former "green screen" application, which can be a competitive advantage for a software product.
- Middle-level language programmers tend to be somewhat more technically skilled than high-level programmers and are typically paid more.

Languages on middle level language category:

C Programming language which is a type of program oriented language is a middle level language. On the other hand, some object oriented languages are also in middle languages. They are C++, Java.

Conclusion:

Thus these are the definition, characteristics, advantages and disadvantages of Middle level languages.

LOW LEVEL LANGUAGES

In computer science, a **Low-Level Programming Language** is a programming language that provides little or no abstraction from a computer's instruction set architecture. Generally this refers to either machine code or assembly language.

The word "low" refers to the small or nonexistent amount of abstraction between the language and machine language; because of this, low-level languages are sometimes described as being "close to the hardware."

Low-level languages can be converted to machine code without using a compiler or interpreter, and the resulting code runs directly on the processor. A program written in a low-level language can be made to run very quickly, and with a very small memory footprint; an equivalent program in a high-level language will be more heavyweight.

Low-level languages are simple, but are considered difficult to use, due to the numerous technical details which must be remembered.

By comparison, a high-level programming language isolates the execution semantics of computer architecture from the specification of the program, which simplifies development.

Low-level programming languages are sometimes divided into two categories: ***first generation***, and ***second generation***. They are of two types:

1. Machine code

2. Assemblies

Machine code:

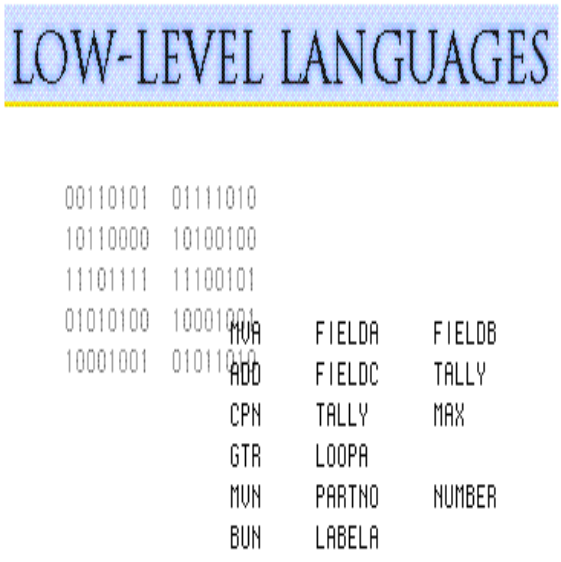
Machine code is the only language a microprocessor can process directly without a previous transformation. Currently, programmers almost never write programs directly in machine code, because it requires attention to numerous details which a high-level language would handle automatically, and also requires memorizing or looking up numerical codes for every instruction that is used. For this reason, second generation programming languages provide one abstraction level on top of the machine code.

Assembly:

Assembly language is not considered a programming language as it has no semantics and no specification, being only a mapping of human-readable symbols, including symbolic addresses, to opcodes, addresses, numeric constants, strings and so on.

Typically, one machine instruction is represented as one line of assembly code. Assemblers produce object files which may be linked with other object files or loaded on their own.

Most assemblers provide macros.



Example:

The same Fibonacci number calculator as above, but in x86 assembly language using MASM syntax differs.

ASSEMBLY LANGUAGES

An **assembly language** is a low level programming language for a computer or other programmable device, in which there is a very strong (generally one to one) correspondence between the language and the architectures machine code instructions. Each assembly language is specific to a particular computer architecture, in contrast to most high level programming languages, which are generally portable across multiple architectures, but require interpreters or compilers.

Assembly language is converted into executable machine code by a utility program referred to as an assemblers the conversion process is referred to as ***assembly,*** or ***assembling*** the code.

Assembly language uses a mnemonic to represent each low-level machine operation or opcode. Some opcodes require one or more operands as part of the instruction, and most assemblers can take labels and symbols as operands to represent addresses and constants, instead of hard coding them into the program. **Macro assemblers** include a macro instruction facility so that assembly language text can be pre-assigned to a name, and that name can be used to insert the text into other code. Many assemblers offer additional mechanisms to facilitate program development, to control the assembly process, and to aid debugging.

Assembler

An **assembler** creates object code by translating assembly instruction mnemonics into opcodes and by resolving symbolic codes for memory locations and other entities .The use of symbolic references is a key feature of assemblers, saving tedious calculations and manual address updates after program modifications. Most assemblers also include macro facilities for performing textual substitution—e.g., to generate common short sequences of instructions as inline, instead of *called* subroutines.

Number of Passes

There are two types of assemblers based on how many passes through the source are needed to produce the executable program.

- One-pass assemblers go through the source code once. Any symbol used before it is defined will require "errata" at the end of the object code (or, at least, no earlier than the point where the symbol is defined) telling the linker or the loader to "go back" and overwrite a placeholder which had been left where the as yet undefined symbol was used.

- Multi-pass assemblers create a table with all symbols and their values in the first passes, then use the table in later passes to generate code.

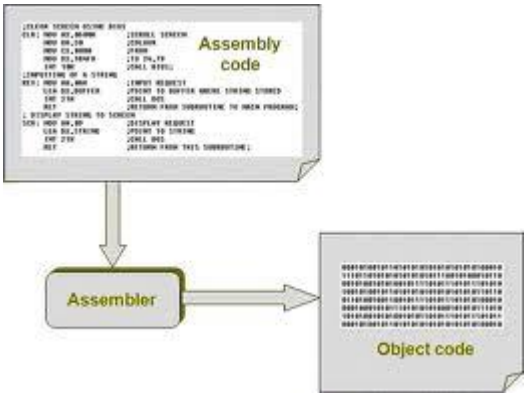
Applications

Assembly language is typically used in a system's boot code, (BIOS on IBM-compatible PC systems and CP/M), the low-level code that initializes and tests the system hardware prior to booting the operating system, and is often stored in ROM.

- Some compilers translate high-level languages into assembly first before fully compiling, allowing the assembly code to be viewed for debugging and optimization purposes.

- Relatively low-level languages, such as C, allow the programmer to embed assembly language directly in the source code. Programs using such facilities, such as the Linux kernel, can then construct abstractions using different assembly language on each hardware platform. The system's portable code can then use these processor-specific components through a uniform interface.

- Assembly language is valuable in reverse engineering. Many programs are distributed only in machine code form which is straightforward to translate into assembly language, but more difficult to translate into a higher-level language. Tools such as the interactive disassemblers make extensive use of disassembly for such a purpose.



- Assemblers can be used to generate blocks of data, with no high-level language overhead, from formatted and commented source code, to be used by other code.

BLU-RAY DISC

Blu-ray Disc (BD) is a digital optical disc data storage format designed to supersede the DVD format. The plastic disc is 120 mm in diameter and 1.2 mm thick, the same size as DVDs and CDs. Conventional (pre-BD-XL) Blu-ray Discs contain 25 GB per layer, with dual layer discs (50 GB) being the industry standard for feature-length video discs.

Recording speed

BD drive speeds				
Drive speed	Data rate		~Write time (minutes)	
	Mbit/s	MB/s	Single-Layer	Dual-Layer
1×	36	4.5	90	180
2×	72	9	45	90
4×	144	18	22.5	45
6×	216	27	15	30
8×	288	36	11.25	22.5
10×	360	45	9	18
12×	432	54	7.5	15
14×	504	63	6.5	13
16×	576	72	5.7	11.5

Software standards

File system

Blu-ray Disc specifies the use of Universal Disk Format (UDF) 2.50 as a convergent friendly format for both PC and consumer electronics environments. It is used in the latest specifications of BD-ROM, BD-RE and BD-R.

In the first BD-RE specification (defined in 2002), the BDFS (Blu-ray Disc File System) was used. The BD-RE 1.0 specification was defined mainly for the digital recording of High-definition television (HDTV) broadcast television. The BDFS was replaced by UDF 2.50 in the second BD-RE specification in 2005, in order to enable interoperability among consumer electronics Blu-ray recorders and personal computer systems. These optical disc recording technologies enabled PC recording and playback of BD-RE. BD-R can use UDF 2.50/2.60.

The Blu-ray Disc application (BDAV application) for recording of digital broadcasting has been developed as System Description Blu-ray Rewritable Disc Format part 3 Audio Visual Basic Specifications. The requirements related with computer file system have been specified in System Description Blu-ray Rewritable Disc Format part 2 File System Specifications version 1.0 (BDFS).

Media format

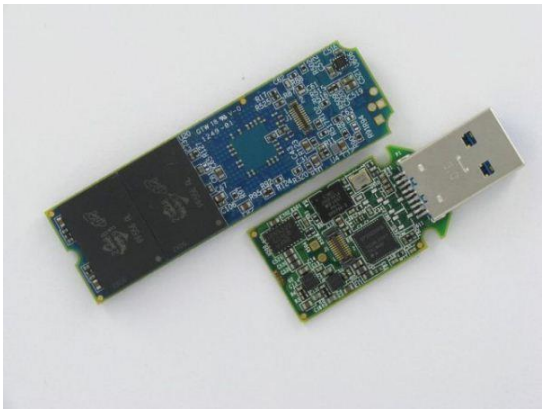
Video

High-definition video may be stored on BD-ROMs with up to 1920×1080 pixel resolution at up to 60 (59.94) fields per second. Officially, progressive scan video can go up to 1920×1080 pixel resolution at 24 frames per second, or up to 59.94 frames per second at a resolution of 1280×720 pixels. Many current Blu-ray players and recorders now support 1920×1080 video at the full 60p and 50p progressive format.

Codecs

The BD-ROM specification mandates certain codec compatibilities for both hardware decoders (players) and movie software (content). Windows Media Player does not come with the codecs required to play Blu-ray discs.

FLASH MEMORY



Flash memory is an electronic non-volatilecomputer storage medium that can be electrically erased and reprogrammed. Flash memory developed from EEPROM (electrically erasable programmable read-only memory).

Flash memory is often used to hold control code such as the basic input/output system (BIOS) in a personal computer. When BIOS needs to be changed (rewritten), the flash memory can be written to in block (rather than byte) sizes, making it easy to update. On the other hand, flash memory is not useful as random access memory (RAM) because RAM needs to be addressable at the byte (not the block) level.

Types of flash memory

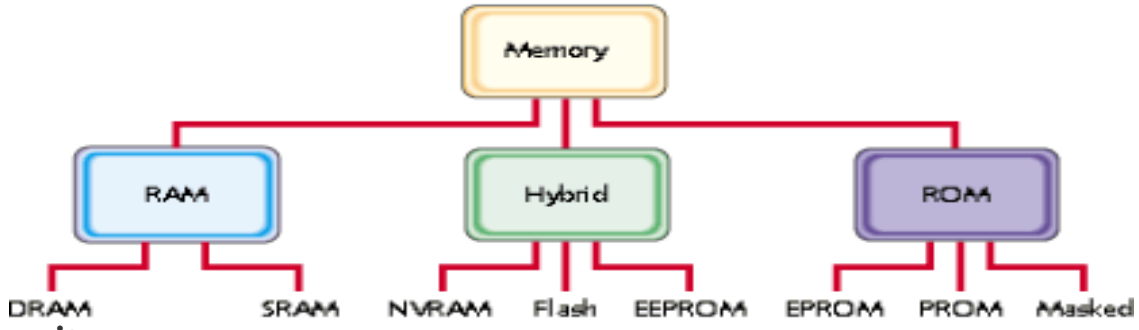
- There are two main types of flash memory, which are named after the NAND and NOR logic gates. The internal characteristics of the individual flash memory cells exhibit characteristics similar to those of the corresponding gates.
- Whereas EEPROMs had to be completely erased before being rewritten, NAND type flash memory may be written and read in blocks (or pages) which are generally much smaller than the entire device. The NOR type allows a single machine word (byte) to be written or read independently.
- The NAND type is primarily used in main memory, memory cards, USB flash drives, solid-state drives, and similar products, for general storage and transfer of data.
- The NOR type, which allows true random access and therefore direct code execution, is used as a replacement for the older EPROM and as an alternative to certain kinds of ROM applications, whereas NOR flash memory may emulate ROM primarily at the machine code level; many digital designs need ROM (or PLA) structures for other uses, often at significantly higher speeds than (economical) flash memory may achieve.
- NAND or NOR flash memory is also often used to store configuration data in numerous digital products, a task previously made possible by EEPROMs or battery-powered static RAM.

History

Flash memory (both NOR and NAND types) was invented by Dr.Fujio Masuoka while working for Toshiba circa 1980.

Principles of operation

Flash memory stores information in an array of memory cells made from floating-gate transistors. In traditional single-level cell (SLC) devices, each cell stores only one bit of information. Some newer flash memory, known as multi-level cell (MLC) devices, including triple-level cell (TLC) devices.



Capacity

The largest single Flash memory chip available stores 256GB. Hard drives, by comparison, regular offer multi-terabyte (1,000GB) capacities. Consumer flash storage devices typically are advertised with usable sizes expressed as a small integral power of two (2, 4, 8, etc.) and a designation of megabytes (MB) or gigabytes (GB); e.g., 512 MB, 8 GB. There are still flash chips manufactured with capacities under or around 1 MB, **e.g.,** for BIOS-ROMs and embedded applications.

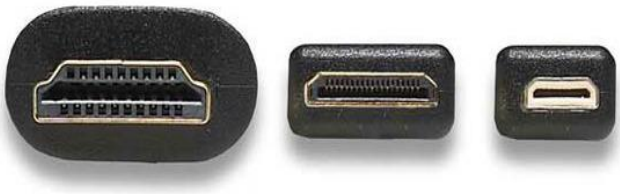
Examples of flash memory

- Personal computers
- PDAs
- Digital Audio Players
- Digital Cameras
- Mobile Phones
- Synthesizers
- Video Games
- Scientific Instrumentation
- Industrial Robotics
- Medical electronics and so on.

HDMI

HDMI, or High Definition Multimedia Interface, is a way of transmitting a video and audio signal digitally. By using an HDMI cable you can send a picture and sound from a source (DVD, HD Box, Blu-Ray and others) to a display (TV, Monitor, Projector). It is currently the cable with the greatest capacity for delivering high definition images and audio. That doesn't always mean that it does give the best picture but it usually does. HDMI is required for the up scaling (increasing the resolution) of DVD images within the DVD Player to 1080P (the highest resolution available on current TV sets).

HDMI is also capable of sending additional information along with the picture and sound like turning on the TV and automatically switching to the right input when you push play on the Blu-Ray player. So, once again HDMI is a digital A/V connection.



The HDMI Advantage:

HDMI technology is the global standard for connecting high-definition equipment. HDMI is the intelligent, all-digital interface that delivers both dazzling quality and unmatched ease of use. More than 1,200 of the world's largest consumer electronics, PC and mobile device manufacturers incorporate HDMI connectivity into their products.

HDMI features and benefits:

Features:

- HDMI technology eliminates unnecessary signal conversions.
- HDMI technology supports standard, enhanced, or high-definition video at 24 bits/pixel, 165MHz max clock frequency.
- HDMI technology supports up to 8 channel digital audio on a single cable eliminating costly A/D signal conversions.
- HDMI offers Bi-directional control signal transfer.
- HDMI offers 5 Gbps bandwidth, 55% spared for future expansion.
- HDMI offers 1 simple, user-friendly connector.
- HDMI technology is backward compatible to DVI hot plug enabled assemblies up to 5 meters in length.

HDMI Benefits:

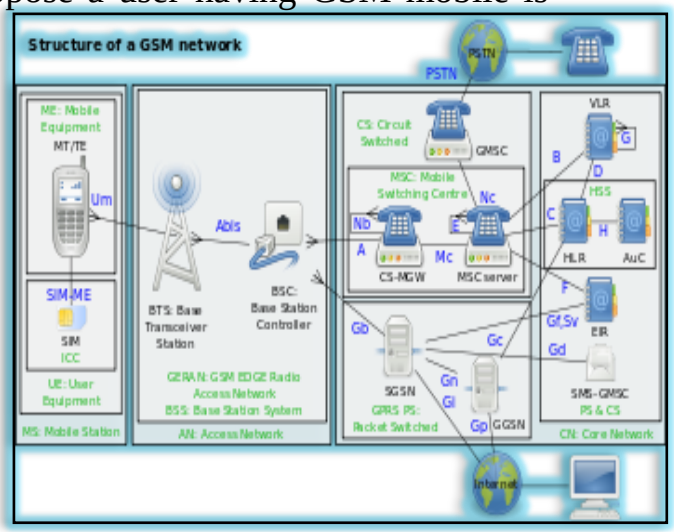
- Instead of needing multiple HDMI cable assemblies for the video signal and multiple HDMI cables for the sound signal, HDMI integrates all video and sound signals onto a single, thin cable. It makes it very easy to connect components together.
- Instead of converting digital signals to analog (to run through the cables) and then back to digital, everything on an HDMI cable .

HDMI BOX

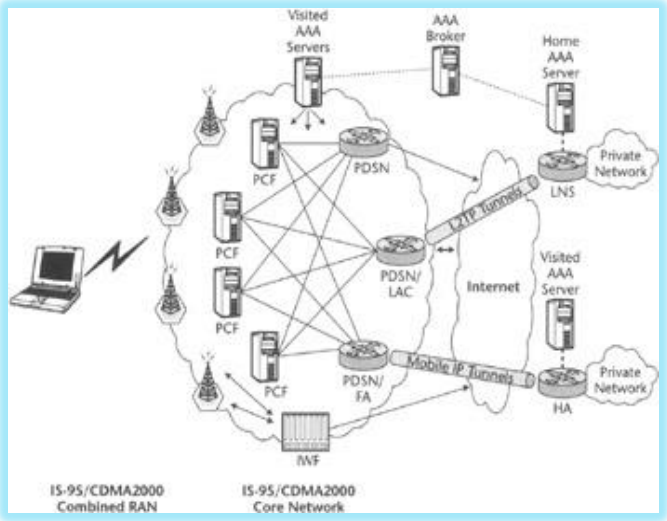
CDMA AND GSM IN MOBILE PHONES

Introduction to GSM and CDMA:

- **GSM** stands for Global System for Mobile communication. It is widely used over the world. GSM system operates on radio frequencies of 800MHz, 1800MHz, 1200MHz. Suppose a user having GSM mobile is calling a phone then a separate individual radio link is crated between the mobile and the tower (transponder). GSM is very useful but it is expensive.



- **CDMA** - CDMA stands for Code Division Multiple Access. In GSM if 2 mobile phones are connected to same tower, they have different frequencies. But for CDMA all the mobile phones in each cell have same frequencies. Suppose 2 CDMA phones are calling from a same area, their frequency is same and hence their radio link is not individual. All the radio links of CDMA reach the transponder at a same time. CDMA offers a huge bandwidth. But CDMA haves some limitations like if there are too many callers in the same area, quality decreases. But CDMA is inexpensive and CDMA phones need very low power.



Structure of CDMA network

GSM technology:

GSM refers to second-generation wireless telecommunications standard for digital cellular services. First deployed in Europe, it is based on TDMA (Time Division Multiple Access) technology. GSM uses three frequency bands: 900 MHz, 1800 MHz and 1900 MHz Dual-band phones operate on two out of

three of these frequencies, while tri-band phones operate on all three frequencies.

CDMA technology:

CDMA (Code Division Multiple Access) digital wireless technology employs a special coding scheme (whereby each transmitter is assigned a code), which allows multiple users to share common access to the network. Using 'spread spectrum' technology, a signal is spread across a broad spectrum of radio frequencies, allowing for a signal with wider bandwidth and increased resistance to interference.

A CDMA2000 mobile phone

The advantages of GSM:

GSM networks enjoy wide international coverage. The use of a SIM (Subscriber Identity Module) card makes it easy to switch between different handsets and allows for the quick and easy import of data such as contacts and text-messages. The amount of battery-supported 'talk-time' is generally higher on GSM phones.

The advantages of CDMA:

CDMA provides wider coverage than GSM and allows for a larger cell area. CDMA-enabled calls can be placed in low signal strength conditions, thus CDMA phones offer better reception/coverage in rural areas.

WEBCAM

A **webcam** is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera (which uses a direct connection using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, FireWire cable, or similar cable.

Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos.Webcams are known for their low manufacturing cost and flexibility, making them the lowest cost form of video-telephony. They have also become a source of security and privacy issues, as some built-in webcams can be remotely activated via spyware.

Typical low-cost webcam used with many personal computers. Animated set of X-ray images of a webcam. Images acquired using industrial CT scanning.

History

Early development

First developed in 1991, a webcam was pointed at the Trojan Room coffee pot in the Cambridge University Computer Science Department. The camera was finally switched off on August 22, 2001. The final image captured by the camera can still be viewed at its homepage. The oldest webcam still operating is Fog-Cam at San Francisco State University, which has been running continuously since 1994.

Connectix QuickCam

The first commercial webcam, the black-and-white Quick-Cam, entered the marketplace in 1994, created by the U.S. computer company Connectix (which sold its product line to Logitech in 1998). Quick-Cam was available in August 1994 for the Apple Macintosh, connecting via a serial port, at a cost of $100. Jon Garber, the designer of the device, had wanted to call it the "Mac-camera", but was overruled by Connectix's marketing department; a version with a PC-compatible serial port and software for Microsoft Windows was

launched in October 1995. The original Quick-Cam provided 320x240-pixel resolution with a grayscale depth of 16 shades at 60 frames per second, or 256 shades at 15 frames per second.

In 2010, Time Magazine named the Quick-Cam as one of the top computer devices of all time.

Videoconferencing via computers already existed, and at the time client-server based videoconferencing software such as CU-See Me had started to become popular.

Later developments

One of the most widely reported-on webcam sites was Jenni-Cam, created in 1996, which allowed Internet users to observe the life of its namesake constantly, in the same vein as the reality TV series *Big Brother*, launched four years later. Other cameras are mounted overlooking bridges, public squares, and other public places, their output made available on a public web page in accordance with the original concept of a "webcam". Aggregator websites have also been created, providing thousands of live video streams or up-to-date still pictures, allowing users to find live video streams based on location or other criteria.

Around the turn of the 21st century, computer hardware manufacturers began building webcams directly into laptop and desktop screens, thus eliminating the need to use an external USB or FireWire camera. Gradually webcams came to be used more for telecommunications, or video-telephony, between two people, or among several people, than for offering a view on a Web page to an unknown public.

The term 'webcam' (a portmanteau) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet. Some of them, for example, those used as online traffic cameras, are expensive, rugged professional video cameras.

For less than US$100 in 2012, a Three-dimensional space webcam became available, producing videos and photos in 3D Anaglyph image with a resolution up to 1280 x 480 pixels. Both sender and receiver of the images must use 3D glasses to see the effect of three dimensional images.

DAISY CHAINING

In electrical and electronic engineering a **daisy chain** is a wiring scheme in which multiple devices are wired together in sequence or in a ring. Other than a full, single loop, systems which contain internal loops cannot be called daisy chains. Daisy chains may be used for power, analog signals, digital data, or a combination thereof. The term daisy chain may refer either to large scale devices connected in series, such as a series of power strips plugged into each other to form a single long line of strips, or to the wiring patterns embedded inside of devices. Other examples of devices which can be used to form daisy chains are those based on USB, FireWire, Thunderbolt, and Ethernet cables.

Signal Transmission

For analog signals, connections usually comprise a simple electrical bus and, especially in the case of a chain of many devices, may require the use of one or more repeaters or amplifiers within the chain to counteract attenuation (the natural loss of energy in such a system). Digital signals between devices may also comprise a simple electrical bus, in which case a bus terminator may be needed on the last device in the chain.

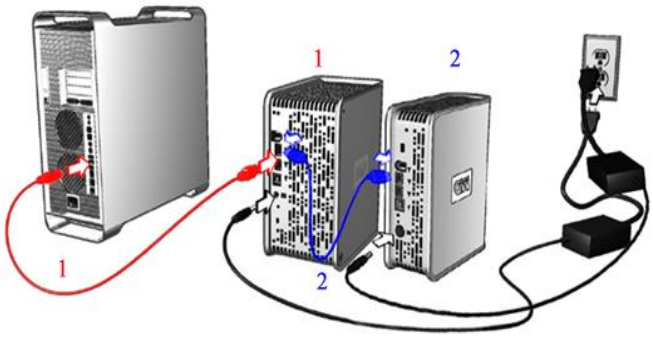
Types:

Computer Software

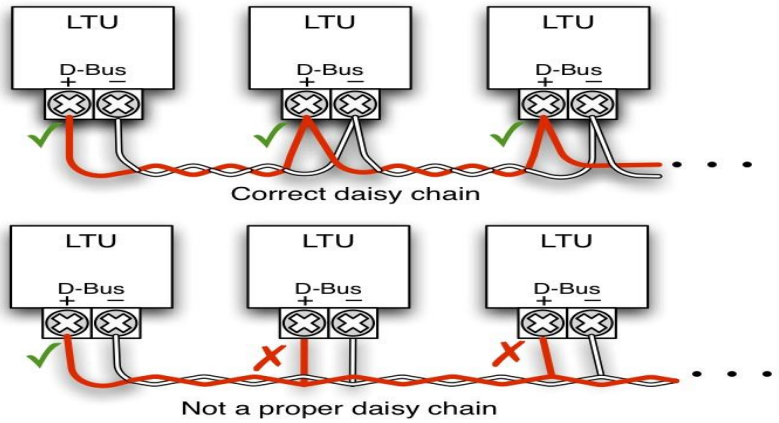
A daisy chain software installation can continue in piecemeal fashion. This is of particular use with downloaded software. If the connection to the download server is lost during the installation process, daisy chaining allows installation to restart from where it stopped. Google Pack provides this capability.

Computer Hardware

Some hardware can be attached to a computing system in a daisy chain configuration by connecting each component to another similar component, rather than directly to the computing system that uses the component. Only the last component in the chain directly connects to the computing system. For example chaining multiple components that each have a UART port to each other. The components must also behave cooperatively. e.g., only one seizes the communications bus at a time.



- SCSI is an example of a digital system that is electrically a bus, in the case of external devices, is physically wired as a daisy chain. Since the network is electrically a bus, it must be terminated and this may be done either by plugging a terminator into the last device or selecting an option to make the device terminate internally.
- Some Serial Peripheral Interface Bus (SPI) IC products are designed with daisy chain capability.
- All JTAG integrated circuits should support daisy chaining according to JTAG daisy chaining guidelines.
- Thunderbolt (interface) also supports daisy-chained devices such as RAID arrays and computer monitors.
- The Hex bus is the 10-wire bus of Texas Instruments, used in the TI-99/4A, CC-40 and TI-74.



Network Topology

Any particular daisy chain forms one of two network topologies:

- **Linear topology:** For example, A-B-C-D-E, A-B-C-D-E & C-M-N-O (branched at C) are daisy chain.
- **Ring topology:** there is a loop connection back from the last device to the first. For example, A-B-C-D-E-A (loop). This is often called a "daisy chain loop".

ER DIAGRAMS AND ITS SYMBOLS

An ER model is an abstract way of describing a database. In the case of a relational database, which stores data in tables, some of the data in these tables point to data in other tables - for instance, your entry in the database could point to several entries for each of the phone numbers that are yours. The ER model would say that you are an entity, and each phone number is an entity, and the relationship between you and the phone numbers is 'has a phone number'. Diagrams created to design these entities and relationships are called entity–relationship diagrams or ER diagrams.

ER Diagramming Tools

There are many ER diagramming tools. Free software ER diagramming tools that can interpret and generate ER models and SQL and do database analysis are MySQL Workbench (formerly DBDesigner), and Open ModelSphere (open-source). A freeware ER tool that can generate database and application layer code (webservices) is the RISE Editor. SQL Power Architect while proprietary also has a free community edition. Proprietary ER diagramming tools are Avolution, ER/Studio, ERwin, DeZign for Databases, MagicDraw, MEGA International, ModelRight, Navicat Data Modeler, OmniGraffle, Oracle Designer, PowerDesigner, Prosa Structured Analysis Tool, Rational Rose, Software Ideas Modeler, Sparx Enterprise Architect, SQLyog, System Architect, Toad Data Modeler, and Visual Paradigm.

Entity–Relationship Modelling

Two related entities

An entity with an attribute

An entity may be defined as a thing which is recognized as being capable of an independent existence and which can be uniquely identified.

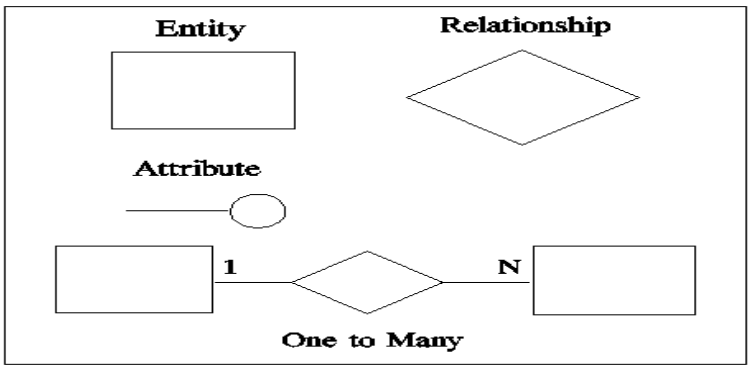
ER And Its Symbols

Peter Chen, the father of ER modelling said in his seminal paper:

"The entity-relationship model adopts the more natural view that the real world consists of entities and relationships. It incorporates some of the important semantic information about the real world."

"The data structure diagram is a representation of the organisation of records and is not an exact representation of entities and relationships."

Several other authors also support his program:



A semantic model is a model of concepts, it is sometimes called a "platform independent model". It is an intensional model. At the latest since Carnap, it is well known that:

"...the full meaning of a concept is constituted by two aspects, its intension and its extension. The first part comprises the embedding of a concept in the world of concepts as a whole, i.e. the totality of all relations to other concepts. The second part establishes the referential meaning of the concept, i.e. its counterpart in the real or in a possible world".

An extensional model is one which maps to the elements of a particular methodology or technology, and is thus a "platform specific model".

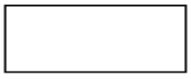
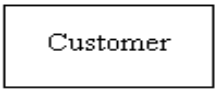
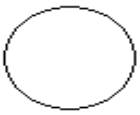
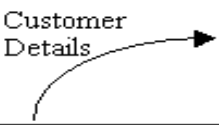
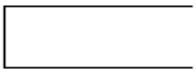
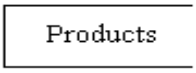
DFD DIAGRAMS AND ITS SYMBOLS

Data Flow Diagrams Symbols

There are some symbols that are used in the drawing of business process diagrams (data flow diagrams). Flow diagrams in general are usually designed using simple symbols such as a rectangle, an oval or a circle depicting a processes, data stored or an external entity, and arrows are generally used to depict the data flow from one step to another.

A DFD usually comprises of four components. These four components can be represented by four simple symbols. These symbols can be explained in detail as follows:

- External entities (source/destination of data) are represented by squares;
- Processes (input-processing-output) are represented by rectangles with rounded corners;
- Data Flows (physical or electronic data) are represented by arrows;
- Data Stores (physical or electronic like XML files) are represented by open-ended rectangles.

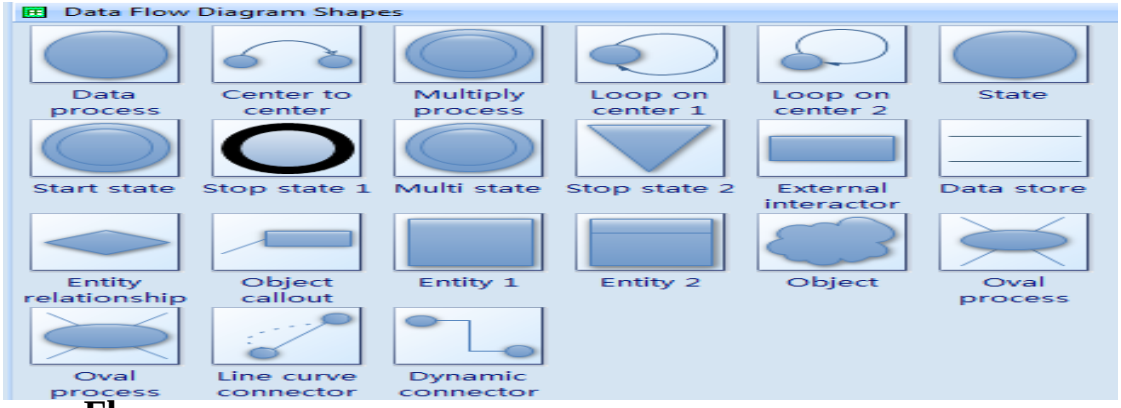
Name	Symbol	Description	Example
Entity		Used to represent people and organizations outside the system. They either input information to the system, accept output information from the system or both	
Process		These are actions that are carried out with the data that flows around the system. A process accepts input data and produces data that it passes on to another part of the DFD	
Data Flow		These represent the flow of data to or from a process	
Data Store		This is a place where data is stored either temporarily or permanently	

External Entity

An external entity is a source or destination of a data flow which is outside the area of study. Only those entities which originate or receive data are represented on a business process diagram. The symbol used is an oval containing a meaningful and unique identifier.

Process

A process shows a transformation or manipulation of data flows within the system. The symbol used is a rectangular box which contains 3 descriptive elements: Firstly an identification number appears in the upper left hand corner. This is allocated arbitrarily at the top level and serves as a unique reference. Secondly, a location appears to the right of the identifier and describes where in the system the process takes place.



Resource Flow

A resource flow shows the flow of any physical material from its source to its destination. For this reason they are sometimes referred to as physical flows. The physical material in question should be given a meaningful name. Resource flows are usually restricted to early, high-level diagrams and are used when a description of the physical flow of materials is considered to be important to help the analysis.

Processes

When naming processes, avoid glossing over them without really understanding their role. Indications that this has been done are the use of vague terms in the descriptive title area - like 'process' or 'update'.

External Entities

It is normal for all the information represented within a system to have been obtained from, and/or to be passed onto, an external source or recipient. These external entities may be duplicated on a diagram, to avoid crossing data flow lines. Where they are duplicated a stripe is drawn across the left hand corner.

ETHERNET

Ethernet is a family of computer networking technologies for local area networks (LANs). Ethernet was commercially introduced in 1980 and standardized in 1985 as IEEE 802.3. Ethernet has largely replaced competing wired LAN technologies such as token ring, FDDI, and ARCNET.

The Ethernet standards comprise several wiring and signaling variants of the OSI physical layer in use with Ethernet. The original 10BASE5 Ethernet used coaxial cable as a shared medium. Later the coaxial cables were replaced with twisted pair and fiber optic links in conjunction with hubs or switches. Data rates were periodically increased from the original 10 megabits per second to 100 gigabits per second.

Systems communicating over Ethernet divide a stream of data into shorter pieces called frames. Each frame contains source and destination addresses and error-checking data so that damaged data can be detected and re-transmitted. As per the OSI model Ethernet provides services up to and including the layer. Since its commercial release, Ethernet has retained a good degree of compatibility. Features such as the 48-bit MAC address and Ethernet frame format have influenced other networking protocols.

History:

Ethernet was developed at Xerox PARC between 1973 and 1974. It was inspired by ALOHA net, which Robert Metcalfe had studied as part of his PhD dissertation. The idea was first documented in a memo that Metcalfe wrote on May 22, 1973, where he named it after the disproven aluminiferous ether as an "omnipresent, completely-passive medium for the propagation of electromagnetic waves".

In 1975, Xerox filed a patent application listing Metcalfe, David Boggs, Chuck Thacker, and Butler Lampson as inventors. In 1976, after the system was deployed at PARC, Metcalfe and Boggs published a seminal paper.

Ethernet Frame:

A data packet on an Ethernet link is called an Ethernet frame. A frame begins with preamble and start frame delimiter. Following which, each Ethernet frame continues with an Ethernet header featuring destination and source MAC addresses. The middle section of the frame is payload data including any headers for other protocols (e.g. Internet Protocol) carried in the frame. The frame ends with a 32-bit cyclic redundancy check which is used to detect any corruption of data in transit.

Varieties of Ethernet:

The Ethernet physical layer evolved over a considerable time span and encompasses coaxial, twisted pair and fiber optic physical media interfaces and speeds from 10 Mbit to 100 Gbit. The most common forms used are 10BASE-T, 100BASE-TX, and 1000BASE-T. All three utilize twisted pair cables and 8P8C modular connectors. They run at 10 Mbit/s, 100 Mbit/s, and 1 Gbit/s, respectively. Fiber optic variants of Ethernet offer high performance, electrical isolationand distance (tens of kilometers with some versions). In general, network protocol stack software will work similarly on all varieties.

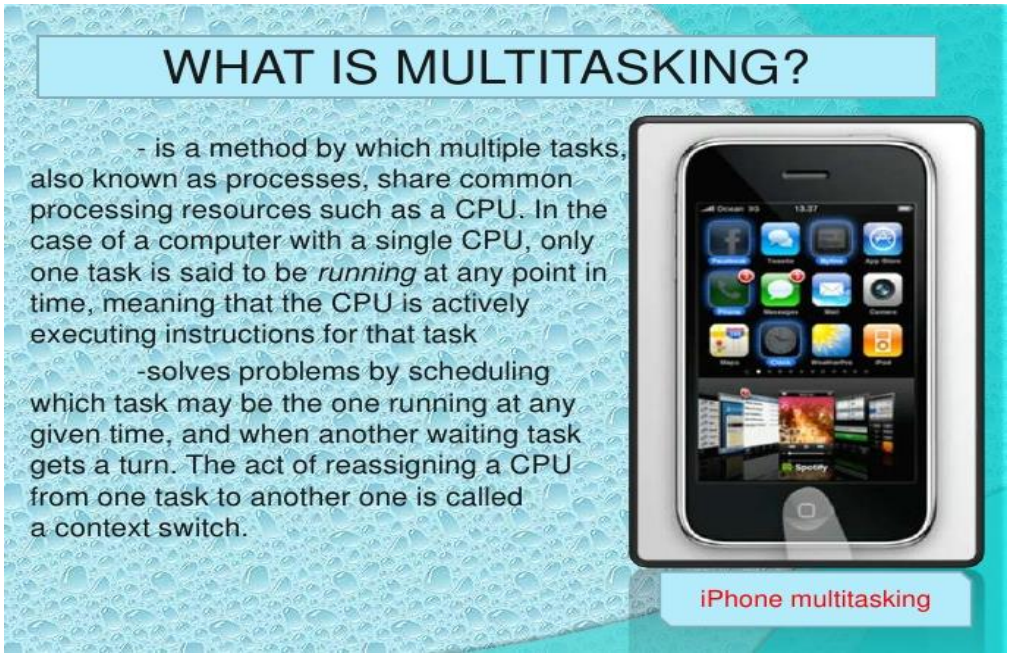
Evolution:

Ethernet evolved to include higher bandwidth, improved media access control methods, and different physical media. The coaxial cable was replaced with point-to-point links connected by Ethernet repeaters or switches to reduce installation costs, increase reliability, and improve management and troubleshooting. Many variants of Ethernet remain in common use.

An Ether Type field in each frame is used by the operating system on the receiving station to select the appropriate protocol module (e.g., an Internet Protocol version such as IPv4). Ethernet frames are said to be *self-identifying*, because of the frame type. Self-identifying frames make it possible to intermix multiple protocols on the same physical network and allow a single computer to use multiple protocols together. Despite the evolution of Ethernet technology, all generations of Ethernet (excluding early experimental versions) use the same frame formats (and hence the same interface for higher layers), and can be readily interconnected through bridging.

MULTITASKING, MULTIPROCESSING & MULTIPROGRAMMING

MULTITASKING



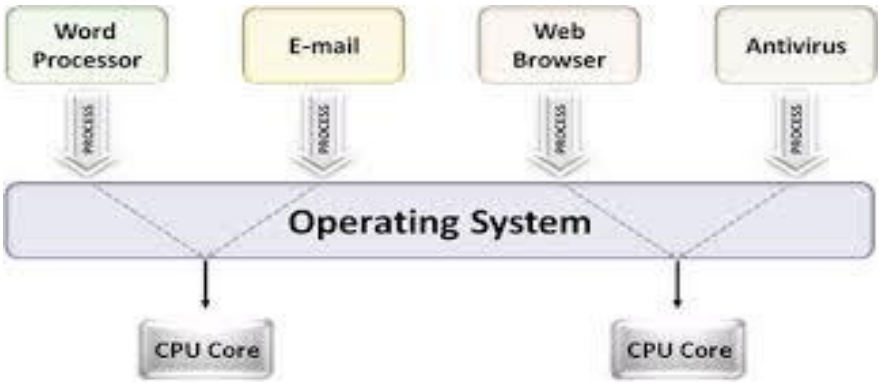
In computing, **multitasking** is a method where multiple tasks, also known as processes, are performed during the same period of time. The tasks share common processing resources, such as a CPU and main memory. Even on computers with more than one CPU (called multiprocessor machines), multitasking allows many more tasks to be run than there are CPUs.

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 and/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.).

Multiprocessing sometimes refers to the execution of multiple concurrent software processes in a system as opposed to a single process at any one instant. However, the terms multitasking or multiprogramming are more appropriate to describe this concept, which is implemented mostly in software, whereas multiprocessing is more appropriate to describe the use of multiple hardware CPUs. A system can be both multiprocessing and multiprogramming, only one of the two, or neither of the two of them



MULTIPROGRAMMING

In the early days of computing, CPU time was expensive, and peripherals were very slow. When the computer ran a program that needed access to a peripheral, the Central processing unit (CPU) would have to stop executing program instructions while the peripheral processed the data. This was deemed very inefficient.

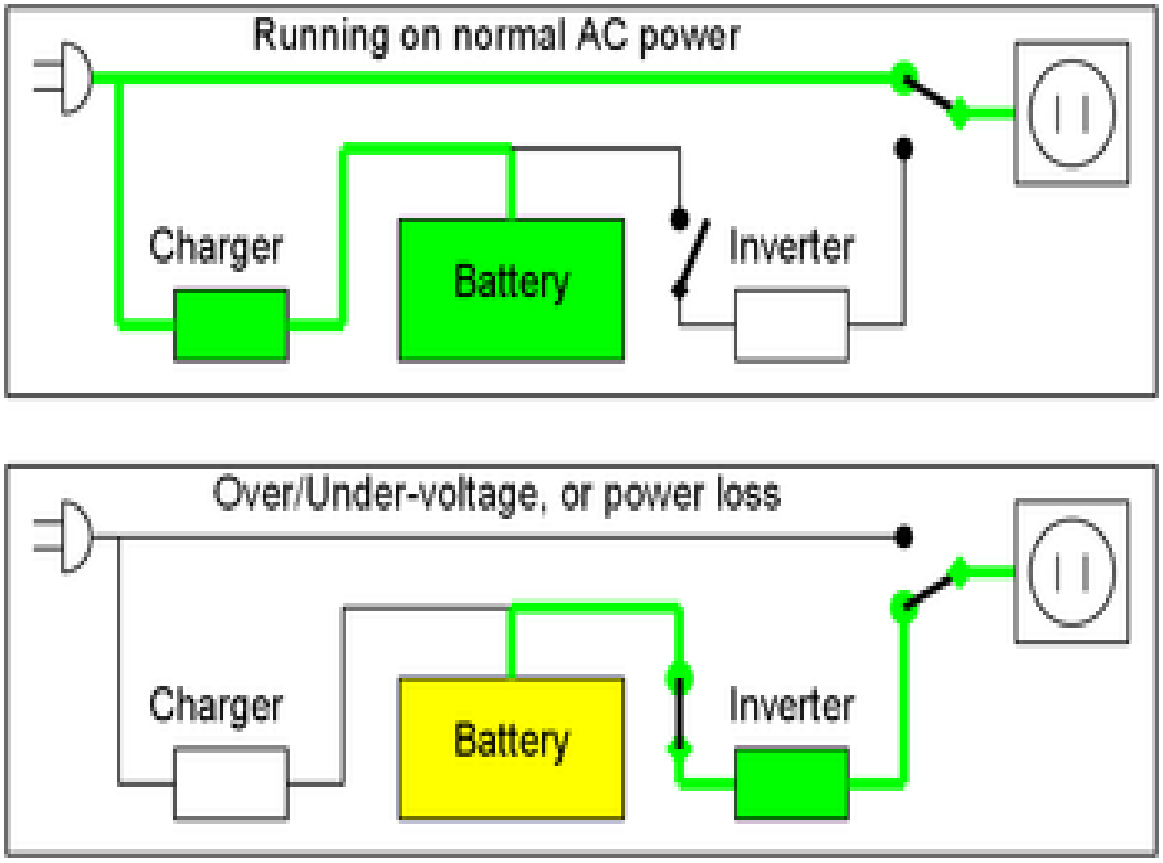
The first computer using a multiprogramming system was the British *Leo III* owned by J. Lyons and Co. When the first program reached an instruction waiting for a peripheral, the context of this program was stored away, and the second program in memory was given a chance to run. The process continued until all programs finished running.

The use of multiprogramming was enhanced by the arrival of virtual memory and virtual machine technology, which enabled individual programs to make use of memory and operating system resources as if other concurrently running programs were, for all practical purposes, non-existent and invisible to them.

Multiprogramming doesn't give any guarantee that a program will run in a timely manner. Multiprogramming greatly reduced wait times when multiple batches were being processed.

UPS MECHANISM

Uninterruptible Power Source, UPSorbattery/flywheel backup, is an electrical apparatus that provides emergency power to a load when the input power source, typically mains power, fails. A UPS differs from an auxiliary or emergency power system or standby generator in that it will provide near-instantaneous protection from input power interruptions, by supplying energy stored in batteries or a flywheel. The on-battery runtime of most uninterruptible power sources is relatively short (only a few minutes) but sufficient to start a standby power source or properly shut down the protected equipment.



Technologies:

The general categories of modern UPS systems are on-line , line-interactive or stand by. An on-line UPS uses a "double conversion" method of accepting AC input, rectifying to DC for passing through the rechargeable battery(or battery strings), then inverting back to 120 V/230 V AC for powering the protected equipment.

A line-interactive UPS maintains the inverter in line and redirects the battery's DC current path from the normal charging mode to supplying current when power is lost. In a standby ("off-line") system the load is powered directly by the input power and the backup power circuitry is only invoked when the utility power fails.

Most UPS below 1 kVA are of the line-interactive or standby variety which is usually less expensive.

Large power units, dynamic uninterruptible power supplies are sometimes used. A synchronous motor/alternator is connected on the mains via a choke. Energy is stored in a flywheel. When the mains power fails, an Eddy-current regulation maintains the power on the load as long as the flywheel's energy is not exhausted.

DUPS are sometimes combined or integrated with a diesel generator that is turned on after a brief delay, forming a diesel rotary uninterruptible power supply (DRUPS).

A fuel call-up has been developed in recent years using hydrogen and a fuel cell as a power source, potentially providing long run times in a small space.

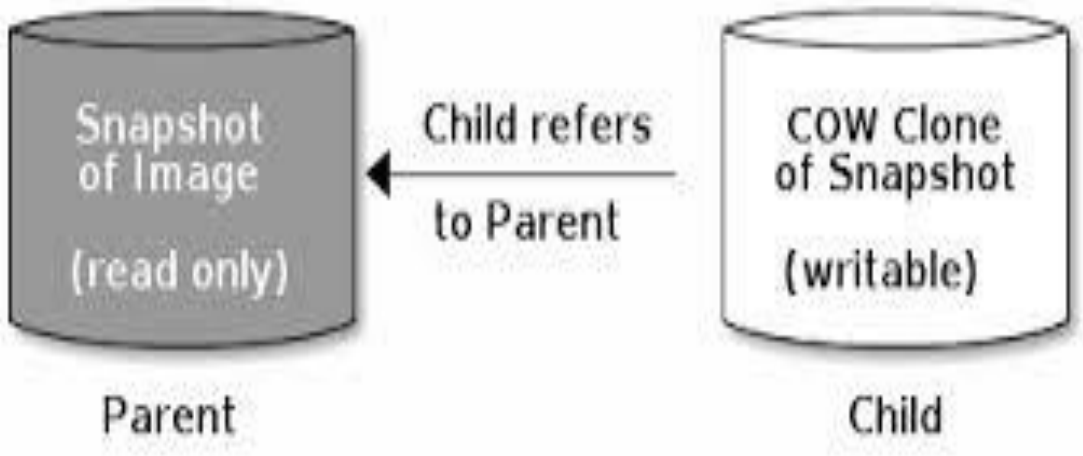
WORM

In computer storage media, WORM (write once, read many) is a data storage technology that allows information to be written to a disc a single time and prevents the drive from erasing the data. The discs are intentionally not rewritable, because they are especially intended to store data that the user does not want to erase accidentally.

Because of this feature, WORM devices have long been used for the archival purposes of organizations such as government agencies or large enterprises. A type of optical media, WORM devices were developed in the late 1970s and have been adapted to a number of different media. The discs have varied in size from 5.25 to 14 inches wide, in varying formats ranging from 140MB to more than 3 GB per side of the (usually) double-sided medium. Data is written to a WORM disc with a low-powered laser that makes permanent marks on the surface.

Because of a lack of standardization, WORM discs have typically been only readable by the drive on which they were written, and hardware and software incompatibility has hampered their marketplace acceptance. Other optical media, such as CDs and DVDs that can be recorded once and read an unlimited number of times are sometimes considered WORM devices, although there is some argument over whether formats that can be written in more than one session (such as the multisession CD) qualify as such.

CD-R has gradually been replacing traditional WORM devices, and it is expected that some newer technology, such as DVD-R or HD-ROM will eventually replace both WORM and CD-R devices.

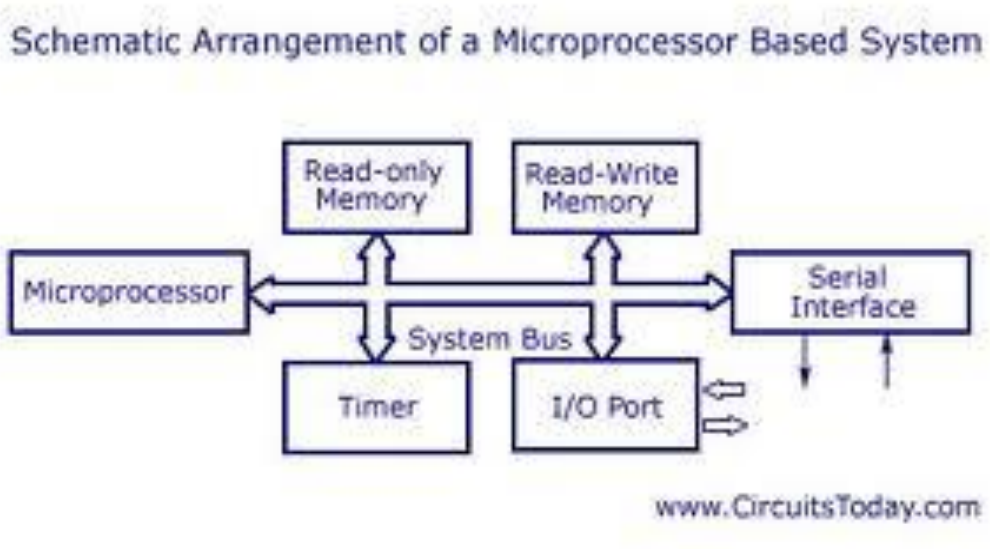


Tips:

External and manual libraries use separate logical libraries to segregate their media. Ensuring that the correct media are loaded is the responsibility of the operator and the library manager software.

A storage pool can consist of either WORM or RW media, but not both.

Do not use WORM tapes for database backup or export operations. Doing so wastes tape following a restore or import operation.



Current WORM drives

1. The CD-R and DVD-R optical disks for computers are common WORM devices. On these disks, no region of the disk can be recorded a second time.
2. However, these disks often use a file system based on ISO 9660 that permits additional files, and even revised versions of a file by the same name, to be recorded in a different region of the disk.
3. To the user of the disk, the disk appears to allow additions and revisions until all the disk space is used.
4. A version of the Secure Digital flash memory card exists in which the internal microprocessor does not allow rewrites of any block of the memory.
5. The Memory Vault product of SanDisk is a thumb drive-like consumer device that functions as a WORM device, by not providing the capability of deleting any file previously written to it.
6. Since 2005 WORM is also an option for high density magnet tape storage devices, developed by the LTO Consortium.

NUMBER SYSTEMS- BINARY, OCTAL, DECIMAL AND HEXADECIMAL

A number can be represented with different base values. We are familiar with the numbers in the base 10 (known as decimal numbers), with digits taking values 0, 1, 2…8, 9. A computer uses a Binary number system which has a base 2 and digits can have only TWO values: 0 and 1. A decimal number with a few digits can be expressed in binary form using a large number of digits. Thus the number 65 can be expressed in binary form as 1000001.

The binary form can be expressed more compactly by grouping 3 binary digits together to form an octal number. An octal number with base 8 makes use of the EIGHT digits 0,1,2,3,4,5,6 and 7.A more compact representation is used by Hexadecimal representation which groups 4 Binary digits together. It can make use of 16 digits, but since we have only 10 digits, the Remaining 6 digits are made up of first 6 letters of the alphabet. Thus the hexadecimal base uses 0,1,2,….8,9,A,B,C,D,E,F as digits.

To summarize:

Decimal: base 10 **Binary:** base 2

Octal: base 8 **Hexadecimal:** base 16

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

Example: Convert (1000100)2 to its decimal equivalent

= 26 x 1 + 25 x 0 +24 x 0+ 23 x 0 + 22 x 1 + 21 x 0 + 20 x 0

= 64 + 0 + 0+ 0 + 4 + 0 + 0

= (68)10

Octal Number System

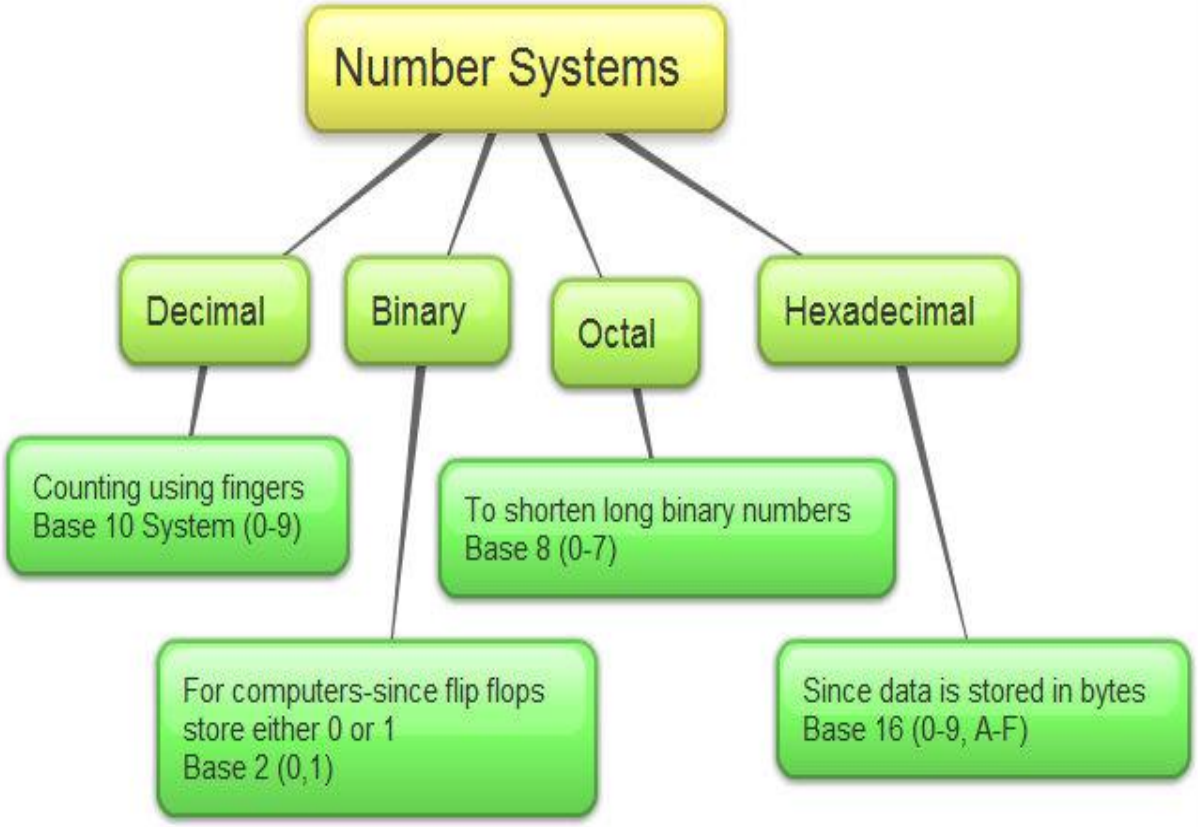
•Base or radix 8 number system.

•1 octal digit is equivalent to 3 bits.

•Octal numbers are 0 to7. (see the chart down below)

•Numbers are expressed as powers of 8. See this table

.



Hexadecimal Number System

•Base or radix 16 number system.

•1 hex digit is equivalent to 4 bits.

•Numbers are 0,1,2…..8,9, A, B, C, D, E, F.

•Numbers are expressed as powers of 16.

BOOKMARKS AND BROWSING HISTORY

Bookmarks

In the context of the World Wide Web, a **bookmark** is a Uniform Resource Identifier (URI) that is stored for later retrieval in any of various storage formats. All modern web browsers include bookmark features. Bookmarks are called **favorites** or **Internet shortcuts** in Internet Explorer, and by virtue of that browser's large market share, these terms have been synonymous with ***bookmark*** since the first browser war. Bookmarks are normally accessed through a menu in the user's web browser, and folders are commonly used for organization. In addition to bookmarking methods within most browsers, many external applications offer bookmark management.

Bookmarks have been incorporated in browsers since the Mosaic browser in 1993. Bookmark lists were called ***Hotlists*** in Mosaic and in previous versions of Opera; this term has faded from common use. Other early web browsers such as ViolaWWW and Cello also had bookmarking features.

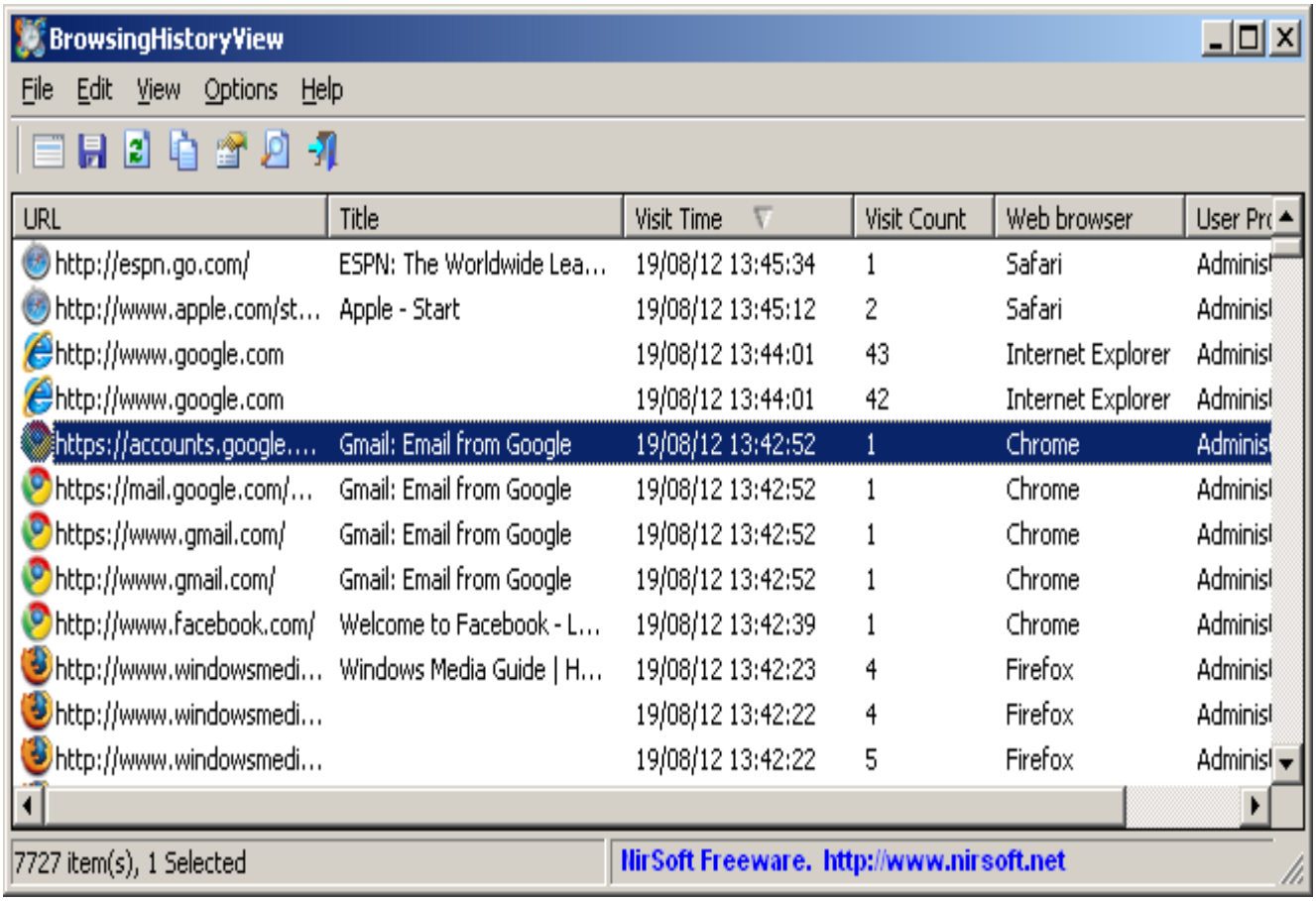
With the advent of social bookmarking, shared bookmarks have become a means for users sharing similar interests to pool web resources, or to store their bookmarks in such a way that they are not tied to one specific computer or browser. Web-based bookmarking services let users save bookmarks on a remote web server, accessible from anywhere.

Browsing History:

Description

BrowsingHistoryView is a utility that reads the history data of 4 different Web browsers (Internet Explorer, Mozilla Firefox, Google Chrome, and Safari) and displays the browsing history of all these Web browsers in one table. The browsing history table includes the following information: Visited URL, Title, Visit Time, Visit Count, Web browser and User Profile.

BrowsingHistoryView allows you to watch the browsing history of all user profiles in a running system, as well as to get the browsing history from external hard drive. You can also export the browsing history into csv/tab-delimited/html/xml file from the user interface, or from command-line, without displaying any user interface.



Versions History

- **Version 1.42 :**
  - Added /cfg command-line option, which instructs BrowsingHistoryView to use a config file in another location instead if the default config file, for example: BrowsingHistoryView.exe /cfg "%AppData%\BrowsingHistoryView.cfg"
- **Version 1.41 :**
  - Fixed a bug with displaying IDN URLs (URLs containing non-English characters) from Firefox history.
- **Version 1.40 :**
  - Added new data source in the 'Advanced Options' window: Load history from the specified custom folders. In this option, you can select the correct AppData folder, Local AppData folder, and the History folder of the profile you want to inspect.

COOKIES

Introduction:

Cookies are also known by many names, HTTP Cookie, Web Cookie, Browser Cookie, Session Cookie, etc. Cookies are one of several ways to store data about web site visitors during the time when web server and browser are not connected. Common use of cookies is to remember users between visits. Practically, cookie is a small text file sent by web server and saved by web browser on client machine.

Uses of cookies:

Cookies may be used for authentication, identification of a user session, user's preferences, shopping card contents, or anything else that can be accomplished through storing text data. Cookies can also be used for travelling of data from one page to another.

Scenarios:

Cookies provide a means in Web applications to store user-specific information. For example, when a user visits your site, you can use cookies to store user preferences or other information. When the user visits your Web site another time, the application can retrieve the information it stored earlier.

Way of writing Cookies:

The browser is responsible for managing cookies on a user system. Cookies are sent to the browser via the Http Response object that exposes a collection called Cookies. We can access the Http Response object as the Response property of our Page class. Any cookies that we want to send to the browser must be added to this collection. When creating a cookie, we need

to specify a Name and Value. Each cookie must have a unique name so that it can be identified later when reading it from the browser. Because cookies are stored by name, naming two cookies the same will cause one to be overwritten. We can also set a cookie's date and time expiration. Expired cookies are deleted by the browser when a user visits the site that wrote the cookies.

Way of reading Cookies:

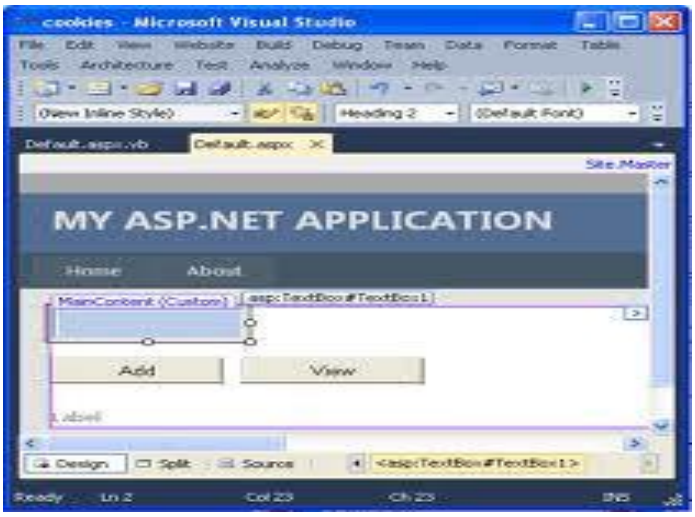
When a browser makes a request to the server, it sends the cookies for that server along with the request. In our ASP.NET applications, you can read the cookies using the Http Request object, which is available as the Request property of your Page class. The structure of the Http Request object is essentially the same as that of the Http Response object, so we can read cookies out of the Http Request object much the same way we wrote cookies into the Http Response object.

Deleting Cookies:

We cannot directly modify a cookie. Instead, changing a cookie consists of creating a new cookie with new values and then sending the cookie to the browser to overwrite the old version on the client Deleting a cookie—physically removing it from the user's hard disk—is a variation on modifying it. We cannot directly remove a cookie because the cookie is on the user's computer.

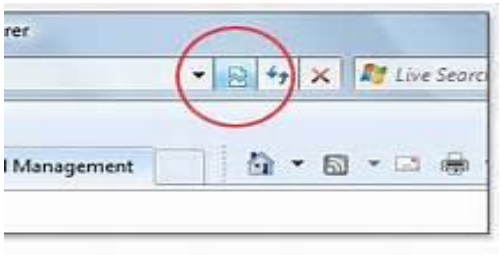
Cookies and its security:

The security issues with cookies are similar to those of getting data from the client. In our application, cookies are another form of user input and are therefore subject to examining and spoofing. A user can see minimum of the data that we store in a cookie, since the cookie is available on the user's own computer. The user can also change the cookie before the browser sends it to you.



COMPATIBILITY MODE

A **compatibility mode** is a software mechanism in which a software emulates an older version of software in order to allow obsolete software or files to remain compatible with the computer's newer hardware or software. Examples of the software using the mode are operating systems and Internet Explorer.



Operating systems:

A **compatibility mode** in an operating system is a software mechanism in which a computer's operating system emulates an older processor, operating system, and/or hardware platform in order to allow obsolete software to remain compatible with the computer's newer hardware or software. This differs from a full-fledged emulator in that an emulator typically creates a virtual hardware architecture on the host system, rather than simply translating the older system's function calls into calls that the host system can understand.

Compatibility mode is a feature of Internet Explorer (IE), a web browser, from version 8 onwards.

Internet Explorer:

IE8

Internet Explorer 8 was promoted by Microsoft as having stricter adherence to W3C described web standards than Internet Explorer 7. As a result, as in every IE version before it, some percentage of web pages coded to the behavior of the older versions would break in IE8. This would have been a repetition of the situation with IE7 which, while having fixed bugs from IE6, broke pages that used the IE6-specific hacks to work around its non-compliance.

To avoid this situation, IE8 implements a form of version targeting whereby a page could be authored to a specific version of a browser using the X-UA-Compatible declaration either as a meta element or in the HTTP headers.

In order to maintain backwards compatibility, sites can opt-into IE7-like handling of content by inserting a specially created meta element into the web page that triggers the "Compatibility mode" in the browser, using:

<Meta http-equip ="X-UA-Compatible" content="IE=EmulateIE7" />

A newer version of the browser than the page was coded for would emulate the behavior of the older version, so that the assumptions the page made about the browser's behavior holds true.

Microsoft proposed that a page with a doctype that triggers standards mode (or almost standards mode) in IE7 would, by default, trigger IE7-like behavior, called "standards mode" in IE8 and future versions of IE. The new features of IE8 are enabled to trigger what Microsoft called the "IE8 standards mode". Doctypes that trigger quirks mode in IE7 will continue to do so in IE8.

Microsoft maintains a list of websites that have been reported to have problems in IE8's standards mode, known as the compatibility view list. When a user enables this list IE8 will render the websites in the list using its compatibility view mode.[5] The list is occasionally updated to add newly reported problematic websites, as well as to remove websites whose owners have requested removal. The Internet Explorer team also tests the websites on the list for compatibility issues and removes those where none are found.

CRT & TFT

A 19-inch (48 cm), 16:10 widescreen LCD monitor. A **monitor** or a **display** is an electronic visual display for computers. The monitor comprises the display device, circuitry and an enclosure. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) thin panel, while older monitors used a cathode ray tube (CRT) about as deep as the screen size.

Originally, computer monitors were used for data processing while television receivers were used for entertainment. From the 1980s onwards, computers (and their monitors) have been used for both data processing and entertainment, while televisions have implemented some computer functionality. The common aspect ratio of televisions, and then computer monitors, has also changed from 4:3 to 16:9 (and 16:10).

Cathode ray tube

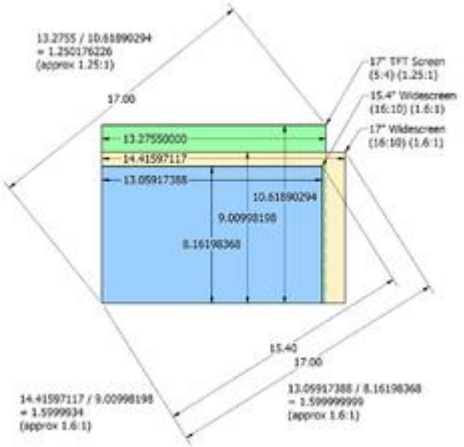
The first computer monitors used cathode ray tubes (CRT). Until the early 1980s, they were known as video display terminals and were physically attached to the computer and keyboard. The monitors were monochrome, flickered and the image quality was poor. In 1981, IBM introduced the Color Graphics Adapter, which could display four colors with a resolution of 320 by 200 pixels, or it could produce 640 by 200 pixels with two colors. In 1984 IBM introduced the Enhanced Graphics Adapter which was capable of producing 16 colors and had a resolution of 640 by 350. CRT technology remained dominant in the PC monitor market into the new millennium partly because it was cheaper to produce and offered viewing angles close to 180 degrees.

Liquid crystal display

There are multiple technologies that have been used to implement liquid crystal displays (LCD). Throughout the 1990s, the primary use of LCD technology as computer monitors was in laptops where the lower power consumption, lighter weight, and smaller physical size of LCDs justified the higher price versus a CRT. Commonly, the same laptop would be offered with an assortment of display options at increasing price points: (active or passive)

monochrome, passive color, or active matrix color (TFT). As volume and manufacturing capability have improved, the monochrome and passive color technologies were dropped from most product lines.TFT-LCD is a variant of LCD which is now the dominant technology used for computer monitors.

The first standalone LCD displays appeared in the mid-1990s selling for high prices. The main advantages of LCDs over CRT displays are that LCDs consume less power, take up much less space, and are considerably lighter. The now common active matrix TFT-LCD technology also has less flickering than CRTs, which reduces eye strain. On the other hand, CRT monitors have superior contrast, have superior response time, are able to use multiple screen resolutions natively, and there is no discernible flicker if the refresh rate is set to a sufficiently high value. LCD monitors have now very high temporal accuracy and can be used for vision research.



The size of a display is usually by monitor manufacturers given by the diagonal, i.e. the distance between two opposite screen corners. This method of measurement is inherited from the method used for the first generation of CRT television, when picture tubes with circular faces were in common use. Being circular, only their diameter was needed to describe their size. Since these circular tubes were used to display rectangular images, the diagonal measurement of the rectangle was equivalent to the diameter of the tube's face. This method continued even when cathode ray tubes were manufactured as rounded rectangles; it had the advantage of being a single number specifying the size, and was not confusing when the aspect ratio was universally 4:3.

The estimation of the monitor size by the distance between opposite corners does not take into account the display aspect ratio, so that for example a 16:9 21-inch (53 cm) widescreen display has less area, than a 21-inch (53 cm) 4:3 screen. The 4:3 screen has dimensions of 16.8 in × 12.6 in (43 cm × 32 cm) and area 211 sq in (1,360 cm^2), while the widescreen is 18.3 in × 10.3 in (46 cm × 26 cm), 188 sq in (1,210 cm^2).

ENCRYPTION AND DECRYPTION

Encryptions (and decryption) are the processes involved in the science of cryptography. Take a message in plain text and encrypt it so it cannot be understood except by someone possessing the decrypt key. In computers and the internet, encryption is used every day for sending passwords across networks, safe from prying eyes and for securely sending credit card and other important details to websites. Encryption/decryption is especially important in wireless communications.

Encryption

Encryption refers to algorithmic schemes that encode plain text into non-readable form or cipher text, providing privacy. The receiver of the encrypted text uses a "key" to decrypt the message, returning it to its original plain text form. The key is the trigger mechanism to the algorithm.

Encryption is used in secure Web sites as well as other mediums of data transfer. If a third party were to intercept the information you sent via an encrypted connection, they would not be able to read it. So if you are sending a message over the office network to your co-worker about how much you hate your job, your boss, and the whole dang company, it would be a good idea to make sure that you send it over an encrypted line.

How Does It Work?

There are types of encryption that are used for specific uses and work in different ways. One is public key encryption. It uses mathematical asymmetrical algorithms with a computer program to create two keys. One key is public and used to encrypt a message. The second key is private, and used by the recipient to decrypt the message. This method is commonly used with the Pretty Good Privacy (PGP) and the Transport Security Layer (TSL) technique to transmit encrypted information over the Internet.

Another method is secret key encryption. Using symmetrical algorithms, a single key is made from a combination of numbers or letters. Both the sender and receiver have the same key to encrypt and decrypt the message. The current United States standard for encryption methods (as of 2002), called the Advanced Encryption Standard (AES) uses a combination of a substitution

cipher, matrix multiplication and the exclusive XOR method to prepare data and keys for secure transmissions.

Start with a message that has to be sent securely. This could be

- Text.
- Numeric Data.
- Secret Codes (E.G. Missile Launch Codes!)

What it is doesn't matter. It is just treated as if it is a stream of bytes.

Next we need an encryption key. This could be a phrase like 'My secret password phrase'. The strength of this key depends upon it being a minimum length and having a good mixture of characters.

- "My7 sEcreT5&£ pas3WoR3w :0{PHRaSe.86$"

Decryption

Reconversion of encrypted data (see encryption) back into its original form

Decryption is the reverse process to Encryption. Frequently, the same Cipher is used for both Encryption and Decryption. While Encryption creates a Cipher text from a Plaintext, Decryption creates a Plaintext from a Cipher text. the process of taking encoded or encrypted text or other data and converting it back into text that you or the computer are able to read and understand. This term could be used to describe a method of un-encrypting the data manually or with un-encrypting the data using the proper codes or keys.

A **decryption key** is digital information used to recover the plaintext from the corresponding cipher text by decryption.

The process of taking encrypted data that has been put into a "secret" format called cipher text and converting it to the original plaintext. To complete this process, a key or password is needed.

ENCODER AND DECODER

Encoder

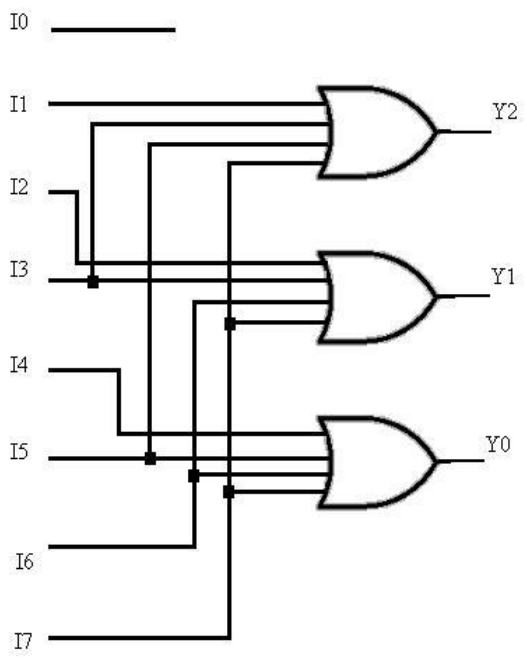
An encoder is a device, circuit, transducer, software program, algorithm or person that converts information from one format or code to another. The purpose of encoder is standardization, speed, secrecy, security, or saving space by shrinking size. Encoders are combinational logic circuits and they are exactly opposite of decoders. They accept one or more inputs and generate a multiple output code.

Encoders perform exactly reverse operation than decoder. An encoder has M input and N output lines. Out of M input lines only one is activated at a time and produces equivalent code on output N lines. If a device output code has fewer bits than the input code has, the device is usually called an encoder.

Octal To Binary Encoder

Octal-to-Binary take 8 inputs and provides 3 outputs, thus doing the opposite of what the 3-to-8 decoder does. At any one time, only one input line has a value of 1. The figure below shows the truth table of an Octal-to-binary encoder.

I0	I1	I2	I3	I4	I5	I6	I7	Y2	Y1	Y0
1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1



Decoder

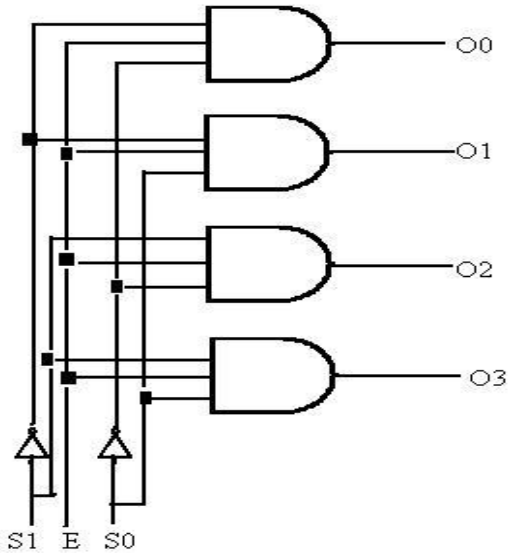
In digital electronics, a decoder can take the form of a multiple-input, multiple-output logic circuit that converts coded inputs into coded outputs, where the input and output codes are different e.g. n-to-2n , binary-coded decimal decoders. Decoding is necessary in applications such as data multiplexing, 7 segment display and memory address decoding.

The example decoder circuit would be an AND gate because the output of an AND gate is "High" (1) only when all its inputs are "High." Such output is called as "active High output". If instead of AND gate, the NAND gate is connected the output will be "Low" (0) only when all its inputs are "High". Such output is called as "active low output".

A slightly more complex decoder would be the n-to-2n type binary decoders. These types of decoders are combinational circuits that convert binary information from 'n' coded inputs to a maximum of 2n unique outputs. In case the 'n' bit coded information has unused bit combinations, the decoder may have less than 2n outputs. 2-to-4 decoder, 3-to-8 decoder or 4-to-16 decoder are other examples.

Let us suppose that a logic network has 2 inputs A and B. They will give rise to 4 states A, A', B, B' . The truth table for this decoder is shown below:

S_1	S_0	E	O_0	O_1	O_2	O_3
×	×	0	0	0	0	0
0	0	1	1	0	0	0
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	1



MULTIPLEXER & DE-MULTIPLEXER

Multiplexer

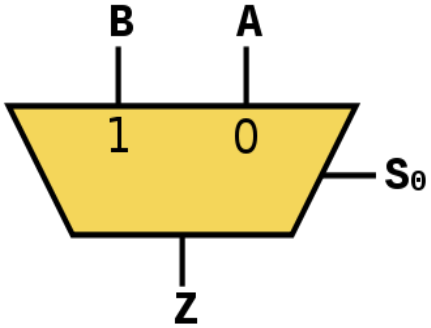
A **multiplexer** (or **mux**) is a device that selects one of several analog or digital input signals and forwards the selected input into a single line.

In digital circuit design, the selector wires are of digital value. In the case of a 2-to-1 multiplexer, a logic value of 0 would connect I_0 to the output while a logic value of 1 would connect I_1 to the output. In larger multiplexers, the number of selector pins is equal to $\lceil \log_2(n) \rceil$ where n is the number of inputs.

For example, 9 to 16 inputs would require no fewer than 4 selector pins and 17 to 32 inputs would require no fewer than 5 selector pins. The binary value expressed on these selector pins determines the selected input pin.

A 2-to-1 multiplexer has a Boolean equation where A and B are the two inputs, S is the selector input, and Z is the output:

$$Z = (A \cdot \overline{S}) + (B \cdot S)$$



A 2-to-1 mux

This can be expressed as a truth table:

S	A	B	Z
0	1	1	1
		0	1
	0	1	0
		0	0
1	1	1	1
		0	0
	0	1	1
		0	0

This truth table shows that when $S=0$ then $Z=A$ but when $S=1$ then $Z=B$. A straightforward realization of this 2-to-1 multiplexer would need 2 AND gates, an OR gate, and a NOT gate.

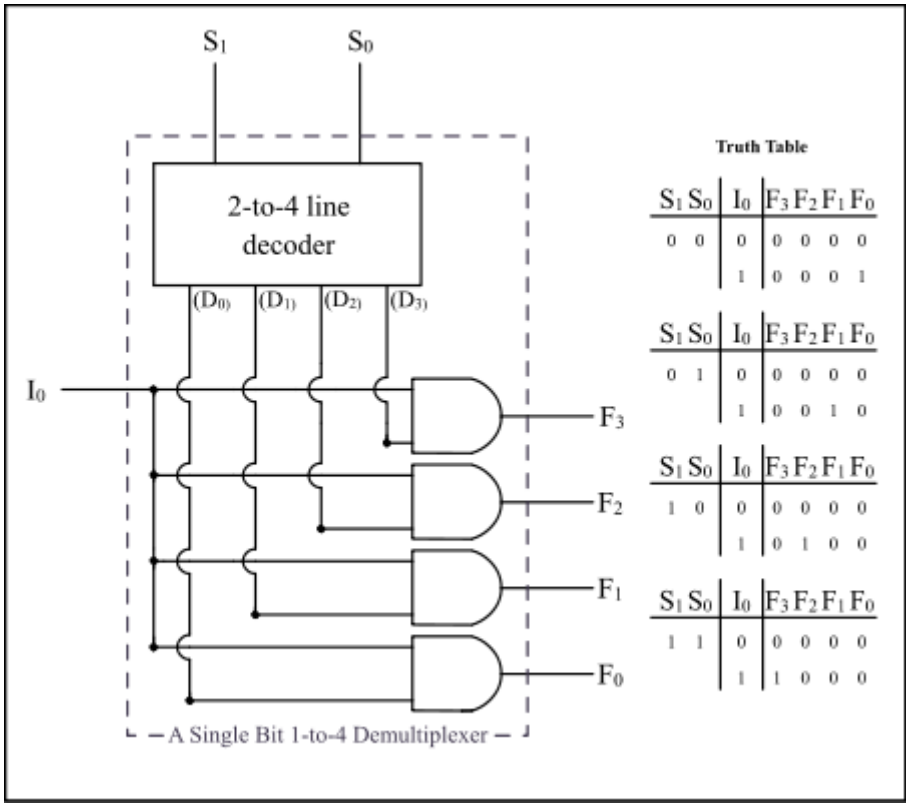
Demultiplexer

A **demultiplexer** (or **demux**) is a device taking a single input signal and selecting one of many data-output-lines, which is connected to the single input. A multiplexer is often used with a complementary demultiplexer on the receiving end.

Demultiplexers take one data input and a number of selection inputs, and they have several outputs. They forward the data input to one of the outputs depending on the values of the selection inputs. Demultiplexers are sometimes convenient for designing general purpose logic, because if the demultiplexer's input is always true, the demultiplexer acts as a decoder. This means that any function of the selection bits can be constructed by logically OR-ing the correct set of outputs.

If X is the input and S is the selector, and A and B are the outputs:

$$A = (X \cdot \overline{S})$$



SLEEP AND HIBERNATE OPTION

To conserve power when not using the computer, you generally have 3 options: shut down, **hibernate** or **sleep**. The state of open documents and applications running is preserved when sleep or hibernate modes are used. However, booting up is faster from sleep than from hibernate because contents of the RAM are preserved. Hibernate uses less power than sleep because contents of the RAM do not need to be preserved; they are saved on the hard disk. Hibernation is similar to regular shutdown but without the unnecessary hassle of terminating all open applications.

COMPARISON CHART

OPERATION	HIBERNATE	SLEEP
Processing Functions	Closed and saved to hard-disk	Stopped and saved in RAM
Power usage	Zero power	Low power consumption
Resumption	Slow	Instantaneous
When to use	When the system is idle for longer time and rebooting after shut down will be tiresome	When the system is idle for a short time
Operating Systems supported	All OS where the hardware is ACPI enabled including Windows, Mac OS X and Linux	All OS where the hardware is ACPI enabled including Windows, Mac OS X and Linux
Also known as	Suspend to disk (Linux), Safe Sleep (Mac), S4 in ACPI	Standby (older versions of Windows), Suspend to RAM (Linux), S3 in ACPI

Pros and Cons

- **Risk of data loss**:

Higher in sleep mode. During hibernation, data is automatically stored in a non-volatile memory before the hardware shuts down. In sleep mode, the data is still in the RAM, which is volatile. In case of a power outage, any unsaved data is lost and cannot be recovered.

- **Time to resume**:

Faster in sleep mode. In sleep mode, since the data is stored in RAM, the resumption is immediate and no time is lost. But a hibernating system needs comparatively more time to resume as it needs time to read back the data from the hard disk or other permanent memory storage.

- **Power consumption**:

Lower in hibernate mode. A hibernating system uses no power at all while a system in sleep mode consumes small but continuous power.

A speed test of switching from sleep/hibernate mode to resume mode is performed in this video:

Variations

Hybrid Sleep: mode is a mix of sleep mode and hibernates, where the contents are stored in RAM and hard drive. The RAM stays powered during power down. The restart is faster (contents retrieved from RAM) and with minimal power loss. During a complete power loss (power outage scenario), when RAM is offline, data is retrieved from the hard drive.

Hybrid Boot : mode where the user is logged out before hibernating, thereby drastically reducing the size of the hibernation. It hence takes less time to write to disk and resume.

ACPI: In the **"Advanced Configuration and Power Interface"** (ACPI) specification, hibernation is called suspend-to-disk and is the S4 power state in the standard. And sleep (also called standby or suspend-to-RAM) is the S3 power state.

LOGOFF AND SWITCH USER OPTIONS

How To Log Off

Click with the mouse on the Start menu button and you should notice two icons at the bottom of this start menu.

Click the Log Off option and you will be asked if you are sure you wish to log off, select OK.

To log off from the computer

Click Start, click Log off, and then click Log off.

When you log off from the computer, you close your user account but the computer remains on for easy access the next time you log on.

To log on, click your user account icon on the Welcome screen. Or, on a domain, press CTRL+ALT+DEL, and then type your account information.

Logging off means as one of the users in the computer, your computer login will be shut off in the sytem.

Fast User Switching is enabled by default in Windows XP Home Edition and Professional on computers with more than 64 megabytes (MB) of RAM. However, Fast User Switching is not available on Windows XP Professional-based computers that are part of a domain network.

Switch Users From the Task Manager

When a user initiates the Switch User option, the computer returns to the Welcome screen. The current user's session remains active and another user can now log on and use the computer. You can initiate the Switch User command in any of the following ways:

- Click Start, click Log off, and then click Switch User.
- Open Task Manager (CTRL+ALT+DELETE), and then click Switch User on the Shut Down menu.
- Hold down the Windows key, and then press the L key).

How to Use Fast User Switching in Windows 7

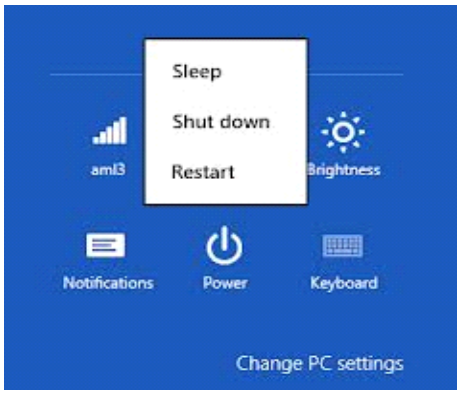
To quickly switch between accounts, follow the instructions below.

1. While logged in to your account, click the Windows Orb to open the Start Menu.

2. Click the small arrow next to the Shut Down button to expand the menu.

3. Click Switch User from the menu.

When you are done using the second account you have the option of switching back to the first account while keeping the second account in the background or logging out the second account altogether.



Switch Again or Log Out?

Unless you need to access the second account right away, I recommend that you sign out from the second account before returning to the first account. The reason for this is that keeping two active logins affects performance due to additional resources necessary to keep both accounts logged in.

Windows 8 enable users to quickly switch between all the available user accounts without having to restart or shutdown the PC. When you lock the screen, it shows you a back navigation button on the logon screen to let you quickly switch to any user account without having to quit background processes.

Often, when users switch to other accounts via Lock function, the background processes become unstable, and in some cases, Windows forcibly closes conflicting system processes. If you don't want to allow switching between user accounts on your PC, you can use the Microsoft Management Console snap-in called Local Group Policy Editor to change the Fast User Switching policy setting. In what follows, we will guide you through the process of disabling Fast User Switching in Windows 8.

ZIP FILE

ZIP is an archive file format that supports lossless data compression. A ZIP file may contain one or more files or folders that may have been compressed. The .ZIP file format permits a number of compression algorithms.ZIP files generally use the file extensions ".zip" or ".ZIP" and the MIME media type `application/zip`.ZIP is used as a base file format by many programs, usually under a different name. When navigating a file system via a user interface, graphical icons representing .ZIP files often appear as a document or other object prominently featuring a zipper.

Compression method:

The .ZIP File Format Specification documents the following compression methods: stored (no compression), Shrunk, Reduced (methods 1-4), Imploded, Tokenizing, Deflated, Deflate64, bzip2, LZMA (EFS), WavPack, PPMd. The most commonly used compression method is DEFLATE, which is described in IETF RFC 1951.Compression methods mentioned, but not documented in detail in the specification include: PKWARE Data Compression Library (DCL) Imploding (old IBM TERSE), IBM TERSE (new), IBM LZ77 z Architecture (PFS).

Combination with other file formats:

The .ZIP file format allows for a comment containing up to 65,535 bytes of data to occur at the end of the file after the central directory. Also, because the central directory specifies the offset of each file in the archive with respect to the start, it is possible for the first file entry to start at an offset other than zero, although some tools, for example gzip, will not process archive files that don't start with a file entry at offset zero.

This allows arbitrary data to occur in the file both before and after the .ZIP archive data, and for the archive to still be read by a .ZIP application. A

side-effect of this is that it is possible to author a file that is both a working .ZIP archive and another format, provided that the other format tolerates arbitrary data at its end, beginning, or middle. Self-extracting archives (SFX), of the form supported by WinZip and DotNetZip, take advantage of this—they are .exe files that conform to the PKZIP AppNote.txt specification and can be read by compliant zip tools or libraries.

This property of the .ZIP format, and of the JAR format which is a variant of .ZIP, can be exploited to hide harmful Java classes inside a seemingly harmless file, such as a GIF image uploaded to the web.

This so-called GIFAR exploit has been demonstrated as an effective attack against web applications such as Facebook.

Limits:

The minimum size of a .ZIP file is 22 bytes.

The maximum size for both the archive file and the individual files inside it is 4,294,967,295 bytes ($2^{32}-1$ bytes, or 4 GiB minus 1 byte) for standard .ZIP, and 18,446,744,073,709,551,615 bytes ($2^{64}-1$ bytes, or 16 EiB minus 1 byte) for ZIP64.

Extra field:

.ZIP file format includes the extra field facility within file headers, which can be used to store extra data not defined by existing .ZIP specifications, and allow compliant archivers not recognizing the fields to safely skip the fields.

Header IDs 0-31 are reserved for use by PKWARE. The remaining IDs can be used by third party vendors for proprietary usage.

We express our sincere gratitude for those who were with us, for the successful launch of this book, which is our new attempt.