of Expt. Java program based on branching and looping statement. Date 3-8-2023

- Branching statements in Java-

Branching statements are the statements used to jump the flow of execution from one part of a program. to another.

- Selective statement can be further classified as :-

1] if :- It is used to decide whether a certain statement or block of statement will be executed or not.

Syntax :-
```
if (condition)
{
 // statements of execute if
 // condition is true
}
```

2] if-else :- It is used to execute a statement when a particular condition is true or false.

Syntax :-
```
if (condition)
{ //Execute this block if the condition is true
}
 else
{
 // Execute this block if condition is false.
}
```

3] switch :- It provides an easy way to dispatch execution to different parts of code based on value of expression.

Syntax :-
```
switch (x) {
case 1: action 1
case 2: action 2
.... default:
        default action
}
```

- Looping statements in Java :-

Looping in programming language is a feature that facilities the execution of a set of instructions/ functions repeatedly while same condition evaluates to true.

- Types of looping statements in Java :-

1] for loop :- A for loop executes a block of code as long some condition is true.

Syntax :- for (initialization: condition: increment/ decrement)
{
statement (s);
}

2] While loop :- A while loop is control flow statement that allows code to be excited repeatedly based on given Boolean condition.

Syntax :- while (boolean condition)
{
loop statements...
}

3] do-while-loop :- do-while loop is similar to while loop with only difference that it checks for condition after executing the statements and therefore is an example of Exit control loop.

Syntax :- do
{
statements...
}
while (condition);

e of Expt. Java program based on type casting Date 10-8-2022

Type Casting :-

Converting one primitive data types into another is known as type casting (type conversion) in java.

You can cast the primitive data types in two ways namely :

① Implicit type casting (Widening)
② Explicit type casting (Narrowing)

1] Widening / Automatic / Implicit type casting-

- Converting a lower datatype to higher datatype is known as widening.
- byte → short → char → int → long → float → double
- In this case the casting / conversion is done automatically therefore, it is known as implicit type casting.
- In the case of widening type casting, the lower datatype (having smaller size) is converted into the higher datatype (having bigger size)
- Hence there is no loss in data. This is why this type of conversion happens automatically.
- In this case both datatypes should be compatible with each other.

2] Narrowing / Explicit / Manually type casting :-

- Converting a higher datatype to a lower datatype is known as narrowing.
- double → float → long → int → char → short → byte
- In this case the casting / conversion is not done automatically. you need to convert explicitly using the cast operator "( )" explicitly.
- Therefore it is known as explicit type casting. In this case both datatypes need not be compatible with each other.
- In the case of narrowing type casting, the higher data type (having large size) are converted into smaller data types (having small size). Hence there is the loss of data.

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e of Expt. Java program based on command line argument Date 17-8-2023

Command-line argument :-

The java command line argument is an argument i.e passed at the time of running the java program.

The arguments passed from the console can be recieved in the java program and it can be used as an input. so it provides a convenient way to check the behaviour of the program for the different value.

The command line argument in java is the information passed to the program at the time of running the program. It is the argument passed through the console when the program is run.

The command line argument is the data that is written right after the programs name at the command line while executing the program.

Command line arguments in c are passed to the main function as argc & argv. command line arguments are used to control the program from the outside.

argv[argc] is a NULL pointer.

The name of program is stored in argv[0] the first command-line argument parameter in argv[1] and the last argument in argv[n].

An argument is a value passed to a function when the function is called. whenever any function is called during the execution of the program there are some values passed with the function. These value are called arguments.

- "infile.txt" is passed as args[0] to main:

```
Public static void main (string [] args)
throws IOException {// First check to see if the program
was run with the command line argument if (args).
```

Syntax:

```
java yourprogramclassName arg1 arg2 arg3
```

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e of Expt. Java program based on object, field, class and method. Date 17-8-2023

Class :-

A class is a group of objects which have common properties. It is a template or blueprint from which objects are created.

It is logical entity. It can't be physical. A class in java can contain : fields, methods, constructors, Blocks Nested class and interface.

Syntax:

```
access_modifier class< class_name>
{
 data member:
 method:
 constructor;
 nested class:
 interface;
}
```

Object :-

An object is an instance of class. A class is template or blueprint from which objects are created. So an object is the instance (result) of a class.

The object is an entity which has state and behaviour. An object is a runtime entity.

Syntax:

```
class_name object = new class_name();
```

Methods :-

Methods in java or java methods is a collection of statements that perform some specific task & return the result to the caller.

Syntax :-

```
<access_modifier><return_type> <method name>
(list of parameters)
{
  // body
}
```

Where -

① Modifier - It is defines the access type of the method It may be public, protected, private default.

② return type - The data types of the value returned by the method.

③ Method name - The rules for field names apply to the method names.

④ Parameter list - Comma separated list of Input parameter is defined, preceded with there data type, within the enclosed parantheses ().

Name

Title of Expt. Java program based on Method overloading Date 24-8-2023

Method Overloading :-

If the class has multiple methods having same name but different in parameters, it is known as method overloading. If we have to perform only one operation having same name of methods increases the readability of the program.

Suppose, you have to perform addition of the given numbers but, there can be number of arguments. If you write the method such as a(int, int) for two parameters and b(int, int, int) for three parameters, then it may be difficult for you as well as other programmer to understand the behaviour of the method because its name differs. So we perform method overloading.

Rules :-

1) Method name must be same
2) Parameter or argument must be different (sequence of argument, number of argument or data type should be different)
3) Return type can be anything.
4) Access specifier can be anything.
5) Exception thrown can be anything.

- Different ways to overload a method.-
  ① By changing number of arguments.
  ② By changing the data type.

Example :-

```
class Adder
{
static int add (int a, int b)
{
return a+b;
}
static int add (int a, int b, int c)
{
return a+b+c;
}
}
```

Name

Title of Expt. Java program based on constructor and constructor overloading. Date 31-8-2023

Constructor:-

In java, constructor is a block of codes similar to the method. It is called when instance of the class is created. Constructor name must be the same as its class name.

Types :- ① Default Constructor
② Parameterized constructor
③ Copy Constructor.

① Default Constructor:-

A constructor is called default constructor when it doesn't have any parameter. The default constructor is used to provide the default values to the object like null etc.

Syntax:- <class_name>() {}

② Parameterized Constructor:

A constructor which has a specific number of parameters is called parameterized constructor. It is used to provide different values to distinct objects.

Syntax:- <class_name>(parameter_list)
{
—
—
—
}

③ Copy Constructor:-

In java, copy constructor is a special type of constructor that creates an object using another object of same java class.

It returns the duplicate copy of an existing object of the class.

Syntax:- class-name (obj. ref)

```
{
==
}
```

- Constructor Overloading:

Constructor overloading in java, is a technique of having more than one constructor with different parameter lists. They are arranged in a way that each constructor performs a different task.

They are differentiated by the compiler by the number of parameters in the list and their types.

Example :

```
Class A
{
  A()
 {
 ==
 }
 A(int x)
 {
 ==
 }
 A(double, string z)
 {
 ==
 }
}
```

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Title of Expt. Java program based on Array

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Array :-

Array is a collection of similar data items. Array is an object in java, which contain similar type of data in a contiguous memory location. Array are used to store the multiple numbers of elements of a single type.

The length of array is established at the time of array creation. After creation the of array length is fixed. The items presented in the array are classed elements. Those elements can be accessed by index values The index is begins from zero(0).

1] One-dimensional Array -

The type of array which stores elements of the same data type in linear sequence is called as one-dimensional Array.

Declaration -

① int[]a;
② int[]a;
③ int a[];

Initialization :-

approach 1 : int a[] = {10,20,30,40};

approach 2 : int []a = new int [100];

a[0] = 100;
a[1] = 20;
a[2] = 30;
a[4] = 40;

2] Two-dimensional Array:
In this type of array elements are stored in rows and columns format that is matrix form.

Declaration :-

① int [][] a;
② int [][]a;
③ int a[][];
④ int [] a[];

Initialization :-

int [][]a = {{10,20,30},{40,50,60}};

Advantage of Array -

① Length of code will be decreased.
② We can access the element present in the any location
③ Readability of the code will be increased.
④ Arrays are the simplest form of data structure and are easy to use.

Title of Expt. Java program base on collection Date 21-9-2023

Collection :-

The collection in java is a framework that provides an architecture to store and manipulate the group of objects.

Java collection can achieve all the operations that you perform on a data such as searching, sorting insertion, manipulation and deletion.

Java collection means a single unit of object. Java collection framework provides may interface (set, list, queue, deque) and classes (ArrayList, Vector, Linked List, Priority Queue, Hashset, Linked Hashset, Tree set)

- It provides readymade architecture.
- It represents a set of classes and interfaces.
- It is optional.

The collection framework represents a unified architecture for storing and manipulating a group of objects. It has :

1. Interfaces & its implementations
   i.e. classes.
2. Algorithm.

Name

Title of Expt. Java program based on Inheritance Date 5-10-2023

Inheritance :-

Inheritance in Java is a mechanism in which one 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 represent the IS-A relationship which is also known as parent - child relationship.

* Use of inheritance in Java :-
  - For method overloading (so runtime polymorphism) can be achieved.
  - For code reusability.

* The Syntax of Java Inheritance :-

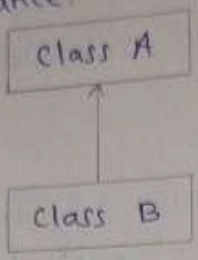
```
1. Class subclass_name extends superclass_name
2. {
3. // Method and field
4. }
```

Types of Inheritance :-

① Single Inheritance.
② Multilevel Inheritance.
③ Hierarchical Inheritance.

1. Single Inheritance :-

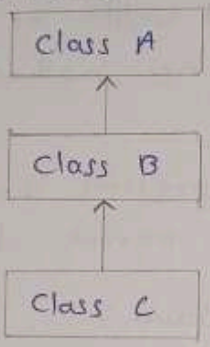
When a class inherits another class, it is known as a single inheritance.



Single Inheritance.

2. Multilevel Inheritance :-

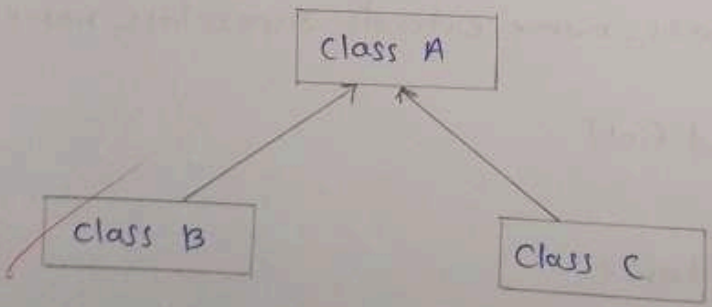
When there is a chain of inheritance it is known as Multilevel inheritance.



Multilevel Inheritance

3. Hierarchical Inheritance :-

When two or more classes inherits a single class, it is known as hierarchical inheritance.



Hirrarchical Inheritance.

Title of Expt. Java program based on method overriding Date 12-10-2023

Method Overriding in Java:-

If sub class (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 sub-class provides the specific implementation of the method that has been declared by one of its parent class is known as method overriding.

Usage of Java Method Overriding:-

- Method overriding is used to provide the specific implementation of a method which is already provided by its super class.
- Method overriding is used for runtime polymorphism.

Rules of Method Overriding:-

1) The method must have the same name as in the parent class.

2) The method must have the same parameters as in parent class.

3) There must be an IS-A relationship (inheritance)

Example:-

```
class Animal {
void eat(){ system.out.println("eating...");
}
class Dog extends Animal{
void eat(){ system.out.println("eating bread");
}
```

* Dynamic Method dispatch in Java :-

Dynamic method dispatch or Runtime polymorphism:
Dynamic polymorphism is the process or mechanism in which a call to an overriden method is to resolve at runtime rather than compile time. It is known as runtime polymorphism or dynamic method dispatch.

We can achieve polymorphism by using the method overriding. When an overriden method is called through a superclass reference. Java determines the superclass which version (superclass / subclass) of that method is to be executed based upon the type of object being refered to at time the call occurs. Thus this determination is made at run time.

At the runtime, it depends on the type of the object being refered to (not the type of the reference variable) that determines which version of an overriden method will be executed.

• Uncasting :-

If the reference variable of parent class refers to the object of child class it is known as upcasting. Java usage this fact to resolve calles to overriden method at runtime.

Example :-

```
Class A { }
Class B extends A { }
A a = new B(); // upcasting.
```

Title of Expt. Java program based on Abstract class. Date 12-10-2023

Abstract class :-

Abstract class is a restricted class that can not be used to create object (to access it, must be inherited from another class).

Abstract Method :-

Abstract method can only be used in an abstract class & it does not have a body.

The body is provided by the subclass (inherited class)

1) An Instance of an abstract class cannot be created.
2) Constructor are allowed.
3) We can have an abstract class without any abstract method.
4) There can be a final method in abstract class but any abstract method is class. (abstract class) cannot be declared as final or in simpler terms.
5) We can define static methods in an abstract class.
6) We can use the abstract keyword for declaration top-level classes (outer class) as well as inner class as abstract.
7) If a class contains atleast one abstract method then compulsory should declare a class as abstract.

8) If the child class is unable to provide implementation to all abstract method of parent class then we should declared child class as abstract so that the next level child class.

Example:

```
abstract class shape
{
  int colour;
  // An abstract function
    abstract void draw();
}
```

Title of Expt. Java program based on Interface Date 14-10-2023

Interface :-

- An interface in java is a blueprint of a class. It has static constants and abstract methods.
- The interface in java is a mechanism to achieve abstraction. There can be only abstract method in the java interface, not method body.
- Interface is used to achieve abstraction & multiple inheritance in java.
- An interface is declared by using interface keyword.
- It is provides total abstraction; means all the methods in an interface are declared with the empty body, and all the fields are public, static & final by default.
- We can achieve 100% abstraction by using the interface.
- A class that implements an interface must implement all the methods declared in the interface.
- Interface methods do not have a body. The body is provided by the "implement" class.
- To access the interface methods, the interface must be "implemented" (like inherited) by another class with the implements keyword (instead of extends).
- The body of the interface methods is provided by the implement class.

Syntax :-

```
interface < interface_name >
{
  // declare constants fields
  // declare methods that abstract by default
}
```

Title of Expt. Java program based on Packages Date 17-10-202

Java Packages :-

A packages is a grouping of related classes and interface providing access protection and name space management.

Advantage of Java Package :-

1) Java packages is used to categorize the classes and interface so that they can be easily maintained.
2) Java package provides access protection.
3) Java package removes naming collision.

- Packages are divided into two categories :-

① Built-in package (Package from Java API)
② User defined packages (Create your own package)

1] Built-in Package :-

The built in package from Java API. The Java API is library of pre-defined classes, interface and sub-packages.

The built in packages were included in JDk.

2] User-defined packages -

The user-defined packages are the package that are defined by user.

- Creating a Package :-

The package keyword is used to create or define a package in java.

- Syntax :-

  Package packageName ;

- To compile java package :-

  java -d Destination_Folder File-name.java

If you are not using and IDE, you need to follow the syntax.

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Title of Expt. Program on exception handling & user defined exception.

Date 26-10-2023

Exception Handling :-

The exception handling in java is one of the powerful mechanism to handle the runtime errors. so that normal flow of the application can be maintained. Exceptions can be recovered by using try-catch, finally blocks.

- try :- The "try" keyword is used to specify a block where we should place exception code. The try block must be followed by either catch or finally.
- Catch :- The "catch" block is used to handle the exception. We can't use catch block alone. It can be followed by finally block later.
- Syntax of try-catch block :-

```
try {
// Block of code to try
}
catch (Exception e) {
// Block of code to handle errors.
}
```

- Multiple catch block :-

For each try block there can be zero or more catch blocks. Multiple catch allow as to handle each exception differently.

- Syntax for multiple catch block :-

```
try {
// protected code
}
catch (ExceptionTypes e1)
{
// catch block
}
```

```
}
catch (ExceptionType2 e2)
{
// catch block
}
```

- finally :- In java, the finally block is always executed no matter whether there is an exception or not. The finally block is optional.

Syntax:

```
try {
// Block of code to try
}
catch (Exception e)
{
// Block of code to handle errors
}
finally
{
// finally block always executes
}
```

- User defined Exception :-

In java we can create our own exceptions that are derived classes of the exception class. creation our own exception is known as custom exception or user defined exception.

To create custom exception, we need to extends exception class that belongs to java.lang package.

for example,

```
public class WrongFileNameException extends Exception
{
    public WrongFileNameException (string errorMsg)
    {
     super (errorMsg)
    }
}
```

Title of Expt. Java program based on Multithreading Date 26-10-2023

Multithreading :-

Multithreading in java is a process of executing two or more threads simultaneously to maximum utilization of CPU.

Multithreading application execute two or more threads run concurrently. Hence it is also known a concurrently in java.

Each thread runs parallel to each other multiple threads don't allocate separate memory area, hence they save memory. Also, context switching between threads takes less time.

Multithreading in java an act of executing a complex process using virtual processing entities independent of each other. This entities are called as threads.

Threads in java are virtual and share the same memory location of the process as the threads are virtual.

- Advantages of Multithreading :-
  - The users are not blocked because threads are independent, and we can perform multiple operation at a times.
  - As such the threads are independent, the other threads won't get affected if one thread meets an exception.