Phase 2 or course 2

Day 1 04-08-2023

Java : Java is an open source and pure object oriented programming language.

Version of Java

Java 1.0 Java 18/19

Java

J2SE J2EE J2ME

JavaSE JavaEE JavaME

Standard Edition Enterprise Edition Micro edition

Java basic programming

OOPs

Exception handling

Collection Framework

JDBC

Open source IDE : Eclipse,

OOPs : Object Oriented Programming system

object : object is any real world entity.

Property or state -🡪 have -🡪variable/ fields

Person

Behaviour -🡪do/does -🡪 functions / methods

Place

Bank

Animal

Car

Customer

Class : class is blue print of object or template of object.

Syntax of class.

class className {

fields;

methods;

}

package is a collection of classes and interfaces.

Data types : data type is a type of data which tells what type of data it can hold.

2 types

1. Primitive data types : it is use to store only value

8 types of primitive

1. byte 1byte
2. short 2
3. int 4
4. long 8 : without decimal number
5. float 4
6. double 8 : with decimal
7. char 2 : single character
8. boolean 1 bit : true or false value.
9. Non primitive or reference data types : it is uses to store value as well as reference of another data types

4 types

1. array
2. class
3. interface
4. enum

array : array is known a reference data types which is use to store more than one value of same types.

datatype arrayName[]; array declaration

int num[];

int num1[]={10,20,30,40,50,60}; array declaration with initialization

array start with index position zero.

System.out.println(num1[0]);

System.out.println(num1[1]);

System.out.println(num1[2]);

Using loop we can access those values one by one

While loop

Do while loop

For loop

For each loop or enhanced loop

Creating the memory size for the array

datatype arrayname[]=new datatype[size];

In Java we can take the value through keyboard lot of way

1. using Scanner class : Scanner is a pre defined class which contains lot of pre defined methods which help to take the value through keyboards.

Syntax to create the Scanner class object.

Scanner obj = new Scanner(System.in);

Scanner class is a part of util package.

java and javax are known as root package.

By default every java program import lang package.

Means we can use all classes and interfaces part of lang package without importing.

In java String is a pre defined class part of lang package.

Car

Property , wheel, color, amount etc

8 primitive + string reference data type we use to

Declare the variable.

Behaviour

We can write behaviour using function or methods in java

returnType methodName(parameterList){

}

void info() { info is method name and this method

no return type

}

String sayHello() { sayHello method name and it return string

Value

return “Welcome”;

}

void add(int x, int y) { add method passing two int value

}

Constructor : constructor is a type of special method which help to create the object.

Pts.

1. Constructor have same name as class itself.
2. Class doesn’t contains return type not even void also
3. Constructor no need to call it will call automatically when we create the object of that class.

this is a keyword which refer to current object.

When local variable or parameter variable and instance variable have same name

To refer to instance variable we use this keyword.

In the life of the object if we want to perform any task only one time

That type of task we have to write inside a empty or parameter constructor.

In the life of the object if we want to perform any task more than one time

That type of task we have to write inside a method.

Encapsulation : binding or wrapping data(variable) and code(methods) in a single unit is known as

Encapsulation.

By default every java class internally follow encapsulation.

class Employee {

variable and methods.

}

JavaBean class Vs Normal class

1. JavaBean class must be public not normal class not mandatory.
2. All variable present inside a JavaBean class must be private but in normal class may or may not.
3. In JavaBean class for each variable we need to provide setter and getter method.
4. Setter method to set the value with condition if we need.
5. Getter method is use to get the value.
6. But in normal class if we write private variable we can provide helper method with name doesn’t matter.

public class Employee {

private int id;

private String name;

private float salary;

public void setId(int id) {

this.id = id;

}

public int getId() {

return this.id;

}

}

Angular 🡪 Model class

Java 🡪 JavaBean class

Database 🡪 Table

Day 2 04-08-2023

Inheritance : Inheritance is use to inherits or acquire properties and behaviour of old class to new class.

class OldClass { super class or base class or parent class

properties

behaviour

}

class NewClass extends OldClass { sub class or derived class or child class.

properties

behaviour

}

Types of inheritance

1. Single inheritance : one super class and one sub class

class A { }

class B extends A{}

1. Multilevel inheritance : one super class and n number of sub class connected one by one

Class A { }

Class B extends A{ }

Class C extends B { }

Class D extends C { }

1. Hierarchical inheritance : one super class and n number of sub class connected directly to super class

Class A { }

Class B extends A{ }

Class C extends A{ }

1. Multiple inheritance : more than one super class and one sub class.

Class A { }

Class B { }

Class C extends A,B { } But java doesn’t support this type of inheritance.

This type of inheritance in java we can achieve using interface.

Oops relationship

1. Is a relationship
2. Has a relationship

class Employee {

id,name,salary

}

class Manager extends Employee {

numberOfEmp

Address add = new Address();

}

class Developer extends Employee {

projectName;

}

class ProjectManager extends Manager{

clientInfo;

}

class Address {

city and state

}

Manager is a Employee

Developer is a Employee

ProjectManager is a Manager

Has a relationship

3 types

Association

1. Aggregation
2. Composition

class A { zero or 1 or many

B obj1 = new B();

}

class B { zero or 1 or many

A obj2 = new A();

}

1-0, 0-1, many-0,many-1, 0-0

Core GUI AWT or Swing or JavaFX

Standalone :

Web Application html, css , servlet and jsp

Android : mobile application

MEAN / MERN

Spring framework and spring boot.

class Manager {

Address padd = new Address(;

Address oadd = new Address();

}

class Address {

}

It is a type of association but it weak association. Weak association is known as aggregation.

Class Student {

StudentHistory sh = new StudentHistory();

}

Class StudentHistory {

}

It is a also type of association but is known as strong association. Strong association is known as composition.

class Trainer {

array of students;

}

class Student {

}

Polymorphism : One name many forms or many implementation.

2 types

1 compile time or static binding or early binding

Method Overloading :

The method have same name but different parameter list or type of parameter list

2 run time or dynamic binding or late binding

Method Overriding :

The method have same name and same method signature (number of parameter list, type of parameter list and return type must be same).

To achieve method overriding we need to inheritance.

Non access specifiers

abstract : abstract keyword we can use with method and class but not with variable.

1. Abstract method : method without body or incomplete method is known as abstract method.

abstract void speed();

1. abstract class :

abstract class className {

}

1. if class contains abstract method then that class must be declare as an abstract.
2. Whichever class extends abstract class that class must be provide the body for all abstract method belong to that class. That class can ignore if that class itself is abstract class.
3. Abstract class we can’t create object.
4. Abstract class can contains normal as well as abstract method ie zero or 1 or all abstract method.

static

1. Static keyword we can use with variable and method but not with class.
2. Static variable : if variable is static we can assig the value for that variable with help of class as well as object.
3. Static method :if method is static we can call that method with help of class name as well as object.
4. Inside non static method we can access both static as well as non static variable directly.
5. Inside static method we can access only static variable directly we can’t access non static variable directly.

Every class we will get only one static memory.

For that class how many object we will create that many heap memory get created.

final : final keyword we can use with variable, method and class.

1. Final variable : to declare constant value in java we use final keyword.

final float PI=3.12f;

1. Final method : if method is final we can’t override that method.
2. Final class : if class is final we can’t inherits or extends that class.

Annotation : annotation is like a decorator in angular. Annotation or decorator is meta-data. Meta-data means data about data. Like angular java also provided lot of pre defined annotation. All annotation start with @ followed by annotation name.

Abstraction : hiding the internal implementation without knowing background details.

Interface : interface is a type of reference data type which is also known as 100% pure abstract class.

Using abstract class we can achieve partial abstraction but using interface we can achieve 100 abstraction.

Syntax to create the interface in java

Interface interfaceName{

Fields;

Methods;

}

In interface all variable by default are public static and final

In interface all methods are by default public and abstract.

Like a class one interface can extends another interface but interface can extends more than one interface but class can’t

Class always implements interface. Class can implements more than one interface at time.

Whichever class implements any interface that class must be provide the body for all methods

Belongs that interface.

Access specifiers :in java we can use 4 types of access specifiers which hep to expose visibility of variable, method and class.

1. private : we can use with instance variable, static variable, non static method, static method, constructor but not with class and local variable.

Scope : private within a same class.

1. default (nothing): we can use with all

scope : within a same package.

1. protected : we can use with instance variable, static variable, non static method, static method, constructor but not with class and local variable.

Scope : within in a same package as well as other package if it is sub class

1. public : we can use with instance variable, static variable, non static method, static method, constructor and class but local variable.

Scope : same package as well as other package.

Package : package is a collection of classes and interface.

Package mainly divided into two types

1. user defined package
2. pre defined package.

When two classes and interface which have same name but different purpose then using package we can avoid the conflict.

Education

school college

Attendance.java Attendance.java

Date java.util.Date to find system date and time

Date java.sql.Date to store date information in database.

Day 3 04-15-2023

Exception Handling :

Exception is an object which occurs when unexpected or abnormal occurs during the execution of a programs. To handle using some technique is known as exception handling.

Java

javac java

complier interpreter

compile time error run time error

syntax error

class Demo {

void display() {

}

Run time error

Error Exception

Error : it is a type of run time error which we can handle it. JVM crash, software or hardware issue.

Exception : it is a type run time error which we can handle it. Divided by zero.

In Java Error and Exception are pre defined classes part of lang package.

Exception

Checked exception unchecked exception

IOException RuntimeException

SQLException ArithmeticException

Etc NumberFormatException

ArrayIndexOutOfBoundsException

5 keywords

try

catch

finally

throw

throws

try{

}catch(Exception e) {

}

Try with single catch block

If we don’t know name of exception as well as if any exception generate we want to perform common task then we have to use try with single catch block

Try with multiple catch block : base upon exception if want to perform different task then we have to use try with multiple catch block.

Finally block

This block execute 100% sure if any exception generate or not.

try {

open the connection

do operation read, write or update

}catch(Exception e) {

}finally {

close the connection

}

}

throw keyword

this keyword is use to generate or raise pre defined or user defined exception with our conditions

throw new Exception()

or

throw new ExceptionSubClass();

throws : this keyword is use to throw the exception to caller method.

This keyword we have to use with method signature.

methodName() throws Exception, ExceptionSubClass {

Collection Framework : it is a like a data structure.

Collection framework contains set of collection of classes and interfaces which help to store the data of same as well as different types. It provided set of methods with help of those methods we can add, remove, search, iterate very easily.

Collection framework hierarchy

Util package

Collection -🡪 interface

Set List Queue Map : interfaces

Set,List and Queue internally extends Collection. But Map doesn’t extends Collection.

Set : it doesn’t allow duplicate. Set few API maintain order, unorder and sorted.

These three classes internally extends Set interface and they provided body for all abstract methods.

HashSet

LinkedHashSet

TreeS

et

List : it allow duplicate and it maintain the order using index position.

Below four classes internally extends List interfaces.

ArrayList

LinkedList

Vector

Stack

Queue : it allow duplicate and by default queue is first in first out.

PriorityQueue

LinkedList

Map : they store the data in key-value pairs. Key is unique and value may be duplicate.

HashMap

LinkedHashMap

TreeMap

Hashtable

­

Array

Set

Map

WeakSet

WeakMap

Full Java Stack

MEAN : Full Stack developer using JavaScript

MERN

LinkedList : LinkedList use node to store the value

Null

Value ref value ref

Pref value nref

By default LinkedList internally follow double linkedlist concept.

04-16-2023

When we display any user defined class reference in println methods. It internally call toString method of object class. That method return [packagename.classname@code](mailto:packagename.classname@code). But if we want useful message then we have to override toString method in user defined class.

If we want to store the data persistence data.

1. File system : using IO package we can do file handling program
2. Database system : we can store the data in any database like mysql or oracle or db2 etc.

Limitation of file base system.

1. Data redundancy : means we can store same data again and again.
2. Data inconsistency : format of the file. Format of the file txt, doc, pdf, excel or any other format.

Notepad text file

Id,name,salary

1,Ravi,12000

1 Ravi 12000

1/Ravi/12000

1-Ravi-12000

Database

Data : raw fact

Information : processed data or meaningful data

Database :we are storing the data in table format.

DBMS :database management system : it is a software which help to store the data in table format.

RDBMS Relational database management system.

PK primary key

TrainerStudent

TId TName tech Sid SName Age

1 Raj Java 100 Seeta 21

1 Raj Java 101 Reeta 22

1 Raj Java 102 Meeta 23

Trainer

PK(primary key)

TId Name tech

1 Raj Java

2 Ravi Python

Student

PK FK (Foreign Key)(Trainer table pk)

Sid Sname age TSId

100 Seeta 21 1

101 Meeta 22 1

102 Leeta 23 2

103 Veeta 24 null

RDBMS :

MySQL

Oracle

SQL Server

Db2

Postgres

All RDBMS database support one of the English statement query language ie SQL (Structured Query Language) using SQL we can create table, store, delete, update and retrieve the records from table.

MySQL is open source RDMBS Database provided by oracle.

MySQL 8.x

We can do Query in MSQL using two ways

Using command prompt

Using workbench (GUI base)

Using Java We can connect to Database (RDBMS – Oracle or MySQL or Db2 etc)

With help of

1. JDBC
2. ORM (Hibernate or JPA Java Persistence API)
3. Spring Data

JDBC : Java Database Connectivity : JDBC is a API (Application Programming interface ) which provided set of classes and interfaces which help to connect the database using java technologies.

Steps to connect to the database.

1 we need to import java.sql.\*; or javax.sql.\*;

2. JDBC throws checked the exception. So we need to handle exception using try-catch or throws mandatory.

3. load the Driver. Driver is a pre defined class provided by vendor whose database we are going to connect.

Types of driver

1. Type 1 or jdbc odbc bridge driver os dependent.
2. Type 2 or jdbc native api driver database dependent.
3. Type 3 or jdbc net protocol driver we need external server.
4. Type 4 or jdbc thin driver we required external jar file in our project which connect set of classes and interfaces which help to connect to database.

From Java 8 onward type 1 drive removed.

Type 4 driver to connect mysql database.

Class.forName(“driverName”).

Class is a pre defined class and name itself is Class which contains forName() static method which help to load the Driver.

4 Establish the connection :

Connection con = DriverManager.getConnection(url,username,password);

DriverManager is a pre defined class part of sql package which contains getConnection static method which takes 3 parameter

1st parameter url

2nd parameter username

3rd parameter password

Get connection method return type is Connection interface reference.

1. Create type of Statement
2. Statement

Statement stmt = con.createStatement();

Statement is a interface which provides set of methods which help to do operation on table.

DML Operation : Insert, Delete, Update

int res = stmt.executeUpdate(“Insert/Delete/Update”)

if(res>0) {

}

ResultSet rs = stmt.executeQuery(“select clause”)

1. PreparedStatement

Using Statement we can execute static query But using PreparedStatement we can execute dynamic query with help of place holder or parameterized query.

Day 5 : 04-22-2023

Maven : Maven is known as build tool.

Or

Gradle

Build tool is responsible to compile the program, run the program, creating jar or war or ear files. Downloading external dependencies or jar files and creating documentation.

Creating common project structure which we can import in any IDE.

Netbean

Eclipse

MyEclipse

POM.xml (Project object Model). It is a type of xml file which hold maven configuration details.

EmployeeManagementSystem with maven tool.

App class (main method interact with console or keyword).

Bean class

Service class

Dao class (Data Access Object ) this class contains pure database logic.

We can write four to five method store employee, delete employee, update employee and retrieve employee

Resource layer : This layer is responsible to provide the database connection.

Core Java Or J2SE or JavaSE (Standard Edition).

AWT or Swing or JavaFX

We can create GUI Application

If we create the application using Core java with JDBC and GUI as AWS or swing

To run this application in client machine it require java software.

This application can be access only one client at time.

JEE or JavaEE or J2EE

Java Enterprise Edition

Using JEE we can create web application using Java technologies.

http://[www.google.com](http://www.google.com)

req(http)-----🡪

Client Server

🡨--Res(http) html or html5

Css or css3 or bootstrap

JavaScript

Server side technologies

JEE

Servlet/JSP (Java Server Pages)

EJB (Enterprise Java Bean)

Asp.net

Php

Python

Node JS

Servlet /JSP and EJB

Servlet, JSP and ejb doesn’t contains main method.

To run Servlet , jsp and ejb program we require server. Because these module are known as

Server side technologies.

Server are mainly divided into two types

1. Web Sever : Tomcat is a type of web server
2. Application Server : Glashfish, Web Logic, JBoss etc

Container : container is a part of server. Which is also known as engine. Container is responsible to take the execution of servlet, jsp and ejb programs. Container is responsible to load the class, creating the object of those classes, calling life cycle method of servlet, jsp and ejb program and destroy the object.

If server is a type of web server which contains only one type of container ie web container. Web container is responsible to execute servlet and jsp program. Tomcat is a type of web server.

If server is a type of application server which container more than one container like web container, ejb container, jms container and more etc. web container is responsible to execute servlet and jsp and ejb container is responsible to execute ejb programs.

Application server provide some extra features like connection pooling, thread management, resource management, security etc.

Servlet : Servlet is a normal java program which help to create dynamic web page on server side.

servlet : servlet is a package which contains set of classes and interfaces.

Servlet : Servlet is a interface which contains five methods.

init

service

destroy

getServletinfo

getSevletConfig

class MyDemo implements Servlet {

we need to override all five methods.

}

GenericServlet : it is a type of abstract class which internally implements Servlet interface and provided body for 4 methods except service methods.

class MyDemo extends GenericServlet {

we need to override service methods.

}

HttpServlet : it is a type of abstract class which internally extends GenericServlet and provided body for service methods as well as provided some extra methods in the form of doXXX like doGet, doPost, doPut and doDelete.

class MyDemo extends HttpServlet {

service or doGet or doPost or doPut or doDelete

}

After deploy or run the application on server now client need to send the request

<http://localhost:8080/ProjectName/UrlPatternName>

Day 6 : 4/23/2023

RequestDispatcher is a interface which provided set of methods which help to redirect from one page to another page.

Syntax to create RequestDispatcher reference

RequestDispatcher rd = request.getRequestDispatcher(“path”);

If target page is another servlet page then path must be url pattern of that servlet page.

If target page is html or jsp then path must be pagename.html or pagename.jsp

rd.forward(request,response); // we can see output of only target page

rd.include(request,response); // source + target page content as one output.

Limitation of Servlet :

1. Servlet is normal java program if we do any changes in servlet

We need to re compile that application again.

1. If we want to write any html or presentation logic in servlet we need to write inside

pw.println(“<h2>welcome to servlet program</h2>”);

1. Servlet is complex. If we want to display any static message through servlet. We need to create java class that class must be extends or implements type of servlet. Then we need to override doGet or doPost method. Then create PrintWriter class object and we need to provide servlet configuration details in web.xml file.

JSP : Java Server Pages . JSP is a tag base interpreter scripting language which help to create dynamic web page on server side.

Jsp tags

1. Scripting
   1. Scriptlet

<%

We can write java code. Like doGet or doPost

%>

* 1. Declarative tag :

<%! Variable declaration %>

* 1. Expression tag :

<%=expression %>

1. Implicit object
   1. out : it is like a PrintWriter class object.
   2. request : it is equal to HttpServletReqeust reference.
   3. Response : it is equal to HttpServletResponse reference.
2. Directive tags
3. Action tags

JavaScript

AJAX :

Limitation of JSP :

1. JSP is a type of servlet. When we run the program on browser internally jsp convert to servlet. That phase is known as page translation. JSP is slower than servlet.
2. If we write business logic or database logic in jsp. That code is not secure.
3. In jsp we can do re-usability of set of code.

MVC : Model View Controller

View -🡪 HTML (static ) and JSP (Dynamic)

Controller -🡪 Servlet (if we write business logic or database logic inside doget or dopost method that logic become local to that servlet programs).

Servlet must be receive value from view technology ie html or jsp. Set those information to JavaBean class object and pass that object to service layer

Model -🡪

JavaBean -🡪Login

Service 🡪LoginService

Dao -🡪LoginDao

Resource -🡪 DbResource

LoginMVCApp : Sevlet, JSP and JDBC with MVC Style

Day 6 : 4/29/2023

Object scope or variable scope

1. Page scope or servlet scope : instance variable part of servlet or jsp consider as page or servlet scope.
2. Request scope.

Servlet and JSP. Object creation servlet and JSP is taken care by web container.

Demo type of Servlet {

String name = “Ravi”; instance variable.

doGet

int age=21; local variable and scope within that method.

TreeMap tm = new TreeMap();

tm.put(1,”Ravi”);

request.setAttribute(“key1”,name);

request.setAttribute(“key2”,age);

request.setAttribute(“key3”,tm);

doPost

}

Home type of servlet or home.jsp

doGet

Object obj1 = request.getAttribute(“key1”);

Object obj2 = request.getAttribute(“key2”);

Object obj3 = request.getAttribute(“key3”);

TreeMap tm1 = (TreeMap)obj3;

doPost

View -🡪 HTML, CSS, Bootstrap , JavaScript and (JSP as view)

Our view as Angular or React JS or Vue JS

Controller -🡪 Servlet or Spring MVC Spring Rest or Spring boot with res

Model 🡪

Java Bean or entity class or pojo

Service : no changes

Dao : pure jdbc or orm (hibernate or jpa) or spring data

Resource class ; Java class or xml file or properties file.

If our view as JSP then controller must be servlet. Controller and View technologies are tightly coupled each others.

Banking Application

View as JSP or HTML

Controller layer

Model layer

Controller and View technologies are tightly coupled to each others.

Controller and View must be loosely coupling.

Amazon --🡪Java Technologies or .net or php etc.

Payment -🡪 Paytm python

Paypal asp.net

Google pay php

Phone pay node js

Credit or debit card

Net banking

Web Service

Java (req)

Amazon XML/JSON HSBC

Java .net(res) .net

eXtensible Markup language

JSON : JavaScript object notation

Employee emp = new Employee()

emp.setId(100);

emp.setName(“Ravi”);

emp.setSalary(12000);

XML

<Employee>

<Id>100</Id>

<Name>Ravi</Name>

<Salary>12000</Salary>

</Employee>

JSON

{“Id”:100,”name”:”Ravi”,”salary”:12000}

Web Service : Giving the service for web application when two or more than one web application running using different language or technologies.

SOAP base web service : Simple Object Access Protocol : In SOAP Web service we can consume and produce the data only in the form of XML.

SOA : Service Oriented Architecture

Restfull web service : Representation State Transfer

In Rest full web service we can consume and produce the data in any format on demand

Like XML, JSON, plain text, html

WSDL : web service description language. Which provide service details.

Class Demo {

sayHello(String name)) {

return “Welcome to my web app”;

}

}

To achieve Rest full Web service using Java

Servlet

JAX\_RS /JAX\_WS

Java API for XML RestFull web service

Java API for XML Web Service

Using third party library we have to make Normal Servlet as rest full web service.

We need to make the response as in the form json. If we make the response as json format

Then any other technologies can call our servlet programs.

If we use normal servlet then our view must be html or jsp.

But using third party module we can produce and consume the data in json format. Then view can be any technologies like asp.net, php, angular, react or any rest client application can call our application.

Spring MVC

If view is normal html or jsp they support only get and method. Html form doesn’t support delete and put method.

According to Rest Full Web service

doGet method : it is use to get the resource : retrieve product, orders, login, customer details in the form of json.

Select query

doPost method : it is use to store the resource : store product info, customer info, order info

insert query

doDelete method : it is use to delete the resource : delete employee record using id, delete product record using pid etc.

delete query

doPut method : it use to update the resource : update employee salary using id, update product name, qty, price using pid etc.

update query

Day 7 : 4/30/2023

Creating dynamic web project with tomcat server and then we convert this project

Into maven project to get pom.xml file to added dependencies.

Cors Policy : Cross Origin Resource Sharing

Frontend -🡪 Angular running on internal web server with port number 4200

Backend 🡪 Java (JEE) running on tomcat server with port number 8080.

Two domain or server are communicating to each others through browser.

In Backend technologies we need to disable cors policy features.