

Resume :-

Page No.

① C -

C Programming is a general-purpose, procedural, imperative computer programming language developed in 1972 by Dennis M. Ritchie at the Bell Telephone Laboratories to develop the UNIX operating system. C is the most widely used computer language.

Programming language is a must for students & working professionals to become a great software engineer specially when they are working in Software Development Domain.

→ C Compiler is platform dependent since it is closely linked to the OS Kernel which is different for different OS. But over the years of all OS's come with pre-installed compilers and libraries that make it quite platform independent for basic programming.

② Core Java:-

Core Java is the part of Java programming language that is used for creating or developing a general-purpose application. To develop general purpose applications. To develop online application and mobile application without code java no one can develop any advanced java applications.

It is used to develop mobile apps, web apps, desktop apps games and much more.

→ It is owned by Oracle, and more than 3 billion devices run java.

→ It is platform Independent. (It works on Windows, Mac, Linux, Raspberry Pi, etc).

C++ → Dynamic memory allocation is done using the new operator.

C → Dynamic memory allocation is done using malloc() & calloc() function.

Java is a programming language and a platform.
Java is a high level, robust, object-oriented
and secure programming language.

Java was developed by Sun Microsystems (which is now the subsidiary of Oracle) in the year 1995.

James Gosling is known as the father of Java.
Before Java its name was Oak. Since Oak
is already a registered company so its name was
changed.

* Types of Java application:

1) Standalone Application:

It is also known as desktop applications or window-based application

Eg:- Media player, antivirus.

2) Web Application:

An application that runs on the server side
and creates a dynamic page is called a
web application.

3) Enterprise Application:

An application that is distributed in nature,
such as banking application, etc is called enterprise
application.

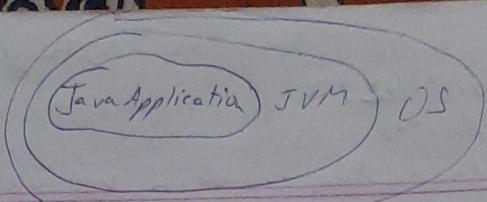
4) Mobile Application:

An application which is created for mobile devices
is called a mobile application.

* Java platforms & Editions:-

1) Java SE (Java Standard Edition):

It is a Java programming platform. It includes
Java programming APIs such as java.lang, java.io,
java.net, java.util, java.sql, java.math etc.



2) Java EE (Java Enterprise Edition):

It is an enterprise platform which is mainly used to develop web and enterprise applications. It is built on the top of the Java SE platform.

3) Java ME (Java Micro Edition)

It is a micro platform which is mainly used to develop mobile applications.

4) Java FX

It is used to develop rich internet applications.
It uses a light-weight user interface API.

* Features of Java :-

- 1) Simple.
- 2) Object-Oriented (It facilitates)
- 3) Portable (^ To carry the java bytecode to any platform)
- 4) Platform Independent
- 5) Secured.
- 6) Robust. (strong).
- 7) Architecture neutral. (Bcz there are no implementation dependent features).
- 8) Interpreted
- 9) High performance. (It's fast bcz java bytecode is "close" to native code)
- 10) Multithreaded
- 11) Distributed (To create distributed Application in java)
- 12) Dynamic. (It supports dynamic loading of classes, It means classes are loaded on demand)

* Basic Concept of Java

* Object Oriented:-

Java is an object-oriented programming language.
Everything in java is an object. Object-oriented means we organize our software as a combination of different types of objects that incorporates both data & behaviour.

APT (Application Programming Interface)

* Java is secured bcz :-

- No explicit pointer

- Java programs run inside a virtual machine sandbox.

* Basic Concepts of OOPS are :-

- 1) Object
- 2) Class
- 3) Inheritance.
- 4) Polymorphism
- 5) Abstraction.
- 6) Encapsulation.

1) Object - An entity that has state & behaviour is known as an object. It is a instance of class. e.g chair, bike, etc.

- 2) Class -
- An object is a real-world entity.
 - An object is a runtime entity.
 - The object is an entity which has state & behaviour.
 - The object is an instance of a class.

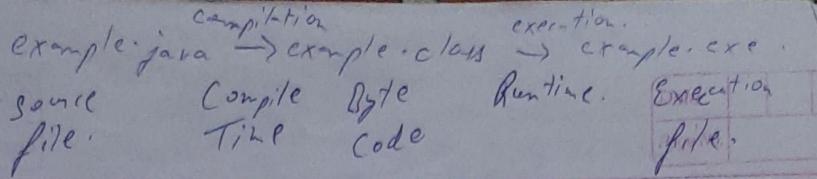
Method:-
A method is like a function which is used to expose the behaviour of an object.

Advantage of method:

- Code Reusability
- Code Optimization.

New keyword:-

The new keyword is used to allocate memory at runtime. All objects get memory in heap memory area.



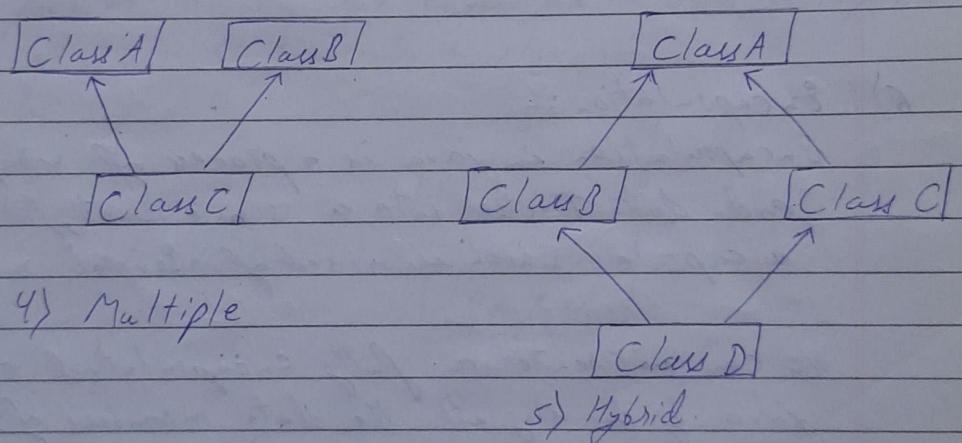
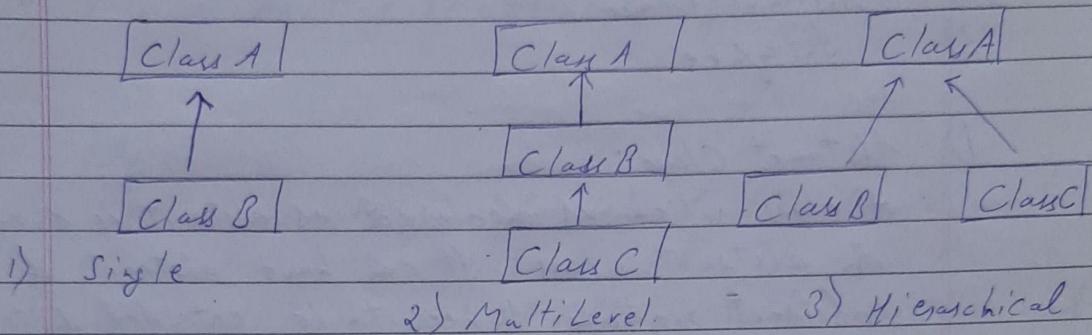
3) Inheritance :-

Inheritance in java is a mechanism in which one object acquires all the properties and behaviour of a parent object. It is an important part of OOPs.

Use of Inheritance in java :-

- For Method Overriding.
- For Code Reusability.

Type of Inheritance in java :-



4) Polymorphism :-

→ Polymorphism in java is a concept by which we can perform a single action in different ways.

Polymorphism is derived from 2 Greek words: "poly" & "morphs". The word "poly" means many and "morphs" means forms. So polymorphism means many forms.

• Types of Polymorphism:

- Compile-time polymorphism.
- Run-time polymorphism.

We can perform polymorphism in java by method overloading & method overriding.

5) Abstraction:

Abstraction is a process of hiding the implementation details and showing only functionality to the user.

Abstraction lets you focus on what the object does instead of how it does it.

Ways to achieve abstraction:

1) Abstract class

2) Interface

1) Abstract Class:

A class which is declared as abstract is known as an abstract class. It can have abstract & non-abstract methods. It needs to be extended & its methods implemented. It cannot be instantiated.

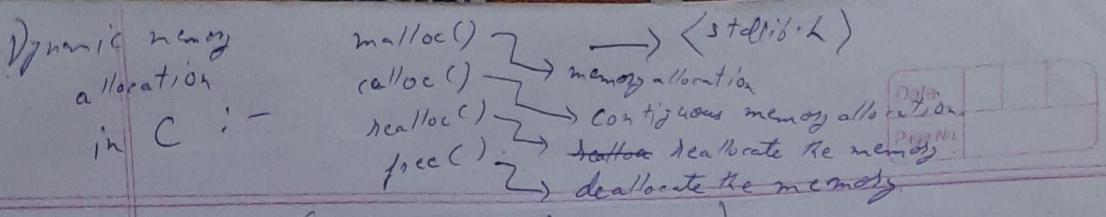
6) Encapsulation:-

Encapsulation in java is a process of wrapping code and data together into a single unit, for example, a capsule which is mixed of several medicines.

We can make a fully encapsulated class in java by making all the data members of the class private.

We can use setters & getters methods to set & get the data in it.

The Java Bean class is the example of a fully encapsulated class.



* JVM (Java Virtual Machine):

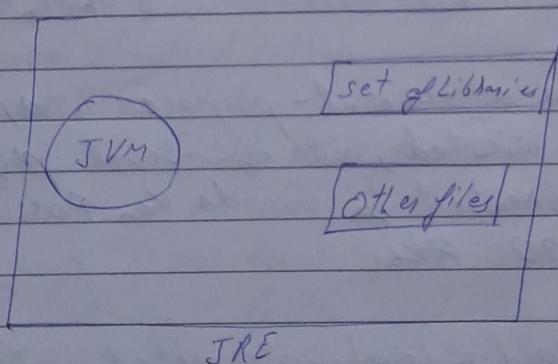
The JVM is an abstract machine. It is called a virtual machine bcz it doesn't physically exist. It compiles the source code to Java byte code.

JVM performs:

- Loads code
- Verifies code
- Executes code.
- Provides Runtime Environment.

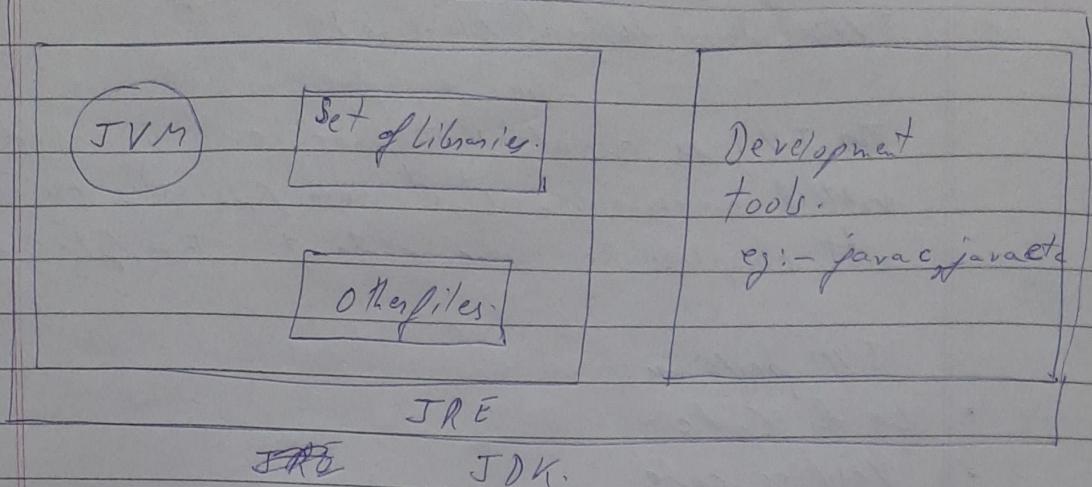
* JRE:-

JRE is an acronym for Java Runtime Environment. It is also written as Java RTE. The Java Runtime Environment is a set of software tools which are used for developing Java applications. It is used to provide the runtime environment. It is the implementation of JVM. It physically exists.



* JDK:-

JDK is an acronym for Java Development Kit. The Java Development Kit (JDK) is a software development environment which is used to develop java applications & applets. It contains JRE + development Tools.



Data types:-

- 1) Primitive Data types:- The primitive data types include boolean, char, byte, short, int, long, float and double.
- 2) Non-Primitive Data types - The non-primitive data types include classes, interfaces, and Arrays.

* PYTHON:- (Indentation → spacing)

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido Van Rossum during 1985-1990.

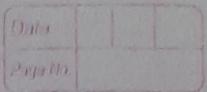
→ Python is a high level, interpreted, interactive & object oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently whereas other languages use punctuation and it has fewer syntactical constructions than other languages.

Used in web development domain.

* Advantages of Python:-

Slicing, Insertion, Deletion,

len, range



- Python is Interpreted. → Python is processed at run time by the interpreter.
- Python is Interactive. → Directly interact at the command line.
- Python is Object Oriented.
- Python is a Beginner's Language → Easy to understand.

* Characteristics of Python:-

- It supports functional & structured programming methods as well as OOP.
- It can be used as a scripting language or can be compiled to byte-code for building large applications.
- It provides very high-level dynamic data types and supports dynamic type checking.
- It supports automatic garbage collection.
- It can be easily integrated with C, C++, COM, Active X, CORBA, & Java.

* Applications of Python:-

- Easy-to-Learn. → Few keywords & simple structure.
- Easy-to-read
- Easy-to-maintain.
- A broad standard library.
- Interactive Mode.
- Portable. → Run on wide variety of hardware platform.
- Extensible. → add low level module to python interpreter.
- Database. → provides interface to all commercial db.
- GUI Programming - Python supports GUI application.
- Scalable - Python provides a better structure & support for large programs than shell scripting.

* `List = ['physics', 'chem', 1997];`

* `Tuple = ('physics', 'chem', 1997);`

* `Dict = {'Name': 'Zara', 'Age': 7, 'Class': 'First'}`

`import time`

* Method:-

`def function(st):`

`print "Hello", st`

`return`

* def print_func (par):
 print "Hello : ", par
 return.

C++

object oriented

Loops:-

By Bjarne Stroustrup
 (Bell Telephone)

1) while expression:
 statement(s)

Middle Level

2) for iterating-var in sequence:
 statement(s)

Object & Class
 design class

3) Nested loop:-

(C++) Extens.

• C++

for iterating-var in sequence!

for iterating-var in sequence:
 statements(s)

dependent

statements(s).

//

/* */

* if expression 1:
 statement(s).

32.

elif expression 2:
 statement(s)

else secure.

else:
 statement(s)

- Actual Parameters are defined in the function call.
- Formal Parameters are used in the function header.

CTP	Parameters	C	JAVA	PYTHON
object oriented	language type	procedure oriented programming	object oriented programming	both types of languages (opp & oop)
By Andre Stroustrup (Bell Telephone)	Developer	Dennis Ritchie	James Gosling	Guido Van Rossum
Middle level.	Language level	Middle Level Language	High Level Language	High Level Language
object class driven	Building Block	Function driven	Object & class driven	Function, Object and Class driven
(C++) extension	Extension	.C	.java	.PY
dependent	Platform	Dependent	Independent	Independent
/* */	Comment style	/* */	/* */ /* */ for multi line	# single line ''' multi line '''
32.	Keywords	32	63	33.
secure.	Data security	not secure	fully secured. (Hidden)	secure. (Less than Java)
Coding Difference.	#include <stdio.h> int main() { printf("Hello"); return 0; } output = Hello (Same). Java	Class HelloWorld { public static void main(String[] args) { System.out.println("Hello"); } }	printing	
Note:- C is mostly used to develop system software.	Note:- Java is very secured and Note:- Python is robust language that's future because why it's very popular than others Languages.	Note:- Java is very secured and Note:- Python is robust language that's future because why it's very popular than others Languages.	it's fewer lines of code	basis Languages and it's have many libraries to solve

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* DBMS:-

Database Management System is a software for storing and retrieving users' data while considering appropriate security measures. It consists of a group of programs which manipulate the database. The DBMS accepts the request for data from an application & DBMS allows instructions to the operating system to provide the specific data.

DBMS allows users to create their own databases as per their requirement.

DBMS provides an interface between the data and the software application.

* Popular DBMS software :-

- MySQL.
- Oracle.
- Microsoft Access.
- Microsoft SQL server.

* Application of DBMS:-

- Banking.
- Airlines.
- Universities.
- Telecommunication.
- Sales.

* Types of DBMS:-

- 1) Hierarchical Database.
- 2) Network database.
- 3) Relational database
- 4) Object-Oriented database.

- Pass by Value → A copy of the actual value of actual parameter is stored in memory.
- Pass by reference → A copy of the address of the actual parameter is stored in memory.

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1) Hierarchical DBMS:-

In a Hierarchical DBMS database, model data is organized in a tree-like structure. Data is stored hierarchically (top down or bottom up) format. Data is represented using a parent-child relationship.

2) Network model:-

The network database model allows each child to have multiple parents. It helps you to address the need to model more complex relationships like as the orders/parts may-to-many relationships. Complex like model!

3) Relational model:-

Relational DBMS is the most widely used DBMS model becz it is one of the easiest. This model is based on normalizing data in the rows and columns of the tables. Relational model stored in fixed structures and manipulated using SQL.

4) Object Oriented model:-

In Object-oriented model data stored in the form of objects. The structure which is called classes which display data within it. It defines a database as a collection of objects which stores both data members values & operations.

* When not to use DBMS:-

Not recommended when you do not have the budget or the expertise to operate a DBMS. In such case use, Excel or/ Flat files etc.

* SQL queries:-

SELECT * FROM

SELECT * FROM Customers;

INSERT INTO table-name (column1, column2, ...)
VALUES (value1, value2, ...);

- DELETE FROM table-name WHERE condition;
- UPDATE table-name SET column1 = value1, column2 = value2, ... WHERE condition;
- ALTER table-name AUTOINCREMENT = 1;
- SELECT column1, column2, ...

FROM table name;

ORDER BY column1, column2, ... ASC / DESC;

* HTML:- (Hyper text Markup language)

HTML is the standard markup language for Web pages. With HTML you can create your own website. HTML is easy to learn.

Eg:- Syntax:

```
<!DOCTYPE html>           → document is a HTML5
<html>                   → Root element of the document
<head>                   → It contains meta information about the HTML page.
<title> Page Title.</title>   → Title of the HTML page.
</head>
<body>                   → Contains all visible contents of the document body.
```

<h1> This is a heading </h1>

<p> This is a paragraph. </p>

```
</body>
</html>
```

→ Contains
{ }

<big> </big>

<small> </small>

<ins> </ins>

(div class = container)

<div>

* CSS :-

- CSS stands for Cascading Style Sheets.
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media.
- CSS saves a lot of work. It can control the layout of multiple web pages all at once.
- External stylesheets are stored in CSS files.

CSS is used to define styles for your web pages, including the design, layout & variations in display for different devices & screen sizes.

CSS Example :-

```
body {
    background-color: lightblue;
}
```

```
h1 {
    color: white;
    text-align: center;
}
```

```
p {
    font-family: verdana;
    font-size: 20px;
}
```

* PHP : (Hypertext Preprocessor) :-

- PHP is an acronym for "PHP: Hypertext Preprocessor".
- PHP is a widely-used, open source scripting language.
- PHP scripts are executed on the server.
- PHP is free to download and use.

* What is a PHP file?

- PHP files can contain text, HTML, CSS, JavaScript & PHP code.
- PHP code is executed on the server & the result is returned to the browser as plain HTML.
- PHP files have extension ".php"

* what can PHP do?

- PHP can generate dynamic page content.
- PHP can create, open, read, write, delete, and close files on the server.
- PHP can collect form data.
- PHP can send and receive cookies.
- PHP can add, delete, modify data in your database.
- PHP can be used to control user-access.
- PHP can ~~easy~~ encrypt data.

* Why PHP?

- PHP runs on various platforms (Windows, Linux, Unix, Mac OS X).
- PHP is compatible with almost all servers used today. (Apache).
- PHP supports a wide range of database.
- PHP is easy to learn & runs efficiently on the server side.

Syntax :-

```

<body>
    <?php
        echo "Hello world";
    ?>
</body>
  
```

Fixed Values are called Literals.
Variable Values are called Variables.

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* Java Script:-

Java Script is the world's most popular programming language.

Java Script is the programming of the Web.

It helps to carry out the operations. (arithmetic, assignment etc.)

* STRENGTH:-

1) Team Leader & Player:-

- * Team Leader is someone who oversees the functionality of a workgroup by providing guidance & instruction.
- A team leader is someone who provides guidance, instruction, direction and leadership to a group of individuals for the purpose of achieving a key result or group of listed results.

2) Diligent:-

Having or showing care and conscientiousness in one's work or duties.

3) Optimistic:-

Hopeful & Confident about the future.

4) Workaholic:-

a person who works a lot of the time and finds it difficult not to work.

* Ethical Hacking:-

(Kali Linux) Tools

* Hacking:-

- Gaining access to a system that you are not supposed to have access is considered as hacking.
- Ethical Hacking! - (Kali Linux) ← OS ← Secure.

Ethical Hacking is also known as White Hat Hacking or Penetration Testing. Ethical Hacking involves an authorized attempt to gain unauthorized access to a computer system or data. Ethical Hacking is used to improve the security of the systems & networks by fixing the vulnerability found while testing.

Type of Hacking:-

Tools

- Network Hacking. → Gathering info about Network → Nmap, Ping, Telnet etc.
- Website Hacking. → Unauthorized access over web servers, database & make a change in the information.
- Computer Hacking. → Unauthorized access to computer & steals the information from the PC, like password.
- Password Hacking → recovering sensitive password.
- Email Hacking. → Unauthorized access on an Email account & using it without the owner's permission.

Advantage of Hacking:

- It is used to recover the lost of information, especially when you lost your password.
- It is used to perform penetration testing to increase the security of the computer & network.
- It is used to test how good security is on your network.

4. Disadvantages:-

- It can harm the privacy of someone.
- Hacking is illegal.
- Hampering system operations.

Types of Hackers:-

- 1) Black Hat Hackers.
- 2) White Hat Hackers.
- 3) Grey Hat Hackers.

1) Black Hat Hackers:-

Black Hat Hackers are also known as an Unethical Hacker or a Security Cracker. These people Hack the system illegally to steal money or to achieve their own illegal goals. They find banks or other companies with weak security & steal money or credit card information. They can also modify or destroy the data as well. Black Hat hacking is illegal.

2) White Hat Hackers:-

White hat Hackers are also known as Ethical Hackers or a Penetration Tester. White Hat Hackers are the good guys of the hacker world. These people use the same technique used by the black Hat Hackers. They can also Hack the systems, but they can only Hack the system that they have permission to Hack in order to test the security of the system. They focus on security & protecting IT System. White Hat hacking is legal.

3) Grey Hat Hackers :-

Grey Hat Hackers are Hybrid between Black Hat Hackers & white Hat Hackers. They can Hack any system even if they don't have permission to test the security of the system but they will never steal money or damage the system.

In most cases, they tell the administrator of that System. But they are also illegal because they test the security of the system that they do not have permission to test. Grey Hat hacking is sometimes acted legally & sometimes not.

Ethical Hacking Tools:-

1) NMAP:- (Uses raw IP packets to determine).
 NMAP stands for Network Mapper. It is an open source tool that is used widely for network discovery & security auditing.

2) Burp Suite:- (It can be used as a sniffing tool between your browser & the webserver to find parameters.)
 Burp Suite is a popular platform that is widely used for performing security testing of web applications.

3) Angst IP Scanner:-

Angst IP Scanner is a lightweight, crossplatform IP address and port scanner. It can scan IP addresses in any range.

4) Wireshark:-

Wireshark is one of the best data packet analyzers.

JAVA:-

* Syntax:

```

public static void main (String args[ ]) {
    ↑           ↑           ↑
  access      Keyword     Method Name
  modifier   (No need   (Execution of
  (accessible to create program starts
  outside its object) from User).
  class).
  
```

↓

return type String Class.

(Does not return anything).

array of string objects
(command line arguments).

Call by JVM.

import java.io.*; ← including packages
 ↗ Input/Output

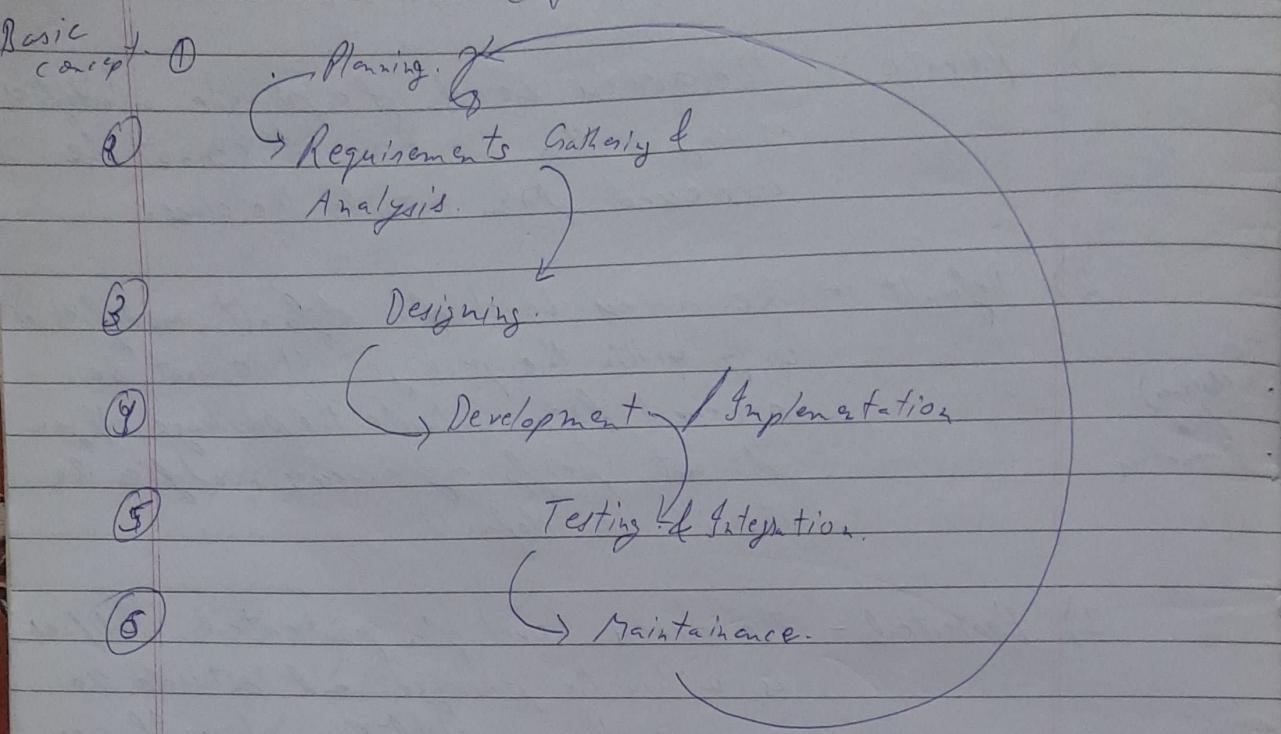
Java access modifiers:- (4)

- the
members
to find
parameters
- 1) Private :- The access level of a private modifier is only within the class. It cannot be accessed from outside the class.
 - 2) Default :- The access level of a default modifier is only within the package. It cannot be accessed from outside the package. If you do not specify any access modifier then it will be default.
 - 3) Protected - The access level of a protected modifier is within the package and outside the package through child ~~own~~ class. If you do not make the child class, it cannot be accessed from outside the package.
 - 4) Public - The access level of a public modifier is everywhere. It can be accessed from within the class, outside the class, within the package & outside the packages.

+ Access specifiers in C are:-

- 1) Public - members are accessible from outside the class.
- 2) Private - members are accessible but cannot be accessed from outside the class.
- 3) Protected - members cannot be accessed from outside the class, however, they can be accessed in inherited classes.

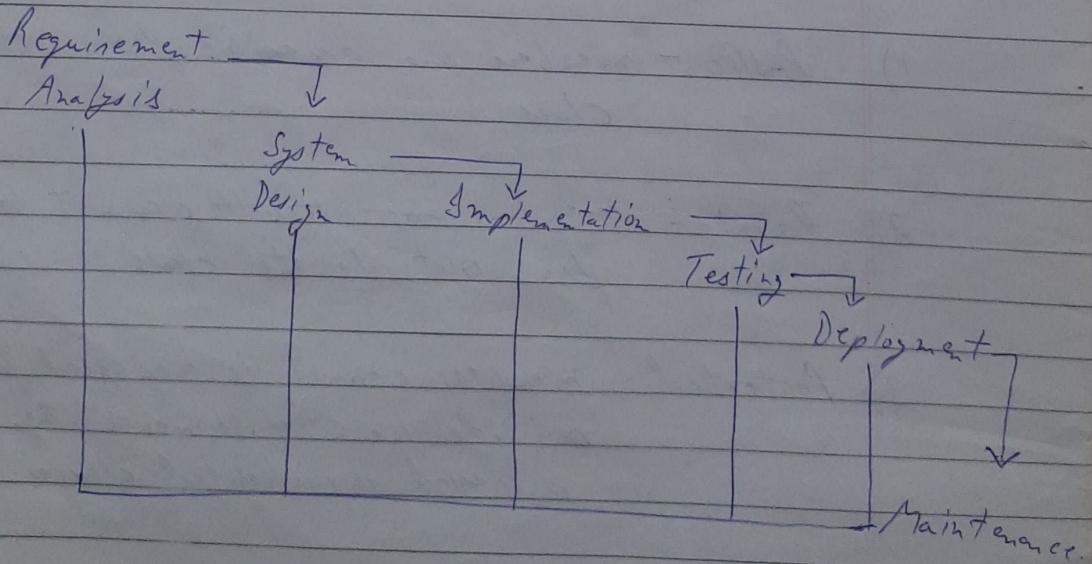
* SDLC Model (Software Development Life Cycle Model)



SDLC models:-

- 1) Waterfall Model.
- 2) V-shaped Model.
- 3) Iterative Model.
- 4) Spiral Model.
- 5) Big Bang Model.
- 6) Agile Model.

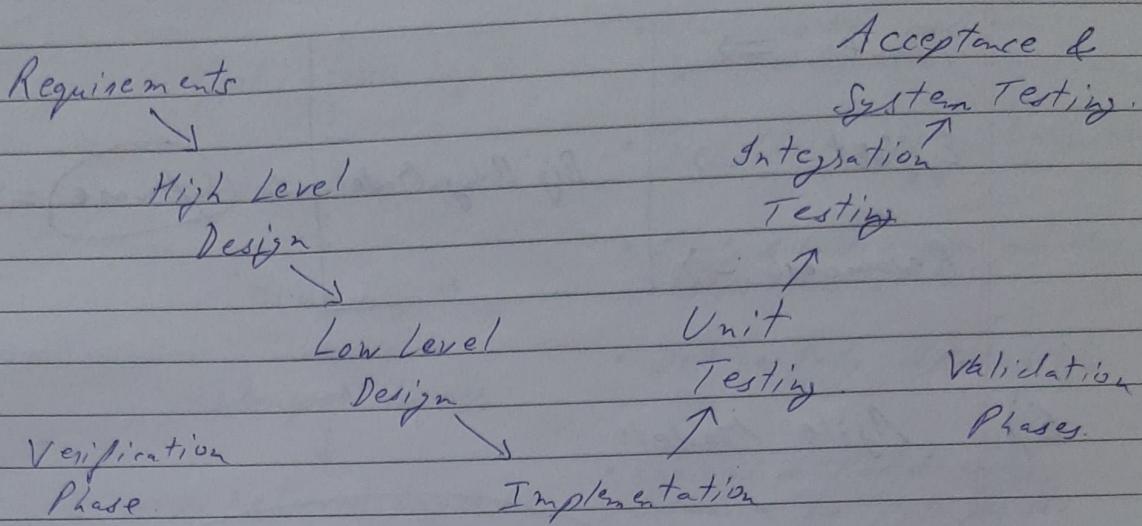
1) Waterfall Model:-



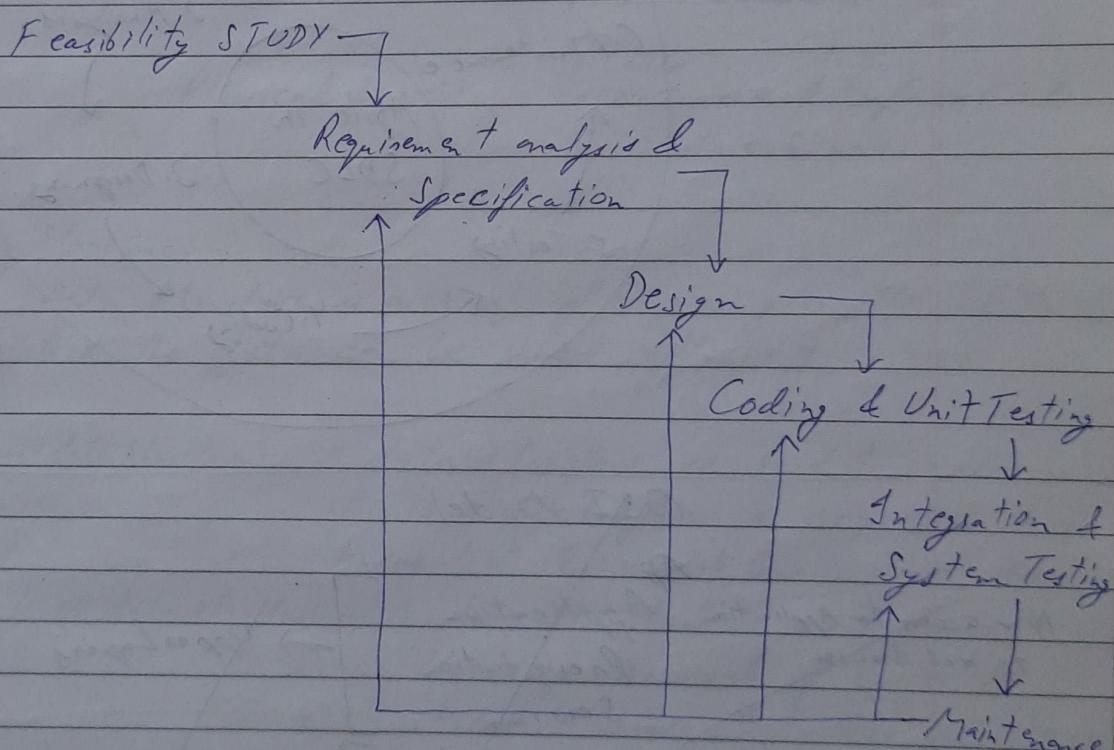
Defence (copy)
int a = 20;
int def = a;

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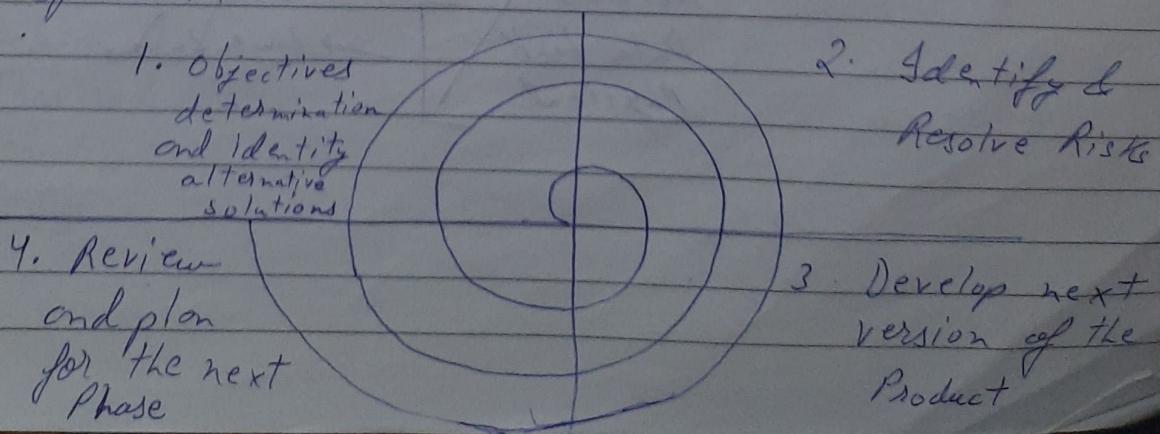
2) V-shaped model:



3) Iterative Model



4) Spiral Model



5) Big Bang Model:

Time \Rightarrow

Effort \Rightarrow

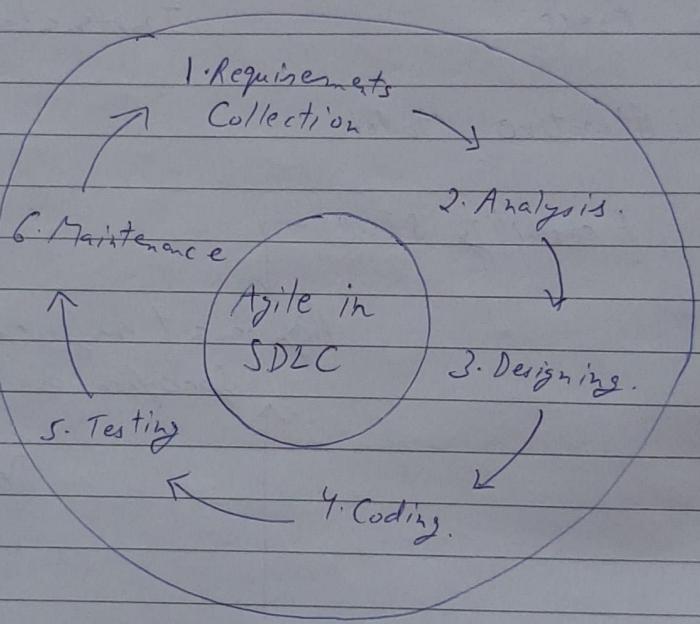
Resources \Rightarrow

Big Bang Model

Software

Release

6) Agile Model:



OSI Model

New access to Application
eg. Web Browser.

APP
Application,
Presentation
Session

Transport
Network.

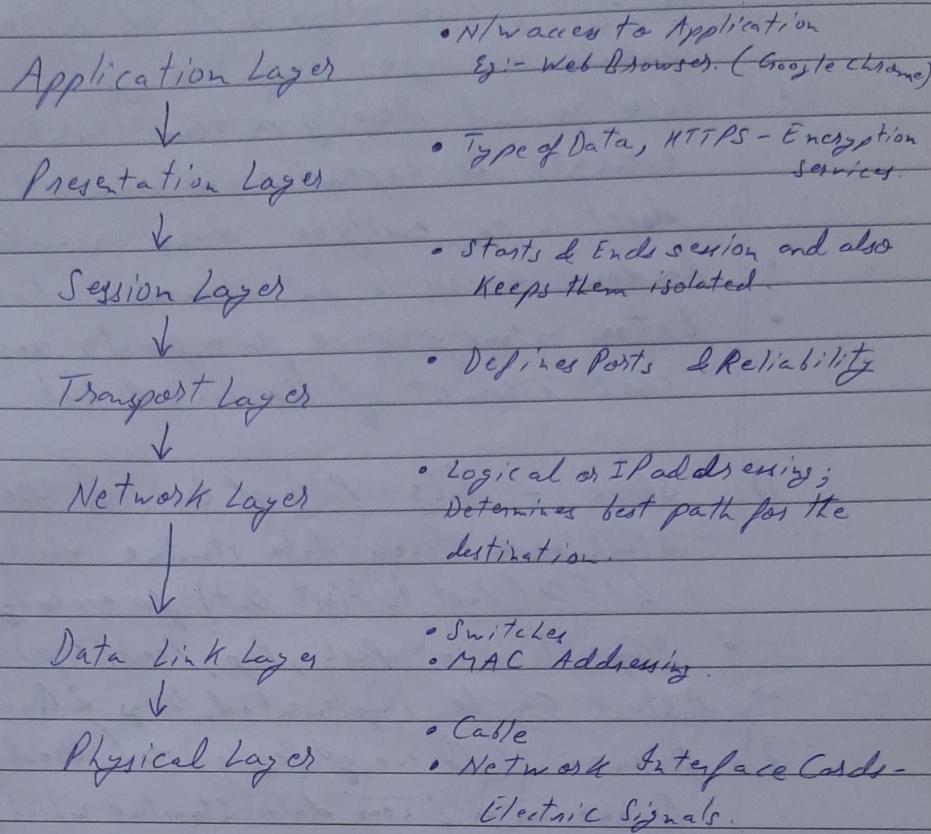
Data Link
Physical

Upper Layers

Middle Layers.

Lower Layers

* OSI Model. (Open System Interconnection)



* Data Structure:-

A Data Structure is a way of organizing the data so that the data can be used efficiently.

- Linear data structure - A data structure is said to be linear if its elements form a sequence or a linear list. Eg:- List, Queue, Stack, etc.
 - Non-linear data structure - A data structure is said to be non-linear if traversal of nodes is + nonlinear in nature. Eg:- Tree, MyL, BST etc.
- * The operations performed in DS:-
- Insertion
 - Deletion
 - Traversal
 - Searching
 - Sorting.

* How is an Array diff from linked list?

- The size of the array is fixed, linked lists are dynamic in size.
- Insertion and deleting a new element in an array of elements is expensive, whereas both insertion & deletion can easily be done in linked lists.
- Random access is not allowed in linked list.
- Extra memory space for a pointer is required with each element of the linked list.

1) Stack:- (Eg:- Piles of Book) \rightarrow (Used for DFS)
 Stack is a linear data structure which follows the order LIFO (Last In First Out) for accessing elements.

- Operations:- Push, Pop, Peek (top).

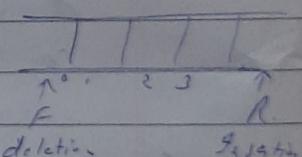
\rightarrow A stack can be implemented Using 2 Queues.

2) Queue: (Queue of People) \rightarrow (Used for BFS)

Queue is a linear data structure which follows the order FIFO (FIRST IN FIRST OUT) to access elements.

- Operations:- \emptyset , Insertion, deletion, Enqueue, Dequeue, Front, rear.

\rightarrow A Queue can be implemented Using
2 stacks.



* Infix:-

$$A * (B + C) / D.$$

$$A * B C / D$$

$$* A + B C D$$

BEDMAS

$$A * B C + / D.$$

* Postfix:-

$$A B C + * D /$$

$$A + B C D$$

$$A B C + * D /$$

$\times A$

$$A + (B C) / D$$

* Prefix :-

$$/ * A + B C D$$

$$* A + B C D$$

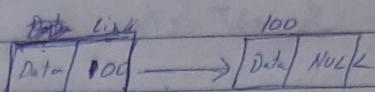
* What is a Linked List and what are its types?

→ A linked list is a linear data structure where each element is a separate object.

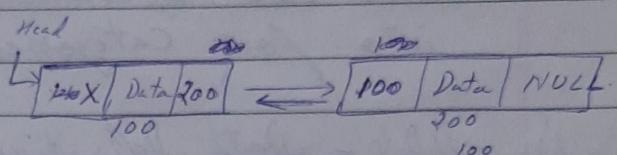
Each element (that is node) of a list is comprising of two items - the data and a reference to the next node.

Type of Linked List:-

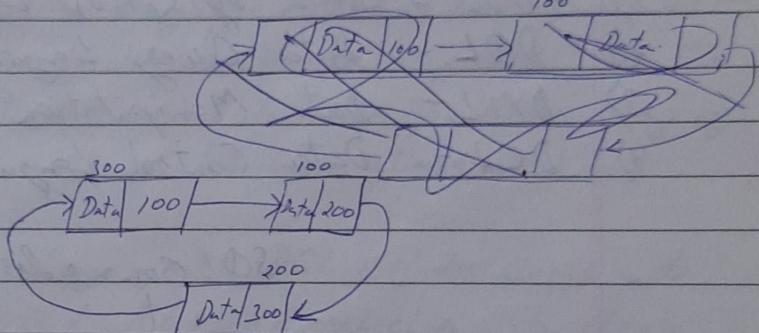
1) Singly Linked List



2) Doubly linked list



3) Circular Link List



* Project:-

- HTML
- CSS
- JavaScript
- SMTP protocol
- Ajax & JQuery . (Bootstrap)
- PHP
- SDL & Server (FTP)
(Database)
- Android studio
- Session

* SQL (Structured Query Language)

Structured Query Language (SQL) as we all know is the database language by the use of which we can perform certain operations on the existing database and also we can use this language to create database.

SQL uses certain commands like Create, Drop, Insert etc. To carry out the required tasks.

* These SQL commands are mainly categorized into four categories as:

- 1) DDL - Data Definition Language.
- 2) DQL - Data Query Language.
- 3) DML - Data Manipulation Language.
- 4) DCL - Data Control Language.

SQL Commands:-

DDL	DQL	DML	It is used to insert data into table	DCL
is used to create the database & its objects.	Create Alter → is used to alter the structure of database. Drop → is used to delete objects. Rename → is used to rename an object existing in the database. Truncate → is used to remove all records from table, including spaces. Comment → is used to add comments to the data dictionary.	Is used to retrieve data from the database. Select	Insert → Update Delete → Merge Call Explain Plan LOCK TABLE	gives way access privilege to database GRANT REVOKE ↓ withdrew users acc privileges give by using the GRANT command

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1) DDL (Data Definition Language): DDL or Data Definition language actually consists of the SQL commands that can be used to define the database schema. It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in the database.

2) DQL (Data Query Language):

DML statements are used for performing queries on the data within schema objects. The purpose of DQL Command is to get some schema relation based on the query passed to it.

3) DML (Data Manipulation Language): The SQL commands that deals with the manipulation of data present in the database belong to DML or Data Manipulation Language. and this includes most of the SQL statements.

4) DCL (Data Control Language): DCL includes commands such as GRANT and REVOKE which mainly deals with the rights, permissions and other controls of the database system.

5) TCL (Transaction Control Language): TCL commands deals with the transaction within the database.

Commit → commits a transaction.

Rollback → rollbacks a transaction in case of any error occurs.

Savepoint → sets a savepoint within a transaction.

Set Transaction → specifies characteristics for transactions.

* DBMS:-

- **Normalization:**

Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly & deletion anomaly.

- **Anomalies :-**

There are 3 types of anomalies that occur when the database is not normalized. These are - Insertion, update and deletion anomaly.

- **Normal forms:-**

- 1) First normal form (1NF)
- 2) Second normal form (2NF)
- 3) Third normal form (3NF)
- 4) Boyce & Codd normal form (BCNF).

- 1) First normal form (1NF):

As per the rule of first normal form, an attribute (column) of a table cannot hold multiple values. It should hold only atomic values.

Anomaly :-

		Ex:-	
emp-id	emp-name	emp-id	emp-name
101	John	101	John
102	Rozie Rom	102	Rozie Rom

- 2) Second normal form (2NF):

A table is said to be in 2NF if both the following conditions hold:

- i) Table is in 1NF (First normal form).
- ii) No non-prime attribute is dependent on the proper subset of any candidate key of table.

An attribute that is not part of any candidate key is known as non-prime attribute.

Eg:- Anamoly:-

Teacher_id subject teacher-age.

111	Maths	38
111	Physics	38
222	Biology	38
333	Physics	40
333	Chemistry	40

To make the table complies with 2NF we can break it in two tables like this! -

- Teacher-details table:

teacher_id	teacher-age
111	38
222	38
333	40

- Teacher-subject table:

teacher_id	subject
111	Maths
111	Physics
222	Biology
333	Physics
333	Chemistry

- * Third Normal form (3NF)

A table design is said to be in 3NF if both the following conditions hold:

- Table must be in 2NF

- Transitive functional dependency of non-prime attribute on any super key should be removed.

An attribute that is not part of any candidate key is known as non-prime attribute.

In other words 3NF can be explained like this:
A table is in 3NF if it is in 2NF and for each functional dependency $X \rightarrow Y$ at least one of the following conditions hold:

- X is a super key of table.
- Y is a prime attribute of table.

An attribute that is a part of one of the candidate keys is known as prime attribute.

emp-id	emp-name	emp-zip	emp-state	emp-city	emp-district
1001	John	282005	UP	Agra	Dagah Bahadur
1002	Ajeet	222008	TN	Chennai	M-City
1008	Lora	282007	TN	Chennai	Urapakkam

• employee table:

emp-id	emp-name	emp-zip
1001	John	282005
1002	Ajeet	222008
1008	Lora	282007

employee - zip table:

emp-zip	emp-state	emp-city	emp-district
282005	UP	Agra	Dayal Bagh
222008	TN	Chennai	M-City
282007	TN	Chennai	Uttappakkam

* Boyce Codd normal form (BCNF).

It is an advance version of 3NF that's why it is also referred as 3.5NF. BCNF is stricter than 3NF. A table complies with BCNF if it is in 3NF and for every functional dependency $X \rightarrow Y$, X should be the super key of the table.

emp-id	emp-nationality	emp-dept	dept-type	dept-no-of-emp
1001	Austrian	Production and planning	D001	200
1001	Austrian	stores	D001	250
1002	American	design and technical support	D134	100

* emp-nationality table:-

emp-id	emp-nationality
1001	Austrian
1002	American

$$\begin{array}{r}
 1 \quad 2 \quad - 6 \\
 2 \quad 3 \quad - 1 \\
 3 \quad 1 \quad - 0 \\
 \end{array}$$

* emp-dept table:

emp-dept	dept-type	dept-no-of-emp
Production & planning	D001	200
stores	D001	250
design & technical support.	D134	100

* emp-dept-mapping table:

emp-id	emp-dept
1001	Production and planning
1001	stores.
1002	design & technical support.

* Inner Join:-

Inner join combines the two or more records but displays only matching values in both tables.

Inner join applies only the specified columns.

* Syntax :-

SELECT column-name(s)

FROM table1

INNER JOIN table2

ON table1.column-name = table2.column-name;

Example :-

- Student Table:

ID	Name	Address	Age
1	Riya	Kolhapur	20
2	Sneha	Mumbai	21
3	Nisha	Gadkisalai	24
4	Anjali	Pune	23

- Student_1 Table:

id	S_Name	Address	Age
1	Poonam	Kagal	23
2	Namita	Pune	21
3	Nisha	Gadkisalai	24
4	Sonali	Belgaon	26

- * Query:

```

SELECT Name
FROM Student
INNER JOIN Student_1
ON Student.Name = Student_1.S_Name;
    
```

- Output:-

Name
Nisha.

- * Cross Join:-

Cross join defines as a Cartesian product where the number of rows in the first table multiplied by the number of rows in the second table.

If no where clause is used along with CROSS JOIN, this kind of result is called a Cartesian Product. Cross join applies to all columns.

• Syntax :-

Select *

From table1

Cross join table2;

• Example:

Student Table:

ID	Name	Address	Age
1 1	Riya	Kolhapur	20
2 2	Sneha	Mumbai	21
3 3	Nisha	Gadkisgaj	24
4 4	Ajali	Pune	23

• Student_1 Table:

id	S-Name	Address	Age
1 1	Poonam	Kagal	23
2 2	Namita	Pune	21
3 3	Nisha	Gadkisgaj	24
4 4	Sonal	Balgadon	26

• Query:-

Select *

From Student

Cross join Student_1;

• Output:

ID	Name	Address	Age	id	S-Name	Address	Age
1 1	Riya	Kolhapur	20	1	Poonam	Kagal	23
2 2	Sneha	Mumbai	21	1	Poonam	Kagal	23
3 3	Nisha	Gadkisgaj	24	1	Poonam	Kagal	23
4 4	Ajali	Pune	23	1	Poonam	Kagal	23
5 1	Riya	Kolhapur	20	2	Namita	Pune	21
6 2	Sneha	Mumbai	21	2	Namita	Pune	21

15 types & advantages Types of Testing

Data		
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7	3	Nisha	Gadkislay	24	2	Namita	Pune	21
8	4	Ajali	Bebacon	26	2	Namita	Pune	21
9	1	Riya	Kalhapur	20	3	Nisha	Gadkislay	24
10	2	Sneha	Mumbai	21	3	Nisha	Gadkislay	24
11	3	Nisha	Gadkislay	24	3	Nisha	Gadkislay	24
12	4	Ajali	Bebacon	26	3	Nisha	Gadkislay	24

:

:

:

* Types of Testing in SDLC:-

• Unit Testing :-

It focuses on smallest unit of software design. In this we test an individual unit or group of inter related units. It is often done by programmer by using sample input & observing its corresponding outputs.

• Integration Testing:-

The objective is to take unit tested components & build a program structure that has been dictated by design. Integration testing is testing in which a group of components are combined to produce output.

• Integration testing is of four types:

i) Top down

ii) Bottom Up

iii) Sandwich

iv) Big-Bang

• System Testing:-

In this software is tested such that it works fine for different operating system. It is covered under the black box testing technique. In this we have security just focus on required input and output without focusing on internal working.

In this we have security testing, recovery testing, stress testing & performance testing.

Operating System :-

* BASIS FOR COMPARISON

	LINUX	WINDOWS
Cost	Free of Cost	Expensive
Open source	Yes	No
Customizable	Yes	No
Security	More secure	Vulnerable to viruses and malware attacks
Separation of the directories using	Forward slash.	Back slash.
File names	Case sensitive	Case insensitive
Efficiency	Effective running efficiency	Lower than Linux

1KB - 10^2 bytes
 1MB - $10^2 \times 10^2$ bytes
 1GB - $10^2 \times 10^2 \times 10^2$ bytes
 Robotics
 AI
 ML
 Runtime error
 Compile time error
 Syntax error.
 Method overriding.
 Method Overloading.
 Interface.
 long, short, int
 float, byte
 values
 Data
 Frame

* Interface :-

An interface is a reference type in java. It is a collection of abstract methods. A class implements an interface, thereby inheriting the abstract methods of the interface.

* Overloading:-

- Overloading happens at compile-time.
- In overloading function name is same but parameters are different.
- Performance of overloading is better than overriding.

* Overloading:- Overriding:-

- Overriding happens at run-time.
- In overriding function name is same and parameters are same. So the function called latter is executed.
- Performance of overriding is lower than overloading.

* Runtime error:-

Runtime error on the other hand refers to the errors encountered during the execution of a code at runtime.

* Compile-time errors -

Compile-time errors are generally referred to the errors corresponding to syntax or semantics.

* Primitive Data Types:-

byte - 8 bits. {0-255}	char - 8 byte. {A-Z, a-z}
short - 2 byte.	string - 2 byte
int - 4 byte }	10000
long - 8 byte }	100000000
float - 4 byte }	1000.00000
double - 8 byte. }	1000.00000
boolean - 1 bit	(0,1) false true.

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* Pointer :-

Pointers (pointer variables) are special variables that are used to store addresses rather than values.

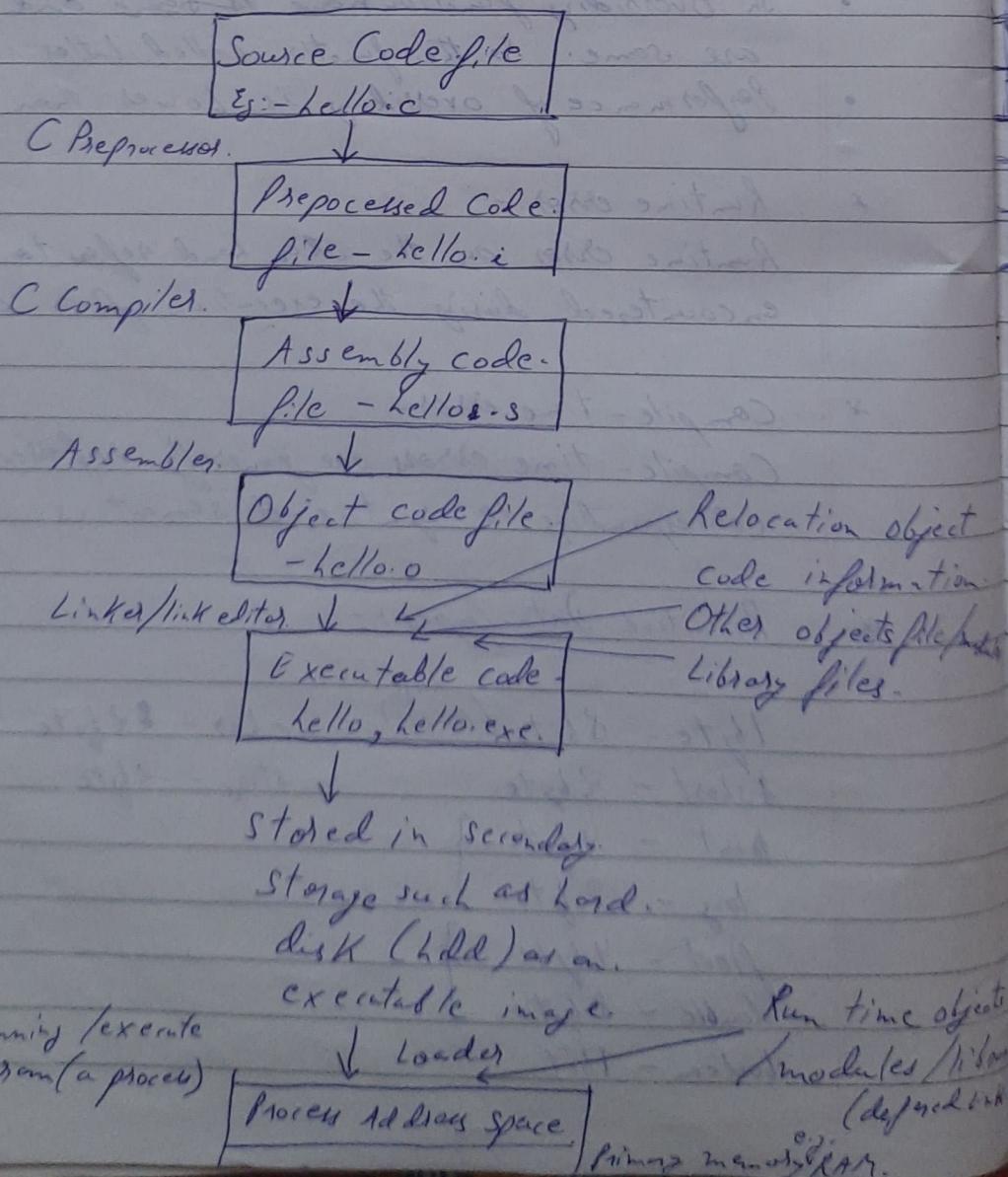
Pointer syntax:

```
int *p;
```

* Hash Table :-

In computing, a hash table (hash map) is a data structure that implements an associative array abstract data type, a structure that can map keys to values. A hash table uses a hash function to compute an index, also called a hash code, into an array of buckets or slots, from which the desired value can be found.

* Execution of a program:-

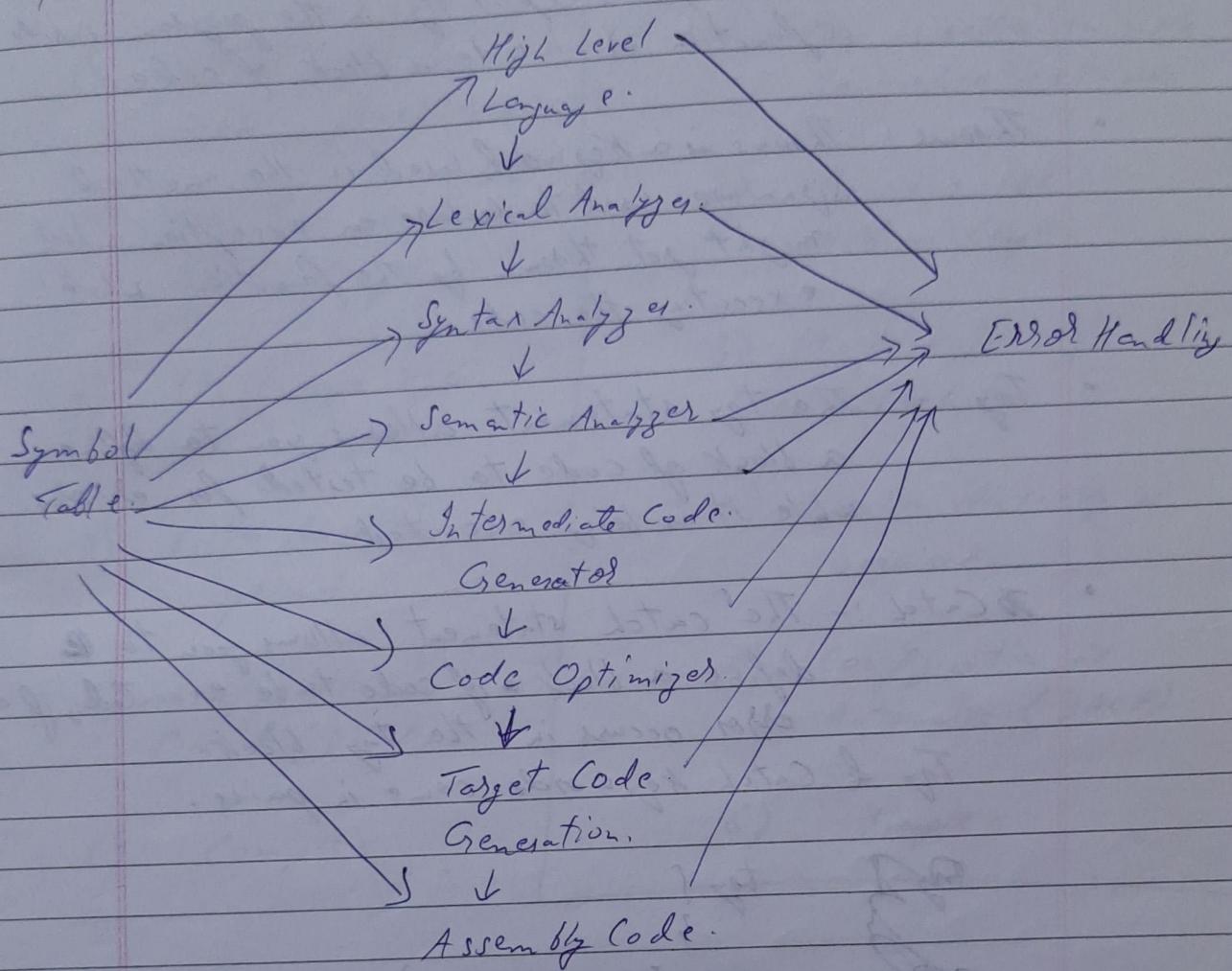


When running / execute
the program (a process)

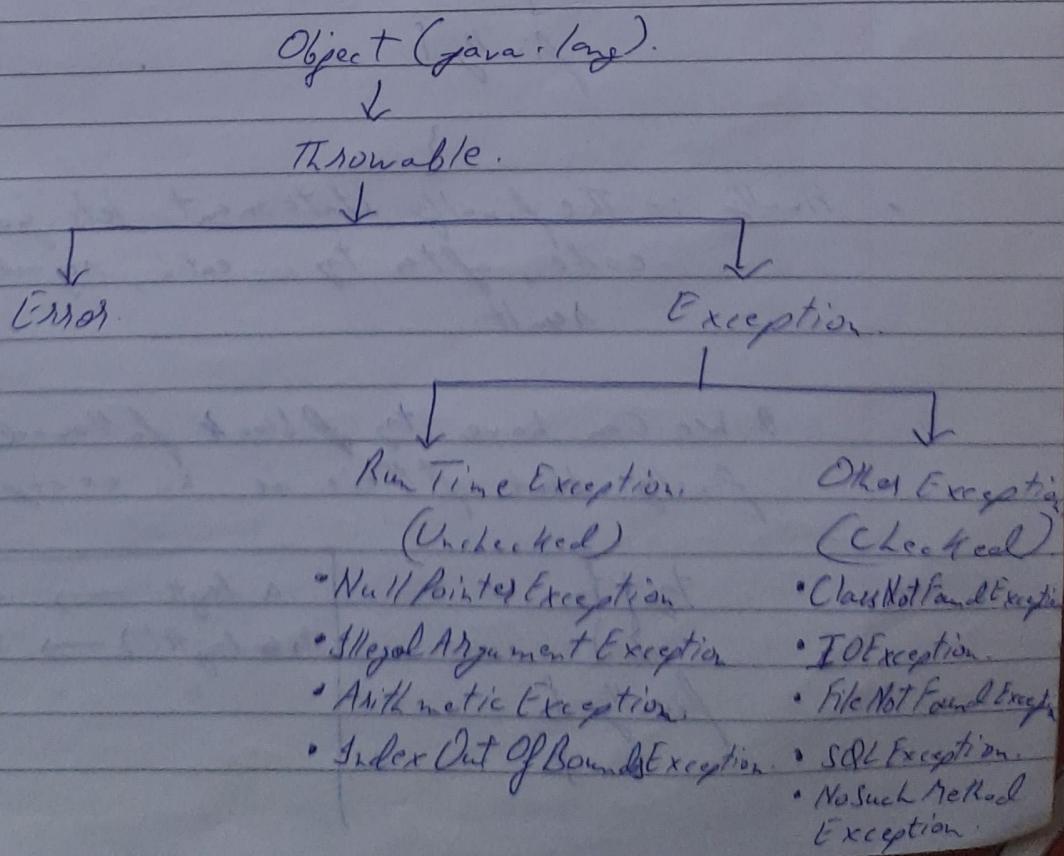
60
60
180 min
180
1.2
150

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* Phases of Compiler:-



* Exception! -



- **throw:** Throw is a keyword which is used to throw an exception explicitly in the program inside a function or inside a block of code.
 - **Throws:** Throws is a keyword used in the method signature used to declare an exception which might get thrown by the function while executing the code.
 - **Try:-** The try statement allows you to define a block of code to be tested for errors while it is being executed.
 - **Catch :-** The catch statement allows you to define a block of code to be executed, if an error occurs in the try block.
- Try & Catch keywords come in pairs :

```

try {
    ...
}
catch(Exception e) {
    ...
}
finally {
    ...
}
  
```

- **Finally :-** The finally statement lets you execute code, after try...catch, regardless of the result.

& we can have try block followed by a finally block if there is no exception.

```

try {
}
finally {
}
  
```

a.length → array (Find the length)
 str.length() → string (Find the length)

IPv4

- 1) Not suitable for mobile networks
- 2) IPv4 has 32 bits Address Length.
- 3) Its package size is 576 bytes.
- 4) Router discovery is optional.
- 5) Configuration is manual (DHCP)
- 6) Complex

IPv6

- 1) IPv6 is better suitable to mobile networks.
- 2) IPv6 has 128 bits Address Length.
- 3) Its package size is 1280 bytes.
- 4) Router discovery is required.
- 5) Configuration is automatic (DHCP).
- 6) Simple.

<table>
<tr> </tr>
<td> </td>
<td> </td>
</table>

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Project:-

```
session_start(); // session_destroy();  
$conn = new mysqli($server, $username, $password, $dbname);  
$name = $_POST['fullName'];  
$conn->close();  
$_SESSION['verified'] = "true";  
if (isset($_SESSION['jani']) && $_SESSION['jani'] == "true") {  
}  
}  
else {  
    header("location:Home.php");  
}  
.  
.container {  
width: 370px;  
height: 100%;  
text-align: center;  
margin: 0 auto;  
background-color: #f2f2f2;  
border-radius: 50px;  
}
```

```
$sql = mysqli_query($conn, "select * from users where  
email = '$email'");  
$name = "error";  
if ($sql->num_rows > 0) {  
    while ($row = $sql->fetch_assoc()) {  
        $name = $row["name"];  
    }  
}  
echo "The name is ". $name;
```

\$otp \$otp = rand(11111, 99999);

• SMTP (Simple Mail Transfer Protocol):

```
smtp_mailer($email, 'OTP Verification', $otp);  
function smtp_mailer($to, $subject, $msg) {  
    $mail->SMTPSecure = 'ssl';  
    $mail->Host = "smtp.gmail.com";  
    $mail->Port = 465; // 587.
```

</html>

<body>

class="auto-fit" style="width: 100%; height: auto; border: none;"/>

<input type="email" id="email1" placeholder="Enter Email" required="required" style="width: 100%; height: auto; border: none; border-radius: 5px; padding: 5px; margin-bottom: 10px;"/>

<div class="container" style="width: 100%; height: auto; border: none; border-radius: 5px; padding: 10px; background-color: #f0f0f0; margin-bottom: 10px; position: relative; z-index: 1; >

</div>

<p></p>

<script>

function call()

{

window.open('tel:919123431105'); //window.location = 'login.php'

}

</script>

</body>

</html>

\$con = mysqli_connect('localhost', 'id13895703-jersi',
'Jasvirinder1997@123', 'id13895703-
Hekinidege');

(server) (username)

(password) (database)

function participate()

jQuery.ajax({

success: function () {

window.location = 'login.php'

}

});

},

?php header("location: like.php"); ?>

fromail → Usename = "jasvirinder1997@gmail.com";

fromail → Password = "xx9x00";

fromail → SetForm ("jasvirinder1997@gmail.com");

<input type="button" value="Participate" class="btn-login" style="width: 100%; height: auto; border: none; border-radius: 5px; padding: 5px; margin-top: 10px; margin-bottom: 10px; font-size: 14px; font-weight: bold; color: white; background-color: #007bff; transition: all 0.3s ease; >

onclick="window.location.href='register.php'"/>

<style>
</style>

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{span id="payload_error" class="field-error">{/span}

<script>

function send()

var email = \$('#email1').val();

var password = \$('#password1').val();

jQuery.ajax({

url: 'http://nisalKant.com/TTE/check.php',

type: 'post',

data: {email: email, password: password},

success: function(result){

if (result == 'yes') {

window.location = 'index-upload.php'

}

if (result == 'not-exist') {

\$('#email_error').html('Email mismatched');

\$('#password_error').html('');

}

if (result == 'set') {

\$('#password_error').html('Please enter the Email & Password');

\$('#email_error').html('');

}

}

});

</script>

8.63 + 3.72

curs

HTT direction

10 days 6m-1pm

* Types of Cloud Services:-

1) Infrastructure as a service (IaaS):-

The most basic category of cloud computing services. With IaaS, you rent IT infrastructure - servers & virtual machines (VMs), storage, networks, operating systems - from a cloud provider on a pay-as-you-go basis.

2). Platform as a service (PaaS):-

Platform as a service refers to cloud computing services that supply an on-demand environment for developing, testing, delivering & managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network & databases needed for development.

3) Serverless Computing:-

Overlapping with PaaS, serverless computing focuses on building app functionality without spending time continually managing the servers & infrastructure required to do so. The cloud provider handles the set-up, capacity planning & server management for you. Serverless architectures are highly scalable & event-driven, only using resources when a specific function or trigger occurs.

24) Software as a Service (SaaS):-

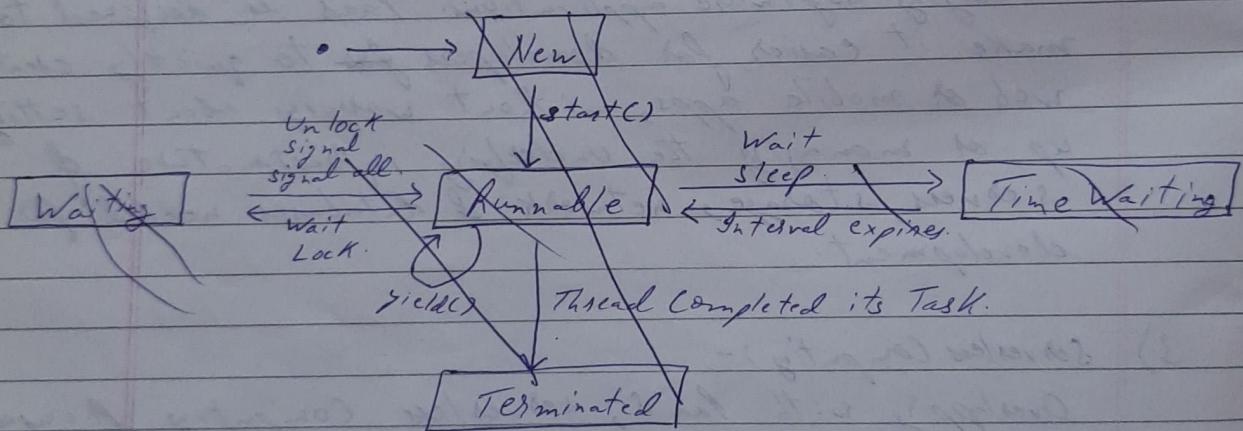
Software as a service is a method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host & manage the software application

and underlying infrastructure to handle any maintenance, like software upgrades & security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet or PC.

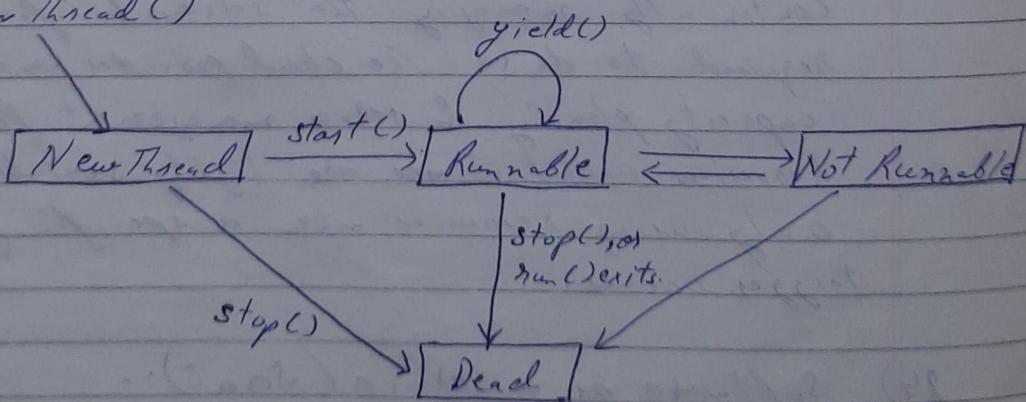
The companies provide cloud services like -

- Amazon Web Services
- Microsoft Azure
- Google Cloud
- IBM Cloud
- GoDaddy

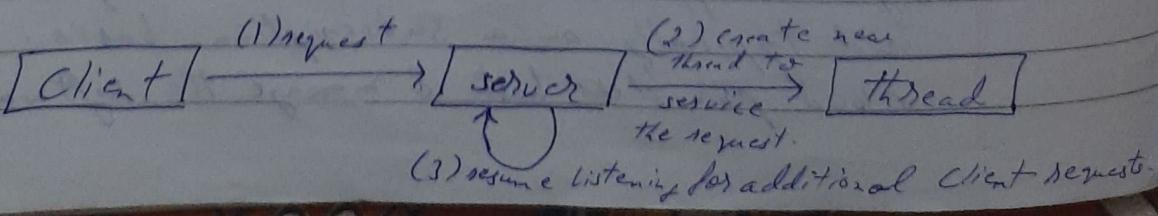
* Life Cycle of a thread:-



newThread()



* Multithreaded Server Architecture:-



* Thread:- Threads are a way for a program to divide itself into two or more simultaneously running tasks.
A thread is a single sequential flow of control within a program.

Diff between C++ & Python:-

C++ Python

C++

- | | |
|---|--|
| 1. It is a flexible, object-oriented and open source programming language designed to raise development quality expectations in the scripting domain. | 1. It is a general purpose programming language which is best suited for resource constrained applications, such as those found in software infrastructures. |
| 2. The built-in garbage collection system ensures efficient memory management in Python. | 2. C++ does not need a garbage collector because it has no garbage. |
| 3. It is both dynamically typed & strongly typed language in which type checking is done at run-time. | 3. It is a statically typed language in which variable types are explicitly declared & are determined at compile-time. |
| 4. It is easier to learn & write code in Python than C++. | 4. It is less versatile & more difficult to learn than Python. |
| 5. Rapid prototyping is possible due to small size of the code. | 5. Rapid prototyping is not possible due to the large size of the code. |

1) ^{input} Compiler

1. Compiler Takes Entire program as input.
2. Intermediate Object Code is generated.
3. Conditional Control statements are Executed faster.
4. Memory Requirement: More (since Object Code is Generated).
5. Program need not be compiled every time.

Ex:- C Compiler.

Interpreter

1. Interpreter Takes Single instruction as input.
2. No Intermediate Object Code is generated.
3. Conditional Control statements are Executed slower.
4. Memory Requirement is Less.
5. Every time Higher Level program is converted into lower Level program.
6. Errors are displayed for. or for every instruction interpreted

Ex: BASIC

Header files :-

1. stdio.h → This is standard input/output header file in which Input/Output functions are declared.
2. conio.h → This is console input/output header file.
Ex: clrscr(), getch(), textcolor(), textbackground()
3. string.h → All strings related functions are defined in this header file.

4. stdlib.h → This header file contains general functions used in C programs.
5. math.h → All maths related functions are defined in this header file.
6. time.h → This header file contains time & clock related functions.
7. ctype.h → All character handling functions are defined in this header file.

* Trigger:- A Trigger is a stored procedure in the database which is automatically invoked whenever an event occurs in the database.
Eg:- Like insertion, deletion & Updation etc events.

* Robotics:-

- Robotics is an interdisciplinary research area at the interface of computer science & engineering.
- Robotics involves design, construction & operation & use of robots.
- The goal of robotics is to design intelligent machines that can help & assist humans in their day to day lives & keep everyone safe.
- Robotics draws on the achievement of information engineering, computer engineering, mechanical engineering & electronic engineering & others.

* Artificial Intelligence:-

- Artificial Intelligence is a technology using which we can create intelligent systems that can simulate human intelligence.
- The artificial intelligence system does not require to be pre-programmed, instead of that, they use such algorithms which can work with their own intelligence.

Programming language - Arduino, python, matlab, C++.

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- It involves machine learning algorithms such as Reinforcement learning, algorithm deep learning neural network.

* Machine Learning:-

- Machine learning is a subfield of artificial intelligence which enables machines to learn from past data and experiences without being explicitly programmed.

- Machine learning enables a computer system to make predictions or take some decisions using historical data without being explicitly programmed.

- Machine learning uses a moderate amount of structured & semi-structured data so that a machine learning model can generate accurate semi-structured predictions based on that data.

Machine learning works on algorithm which learn by its own using historical data.

Supervised Unsupervised

- | | |
|----------------------------------|--------------------------------------|
| 1) Input Data is labelled | 1) Input Data is Unlabelled |
| 2) Uses training dataset | 2) Uses just input dataset |
| 3) Used for prediction | 3) Used for Analysis |
| 4) Targeted to a defined result. | 4) Not Targeted to a defined result. |

* Struct:-

Struct is a customized data type that contains other data type

```
Ex:- struct student {
    int rollNumber;
    char section;
    void getName();
}
```

- class can be inherited but struct cannot.
- Members of a class are private by default.
- Members of a struct are public by default.

* Sensor:-

A sensor is a device, module, machine or subsystem whose purpose is to detect events or changes in its environment and ~~send~~ send the information to other electronics, possibly a computer, processor.

* Actuator :-

An actuator is a component of a machine that is responsible for moving & controlling a mechanism.

* Microcontroller:-

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system.

A typical microcontroller includes a processor, memory & input/output peripherals on a single chip.

* Diff between Microcontroller & Microprocessor:-

Microprocessor consists of only a central processing unit, whereas microcontroller contains a CPU, memory, I/O all integrated into one chip. Microcontroller using type internal connecting buses & microprocessors use external buses.

* Programming language:-

A programming language is a formal language comprising a set of instructions that produce various kinds of output. Programming languages are used in computer programming to implement logic, implement algorithms. Most programming languages consist of instruction sets composed of