ASSIGNMENT No. 02
Basic of ICT 1431 B.A/ B.Com
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Q 1 What is meant by operating system? Elaborate its functions and responsibilities.

Operating System

An operating system is a conglomeration of software that controls the hardware of the computer and ensures that the computer can perform all its basic functions, which are necessary for all other programs to work. The operating system helps additional programs integrate with the computer so that they can run. Because the operating system is so important, it is usually the first software added to the computer. Operating systems contain a number of utilities.

Definition

A utility in an operating system is a computer program that performs a single task, usually very specific and related to only part of the operating system software. These programs work mostly with system resources such as memory and basic data flow. They often help computers organize their memory and set apart memory for applications that are added later in the life of the computer.

Operating systems have many different software programs that help them run basic processes for the computer. Some of this software users can replace or delete. Other types of software are vital to the operating system and help it function correctly. Likewise, some software is highly complex and multi-layered, while other types are simple and take up only a little space. Utilities tend to be smaller, more basic types of software. While you are pretty much free to use your Apple device as you please, there are certain things you can't do due to Apple's own restrictions. These restrictions are spelled out in.

Difference: Operating systems also use software known as applications, and it can sometimes be difficult to tell what the difference is. In general, utilities are smaller and more simple than applications. Applications are complex and perform many functions instead of only one, often functions that are not directly related to the basic computer structure. Word processors and datasheet programs are two of the most common applications.

Add-Ones

Some utilities in operating systems may not be completely necessary, and some utilities can even be part of applications. For instance, a simple program within an application that allows it to print to multiple locations may be considered a utility, as can simple tools within an operating systems. These tools can often be added on or taken away from the operating system as desired.

Different functions of an operating system

Operating systems manage user interaction with the physical resources a computer provides. Through an operating system, users are able to carry out every day computing activities including running applications, accessing websites, using email and storing files, such as data and media items. The main operating systems used on desktop and laptop computers include various versions of Microsoft Windows and Mac, plus a variety of Linux distributions, including Ubuntu. Their interfaces and approaches may vary, but the main functions within an operating system are broadly the same.

Memory Management

Operating systems use Random Access Memory to store the short-term data required for applications and other computer functions to operate. Each computing activity that is ongoing has a certain amount of memory allocated to it, which the operating system manages. In cases where an application attempts to do something that there is not enough memory for, an operating system can sometimes use virtual memory to carry out the required processing, by utilizing a section of hard disk memory and using it as though it is RAM.

File Management: Computer devices can store many different types of data, file and document. This may include personal user files, such as word processing documents, photographic images and video. Applications installed on the computer may also be associated with numerous files required when they execute. The operating system manages the storage and use of these files, including viewing, editing and deleting. Most operating systems provide a graphical user interface for user access to the file system, such as Windows Explorer or Finder on Mac OS X.

Input / Output

Computers use a variety of channels for user interaction. Computer output includes the monitor and audio speakers or headphones, while input includes the mouse and keyboard. These are the standard input / output elements in a desktop or laptop computer, while mobile devices sometimes offer additional elements. These hardware components are managed by the operating system through the use of drivers. Drivers handle communication between the user and the hardware provided within a given computing system, including capturing and interpreting user input and presenting output in response to it.

Applications: The operating system itself is a software application. In most cases, however, user access to computing resources takes place through other applications. There are some applications installed on an operating system when it is initially installed itself, but users can also install additional software either from disk or by downloading over the Web. The operating system handles the execution of applications as well as managing the resources they require, such as memory and input / output. Common applications include Web browsers, email clients, word processing programs and media players.

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Q. 2 What are the five components of data communication? Elaborate with the help of diagram. (20)

Optical fiber is a term for any sort of plastic or glass conduit meant to transport light. The principles behind it are actually quite old, but in recent years it has become an incredibly important technology, as communications infrastructure has begun to use this fiber to transmit data at extremely high rates. Aside from fiber optic communications, however, it has a number of applications in medicine, consumer products, and physics. This sort of fiber offers a number of advantages over traditional metal wire, the most important being that there is considerably less signal degradation. Additionally, it is immune to electromagnetic interference, which can seriously impede the transmission of data along normal metal wires. This adds an added security measure, as well, since optical fiber can survive an electromagnetic pulse that would destroy metal cables.

The basic principle behind optical fiber is quite simple: The fiber is coated to make it completely reflective on the inside, so that when light goes in, it reflects without losing any light, and passes down the fiber to the other end. This basic idea, of guiding light by refraction, goes back to the 1840s. By the beginning of the 20th century, some practical applications had been developed, most notably the use of this fiber in dentistry to light up the inside of the mouth.

Optical fiber use in data communications: Optical fibers can be used to transmit light and thus information over long distances. Fiber-based systems have largely replaced radio transmitter systems for long-haul optical data transmission. They are widely used for telephony, but also for Internet traffic, long high-speed local area networks (LANs), cable TV, and increasingly also for shorter distances. In most cases, silica fibers are used, except for very short distances, where plastic optical fibers can be advantageous.

Compared with systems based on electrical cables, the approach of optical fiber communications (lightwave communications) has advantages, the most important of which are:

➢ The capacity of fibers for data transmission is huge: a single silica fiber can carry hundreds of thousands of telephone channels, utilizing only a small part of the theoretical capacity. In the last 30 years, the progress concerning transmission capacities of fiber links has been significantly faster than e.g. the progress in the speed or storage capacity of computers.

➢ The losses for light propagating in fibers are amazingly small: ≈ 0.2 dB/km for modern single-mode silica fibers, so that many tens of kilometers can be bridged without amplifying the signals.

➢ A large number of channels can be preamplifier in a single fiber amplifier, if required for very large transmission distances.

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➤ Due to the huge transmission rate achievable, the cost per transported bit can be extremely low.

➤ Compared with electrical cables, fiber-optic cables are very lightweight, so that the cost of laying a fiber-optic cable can be lower.

➤ Fiber-optic cables are immune to problems that arise with electrical cables, such as ground loops or electromagnetic interference (EMI).

Advantages:

➤ semiconductor and fiber amplifiers (mostly erbium-doped fiber amplifiers, sometimes Raman amplifiers) for maintaining sufficient signal powers over long lengths of fibers, or as preamplifiers before signal detection

➤ optical filters (e.g. based on fiber Bragg gratings) and couplers

➤ optical switches and multiplexers (e.g. based on arrayed waveguide gratings); for example, optical add/drop multiplexers (OADMs) allow wavelength channels to be added or dropped in a WDM system

➤ electrically controlled optical switches

➤ devices for signal regeneration (electronic or optical regenerators), clock recovery and the like

➤ various kinds of electronics e.g. for signal processing and monitoring

➤ computers and software to control the system operation

Data communication

As mentioned before, the purpose of a communication system is to transmit intelligence signal from a source to a destination at some point away from the source. Figure 1 is a block diagram of a communication system. This system consists three basic components: transmitter, channel, and receiver.

Data communication system.
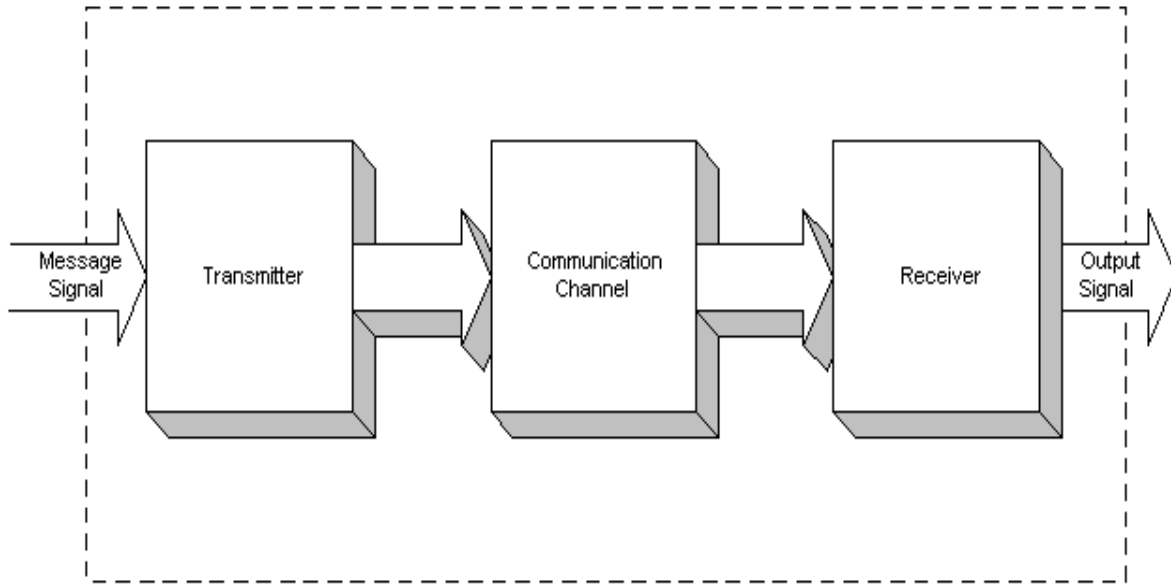
The transmitter's function is to process the message signal into a form suitable for transmission over the communication channel. This is called modulation. As for the communication channel, its function is to provide a pathway between the transmitter's output and the receiver's input. The job of the receiver is to process the received signal to recover the appropriate message signal. If the different elements do their jobs accordingly, then the output signal should equal to the input message signal. This communication system will be visit again later in this report as we go through the lesson plans for amplitude modulation.

There are two methods in transmitting an intelligent message signal over the communication channel. The two methods are analog or digital. There are both advantages and disadvantages to both methods. For the digital method, its advantages include the following:

1. Increased immunity to noise in the channel and outside interference which are impossible to prevent in the communication channel.
2. Offer flexible operation of the system due to the technologies in digital system.
3. Different types of message signals as voice data, video data, or computer data can be implemented in the same format by the transmitter.
4. Message signals can be encrypted to provide security for sensitive data.

The disadvantages of the digital method are that the communication system are very complex and can be costly for communication channel such as satellite channels and optical fibers. Analog has two very good benefits. The first is that the communication system of analog method is very simple. The second benefit of analog method is that it is not very expensive because the use of simple technology. It may eventually be eliminated by the digital method as the communication systems become simple by progressive technology and the availability of more communication channel for digital method. There are still many broadcasting systems that use the analog method to transmit messages such as the radio. Some of our telephone networks are still implemented using the analog method. Analog will remain for some time yet so it is a good idea to learn about the analog method as well the digital method.

Q. 3 Explain the layers of OSI model in detail. (20)
(b)

o   OSI stands for **Open System Interconnection** is a reference model that describes how information from a <u>software</u> application in one <u>computer</u> moves through a physical medium to the software application in another computer.

o   OSI consists of seven layers, and each layer performs a particular network function.

o   OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered as an architectural model for the inter-computer communications.

o   OSI model divides the whole task into seven smaller and manageable tasks. Each layer is assigned a particular task.

o   Each layer is self-contained, so that task assigned to each layer can be performed independently.

Characteristics of OSI Model:
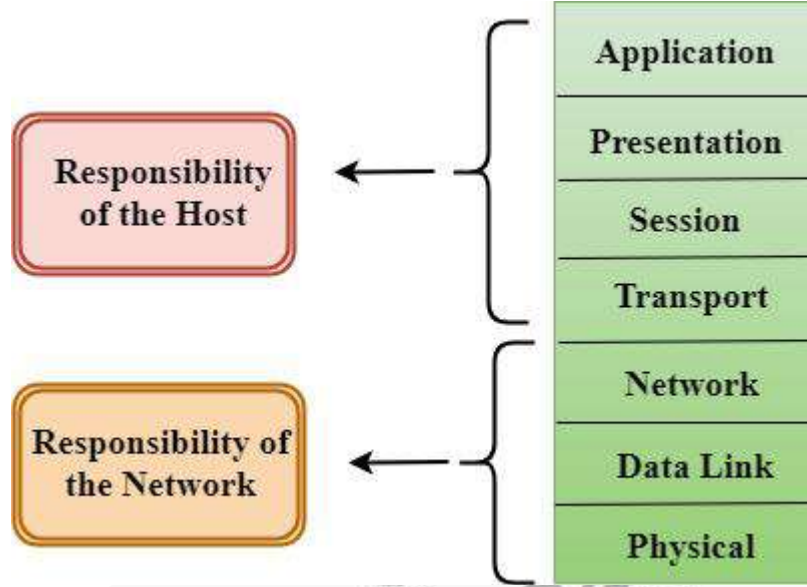
o   The OSI model is divided into two layers: upper layers and lower layers.

o   The upper layer of the OSI model mainly deals with the application related issues, and they are implemented only in the software. The application layer is closest to the end user. Both the end user and the application layer interact with the software applications. An upper layer refers to the layer just above another layer.

o   The lower layer of the OSI model deals with the data transport issues. The data link layer and the physical layer are implemented in hardware and software. The physical layer is the lowest layer of the OSI model and is closest to the physical medium. The physical layer is mainly responsible for placing the information on the physical medium.
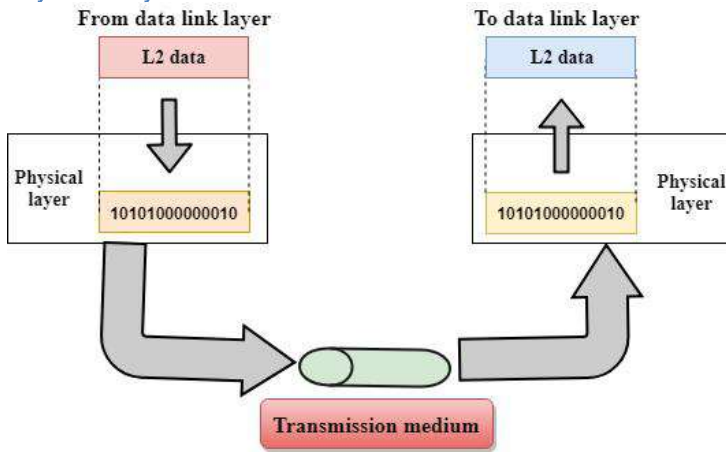
Functions of the OSI Layers

There are the seven OSI layers. Each layer has different functions. A list of seven layers are given below:

1.   Physical Layer
2.   Data-Link Layer
3.   Network Layer
4.   Transport Layer
5.   Session Layer
6.   Presentation Layer
7.   Application Layer
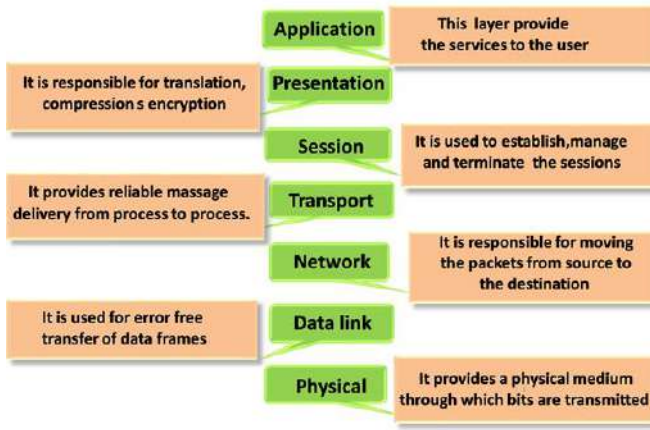
Physical layer

o The main functionality of the physical layer is to transmit the individual bits from one node to another node.

o It is the lowest layer of the OSI model.

o It establishes, maintains and deactivates the physical connection.

o It specifies the mechanical, electrical and procedural network interface specifications.

Functions of a Physical layer:

o **Line Configuration:** It defines the way how two or more devices can be connected physically.

o <u>Data Transmission</u>: It defines the transmission mode whether it is simplex, half-duplex or full-duplex mode between the two devices on the network.

o <u>Topology</u>: It defines the way how network devices are arranged.

o **Signals:** It determines the type of the signal used for transmitting the information.

Q. 4 What is meant by Multimedia? Write some examples of multimedia applications in education and entertainment. م

(20)

Media or channel is the means or ways of transmitting the messages from sender to the receiver. The media of oral communication are face to face conversation, telephone or mobile, conference, meetings etc. The media of written communication are newspaper, letter, report, memo, mail etc.

Types of media communication

We divide the different types of communication medium into two different categories:

1. Physical media

2. Mechanical media (everything that is not No. 1)

This site focus on the internal communication. Our listings of types of communication medium therefore exclude external media.

Physical media

With physical media we mean channels where the person who is talking can be seen and heard by the audience. The whole point here is to be able to not only hear the messages but also to see the body language and feel the climate in the room. This does not need to be two-way channels. In certain situations the receiver expect physical communication. This is the case especially when dealing with high concern messages, e.g. organizational change or down sizing. If a message is perceived as important to the receiver they expect to hear it live from their manager.

- Large meetings, town hall meetings
- Department meetings (weekly meetings)
- Up close and personal (exclusive meetings)
- Video conferences
- Viral communication or word of mouth

Large meetings

Large meetings have got great symbolic value and should be used only at special occasions. This channel works very well when you need to get across strategic and important messages to a large group of people at the same time, creating a wide attention, get engagement or communicate a sense of belonging. Large meetings are excellent when you want to present a new vision or strategy, inform about a reorganisation or share new values. The opportunity for dialogue is limited at large meeting, of course but you can create smaller groups where dialogue can be performed.

Weekly departmental meetings

In the weekly meetings you and your group communicate daily operative issues, gives status reports and solves problems. Weekly meetings are also used to follow up on information from large meetings, management team meetings etc from a "what's-in-it-for-us-perspective". This type of smaller group meetings gives good opportunities for dialogue. This channel is often the most important channel you have as a manager, because that's where you have the opportunity to build the big picture, you can prepare for change, you can create ownership of important strategies and goals etc. This is a favourite among the types of communication medium.

Up close and personal

This is a form of meetings where, often, a senior manager meets with a "random" selection of employees to discuss and answer questions. Some managers use this as a on going activities on a monthly basis. It can also be used in specific projects or campaigns e.g. launching new strategies.
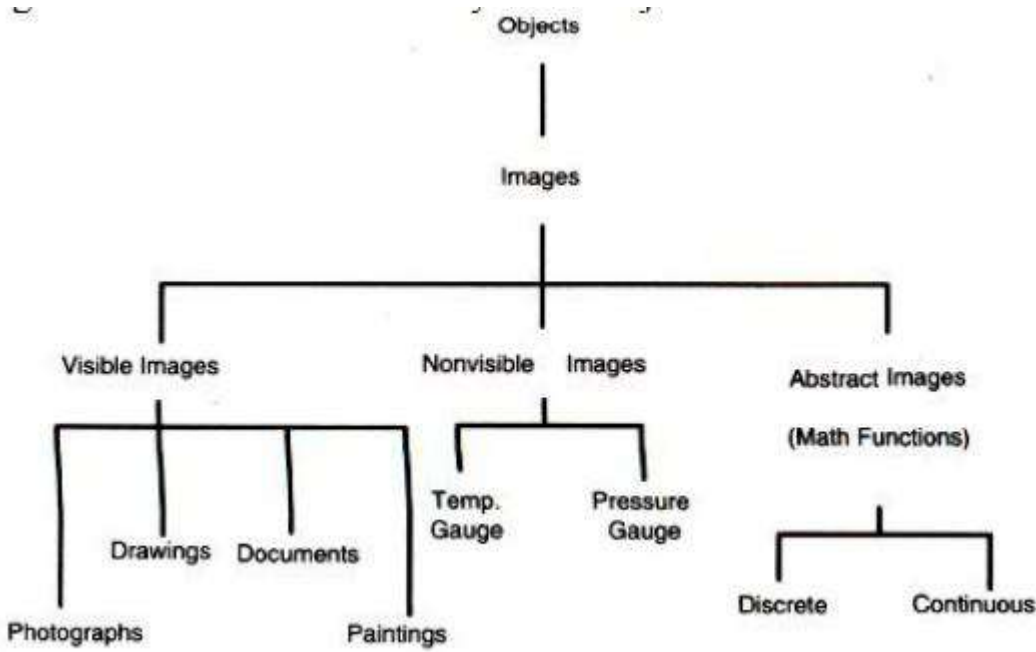
Viral communication

Or viral marketing as it is also called works external as well as internal and refer to marketing techniques that use pre-existing social networks to produce increases in awareness or knowledge through self-replicating viral processes. It can be word-of-mouth delivered or enhanced by the network effects of social media.

Mechanical media

The second of the two types of communication medium is mechanical media. With mechanical media we mean written or electronic channels. These channels can be used as archives for messages or for giving the big picture and a deeper knowledge. But they can also be very fast. Typically though, because it is written, it is always interpret by the reader based on his or her mental condition. Irony or even humour rarely travels well in mechanical channels.

- E-mail
- Weekly letters or newsletters
- Personal letters
- Billboards
- Intranet
- Magazines or papers
- Sms
- Social media

E-mail

E-mail is a good channel for the daily communication to specific target groups. It is suitable mainly for up-to-date and "simple" messages and where there is no risk of misunderstanding, E-mail is an important supplement to weekly meetings and the Intranet. Invitation to and agenda for meetings can with advantage be sent out with e-mail before the meeting, while background facts and minutes from meetings is well suited to be stored on the Intranet.

Some short e-mail tips:

- Write short and to the point.
- Target your messages to the audience and avoid sending unnecessary all-employees-e-mails.
- Set up your subject line to describe what the e-mail is about.
- Clearly state if the message is for information or for action.
- Avoid attaching large documents if possible. Post a link or direct to the source instead.

Weekly letters

Managers that have large groups of employees and who has difficulties in meeting all of them often choose to publish a personally weekly letter. It is sort of a short summary of news with personally reflections. Many employees often appreciate it because it has the potential to give the "what's-in-it-for-us" angle. They can also contain summaries and status in tasks, projects or issues – yesterday, today and tomorrow.

Personal letters

At special occasions it can be justified to send a personal letter to employees in order to get attention to a specific issue. E.g. pat on the back letter after extra ordinary achievements. Or it can be a letter with your personal commentary on an ongoing reorganisation that affects many employees. One other example is a letter that summarizes the past year and wishes all the best for the holidays.

Billboard

One of the most forgotten types of communication medium is clearly the billboard. Especially today, when everything is about social media. But the good thing with the billboard is that you can use billboards to inform people who does not have computers and/or access to the Intranet or to reach people that work part time and does not attend weekly meetings.

- News summary
- Weekly letters
- Minutes from meetings
- Schedules
- Holiday lists

You can also use the billboard to gather ideas e.g. for items for upcoming meetings

Intranet

The Intranet is of course one of the most used types of communication medium and a very important communication channel and work tool for you as a manager, but it is also your job to help your employees prioritise and pick out the information on the Intranet, as well as translating messages into local consequences. Ask your self: what information concerns you employees? In what way are they concerned? How do I best communicate this to my employees? Weekly meeting or your weekly letter can be a suitable channel to discuss or inform of information found on the Intranet.

Employee magazine

A Magazine offers the opportunity to deepen a specific issue, explain context, describing consequences or tell a story. It also has the opportunity to reach many employees. If you want to create a broad internal understanding of strategic messages the magazine can be a good vehicle to use e.g. by writing an article based on an interview with you. As were the case with the Intranet you also have to "translate" the information in the magazine to your employees. You can ask yourself: What does the content in a specific article mean to us? How shall I best communicate it to the employees?

Sms

Or text messaging to the mobile phone is one of the new types of communication medium and not a very widely used channel but where it is used it is proven very effective. Some companies use it as an alert system e.g. for giving managers a head start when something important will be published on the

Intranet. The advantage with Sms is that it is fast. But it should be used rarely as an exclusive channel. Some companies use it as a subscription tool where you can subscribe to e.g press-releases.

Social media

Wikipedia describe social media as "Media designed to be disseminated through social interaction, created using highly accessible and scalable publishing techniques. Social media supports the human need for social interaction, using Internet- and web-based technologies to transform broadcast media monologues (one to many) into social media dialogues (many to many). It supports the democratization of knowledge and information, transforming people from content consumers into content producers. Businesses also refer to social media as user-generated content (UGC) or consumer-generated media (CGM)."

Q. 5 What is meant by Programming language? Differentiate between low level and high-level languages with the help of examples.

All computer programmers are aware that you must instruct computers through use of a programming language. A high level programming language is one which hides details of how a computer operates in favor of making a more abstract, human way of instructing it to perform tasks. There are distinct characteristics that higher level languages have over lower level ones.

Identification

High level programming languages express concepts at a more abstracted level than lower level languages. A lower level programming language might require you to directly discuss the details of allocating a file, for example. Its higher level peer would simply require you to create a file object, disguising the details of implementation. The process of computer development can be seen through ever-increasing trend toward making things less technical. What once used to be fed into machines through punch cards and binary communication is now delivered through rich verbal usage and abstract concepts, such as objects and their relationship to one another.

History

During the early days of computer science, new languages were constantly being invented. These represented ideologies that programmers thought would better help them solve complex problems while keeping their software maintainable and understandable by a wide number of humans. This gradual inclination toward increased abstraction and development of rich languages with even richer of stored knowledge simplified the amount of work and technical skill required for a programmer to accomplish complex tasks. In essence, complicated tasks became easier. As these languages developed, various methodologies became predominant in certain feels of programming. For example, Object Oriented Programming took the forefront of many large scale development companies and gave rise to languages, such as Bjarne Stroustrup's C++ and Sun's Java programming language.

Warning:

Adopting high level programming languages in education is often criticized in the computer science community. Teaching them to new students is seen as controversial, because teaching them often puts the student into the mindset of understanding a methodology and a set of tools rather than the finer points of how a computer operates. In addition, high level languages can sacrifice efficiency for maintainability, sometimes taking significantly larger amounts of memory and making presumptions about how the program will operate.

Considerations

Using a computer language is often simply picking the best tool for the job. Higher level languages are excellent for rapid development and large applications that require teams of programmers to maintain. Modern computers have the processing power for these tasks, and efficient compilers can do an excellent job in maintaining efficiency. Highly specialized work, such as writing device drivers, is often done in lower level languages.

Two types of computer languages

Computer language or programming language is a coded syntax used by computer programmers to communicate with a computer. It is the only language that computers, software programs and computer hardware can understand. Computer language establishes a flow of communication between software programs. The language enables a computer user to dictate what commands the computer must perform to process data. Computer language comes in various types that employ different sets of syntax.

Machine Language

Machine language or machine code is the native language directly understood by the computer's central processing unit or CPU. This type of computer language is not easy to understand, as it only uses a binary system, an element of notations containing only a series of numbers consisting of one and zero, to produce commands. The computer's processor needs to convert high-level languages into this language before it can run a program or do a user-defined command. To convert a certain language into machine code, the computer processor needs a compiler, a program that converts a source code written in one language into a different language syntax. The compiler generates a binary file, or executable file, that the CPU will execute. Every computer processor has its own set of machine code. The machine code will determine what the computer processor should do, and how it should do it.

Assembly Level Language

A study in the early 1950s has led to the development of low level languages or Assembly Level Language. Also considered as second-generation language, Assembly Level Language is a set of codes that can run directly on the computer's processor. This type of language is most appropriate in writing operating systems and maintaining desktop applications. It allows the programmer to perform several tasks like registry access, memory management and clock cycle correspondence. With the assembly level language, it is easier for a programmer to define commands because he has the prerogative when it comes to naming the variables. However, this language is not flexible because the user cannot reuse the set of codes written using this language. It is not as explanatory as compared to its other counterparts. The user has to encrypt this language into machine language in order for the computer to process the commands written by the programmer.

High Level Language: The development of high level languages came about when the computer programmers started to have problems regarding the computer's increasing lack of portability. High level languages ignore the unimportant details found in low level languages. Many programmers consider the high level language as a momentous solution to hassles brought about by computer languages because of its ease of use and low tendency to produce bugs. Programmers often refer to high level languages as mid level languages that only use the concepts of abstraction and constructs to the extremes.

Basic features

In computer science parlance, programming languages are divided into categories according to the distance in which the syntax is abstracted from the native processor instructions. Most high-level languages use a compiler to make them portable among the supported platforms. This allows the programmer to work in an English-like syntax while the compiler deals with the details of converting it into processor-specific instructions. The efficiency of modern compilers has made high-level languages more popular than the more challenging requirements of low-level tools.

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Example: C++

C++ is a high-level language that maintains some of the features of a low-level language. It provides a minimally worded logical command set that is accessible for programmers on many platforms without worrying about the underlying processor instruction set. It retains the C language ability to directly address the processor or memory hardware when necessary, a feature that many other high-level languages have done away with.

Example: COBOL

Common Business Oriented Language, or COBOL, is an example of a verbose high-level language. Instructions and variables are spelled out in lengthy statements designed for the ease of reading by the programmer. The syntax is portable among the numerous platforms on which the language is supported. Though it has been updated with modern object-oriented features, it has been supplanted in recent years by other programming tools.

Computer and Interpreter

Computer language processor that translates a program line-by-line (statement-by-statement) and carries out the specified actions in sequence. In contrast, an assembler or compiler completely translates a program written in a high-level language (the source program) into a machine-language program (the object program) for later execution. Whereas a compiled-program executes much faster than an interpreted-program, an interpreter allows examination and modification of the program while it is running (executing).

People interact with computers to get work accomplished quicker and easier. As with spoken languages, people have many different computer-programming languages to communicate with computers. These computer-programming languages help bridge the gap between computers and people.

Computer languages have been developed with interpreting statements in mind. These are some of them:

Python

A very popular, free, object oriented interpreted language created in 1991. It is also modular which means people can add extra parts to it for others to use. You will find Python being used as the back-end processing language on web servers.

BASIC

The grand-daddy of interpreted computer languages. Created nearly fifty years ago (1963) as an easy-to-learn language. Its strength is that it is interactive - it checks your code as you type it in and its syntax is simple.

JAVA

This is the second type of interpreter. It compiles source code into byte code which then runs on a virtual machine. Java is very popular as the language to use for coding the business-logic within a

company's business application. For example, on on-line mortgage application form on a Building Society web site would most likely be connected to a Java server that is working through all the complex business rules for providing a customer quote.

We generally write a computer program using a high-level language. A high-level language is one which is understandable by us humans. It contains words and phrases from the English (or other) language. But a computer does not understand high-level language. It only understands program written in 0's and 1's in binary, called the machine code. A program written in high-level language is called a source code. We need to convert the source code into machine code and this is accomplished by compilers and interpreters. Hence, a compiler or an interpreter is a program that converts program written in high-level language into machine code understood by the computer.

The difference between an interpreter and a compiler is given below:

Interpreter	Compiler
Translates program one statement at a time.	Scans the entire program and translates it as a whole into machine code.
It takes less amount of time to analyze the source code but the overall execution time is slower.	It takes large amount of time to analyze the source code but the overall execution time is comparatively faster.
No intermediate object code is generated, hence are memory efficient.	Generates intermediate object code which further requires linking, hence requires more memory.
Continues translating the program until the first error is met, in which case it stops. Hence debugging is easy.	It generates the error message only after scanning the whole program. Hence debugging is comparatively hard.
Programming language like Python, Ruby use interpreters.	Programming language like C, C++ use compilers.