

Subject- 1.5 Fundamentals of IT (Information Technology)

A computer can be defined as an electronic machine or device that accepts data and instructions as input, performs processing (calculations and other operations) on the data according to the given instructions and produces the results as output.

Computers can also store data for later uses in appropriate storage devices and retrieve whenever it is necessary.

Charles Babbage designed the difference engine in 1820s and thus is also known as Father of Computer

Generation of Computer

Types of computers are classified into generations depending on their basic characteristics.

A computer belonging to a particular generation shares similar properties with the other computers of that group.

First generation computers (1949 to 1955)

- These were very early stage computers that were designed for mathematical and scientific users.
- Vacuum tubes were the main components in first generation computers.
- The size of these computers was huge and they weighted in tones.
- Machine language was used to provide instructions to these computers and the programming was very difficult.

- They had slow operating speed, consumed a lot of electricity and had small memory.

Examples: ENIAC (Electronic Numerical Integrator and Calculator)

UNIVAC (Universal Automatic Computer)

Second generation computers (1956 to 1965)

- The commercial production of computers started.
- Second generation computers used transistors in place of vacuum tubes.
- A transistor is very small as compared to vacuum tube and they consume very less electricity and produce less heat.
- The concept of storage space came and “Magnetic core memories” were developed.
- Operating system and computer programming languages were developed.

Examples: IBM 1401, CDC 3600

Third generation computers (1966 to 1975)

- A new device known as “Integrated circuit” or “Chip” was invented.
- The integrated circuits replaced the transistors in computers.
- Integrated circuit was created by grouping many transistors and other components on a very small silicon chip.
- These computers were smaller in size, more efficient and faster in working and contain huge memories than earlier generation computers.
- They supported high level programming languages.
- These computers were cheaper and now available in offices.

Examples: ICL 1900, Honeywell model

Fourth generation computers (1976 to Present)

- Microprocessors were developed in this generation
- VLSI technology (Very Large Scale Integrated) Circuits were used in computers.
- Thousands of small components were packed on a single chip

- Microprocessor is also called as CPU (Central Processing Unit).
- Magnetic semiconductor memories are mainly used in these computers
- They contain huge storage volumes in the form of magnetic and optical storage.

Examples: STAR 1000, DEC 10

Fifth generation computers (Upcoming)

- “Artificial Intelligence” is the focus area of this generation
- Fifth generation computers would be able to learn from the environment and take decisions.
- These computers will have learning and decision making powers
- These computers will be based on parallel processing using multiple CPUs and will have permanent storage devices.

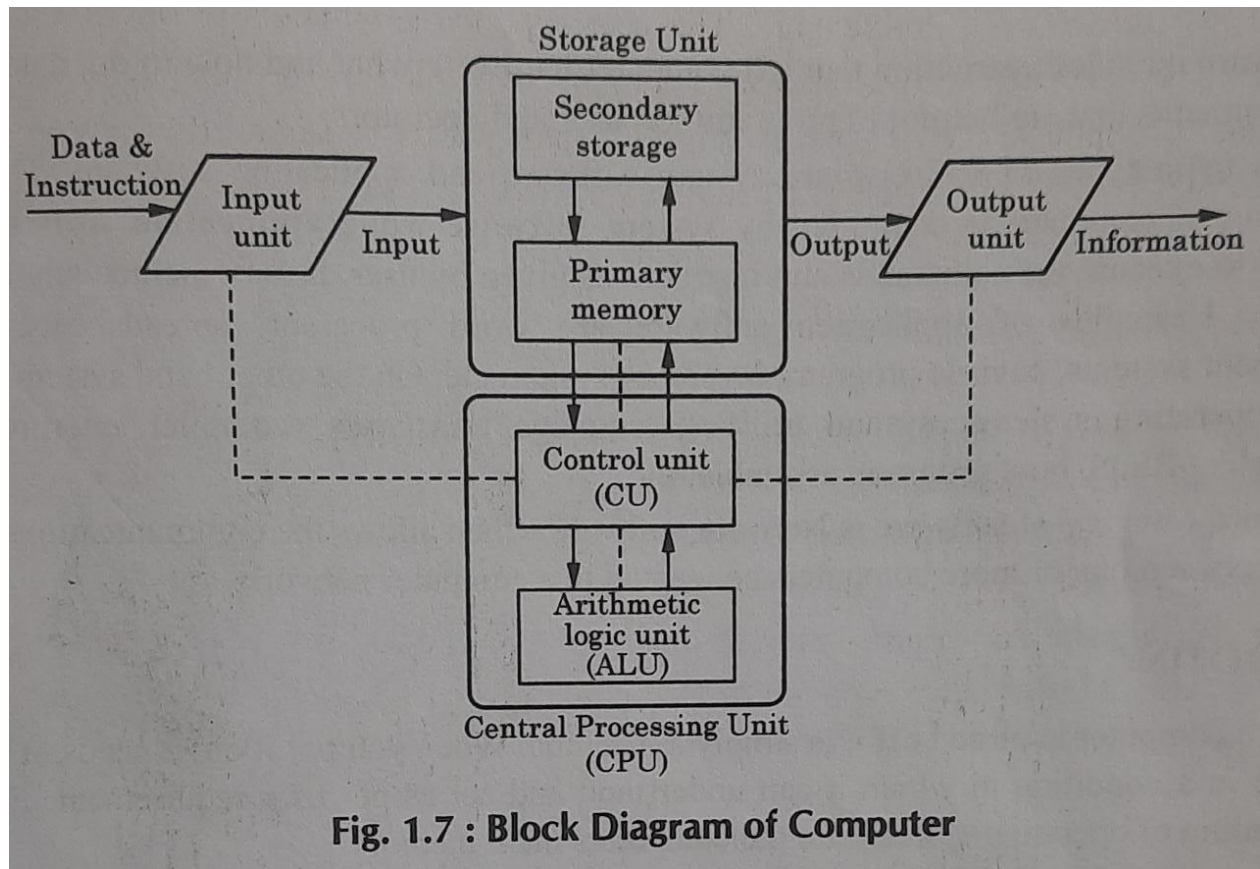
Block Diagram of a Computer

Any computer system has essentially four important parts normally input unit, central processing unit, storage unit and output unit.

Computers perform following five basic operations for converting raw input data into information useful to users.

1. Inputting: The process of entering data and instructions into computer system is called inputting.
2. Storing: Saving data and instructions so that they are available for future use whenever required.
3. Processing: Performing arithmetic operations (like add, subtract, multiply, divide etc.) or logical operations (like less than, greater than etc.) on data in order to convert them into useful information
4. Outputting: The process of obtaining useful information or results to user such as printed report or visual display.

5. Controlling: Detecting the manner and sequence in which all above operations are performed.



In the figure, the solid lines are used to indicate the flow of instruction and data and the dotted lines represent the control exercised by the control unit.

Hardware

The physical components of a computer are collectively known as computer hardware.

All the physical parts of a computer that can be touched or seen is called hardware.

Examples: CPU, Keyboards, mouse, printer etc.

Computer Hardware can be categorized into two parts

- Internal hardware components
- External hardware components

A. Internal hardware components: These are necessary for the appropriate functioning of the computer. It includes motherboard, CPU, RAM, ROM, Hard disk drive, Solid state drive, Graphic processing unit etc.

B. External hardware components: These are externally attached to the computer to add or improve its functionality. It includes mouse, keyboard, touchpad, camera, printer, scanner etc.

Software

A set of computer programs that is designed to perform well-defined functions. A program is a sequence/ set of instructions which are written to solve a problem.

It is different from hardware but both hardware and software work collectively to perform a task.

Software includes instructions that tell computer hardware what and how to do, data and other set of documents that are helpful to the programmer, user and operators.

Software can be categorized into two types:

- a. System software
- b. Application software

A. System software: System software is a collection of programs designed to operate, control and extend the processing capabilities of the computer itself. System software acts as the intermediary between the hardware and the end users.

Example: Operating system, assemblers, interpreter etc.

B. Application software: It is designed to cater a particular need of a particular environment. It directs computer to execute the commands and given by user. Example: word processor, spreadsheets, any web application etc.

Booting

Booting is the process of starting a computer.

Booting can be performed either by hardware action, such as pressing a button or by a software command. When you put the computer on, it needs to bring the hardware in a condition in which it can understand and act as per user requirement. For this it needs loading of operating system into the computer main memory.

This process of starting the computer and loading the operating system like Windows, Linux etc. into its main memory is called Booting.

There are two types of Booting

- a. Cold booting
- b. Hot booting

A. Cold booting: In cold booting, the computer is started or powered ON from shut-down state. During cold-booting, all the instructions are read by the system from the ROM (BIOS) and the operating system will be automatically loaded into the system.

This booting is also called as Hard booting

This booting is more time consuming than Hot booting

B. Hot booting: The hot boot is the process of restarting the computer without switching off the power supply. In this boot, the computer does not start from the initial state.

This boot is required in cases when system is struck off somewhere (hang state) and most commonly Ctrl+Alt+Del buttons are used to reboot the system.

This is also called as warm boot or soft boot.

Steps of Boot process: There are 6 steps

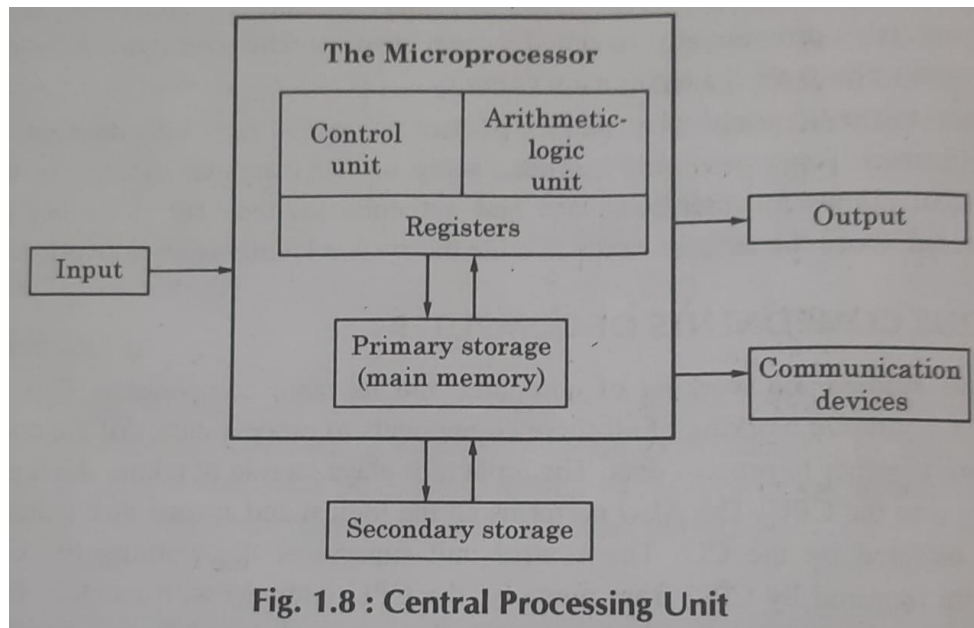
- a. **The startup:** The switching of power of computer ON is called startup. This step supplies electricity to BIOS program in ROM and to the processor of computer

- b. **POST:** POST means Power On Self Test. This program is stored on ROM and as soon as the power is switched on, the program starts initial check of input and output devices connected to computer, RAM and presence of disk drivers. If any necessary hardware is found missing, a beep sound is produced to report the error and system hangs over there.
- c. **Loading of operating system:** Once POST is performed properly and no error occurs then the bootstrap loader program starts loading the operating system into the main memory. When the entire operating system gets loaded into RAM, the initial files are executed and it is ready to work.
- d. **System configuration:** Now in this step, different drivers are loaded into the main memory. Drivers are the special system programs which are necessary for functioning of various peripheral devices connected to computer. This is called configuring the system
- e. **Loading system utilities:** The basic functioning programs like antivirus program, data compression program etc. are called system utilities. After configuring the system, these system utilities are loaded in main memory.
- f. **User authentication:** The last step of boot process is user authentication. This step is performed if any password has been setup on the computer system. In this step, the system allows to enter password and authenticates the user if correct password is entered. Once the authentication is done the system is fully ready to work on.

Central Processing Unit (Functional Parts and Functions)

CPU is responsible for actual processing of inputs to generate the output. CPU is considered as the brain of computer and is also called as Microprocessor.

The speed and efficiency of computer mainly depends upon the CPU.



CPU is divided into Arithmetic Logic Unit (ALU) and Control Unit (CU)

ALU performs Arithmetic and Logical calculations

CU supervises the working of ALU

- a. **Control Unit:** CU supervises the working of ALU. CU decides the sequence of programs to be executed. It also coordinates the functioning of various input output devices attached to computer.
- b. **Arithmetic Logic Unit:** ALU is part of CPU where actual calculations and logical comparisons are performed. The arithmetic calculations involve addition, subtraction, greater than, less than etc.
These calculations are performed on data that is stored in internal storage areas of CPU, called registers.
- c. **Registers:** Registers are internal storage locations inside the CPU that are used to store instructions or data. These registers are used by ALU and CU for storing intermediate results and control information.

Types of Registers are

- The **Program Counter** is used to keep the address of the next instruction to be fetched.

- The **Instruction Register** is used to store the address of the current instruction that is being processed
- The **Address Registers** are used by instructions for indirectly accessing the contents of memory by its address.

Memory

Memory is responsible for storing the data and instructions either temporarily or permanently.

Memory is the storage area where all the inputs are stored before processing and the outputs are stored after processing of inputs.

Memory also serves as the space to store the instructions.

Functions of memory

Stores the data and instructions to be processed

Stores intermediate result for processing

Stores the final results of processing before these are released to an output device.

Primary and Secondary Memory

Primary memory: Primary memory is the main memory that the CPU has access to. This is also known as volatile memory. The storage capacity of these memories is far less than secondary storage devices. Primary memory is used when you start the computer and when using some application file that has not been saved in the secondary storage.

RAM and cache memory are examples of it.

RAM (Random Access Memory) is a type of primary memory. It is used by all the programs running on the computer. It is a read write memory which means you can read the information stored in this memory as well as write new information into this memory.

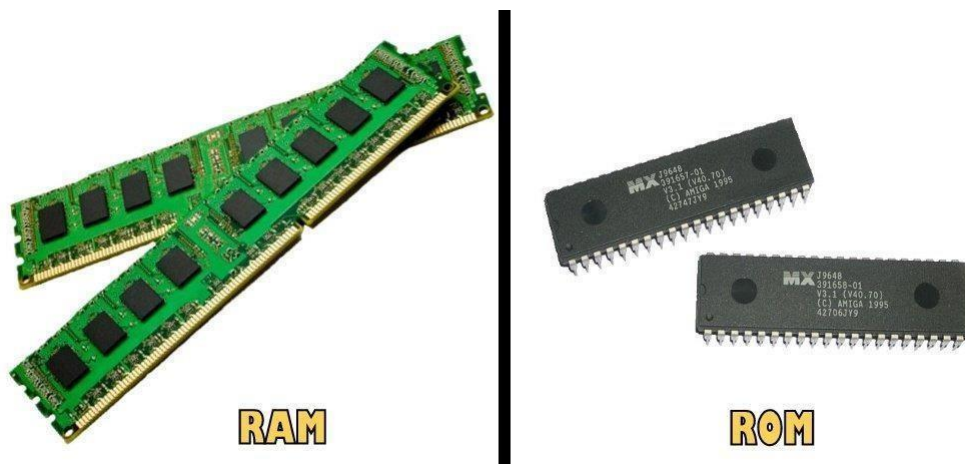
ROM (Read-only memory) is the other type of primary memory. ROM is used to store instructions that are important for starting up a computer. ROM contains several programs that run automatically when you start a computer.

ROM is a permanent memory and its contents are retained when you switch off the computer.

Modern computers contain utility programs to edit and store the data stored in ROM chips.

Some types of ROM are

- a. PROM (Programmable Read Only Memory)
- b. EPROM (Erasable Programmable Read Only Memory)
- c. EEPROM (Electrically Erasable Programmable Read Only Memory)



Secondary Memory:

The secondary memory devices are used to permanently store the information generated from computer. Secondary memory is a non-volatile memory that is external to the computer. It is the type of memory that is available to the user in the form of various devices and media.

Examples: Hard disk, CDs, DVDs, USB storage devices

Advantages of secondary memory:

- a. Permanent storage where data is not lost when we switch off the computer.
- b. Huge storage capacity (Several GBs or TBs)
- c. Low storage cost of data

- d. Data transfer between two or more storage computers

Volatile and Non-volatile memory

Volatile memory is a type of computer memory that requires power to maintain its data. When the power supply is turned off, the data stored in volatile memory is lost. It is typically used for temporary storage of data that needs to be accessed quickly.

It is fast but it has limited capacity and is more expensive than non-volatile memory

Example of volatile memory includes the cache, RAM of the computer

Non-volatile memory

It can retain the data even when the power supply is turned off. Non-volatile memory is used for long-term storage of data that needs to be accessed even after the computer has been turned off.

It is slower than volatile memory but has a much larger capacity and is less expensive.

Example of Non-volatile memory includes optical storage discs, secondary storage like ROM, flash memory, hard drives or solid-state drives.

Units of Memory

- a. **1 bit:** A bit is a value of either a 0 or 1. It is the space required to store one binary digit (0 or 1) in the memory.
- b. **1 Nibble:** 1 nibble is equal to 4 bit
- c. **1 Byte:** It consists of 8 bits. It is the space required to store 1 character of keyboard (like letter “A” or “B”)
- d. **1 KiloByte (KB):** The space required to store 1024 Bytes in the memory.
1 KB = 1024 Bytes

- e. 1 MegaByte (MB): The space required to store 1024 KiloBytes in the memory. 1 MB = 1024 KB
- f. 1 GigaByte (GB): The space required to store 1024 MegaBytes in the memory. 1 GB = 1024 MB
- g. 1 TerraByte (TB): The space required to store 1024 GigaBytes in the memory. 1 TB = 1024 GB
- h. 1 PetaByte (PB): The space required to store 1024 TerraBytes in the memory. 1 PB = 1024 TB

Some abbreviations:

- CPU: Central Processing Unit
- RAM: Random Access Memory
- ROM: Read-only Memory
- BIOS: Basic Input/Output System
- GPU: Graphics Processing Unit
- ALU: Arithmetic Logic Unit
- USB: Universal Serial Bus
- HDD: Hard Disk Drive
- SSD: Solid State Drive

Storage Devices

Computer storage devices are used to store huge amounts of data and information permanently.

Different types of storage devices are

1. **Magnetic storage devices:** They use magnetized material to save the data. When the device gets connected to a computer, a powerful magnetic field is

formed and the machine can read and store binary information using the two magnetic polarities.

Examples: Hard drive, Floppy disk, Zip-disk etc.



hard disks



floppy disks



zip disks

2. Optical storage devices: Lasers and lights are utilized to detect and store information in these devices. They are cheaper than USB drives and can store more data.

Example: CD-ROM, DVD, Blu-ray disc etc.



Compact Disc (CD)
Capacity: 700 MB
Available from 1982



DVD
Capacity: 4.7 GB
Available from 1995



Blu-ray Disc
Capacity: 25 GB
Available from 2006

3. Flash Memory Devices: These devices display both magnetic disks and storage technologies. They are simple to use, transportable and readily available. They are more cost effective and convenient method of data storage.

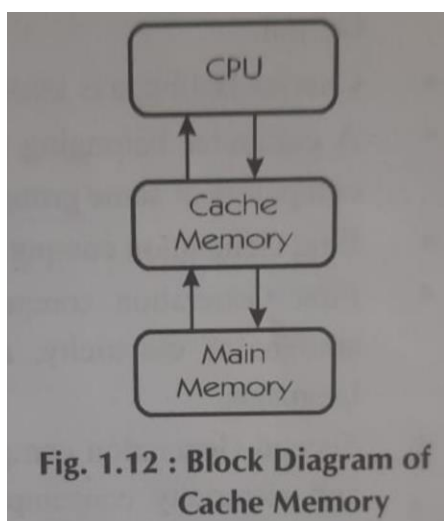
Examples: USB drive (pen drive), memory card



Cache Memory: Cache memory is a very high speed memory which is placed between the processor and main memory to adjust the difference of their working speed. Its objective is maximizing CPU utilization.

The frequently accessed data and instructions are stored in cache memory so that they are immediately available to the CPU when needed.

Cache memory is used to reduce the average time to access data from the main memory.



Various types of cache memory are

Level 1 or L1 cache (Present inside the CPU)

L2 cache (It is present on board, maybe inside or outside the

CPU) L3 cache (Located outside the CPU but in close proximity)

CPU speed and CPU word length

CPU performance is dependent on two main factors

- a. Clock speed
- b. Word length

CPU clock speed or clock rate tells how fast a CPU can work.

Or how many instructions cycles the CPU can deal with in a second. It is measured in Hertz.

The faster the clock speed, the faster would be the processing of data by the computer.

Word length corresponds to maximum number of bits of information that a computer can process at one time.

It is expressed in terms of bits.

The larger the word length is, the faster the computer.

Unit: -II

Basic Internet Skills

Data communication means sending data electronically from one computer to another. It involves linking of computers, which allows the resources of one computer to be shared by the other

Computer network is a group of computers and peripheral devices connected through a data communication system. A computer network facilitates the sharing of hardware and software resources among different users working on different computers.

The aim of networking is to share resources.

Hardware sharing: All the devices like printer, scanner etc. are attached to a remote server which is shared among multiple computers.

Software sharing: Every application software can be installed on main server rather than installing it on every computer individually.

Efficiency of hardware and software resources: As all the resources are installed at a single point so all the modifications can be done at that single point.

Reduces Data redundancy: The data that is used by multiple people can be stored at single point and shared through common network. This reduces data redundancy.

Saves Paper and time: Files can be shared digitally.

Internet sharing: Common network gives access to internet to all the systems.

Security: As all the data is there on the server so securing that server is enough to secure the data.

Browser

Web browser is a software that interprets the markup of files in HTML, formats them into web pages and displays them to the user.

It is a software program on your computer which is used to access information from World Wide Web servers.

The largest networked collection of linked documents is known as World Wide Web.

In web browser

1. A window displaying the current page
2. Web links which changes colors when used (Initially they are in blue color and after using they turn purple)

3. A row of button at the top of browser window which are home button, back and forward buttons, stop button. There are also The Go menu and Preferences and the Bookmarks.

URL (Uniform Resource Locator)

Each web page or internet can be accessed by using a unique address, this unique address is called URL.

Web browser uses a URL to identify the location of a web page.

Example: <http://www.kuk.edu/lib/btech.html>

Structure of URL

URL contains three parts.

First part http specifies the protocol. HTTP will be used to transfer the content of web page.

Second part www.kuk.edu specifies the address of site. (In this, edu specifies that this is education site, www specifies that this site is on world wide web, kuk is name of the organization which hosted the website)

Third part /lib/btech html specifies the path of file btech.html which is stored in the folder lib.

Different Protocols for URLs :

Protocol	Types of access
http : //	HTML documents
telnet :	Remote Telnet (login) session
File :// HTML	documents on your hard drive
news ://	Use net news group on a particular news server
https ://	Some "secure" HTML documents
ftp ://	FTP sites and files

Different Types of URLs :

- Absolute URL
- Relative URL

Absolute URL : The absolute URL uses a complete internet address to specify the location of the web page. It specifies the transfer protocol, then the particular server on which the file is located and finally the actual path of the file on server. For example :

`http : // www. microsoft. com/windows/index.html`

Relative URL : Relative URL is used for accessing a file on web when the full internet address is unnecessary. In most cases websites uses hyperlinks which points to documents and other files located on the same site and often in the same folder. When relative URL is used the base part of URL is automatically concatenated to the relative URL by the web browser.

World Wide Web (WWW)

WWW is a network of millions of servers, hosts and users. The contents stored on web are accessed through web browsers.

WWW is also a tool to find and retrieve information using links to other web pages.

Hypertext: Hypertext is similar to normal text but it is linked to another text or page or information content.

Hypermedia is advanced version of hypertext document as it contains sound, image or video apart from text.

Three key components of www are

- a. URL (Uniform Resource Locator)
- b. HTTP (Hyper Text Transfer Protocol)
- c. HTML (Hyper Text Markup Language)

HTTP defines how information is transferred between the server and the browser. All HTML files are transferred using HTTP protocol. The HTTP protocol is a TCP/IP (Transmission Control Protocol / Internet Protocol) based protocol.

HTML is used for creating web pages. WWW is a collection of millions of online documents which are written in HTML and they provide a link from one document to other. HTML is based on a set of predefined tags. Using these tags, we can alter the text like underline it, bold or italic it etc.

Efficient use of search engines

A search engine is a collection of program that gathers information from the web, indexes it and puts it in a database so that it can be searched. Search engine uses just keywords or phrases to search the result.

Search engine contains a computer program called 'spider' or 'crawler' or 'bot' or 'robot' which is responsible for building up the database attached with each search engine.

Various search engines are:

1. Alta Vista (<http://www.altavista.com>)
 2. Excite (<http://www.excite.com/>)
 3. Goggle (<http://www.google.com>)
 4. Hot BOT (<http://www.hotbot.com>)
 5. Info seek (<http://www.infoseek.com/>)
 6. Khoj ([http://www.khoj/](http://www.khoj.com). com)
 7. Lycos (<http://www.lycos.com/>)
 8. Megellan ([http://wwwmckinley.com/](http://www.mckinley.com/))
 9. Northern Light (<http://www.norhternlight.com/>)
 10. Rediff ([http://www.rediff/](http://www.rediff.com). com)
 11. Web crawler (<http://webcrawler.com> <SEARCH.doc>)
 12. Yahoo! (<http://www.yahoo.com/>)
- They all share more similarities than differences.

Starting a search engine

Step 1: Enter the URL of a search engine like www.google.com and then press enter key.

Step 2: Type what you want to search in the search box

Step 3: Clicking the search button, a large number of hyperlinks are retrieved in accordance to their relevance to the search topic.

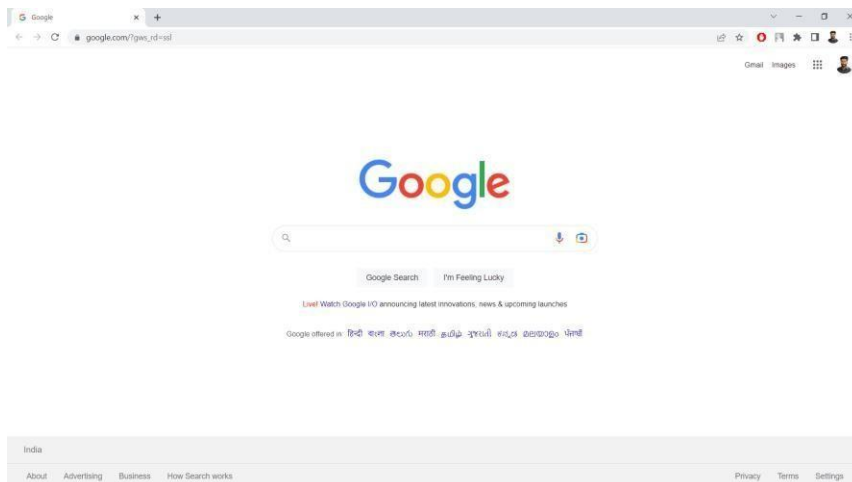


Figure 1 Shows the Step 1

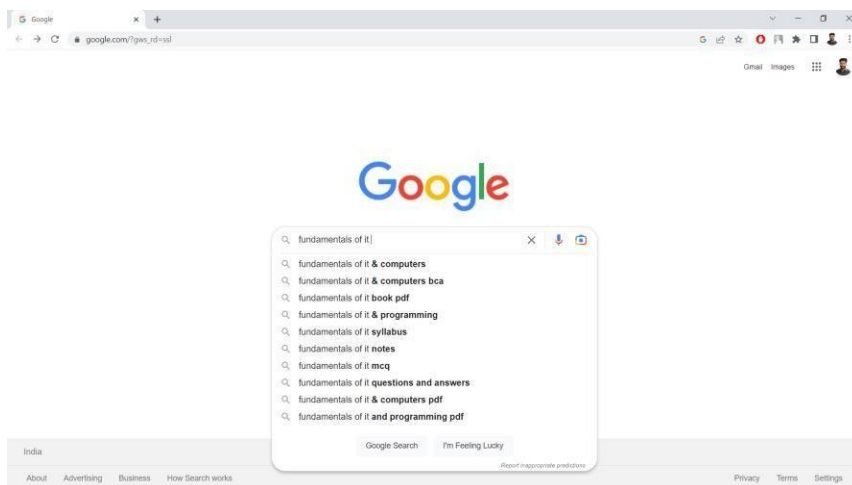


Figure 2 Shows the Step 2

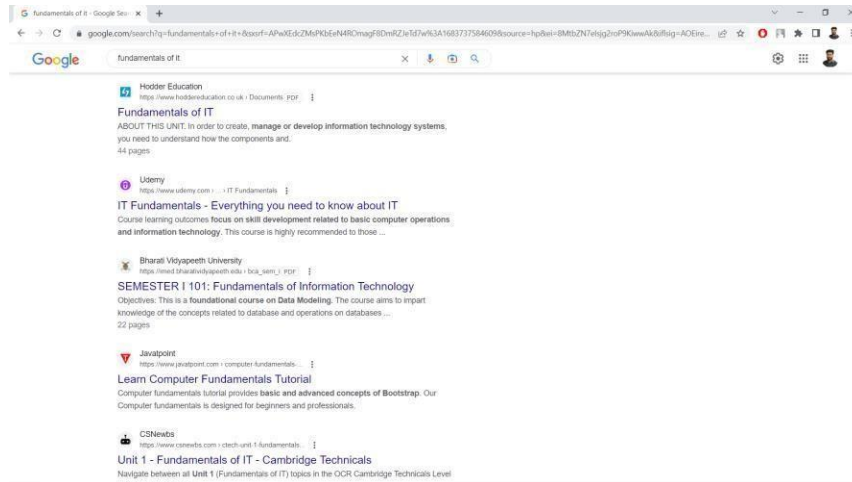


Figure 3 Shows the Step 3

About GOOGLE search engine

- Google is a user friendly search engine.
- It is not case sensitive
- It does not use wild card characters
- It supports logical operations 'OR'
- It can restrict the search to specific extensions
- Implied operators +, -, & are used to indicate the existence of a word or its absence.

Digital India

This program was launched by Prime Minister of India, Sh. Narendra Modi on July 1, 2015.

The program ensures that govt. services are made available to citizens in electronic forms. It is done by improving online infrastructure and increasing internet connectivity.

The important initiatives under Digital India campaign are

- Digilocker
- E-education
- E-health
- E-kranti

- E-hospitals
- BHIM-UPI portal

Digital India portal has been launched by Government of India to comprise all the services on a single portal. It started in 2017. Department of Electronics and Information Technology (DIET) is running this project with state and central government.

Objectives of Digital India portal are

- Provides e-payment system
- Provides delivery services
- Provides PAN, AADHAAR related services
- Bill payment, shopping, certificates, passport, driving licence etc.

National portal of India provides a single window access to information and services that are electronically delivered from all the government departments. It presents information resources and online services from government sources accessible from a single point.

Example: NSP (National Scholarship Portal)

State portals are developed for each state separately to provide access to information and services available for separate state.

Example: Haryana state has CM Window, E-mausam Krishi service etc.

E-mail (Electronic Mail)

Electronic mail is popularly known as E-mail and its purpose is to send the electronic formatted message.

Email provides the ability to distribute information to large number of people virtually, instantaneously and inexpensively.

2.5.1 E-Mail Address

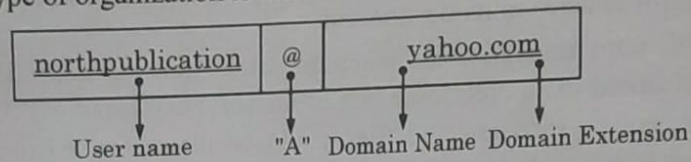
To send and receive mails, one needs to have an e-mail address. The E-mail address works similar as our postal address or phone number. While sending an e-mail, we enter the E-mail address (s) of the recipient(s) so that the computer knows where to send it.

An e-mail address consists of two parts, separated by the @ ('at') symbol. An e-mail address does not contain spaces.

E.g., northpublication@yahoo.com

User Name : It is the name of a person's account, which can be an actual name of any name.

Domain Name : It is the location of the person's account on the Internet separated by a period (.) and then type of organization is mentioned.



There are many sites on the Internet which provide free e-mail facility. The popular sites are www.hotmail.com, www.yahoo.com, www.gmail.com, www.rediffmail.com.

2.5.2 Advantages of E-mail

- The cost of sending an electronic message is nominal.
- The messages are sent and received instantly.
- E-mails never get lost and do not reach at the wrong destination.
- E-mail allows us to be in touch with the people who are staying far away.
- We can attach pictures, videos, sounds to our e-mails and send it to anyone.
- We can read, print, forward, reply or delete the received message.

Log-in

Google
Sign in
to continue to Gmail

Email or phone

[Forgot email?](#)

Not your computer? Use Guest mode to sign in privately.
[Learn more](#)

[Create account](#) [Next](#)

English (United States) ▼ Help Privacy Terms

Google
Hi Saurav

sauravkumar0816@gmail.com ▼

Enter your password

☐ Show password

[Forgot password?](#) [Next](#)

English (United States) ▼ Help Privacy Terms

E-mail service providers in India

Top free providers include Gmail, Yahoo, Outlook, AOL, Zoho, Mail.Com, and ProtonMail. Some other Email providers are CounterMail, Hushmail, and Tutanota.

Effective use of Gmail

1. Use labels to categorize the emails
2. Install Gmail add-ons like Docu sign, Grammarly, Gphy etc.
3. Use Gmail shortcuts for various steps
4. Keyboard based search operators to work faster

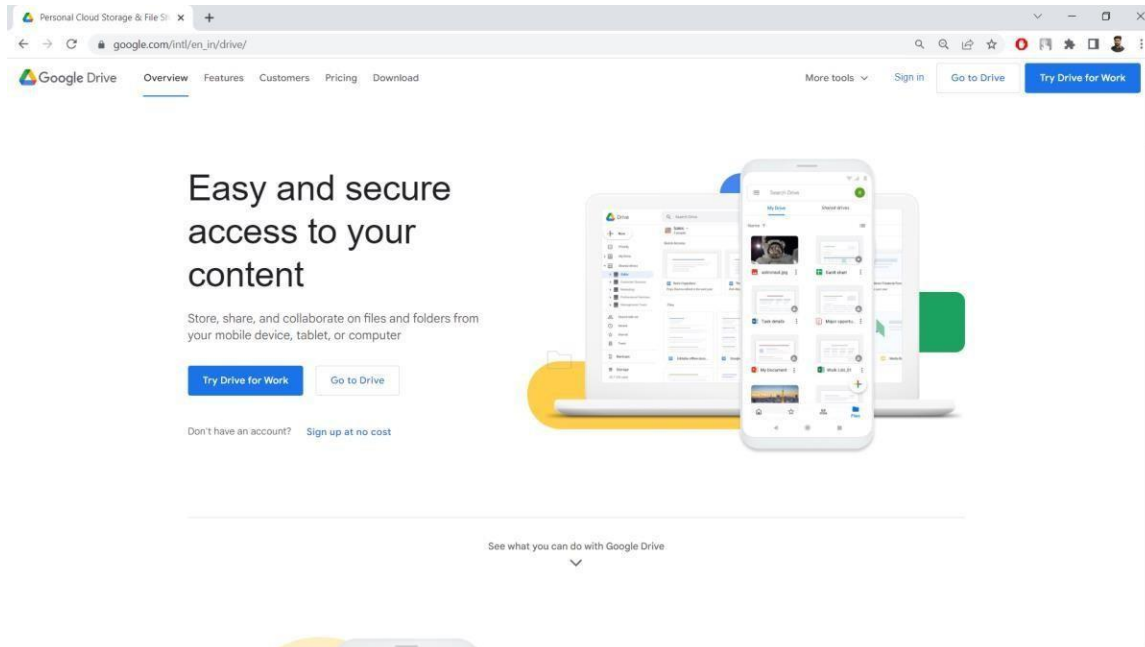
S. No.	Search operator	Function
1.	from :	specify sender
2.	to :	specify recipient
3.	older :	search manages older then specified time period
4.	newer:	search message that are newer than specified time period
4.	subject:	words in subject line

5. Clean Gmail inbox regularly to use it effectively. Can also use Autoclean feature of Gmail.
6. Unsubscribe email on Gmail which you no longer need.

Effective use of Google Drive

Google drive or G drive allows to store documents, images, videos etc. remotely to the cloud and they can be accessed from anywhere.

Initial drive storage of 15 GB is free and can be accessed from any device.



1. Find the needed file using search after opening google drive
2. Publish the file to web for making the sharing of file publically in simple ways.
3. Pull out text from images while saving them
4. Shorten long links using URL shortener add-on
5. Back-up and sync the files from laptop or phone
6. Use color code in the files to find them fast
7. Use keyboard shortcuts to save time and clicks.

Google Calendar

Google calendar is a time management and scheduling service.

It allows user to edit and create events and comes free with google account.

It can be used on laptop and mobile phones

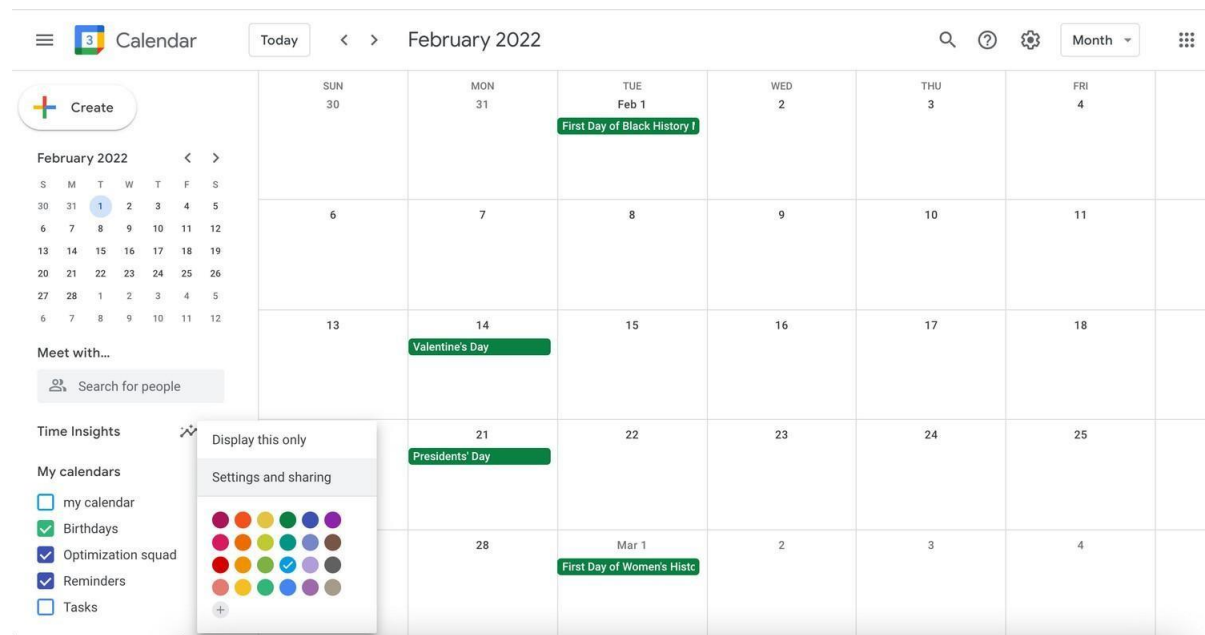
On this, we can quickly schedule meetings and events and can get reminders about them

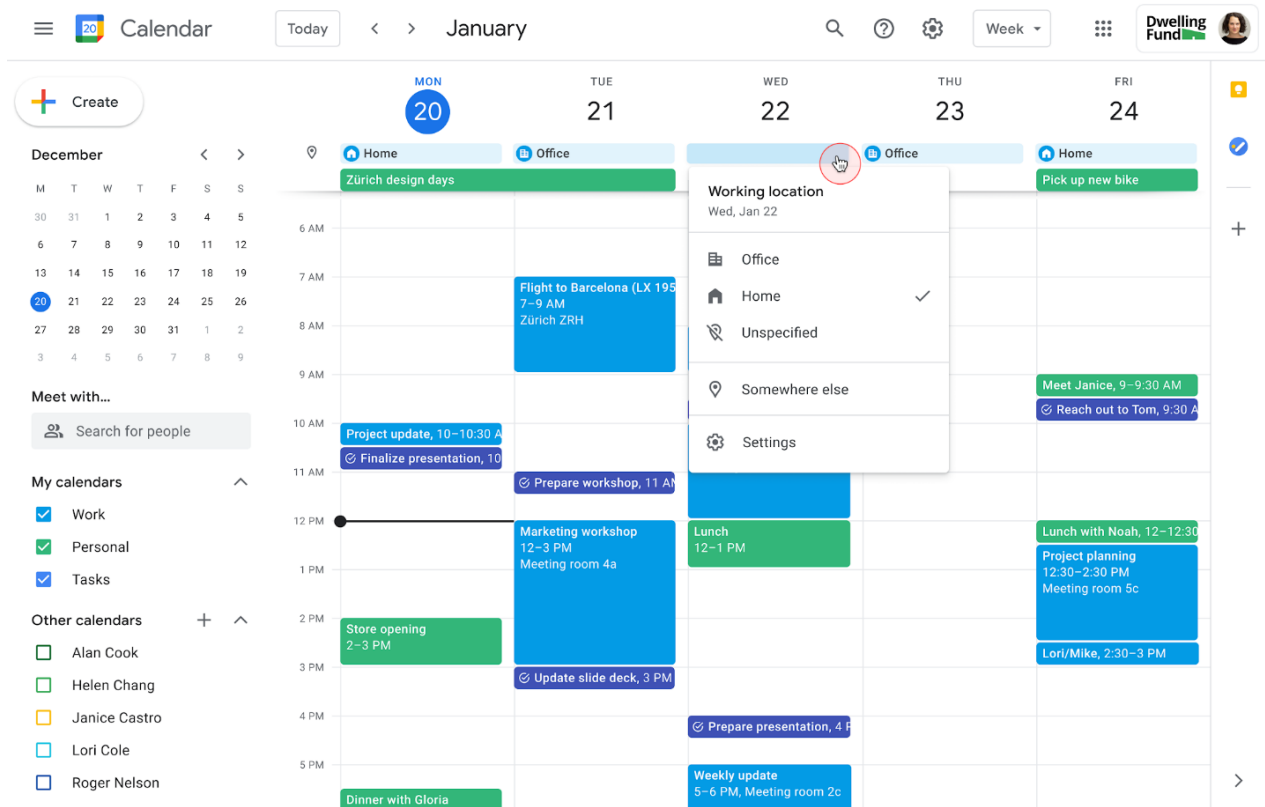
We can share our schedule with others also and they can make changes as well

It has a set start time and stop time option along with option for all day event. Recurring functions can also be used for frequency.

Colors can be used to highlight the events.

Locations can be added, notifications can be sent and events can be seen on other phones also.





Googles Sites

Google sites is a free website builder from google. It allows to create website with ease just by dragging the content we need.

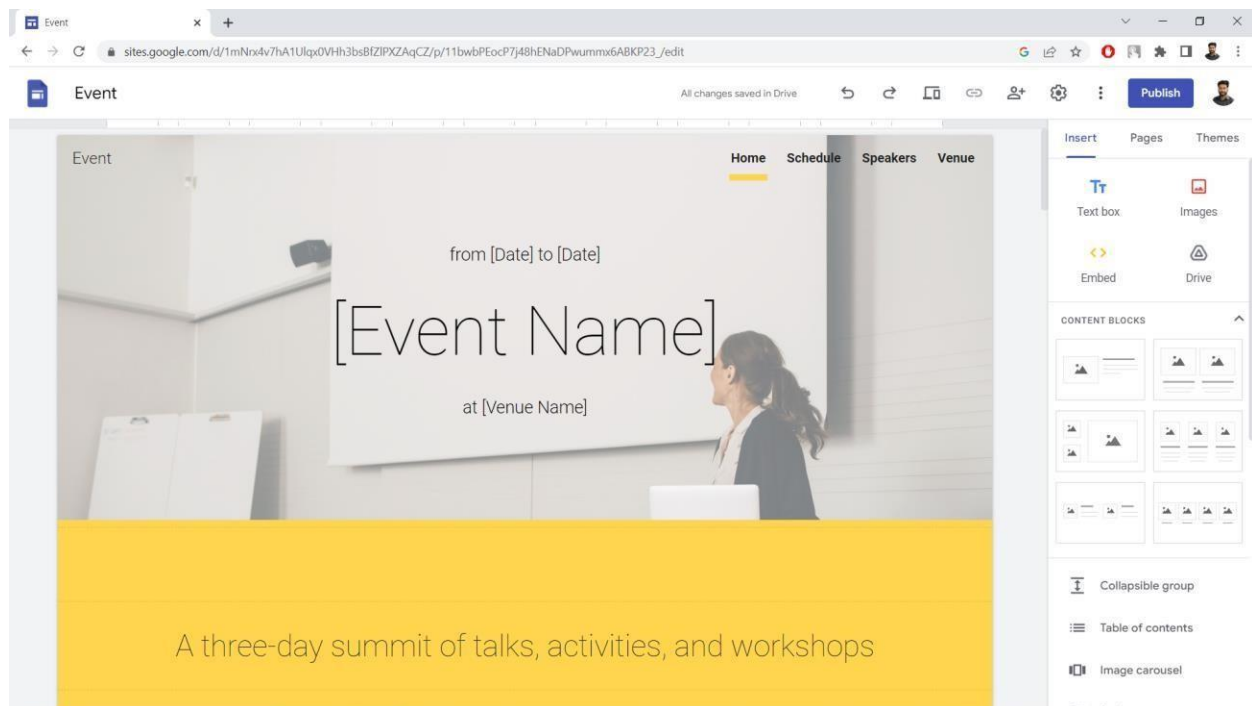
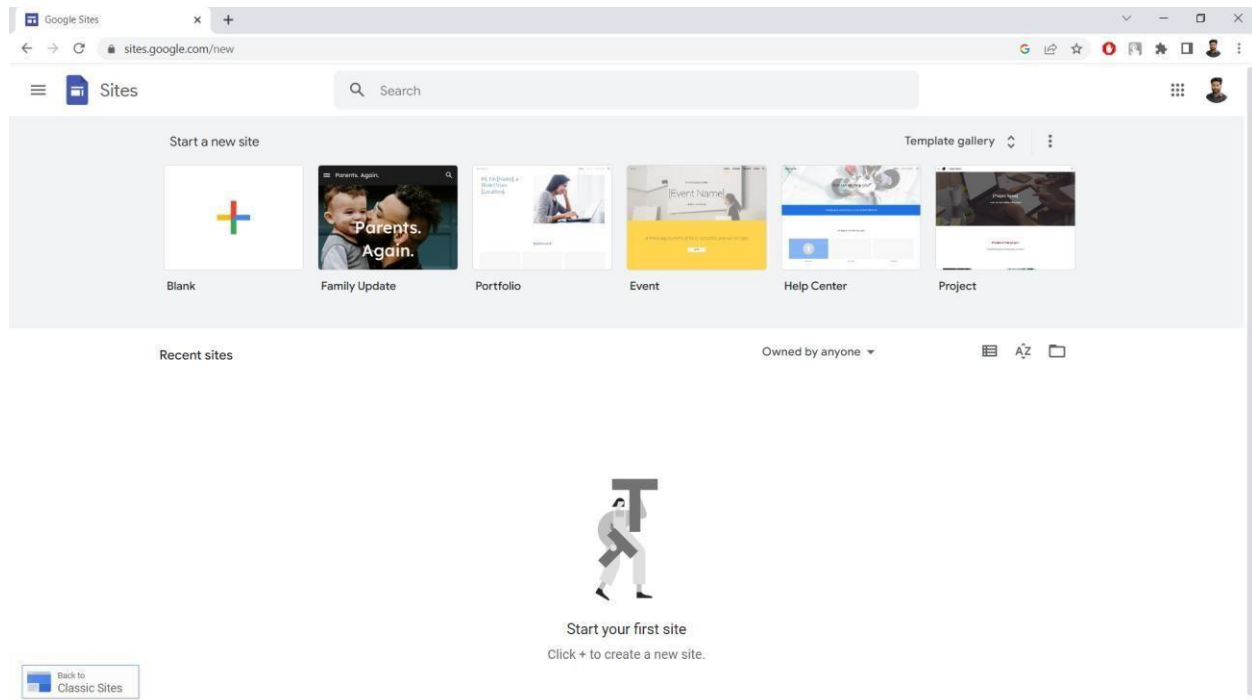
It also allows us to create website with another user as it can give edit access to others. It happens in real time.

It is compatible with other google services like google sheets, google slides, google docs etc.

The site is completely free and there is no limit on number of sites that we can create within 15GB of storage.

No background in coding and web development is required as it is very user friendly and have templates.

It is a good option for a free service, work presentations, small businesses etc. as we can add links, images, videos, text and much more



Sign in to google account and go to google sites homepage.

Pick the template to use under “start new site”. Also there are various options in “Template gallery” out of which “Events” is selected here.

Enter all the required details and contents of the site and once all of this is done, hit Publish

In the pop-up box after hitting Publish, choose the URL you want and can also customize it.

Once finished, click on Publish again to make the website visible to others.

Google Sheets

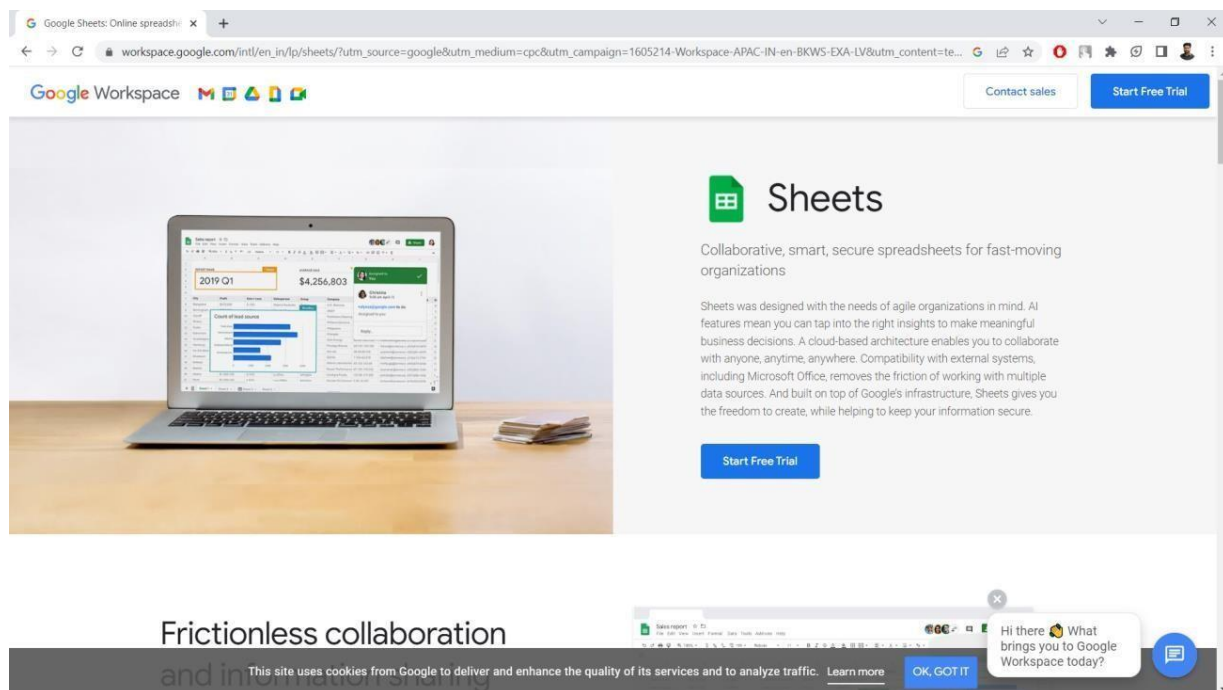
It is a spreadsheet program developed by Google.

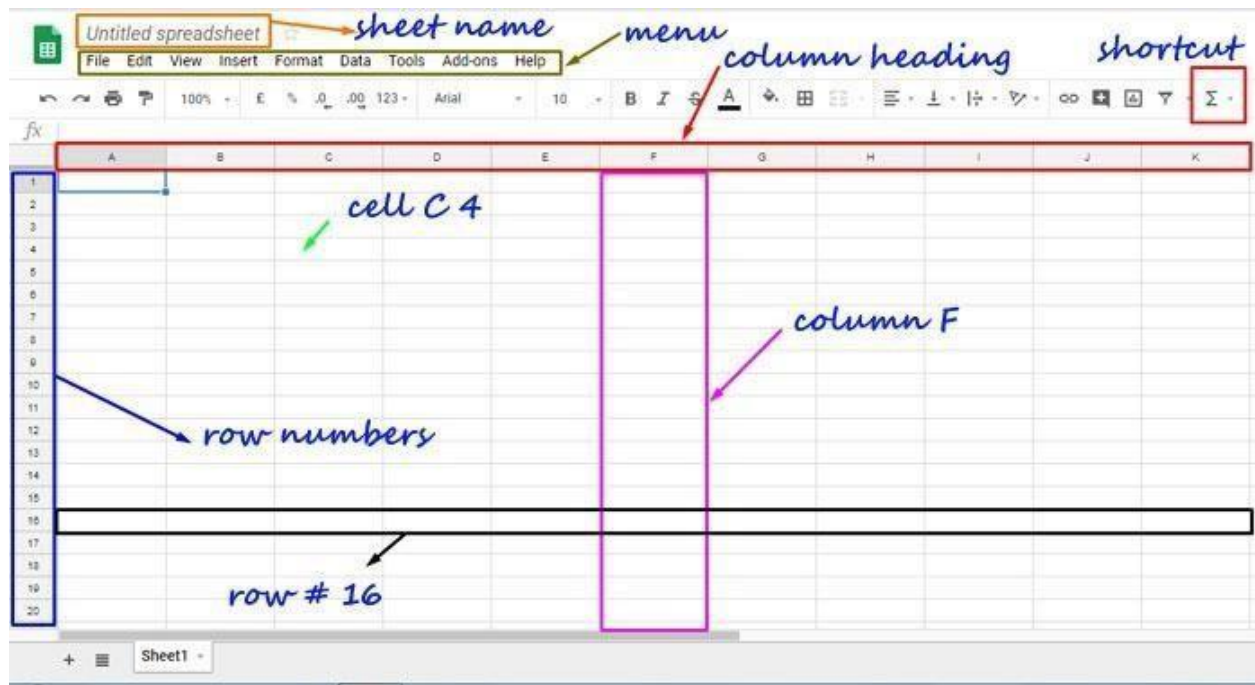
It organizes the data into rows and columns and allows you to do mathematical and logical operations on them

It can be used in daily life as well as work life.

Use of google sheets does not require programming knowledge and does not require downloading or installing of program on computer.

It runs on the web browser.





Google sheets allows format and styles for the spreadsheet.

It allows change of colors, font type, font size, borders, numbers etc.

It allows real time collaborative editing.

It is free to use, require minimal training, customizable and it is collaborative than other similar tools

Online Communication and Conferencing

Online communication means sharing of information or communication over a computer network or telecommunication network. A phone call or online chats are different ways of online communication.

Online Conferencing is a service which allows an audio or video conferencing or meeting through web services. Participants can see, talk and hear to each other in real time.

A **Webcast** is a video broadcast of an event transmitted over the internet.

A **Webinar** is an event held virtually which is attended exclusively by an online audience. Audience can hear and see the presenters but attendees are not seen or heard in the webinar.

A **web meeting** as an audio, web video conferencing solution that combines all services into one online web meeting service. In this, people from different parts of world can see, talk, message each other in real time.

A **Web conferencing** software allows the participants to conduct or attend the web meeting. It enables remote meeting based on VoIP (Voice over Internet Protocol) (Voice call using internet), online video, audio, instant messages, file sharing, screen sharing.

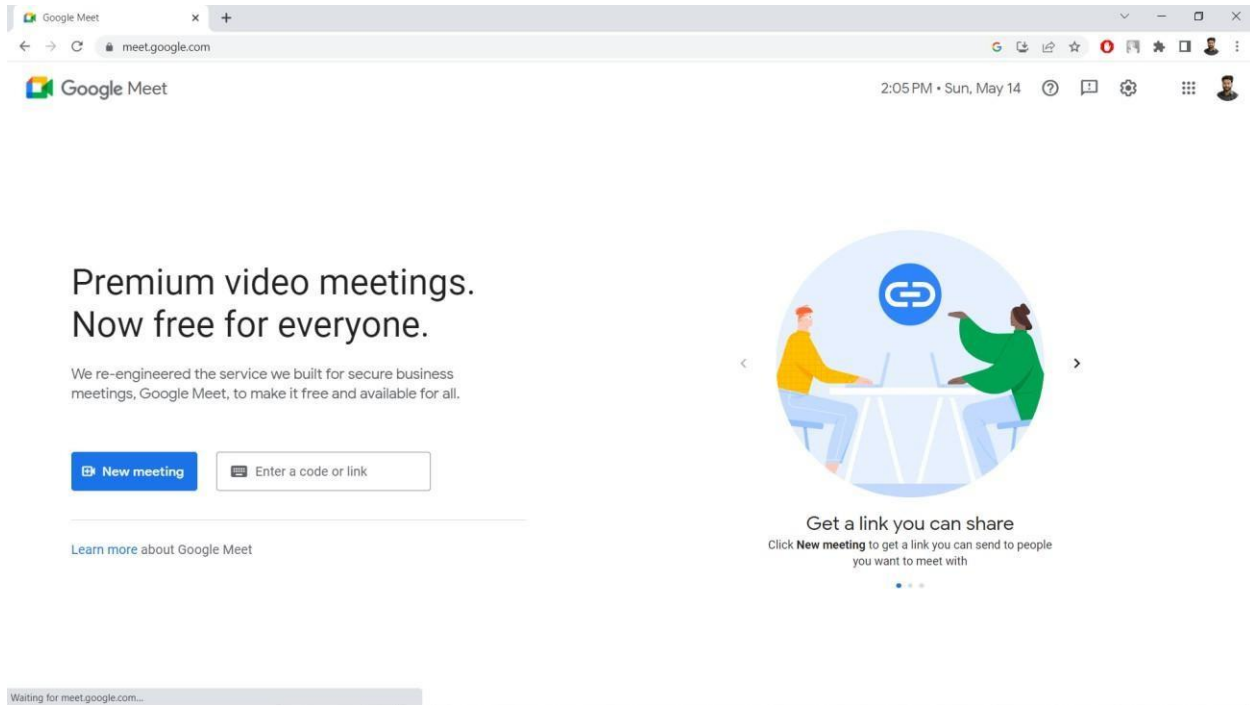
Some examples are Skype, Google meet, Zoom, Cisco webex, Click meeting etc.

Google Meet

Google meet is a video conferencing platform where google allows real-time meetings using the browser, sharing video, desktop, files, screen, presentation with others.

It is not necessary to install in on desktop or phone and can be accessed through browser.

It can be used for audio and video calls where team members can be invited, they can join by a meeting code or by clicking on the meeting link.



WebEx

It is a multifunctional desktop audio/video conference call solution provided by Cisco.

It allows to meet anyone throughout the globe using web services and meetings happen in real time.

It is required to install it on desktop or mobile phone

It is suitable for both small and large group meetings and for audio and video calls

Unit “- III

Basic Logic Building

Logic building is essential for computer programming. It involves breaking down the problem into smaller, manageable parts and defining the steps required to solve it.

A program is a sequence of instructions that is written in a computer programming language. Programming is needed to develop various types of software.

A programming language is a formal language comprising a set of instructions that produce various types of outputs.

Steps in Problem solving

Following are the mainly used steps while creating a program

- 1. Problem analysis:** In this phase, the internal logic of the program is planned. Various program analysis techniques are used to represent the logic of the program and flow charts, pseudo codes, algorithms and decision tables are mainly used tools for this purpose. Program analyst performs the analysis phase and he chooses the most efficient way.
- 2. Coding:** After the development of desired logic and sequence of steps, next comes the coding stage. In this stage, a programming language like C and C++ is selected and the program instructions are coded as per syntax of the chosen language. Other languages in use are Java, visual C++ etc.
- 3. Debugging:** After the coding is done, the program is checked for all kinds of syntax and grammatical mistakes. This includes removing of errors due to invalid syntaxes like absence of semicolon (;) or logical error like absence of increment/ decrement step in a while loop.
The process of removing all kinds of error in the program is called debugging.
- 4. Testing:** After removing all the errors from the program, it is executed and supplied with valid input to see whether the program returns the accurate output.

Algorithm:

Algorithm is a sequence of instructions to solve a particular problem. Algorithm is independent of any programming language and can be written in simple English language as it is a representation of instruction sequence of the solution.

A problem may have multiple algorithms for its solution.

The instructions written in an algorithm must have following characteristics:

- a. Each instruction must be precise and unambiguous.
- b. Each instruction should be written in such a manner that it can be performed in a finite time
- c. One or more instructions should not be repeated infinitely. The program should stop after a given number of iterations.
- d. After executing the steps of algorithm, desired result must be obtained.
- e. The variable names of algorithm must represent the entity they represent in the program. Example, a variable to represent basic salary should be named basic_sal or b_sal etc.

Example 1: Consider a box where no one can see what is happening inside, it is covered on all sides. We give input to the box and it gives output we need but the procedure behind this conversion of input to output is an Algorithm.

Example 2: Write an algorithm to find the average of three subjects.

Step 1: Start

Step 2: Declare and read 3 subjects, let's say S1, S2, S3

Step 3: Calculate the sum of all the 3 subject values and store result in sum variable (Sum = S1+S2+S3)

Step 4: Divide sum by 3 and assign it to Average variable (Average = Sum/3)

Step 5: Print the value of Average of 3 subjects

Step 6: Stop

Example 3: Write an algorithm to count number of males out of 1000 people of a town.

Step 1: Start

Step 2: Initialize GENDER, COUNT and MALE to zero

Step 3: Input gender of the person

Step 4: If gender = male, Increment male and count by 1

 If gender $\neq$ male, Increment count by 1

Step 5: Check count to see if it is less than 1000

Step 6: If count < 1000, repeat from step 3

Step 7: Repeat till Count = 1000

Step 8: Print MALE

Step 9: Stop

Steps for Algorithm development

It is a series of specific steps which solve a particular problem and which the programmer can translate into a computer program in some programming language.

There are five major steps:

Step 1: Obtain a description of problem

The problem description must be stated clearly, it must be unambiguous, it must be complete without internal contradictions

Step 2: Analyze the Problem

This step is to determine the starting and end point for solving the problem. At the starting point, we look at the data available and at the end point, we look at the new facts that we have.

Step 3: Develop a high-level algorithm

High-level algorithm means having high level of detailing in the planning. Each step is detailed out to further level of detailing. It shows the major steps that need to be followed to solve a problem.

Step 4: Refine the algorithm by adding more details

More details are added to the steps and the level of detailing depends upon the situation. Each time more detail is added to the previous algorithm.

Step 5: Review the algorithm

The algorithm needs to be analyzed step by step to determine whether or not it will solve original problem

Flowchart:

A flowchart is a graphical method of representing the logical flow of the program. It uses different shapes to denote different types of instructions and actual instructions are written within these shapes.

Different shapes or boxes of a flowchart are connected by solid lines which indicate the flow of program. Program flow is the exact sequence in which the instructions are to be executed.

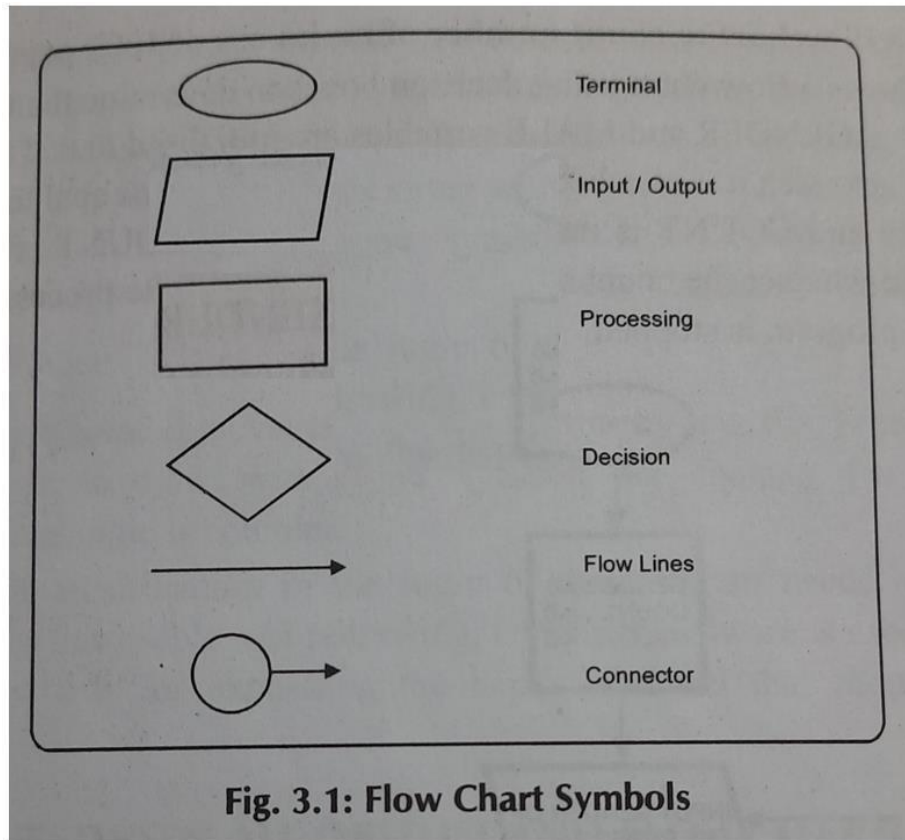
While generating solution for a problem, an algorithm is created first and then it is represented through flow chart.

It is easier to trap any kind of logical error in a flow chart as compared to an algorithm.

Flowchart Symbols: A flowchart uses different symbols to represent different functions in the program.

representing decision in the program etc. The figure 3 shows the symbols used in flow charts. Following is the description of various symbols used in flow chart.

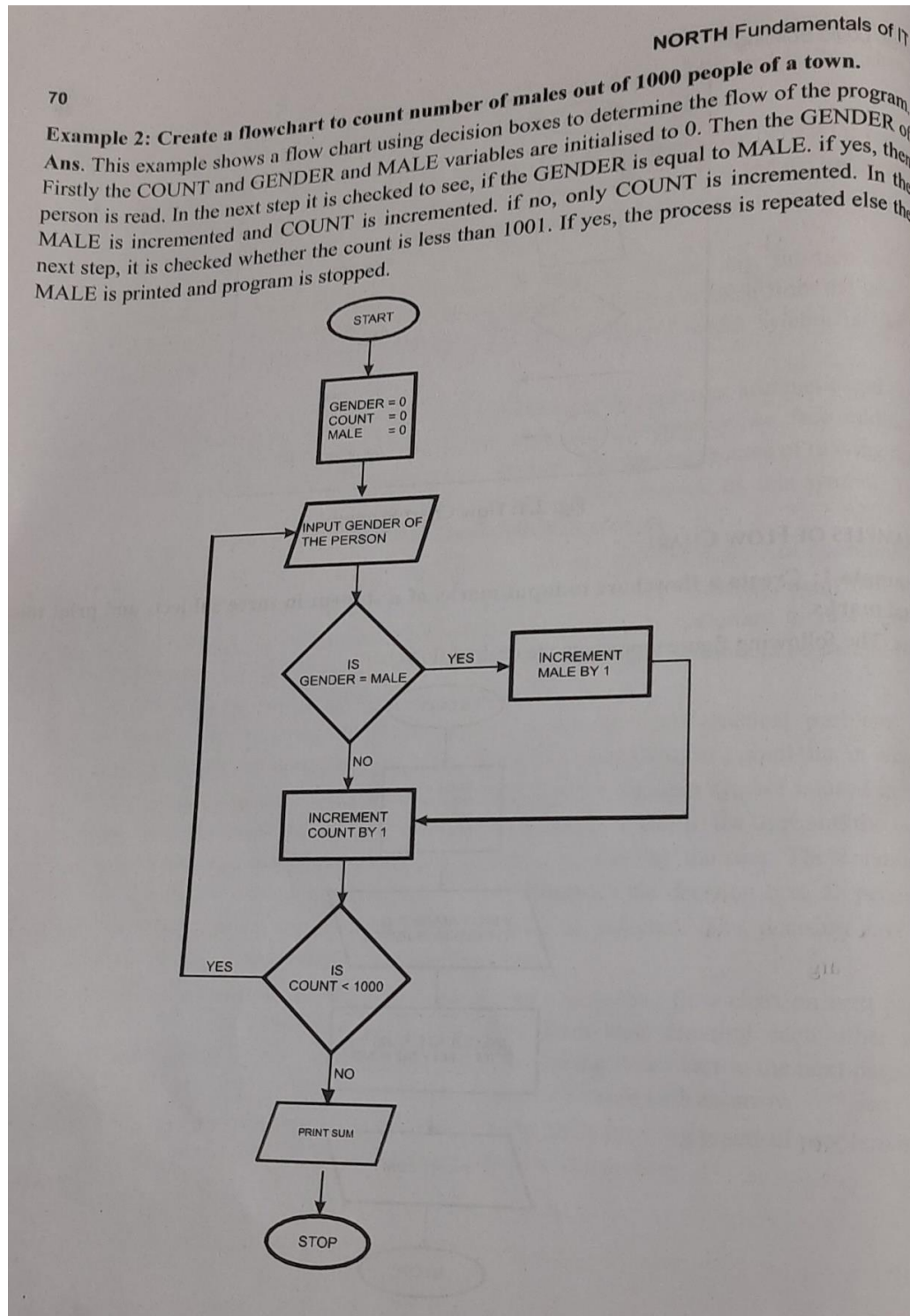
1. **Terminal:** The terminal symbol is used to indicate the beginning (START), ending (STOP) and pauses (HALT) in the program's logical flow. The first and the last symbol in the flow chart is generally a terminal symbol. The terminal symbol is in a shape of an oval.
2. **Input/output:** The input/output symbol is used to denote any function of an input/output device in the program. It is used when an input is taken from the user or output is displayed to the user. The shape of an input / output symbol is like a parallelogram.
3. **Processing:** A processing symbol is used in flowchart to represent arithmetic and data movement instructions. It is used in the flow chart, whenever we face addition, subtraction, multiplication and division of numbers. The logical process of moving data from one to other location of the main memory is also denoted by this symbol. The processing symbol is represented by a rectangle in flow chart.
4. **Flow Lines:** Flow lines with arrowheads are used to indicate the flow of operation or execution of a program. Flow lines indicate the exact sequence in which the instructions are to be executed. These flow lines are very important to represent a situation when, normal flow of top to bottom is not required. One should be careful that two flow lines should not intersect with each other.
5. **Decision:** While developing solutions for commonly faced practical problems, a program generally has multiple execution paths and it is decided at a point that in which direction the program control or execution will flow. A decision symbol is used in the flow chart, at a point where a number of options are available to the user and the user has to select one way depending upon the input supplied by the user. The condition upon which the choice has to be selected, is written in the decision box. Depending upon the condition result, an appropriate path is selected. The decision box is represented by a diamond in the flowchart.
6. **Connector:** Connector symbol is used to extend a very long flow chart on next page. When a flow chart becomes very long, flow lines start crossing each other and understandability of flow chart reduces so, to extend the flow chart to the next page we use connector symbols. Connector is represented by a circle with an arrow.



Limitations of flow charts:

1. Flowcharts are very time consuming.
2. They are difficult to draw with proper symbols and spacing.
3. A little modification in the logic of program needs redrawing the whole flowchart again.
4. There are no set standards for explaining the depth of detail that should be included in a flowchart.

Example:



Differences between Algorithm and Flowchart

1. Algorithms can be written in a simple language whereas flowcharts are visual diagrams.
2. An algorithm is a set of instructions whereas a flowchart is a graphical representation of those instructions.
3. Algorithms are more precise and can be used to solve any problem whereas flowcharts are more general and are used to understand algorithms.
4. Algorithms focus on the sequence of steps to solve a problem whereas flowcharts focus on the flow of data.
5. Algorithms are easier to modify whereas flowcharts can be difficult to modify
6. Algorithm came from Persian mathematician Al Khwarizmi whereas Flowchart was introduced by Frank Gilberth.

