An *Internship* Report

On

JAVA FULL STACK

Submitted

In partial fulfillment for the award of the degree

Of

Bachelor of Technology

in

Computer Science & Engineering

By

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Department of Computer Science & Engineering

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NBA for Civil, EEE, ECE, MECH and CSE, New Delhi)

(Accredited By NAAC with 'A^{+}' Grade, an ISO 9001:2008 Certified Institution)
Siddharth Nagar, Narayanavanam road, Puttur-517583, A.P

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CERTIFICATE

This is to certify that the Mr. / ~~Ms~~. ***K.ARSHAD*** *bearing Roll No.* *19F61A0508* *of* ***IV year B.Tech I*** *semester in the department of* ***Computer Science & Engineering*** *has completed his/~~her~~* ***Internship*** *in the topic of* ***JAVA FULL STACK*** *at* ***Q-SPIDERS*** *during the academic year* ***2022 - 2023.***

Date: **Head of the Department**

TRAINING includes **JAVA FULL STACK**

Introduction to WEB

- What is web?
- Web Features?

Core **HTML**

- Introduction
- Parts in HTML Document
- Head section
- Body Section
- HTML forms

Introduction to CSS

- CSS Basics
- CSS Introduction
- Styling Fonts
- Styling Text

Introduction to JAVA

- Why Java was developed?
- History of JAVA
- Different Java Platforms
- JVM Architecture
- Installing java on windows

JAVA Language **Fundamentals**

- Identifiers
- Keywords
- Variables
- Literals
- Data Types
- Operators
- Looping Statements
- Condition Statements
- Type Casting
- Comments

OOP implementation

- Why OOP?
- OOP concepts with Real life Examples
- Class & Object
- Reference variable
- Constructors
- Instance & static Variables & Methods
- These Keyword & it's usages
- Inheritance & it's Syntax
- Types of Inheritance
- Object Class as Root of java class hierarchy
- Variable Hiding
- Method Hiding
- Method Overriding & Overloading
- Super Keyword & it's usages
- Final Keyword & it's usages
- Constructor Chaining
- Upcasting and Down casting
- Static and Dynamic Binding
- Run time Polymorphism

- Abstract Keyword (Abstract classes and methods)
- Understanding Interfaces
- Implementation of Encapsulation

PACKAGES

- Understanding Packages
- Setting Class path
- Reading Input from Keyboard
- Access Modifiers

ARRAYS

- General Definition of Array
- Advantages of Array
- Arrays in Java
- 1-D Array
- 2-D Array
- Array of reference type
- Operations on Arrays

EXCEPTION HANDLING

- Types of Runtime Errors
- Understanding Exception

Working with **STRING**

- What is String
- String Class
- Creating String Object
- Operations on String

DATABASE- SQL

- Basics of SQL
- Data types
- SQL Statements
- SQL Operations
- Functions
- SQL joins
- Normalization

APTITUDE

- Arithmetic Aptitude
- Problems on Trains
- Simple Interest
- Average
- Numbers
- Boats and Streams
- Compound Interest
- Partnership
- Problems on Ages
- Permutations and Combinations
- Ratio and Proportion
- Probability

SOFT SKILLS

Introduction to **WEB:**

What is web?

The Web is the common name for the World Wide Web, a subset of the Internet consisting of the pages that can be accessed by a Web browser. Many people assume that the Web is the same as the Internet, and use these terms interchangeably. However, the term Internet refers to the global network of servers that makes the information sharing that happens over the Web possible. So, although the Web does make up a large portion of the Internet, but they are not one and same.

Web Features: -

- Easy navigation.
- Trendy, intuitive design and user experience<
- Relevant, authoritative website content<
- Product visuals and descriptions<
- Social media as an extension of the business website<
- Company blog<

Core **HTML**: -

- **Introduction: -**

HTML stands for HyperText Markup Language. It is used to design web pages using a markup language. HTML is the combination of Hypertext and Markup language. Hypertext defines the link between web pages. A markup language is used to define the text document within the tag which defines the structure of web pages. This language is used to annotate (make notes for the computer) text so that a machine can understand it and manipulate text accordingly. Most markup languages (e.g., HTML) are human-readable. The language uses tags to define what manipulation has to be done on the text.

Parts in HTML Document: -

- The HEAD element.
- The TITLE element.
- The title attribute.
- Meta data. Specifying meta data. The META element. Meta data profiles.

Head section: -

The <head> element is **a container for metadata (data about data) and is placed between the <html> tag and the <body> tag**. HTML metadata is data about the HTML document. Metadata is not displayed. Metadata typically define the document title, character set, styles, scripts, and other meta information.

Body Section: -

The <body> tag defines the document's body. The <body> element contains all the contents of an HTML document, such as headings, paragraphs, images, hyperlinks, tables, lists, etc. Note: There can only be one <body> element in an HTML document.

HTML forms: -

HTML Form is **a document which stores information of a user on a web server using interactive controls**. An HTML form contains different kind of information such as username, password, contact number, email id etc. The elements used in an HTML form are check box, input box, radio buttons, submit buttons etc.

Introduction to **CSS: -**

CSS Basics: -

Like HTML, CSS is not a programming language. It's not a markup language either. **CSS is a style sheet language.** CSS is what you use to selectively style HTML elements. For example, this CSS selects paragraph text, setting the color to red:

```
p {
  color: red;
}
```

CSS Introduction: -

Cascading **S**tyle **S**heets, fondly referred to as **CSS**, is a simply designed language intended to simplify the process of making web pages presentable. CSS allows you to apply styles to web pages. More importantly, CSS enables you to do this independent of the HTML that makes up each web page. It describes how a webpage should look: it prescribes colors, fonts, spacing, and much more. In short, you can make your website look however you want. CSS lets developers and designers define how it behaves, including how elements are positioned in the browser.

Styling Fonts: -

1. **CSS Font color**: This property is used to change the color of the text. (Standalone attribute)
2. **CSS Font family**: This property is used to change the face of the font.
3. **CSS Font size**: This property is used to increase or decrease the size of the font.
4. **CSS Font style**: This property is used to make the font bold, italic, or oblique.
5. **CSS Font variant**: This property creates a small-caps effect.
6. **CSS Font weight**: This property is used to increase or decrease the boldness and lightness of the font.

Styling Text: -

CSS defines five generic names for fonts: **serif, sans-serif, monospace, cursive, and fantasy**. These are very generic and the exact font face used from these generic names can vary between each browser and each operating system that they are displayed on.

Introduction to JAVA: -

Why Java was developed?

The Java programming language originated as part of a research project **to develop advanced software for a wide variety of network devices and embedded systems**. The goal was to develop a small, reliable, portable, distributed, real-time operating platform.

History of JAVA: -

The history of Java is very interesting. Java was originally designed for interactive television, but it was too advanced technology for the digital cable television industry at the time. The history of Java starts with the Green Team. Java team members (also known as Green Team), initiated this project to develop a language for digital devices such as set-top boxes, televisions, etc. However, it was best suited for internet programming. Later, Java technology was incorporated by Netscape.

Different Java Platforms: -

There are four platforms of the Java programming language:

- Java Platform, Standard Edition (Java SE)
- Java Platform, Enterprise Edition (Java EE)
- Java Platform, Micro Edition (Java ME)
- Java FX.

JVM Architecture: -

JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed. JVMs are available for many hardware and software platforms (i.e., JVM is platform dependent).

Installing java on windows: -

1. Check if Java Is Installed.
2. Download Java for Windows 10.
3. Install Java on Windows 10. Step 1: Run the Downloaded File. Step 2: Configure the Installation Wizard.
4. Set Environmental Variables in Java. Step 1: Add Java to System Variables. ...
5. Test the Java Installation. Step 1: Write a Test Java Script.

JAVA Language **Fundamentals: -**

Classes, objects, methods, arrays, and lists. Object-oriented programming and design utilizing inheritance, polymorphism, and abstraction. The proper use of Oracle's online Java documentation. Debugging Java programs using an IDE.

- **Identifiers**: -

  An identifier is **a sequence of one or more characters**. The first character must be a valid first character (letter, $, _) in an identifier of the Java programming language, hereafter in this chapter called simply "Java."

- **Keywords: -**

  Java keywords are also known as reserved words. Keywords are particular

words that act as a key to a code. These are predefined words by Java so they cannot be used as a variable or object name or class name.

- **Variables: -**

A variable is a container which holds the value while the Java program is executed. A variable is assigned with a data type. Variable is a name of memory location. There are three types of variables in java: local, instance and static. There are two types of data types in Java: primitive and non-primitive.

- **Literals: -**

Literals in Java are **a synthetic representation of boolean, character, numeric, or string data**. They are a means of expressing particular values within a program. They are constant values that directly appear in a program and can be assigned now to a variable.

- **Data Types: -**

Data types specify the different sizes and values that can be stored in the variable. There are two types of data types in Java:

Primitive data types: The primitive data types include boolean, char, byte, short, int, long, float and double.

Non-primitive data types: The non-primitive data types include Classes, Interfaces, and Arrays.

- **Operators: -**

Operator in Java is a symbol that is used to perform operations. For example: +, -, *, / etc.
There are many types of operators in Java which are given below:

a. Unary Operator,
b. Arithmetic Operator,
c. Shift Operator,
d. Relational Operator,
e. Bitwise Operator,
f. Logical Operator,
g. Ternary Operator and
h. Assignment Operator.

- **Looping Statements: -**

The Java *for loop* is used to iterate a part of the program several times. If the number of iterations is **fixed**, it is recommended to use for loop

There are three types of for loops in Java.

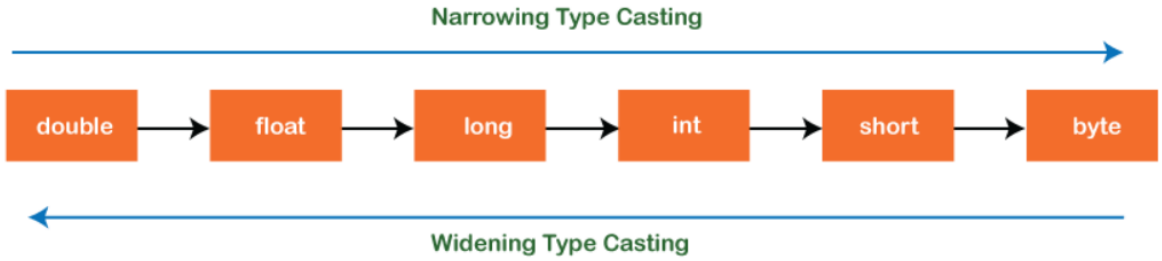
- Simple for Loop.
- For-each or Enhanced for Loop.
- Labelled for Loop.

Condition Statements: -

Java has the following conditional statements: Use if to specify a block of code to be executed, if a specified condition is true. Use else to specify a block of code to be executed, if the same condition is false. Use else if to specify a new condition to test, if the first condition is false.

Type Casting: -

In Java, **type casting** is a method or process that converts a data type into another data type in both ways manually and automatically. The automatic conversion is done by the compiler and manual conversion performed by the programmer. In this section, we will discuss **type casting** and **its types** with proper examples.



Comments: -

Comments in Java are **the statements that are not executed by the compiler and interpreter**. It can be used to provide information or explanation about the variable, method, class, or any statement. It can also be used to hide program code for a specific time.

OOP implementation: -

Why OOP?

OOP **provides a clear structure for the programs**. OOP helps to keep the Java code DRY "Don't Repeat Yourself", and makes the code easier to maintain, modify and debug. OOP makes it possible to create full reusable applications with less code and shorter development time.

OOP concepts with Real life Examples: -

Let's take an example of one of the OOPs concepts with real time examples: **If you had a class called "Expensive Cars," it could contain objects like Mercedes, BMW, Toyota, and so on**. The price or speed of these autos could be one of its attributes (data).

Class & Object: -

A Class in object-oriented programming is a blueprint or prototype that defines the variables and the methods (functions) common to all Java Objects of a certain kind. An object

in OOPS is a specimen of a class. Software objects are often used to model real-world objects you find in everyday life.

Reference Variable: -

A reference variable is **a variable that points to an object of a given class, letting you access the value of an object**. An object is a compound data structure that holds values that you can manipulate. A reference variable does not store its own values.

Constructors: -

Constructor in java is **used to create the instance of the class**. Constructors are almost similar to methods except for two things - its name is the same as the class name and it has no return type. Sometimes constructors are also referred to as special methods to initialize an object.

Instance & static Variables & Methods: -

Instance variables are just variables defined inside a class, and every instance of a class can have a different value for an instance variable. In this module, we'll look at defining static variables in our Java classes. Static variables are also defined as variables inside a class, but with the keyword 'static'.

Static methods are the methods in Java that can be called without creating an object of class. Static method is declared with static keyword. Instance method is not with static keyword.

This Keyword & it's usages: -

This keyword refers to the current object in a method or constructor. The most common use of this keyword is to eliminate the confusion between class attributes and parameters with the same name (because a class attribute is shadowed by a method or constructor parameter).

Inheritance & it's Syntax: -

Inheritance in Java is a mechanism in which one object acquires all the properties and behaviours of a parent object. It is an important part of OOPs (Object Oriented programming system).The idea behind inheritance in Java is that you can create new classes that are built upon existing classes. When you inherit from an existing class, you can reuse methods and fields of the parent class. Moreover, you can add new methods and fields in your current class also.

Inheritance represents the **IS-A relationship** which is also known as a *parent-child* relationship.

The syntax of Java Inheritance

```
class Subclass-name extends Superclass-name
{
  //methods and fields
}
```

Object Class as Root of java class hierarchy: -

Class Object is the root of the class hierarchy. Every class has Object as a superclass. All objects, including arrays, implement the methods of this class.

Variable Hiding: -

Variable Hiding happens **when a variable declared in the child class has the same name as the variable declared in the parent class**. In contrast, variable shadowing happens when a variable in the inner scope has the same name as the variable in the outer scope.

Method Hiding: -

In this section, we will discuss **what is method hiding in Java, method hiding factors (MHF),** and the **differences between method hiding and method overriding**. Also, implement the **method hiding concept** in a Java program. To understand the **method hiding** concept in Java, first, we will understand the **method overriding**. Because the method hiding concept is very similar to the method overriding.

Method Overriding & Overloading: -

If a class has multiple methods having same name but different in parameters, it is known as **Method Overloading**.

If subclass (child class) has the same method as declared in the parent class, it is known as **method overriding in Java**. In other words, if a subclass provides the specific implementation of the method that has been declared by one of its parent classes, it is known as method overriding.

Super Keyword & it's usages: -

The super keyword refers to superclass (parent) objects. **It is used to call superclass methods, and to access the superclass constructor**. The most common use of the super keyword is to eliminate the confusion between superclasses and subclasses that have methods with the same name.

Final Keyword & it's usages: -

The **final keyword** in java is used to restrict the user. The java final keyword can be used in many context. Final can be:

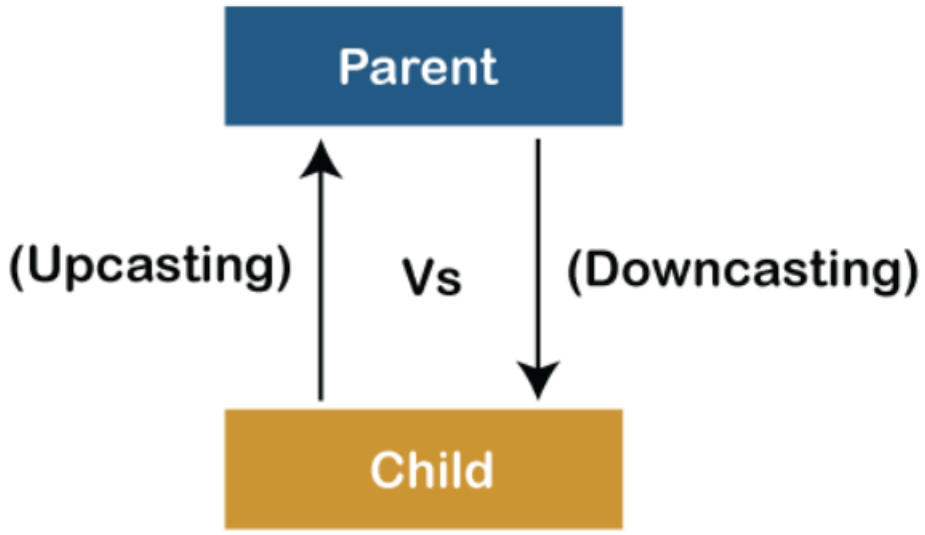
1. Variable.
2. method.
3. class.

Constructor Chaining: -

Constructor chaining refers to **the ability to call a constructor inside another constructor**. You can use a constructor chain either within the same class or even with another one. For the latter, the constructor should be through inheritance from the super class.

Upcasting and Down casting: -

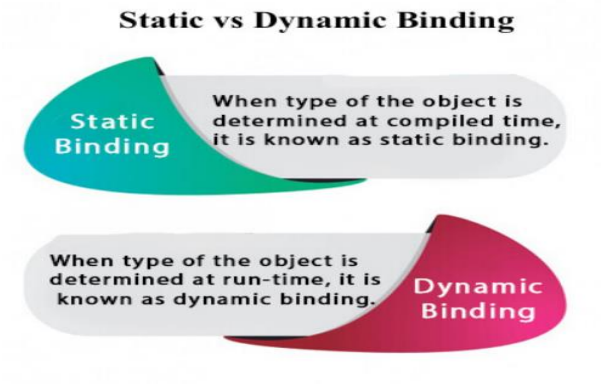
A process of converting one data type to another is known as **Typecasting** and **Upcasting** and **Downcasting** is the type of object typecasting. In Java, the object can also be typecasted like the datatypes. **Parent** and **Child** objects are two types of objects. So, there are two types of typecasting possible for an object, i.e., **Parent to Child** and **Child to Parent** or can say **Upcasting** and **Downcasting**.



Static and Dynamic Binding: -

Static Binding: The binding which can be resolved at compile time by compiler is known as static or early binding. Binding of all the static, private and final methods is done at compile-time.

Dynamic Binding: When type of the object is determined at run-time, it is known as dynamic binding.



Run time Polymorphism: -

Runtime polymorphism, also known as the Dynamic Method Dispatch, is **a process that resolves a call to an overridden method at runtime**. The process involves the use of the reference variable of a superclass to call for an overridden method.

Abstract Keyword (Abstract classes and methods): -

The abstract keyword is a non-access modifier, used for classes and methods: Abstract class: is a restricted class that cannot be used to create objects (to access it, it must be inherited from another class). Abstract method: can only be used in an abstract class, and it does not have a body.

Understanding Interfaces: -

In Java, **an interface specifies the behaviour of a class by providing an abstract type**. As one of Java's core concepts, abstraction, polymorphism, and multiple inheritance are supported through this technology. Interfaces are used in Java to achieve abstraction.

Implementation of Encapsulation: -

In encapsulation, **the variables of a class will be hidden from other classes, and can be accessed only through the methods of their current class**. Therefore, it is also known as data hiding. Declare the variables of a class as private. Provide public setter and getter methods to modify and view the variables values.

PACKAGES: -

Understanding Packages: -

A package in Java is used to group related classes. Think of it as **a folder in a file directory**. We use packages to avoid name conflicts, and to write a better maintainable code. Packages are divided into two categories.

Setting Class path: -

Class path is a parameter in the Java Virtual Machine or the Java compiler

that **specifies the location of user-defined classes and packages**. The parameter may be set either on the command-line, or through an environment variable.

Reading Input from Keyboard: -

Input from the keyboard:

1. import java. util. Scanner; - imports the class Scanner from the library java.util.
2. Scanner scanner = new Scanner (System.in); - creates a new Scanner object, that is connected to standard input (the keyboard)
3. String inputString = scanner. nextLine ();

Access Modifiers: -

There are two types of modifiers in Java: **access modifiers** and **non-access modifiers**.

The access modifiers in Java specifies the accessibility or scope of a field, method, constructor, or class. We can change the access level of fields, constructors, methods, and class by applying the access modifier on it.

There are four types of Java access modifiers:

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 level, it will be the default.
3. **Protected**: The access level of a protected modifier is within the package and outside the package through child 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 and outside the package.

ARRAYS: -

General Definition of Array: -

An array is **a container object that holds a fixed number of values of a single type**. The length of an array is established when the array is created. After creation, its length is fixed.

Advantages of Array: -

- We can access any element randomly by using indexes provided by arrays.
- Primitive type to wrapper classes object conversion will not happen so it is fast.
- Array can store many number of elements at a time.

Arrays in Java: -

An array is **a collection of similar types of data**. For example, if we want to store the names of 100 people then we can create an array of the string type that can store 100 names.

String [] array = new String [100];

Here, the above array cannot store more than 100 names.

1-D Array (One-Dimensional Array): -

One-dimensional array or single dimensional array **must deal with values of only one data type**. One dimensional array can also store multiple objects of the same class. An array in java is an object of a dynamically generated class that can be initialized and created using the new operator.

2-D Array (Two-Dimensional Array): -

Here i and j are the size of the two dimensions, i.e., i denotes the number of rows while j denotes the number of columns. Example: **int A [10][20];** Here we declare a two-dimensional array in C, named A which has 10 rows and 20 columns.

Array of reference type: -

Array, which itself is derived from System. Object. This means that **all arrays are always reference types which are allocated on the managed heap**, and your app's variable contains a reference to the array and not the array itself.

Operations on Arrays: -

Traverse − print all the array elements one by one. Insertion − Adds an element at the given index. Deletion − Deletes an element at the given index. Search − Searches an element using the given index or by the value.

EXCEPTION HANDLING: -

Types of Runtime Errors: -

The 10 most common examples of Runtime Exceptions in Java are:

1. Arithmetic Exception
2. NullPointerException
3. ClassCastException

4. DateTimeException

5. ArrayIndexOutOfBoundsException.

Understanding Exception: -

An exception (or exceptional event) is a problem that arises during the execution of a program. When an **Exception** occurs the normal flow of the program is disrupted and the program/Application terminates abnormally, which is not recommended, therefore, these exceptions are to be handled.

An exception can occur for many different reasons. Following are some scenarios where an exception occurs.

- A user has entered an invalid data.
- A file that needs to be opened cannot be found.
- A network connection has been lost in the middle of communications or the JVM has run out of memory.

Working with STRING: -

What is String: -

Strings, which are widely used in Java programming, are **a sequence of characters**. In the Java programming language, strings are objects. The Java platform provides the String class to create and manipulate strings.

String Class: -

The String class **represents character strings**. All string literals in Java programs, such as "abc," are implemented as instances of this class. Strings are constant; their values cannot be changed after they are created. String buffers support mutable strings. Because String objects are immutable, they can be shared.

Creating String Object: -

There are two ways to create a String object:

1. By string literal: Java String literal is created by using double quotes. For Example: String s= "Welcome;"
2. By new keyword: Java String is created by using a keyword "new". For example: String s=new String("Welcome");

Operations on String: -

Java String class provides a lot of methods to perform ***operations on strings*** such as compare (), concat (), equals (), split (), length (), replace ().

The string operations include **concatenation, scanning, substringing, translation, and verification**. String operators **represent the various types of operations that we can employ on the string type of the variables in the program**. Moreover, python lets us apply numerous string operators on the python string and these are explained well in this article.

DATABASE- SQL(Structured Query language)

- **SQL**

SQL is a standard language for accessing and manipulating databases.

- SQL stands for Structured Query Language
- SQL lets you access and manipulate databases
- SQL became a standard of the American National Standards Institute (ANSI) in1986,and of the International Organization for Standardization (ISO) in 1987

- **Data**

Data is a raw fact which describes the properties of an object. Properties are also called "Attributes". Objects are also called "entities".

- **Database**

- Database is place or medium in which we store the data in a systematic and organized manner

- **CRUD operations**

CRUD refers to the four basic operations a software application should be able to perform – Create, Read, Update, and Delete.

- **DBMS (Data Base Management System)**

- Database management system is a software which is used to manage the database. For example: MySQL, Oracle, etc. are a very popular commercial database which is used in different applications.
- DBMS provides an interface to perform various operations like database creation, storing data in it, updating data, creating a table in the database and a lot more.
- It provides protection and security to the database. In the case of multiple users, it also maintains data consistency.
- Two main features: security and authorization.
- We can store the data in DBMS in the form of files.
- We can communicate in DBMS with the help of "Query Language".

- **Relational Database Management System (RDBMS)**

- RDBMS is a type of DBMS software
- RDBMS has two main features: security and authorization.- We can store the data in RDBMS in the form of "**Tables"**.
- We can communicate in RDBMS with the help of "Structured Query Language".

Tables − In relational data model, relations are saved in the format of Tables. This format stores the relation among entities. A table has rows and columns, where rows represent records and columns represent the attributes.

➢ **Tuple** − A single row of a table, which contains a single record for that relation is called a tuple.

➢ **Rules of E.F. CODD**
➢ **Metadata:** a set of data that describes and gives information about other data.
➢ **Datatypes:**

Data types are used to represent the nature of the data that can be stored in the database table. For example, in a particular column of a table, if we want to store a string type of data then we will have to declare a string data type of this column. Data types mainly classified into three categories for every database.

- String Data types
- Numeric Data types
- Date and time Data types

➢ **Char**
➢ **Varchar**
➢ **Varchar(2)**
➢ **Number**
➢ **Date**
➢ **Large object**
➢ **Constraints**

- **SQL** constraints are used to specify rules for the data in a table. Constraints are used to limit the type of data that can go into a table.
- **NOT NULL** - Ensures that a column cannot have a NULL value
- **UNIQUE** - Ensures that all values in a column are different
- **PRIMARY KEY** - A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table
- **FOREIGN KEY** - Prevents actions that would destroy links between tables
- **CHECK** - Ensures that the values in a column satisfies a specific condition
- **DEFAULT** - Sets a default value for a column if no value is specified

➢ **SQL statements**

1. DDL – Data Definition Language
2. DQL – Data Query Language
3. DML – Data Manipulation Language
4. DCL – Data Control Language
5. TCL – Transaction Control Language

➢ **Data Definition Language**

- DDL changes the structure of the table like creating a table, deleting a table, altering a table, etc.
- All the command of DDL is auto-committed that means it permanently save all the changes in the database.Here are some commands that come under

DDL:

- CREATE
- ALTER
- DROP
- TRUNCATE

- **Data Manipulation Language**

o DML commands are used to modify the database. It is responsible for all form of changes in the database.

o The command of DML is not auto-committed that means it can't permanently save all the changes in the database. They can be rollback.Here are some commands that come under DML:

o INSERT o UPDATE

o DELETE

- **Data Control Language**

DCL commands are used to grant and take back authority from any database user.

o Grant

o Revoke

- **Data Query Language**

o DQL is used to fetch the data from the database.

o It uses only one command:

o SELECT

- **Transaction Control Language**

o TCL commands can only use with DML commands like INSERT, DELETE and UPDATE only.

o These operations are automatically committed in the database that's why they cannot be used while creating tables or dropping them.

o Here are some commands that come under TCL

o COMMIT

o ROLLBACK

o SAVEPOINT

- **SQL operators**

❖ Arithmetic Operators

❖ Comparison Operators

❖ Logical Operators

❖ Bitwise operators

- **FUNCTIONS IN SQL**

o Function is a block of code or list of instructions used to perform some specific tasks.

- **Types of functions**
- **User defined functions**

A user-defined function (UDF) lets you create a function by using a SQL expression

- **Built in functions**
- **Single row functions (SRF)**
- **Multi row functions (MRF)**

o Max()

o Min()

o Sum()

o Avg()

o Count()

- **SQL JOIN**
- A JOIN clause is used to combine rows from two or more tables, based on a related column between them.

- **Different Types of SQL JOINs**

o (INNER) JOIN: Returns records that have matching values in both tables

o LEFT (OUTER) JOIN: Returns all records from the left table, and the matched records from the right table

o RIGHT (OUTER) JOIN: Returns all records from the right table, and the matched records from the left table

o FULL (OUTER) JOIN: Returns all records when there is a match in either left or right table

- **SQL keys**

o Super Key

o Candidate Key

o Primary Key

o Alternate key

o Composite/Compound Key

o Unique Key

o Foreign Key

- **Functional Dependencies**

Attributes in a relation which determines or dependent on other attribute is known as "Functional Dependency"

- **Total Functional Dependency**
- **Partial Functional Dependency**
- **Transitive Functional Dependency**
- **Normalization**

o Normalization is the process of organizing the data in the database.

o Normalization is used to minimize the redundancy from a relation or set of relations. It is also used to eliminate undesirable characteristics like Insertion, Update, and Deletion Anomalies.

- **1NF**

A relation is in 1NF if it contains an atomic value.

- **2NF**

A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.

- **3NF**

A relation will be in 3NF if it is in 2NF and no transition dependency exists.

- **BCNF**

A stronger definition of 3NF is known as Boyce Codd's normal form.

- **4NF**

A relation will be in 4NF if it is in Boyce Codd's normal form and has no multi valued dependency.

- **5NF**

A relation is in 5NF. If it is in 4NF and does not contain any join dependency, joining should be lossless.

APTITUDE

Aptitude is a natural ability to do something.

Arithmetic aptitude

In the Arithmetic Aptitude test, **the questions are based on the concepts of Quadratic Equations, Approximations and Simplifications, Data Sufficiency, and HCF and LCM**.

- **Problems on Trains**
  - km/hr to m/s conversion
  - m/s to km/hr conversion

- **Simple Interest**

- **Principal:**

The money borrowed or lent out for a certain period is called the **principal** or the **sum**.

- **Interest:**

Extra money paid for using other's money is called **interest**.

- Simple Interest (S.I.):

If the interest on a sum borrowed for certain period is reckoned uniformly, then it is called **simple interest**.

- **Profit and Loss**
- **Cost Price:**
- The price, at which an article is purchased, is called its **cost price**, abbreviated as **C.P.**
- **Selling Price:**
- The price, at which an article is sold, is called its **selling prices**, abbreviated as **S.P.**

- **Profit or Gain:**
- If S.P. is greater than C.P., the seller is said to have a **profit** or **gain**.
- **Loss:**
- If S.P. is less than C.P., the seller is said to have incurred a **loss**.
- Percentage
- By a certain **percent**, we mean that many hundredths.
- Thus, *x* percent means *x* hundredths, written as *x*%.

- **Average:**

Average is equals to Sum of observations by Number of observations.

- **Average Speed:**

Suppose a man covers a certain distance at *x* kmph and an equal distance at *y* kmph.

- **Numbers**

Some Basic Formulae:

- $(a + b)(a - b) = (a2 - b2)$
- $(a + b)2 = (a2 + b2 + 2ab)$
- $(a - b)2 = (a2 + b2 - 2ab)$
- $(a + b + c)2 = a2 + b2 + c2 + 2(ab + bc + ca)$

- Problems on H.C.F and L.C.M
- **Factors and Multiples:**

If number *a* divided another number *b* exactly, we say that *a* is a **factor** of *b*. In this case, *b* is called a **multiple** of *a*.

- **Highest Common Factor (H.C.F.) or Greatest Common Measure (G.C.M.) or Greatest Common Divisor (G.C.D.)**

- **Boats and Streams**

1. **Downstream/Upstream:**

In water, the direction along the stream is called **downstream**. And, the direction against the stream is called **upstream**.

2. If the speed of a boat in still water is *u* km/hr and the speed of the stream is *v* km/hr, then:

Speed downstream = (*u* + *v*) km/hr.

Speed upstream = (*u* - *v*) km/hr.

- Time and Distance
- Time and Work

- **Partnership**
- Partnership:

When two or more than two persons run a business jointly, they are called **partners** and the deal is known as **partnership**.

- **Ratio of Divisions of Gains:**

○ When investments of all the partners are for the same time, the gain or loss is distributed among the partners in the ratio of their investments. Suppose A and B invest Rs. *x* and Rs. *y* respectively for a year in a business, then at the end of the year: (A's share of profit) : (B's share of profit) = *x* : *y*.

○ When investments are for different time periods, then equivalent capitals are calculated for a unit of time by taking (capital x number of units of time). Now gain or loss is divided in the ratio of these capitals. Suppose A invests Rs. *x* for *p* months and B invests Rs. *y* for *q* months then, (A's share of profit) : (B's share of profit)= *xp* : *yq*.

- **Problems on Ages**
- **Important Formulas on "Problems on Ages" :**
- 1. If the current age is *x*, then *n* times the age is *nx*.• 2. If the current age is *x*, then age *n* years later/hence = *x* + *n*.
- 3. If the current age is *x*, then age *n* years ago = *x* - *n*.
- 4. The ages in a ratio *a* : *b* will be *ax* and *bx*.

- **Permutation and Combination**
- **Combinations:**
- Each of the different groups or selections which can be formed by taking some or all of a number of objects is called a **combination**.
- **Permutations:**
- The different arrangements of a given number of things by taking some or all at a time, are called permutations.

- **Factorial Notation:**
- Let *n* be a positive integer. Then, factorial *n*, denoted *n*! is defined as:
- **n! = n(n - 1)(n - 2) ... 3.2.1.**
- Problems on Numbers

Some Basic Formulae:

- (*a* + *b*)(*a* - *b*) = (*a*2 - *b*2)
- (*a* + *b*)2 = (*a*2 + b2 + 2*ab*)
- (*a* - *b*)2 = (*a*2 + b2 - 2*ab*)

- **Ratio and Proportion**
- **Ratio:**
- The ratio of two quantities *a* and *b* in the same units, is the fraction and we write it as *a* : *b*.
- In the ratio *a* : *b*, we call *a* as the first term or **antecedent** and b, the second term or **consequent**.

Proportion:

The equality of two ratios is called proportion. If *a* : *b* = *c* : *d*, we write *a* : *b* **::** *c* : *d* and we say that *a, b, c, d* are in proportion. Here *a* and *d* are called **extremes**, while *b* and *c* are called **mean terms**.

- **Probability**
  - **Experiment:** An operation which can produce some well-defined outcomes is called an experiment.
  - **Random Experiment:** An experiment in which all possible outcomes are know and the exact output cannot be predicted in advance, is called a random experiment.

SOFT SKILLS

Soft skills are non-technical skills that describe how you work and interact with others.

- Vocabulary

a list or collection of words or of words and phrases usually alphabetically arranged and explained or defined

- **LSRW**

Language Skills include (LSRW) Listening, Speaking, Reading and Writing. To acquire any new or second language, that particular individual should simultaneously proceed with these four language skills. It shows that to have perfection in communication, that person should have knowledge of language skills.

- **Story writing**

Story writing refers to the method of writing in which the writer narrates a series of events that has led to a problem, the progression of the same and the end result that has led to the current situation of the characters in the story.

- **Conversation**

talk between two or more people in which thoughts, feelings, and ideas are expressed, questions are asked and answered, or news and information is exchanged

- **Group discussion**

Group discussion (GD) is **a comprehensive technique to judge the suitability of an individual and his appropriateness for admission, scholarship, job, etc**. GD assesses the overall personality – thoughts, feelings and behavior - of an individual in a group. A topic is presented to the group members for discussion.

- **Interview**

An interview is **a structured conversation where one participant asksquestions, and the other provides answers**. In common parlance, the word "interview" refers to a one-on-one conversation between an interviewer and an interviewee.

- **Tenses**
  - **Present Simple**
  - **Present Continuous**
  - **Present Perfect**
  - **Present Perfect Continuous**
  - **Past Simple**
  - **Past Continuous**
  - **Past Perfect**
  - **Past Perfect Continuous**
  - **Future Simple**
  - **Future Continuous**
  - **Future Perfect**
  - **Future Perfect Continuous**

- **Accent**

Accent is the way in which people in a particular area or country pronounce words: She spoke with a slight southern accent. An accent is also a mark written or printed over a letter to show how to pronounce it.

- **Comprehension-passage writing**

Comprehension passages are **sure-shot scoring questions**. We are given a passage and some questions that follow the passage. The questions are to be answered by using the data given in the passage, even if it differs from real-life facts.

- **Grammar**

Grammar is **the way we arrange words to make proper sentences**. Word level grammar covers verbs and tenses, nouns, adverbs etc. Sentence level grammar covers phrases, clauses, reported speech etc.

- **Presentation skills**

Presentation skills are **the skills you need in delivering effective and engaging presentations to a variety of audiences**. These skills cover a variety of areas such as the structure of your presentation, the design of your slides, the tone of your voice and the body language.