JAVA PROGRAMMING

COURSE NAME: MCA – 5TH SEMESTER

LAB MANUAL

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WEEK 1:

(b) Setting the PATH variable to the appropriate directory location.

1. Setting the PATH variable temporarily:
   To set the temporary path of JDK, you need to follow the following steps:

- Open the command prompt
- Copy the path of the JDK/bin directory
- Write in command prompt: set path=”Path of the bin folder in java”
- Example:

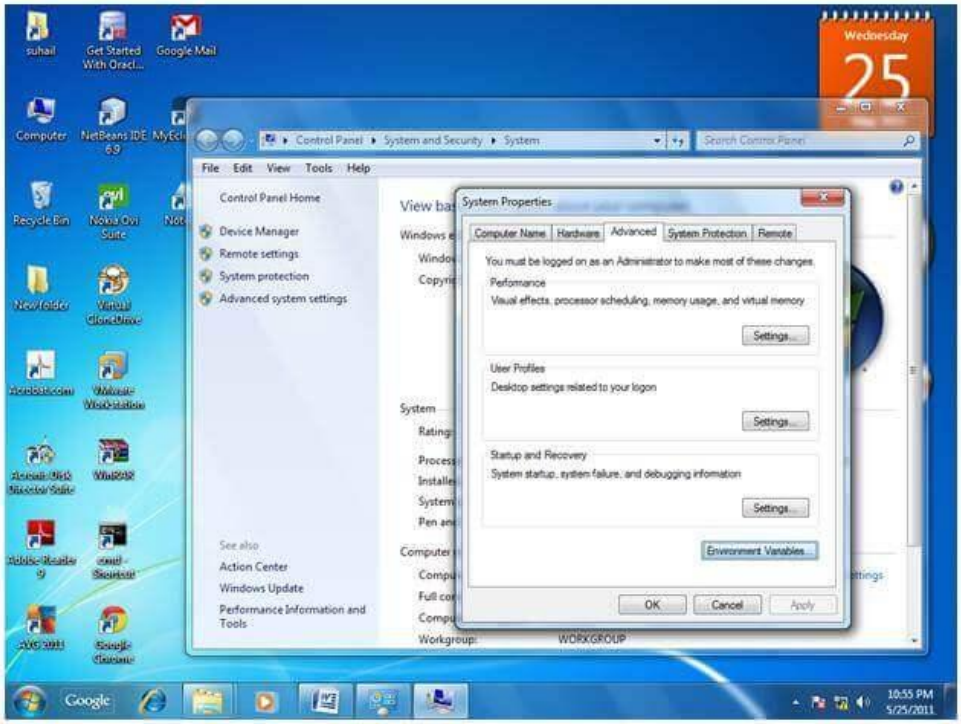
C:\>set path=C:\Program Files\Java\jdk1.6.0_23\bin

Setting the PATH variable permanently in Java:

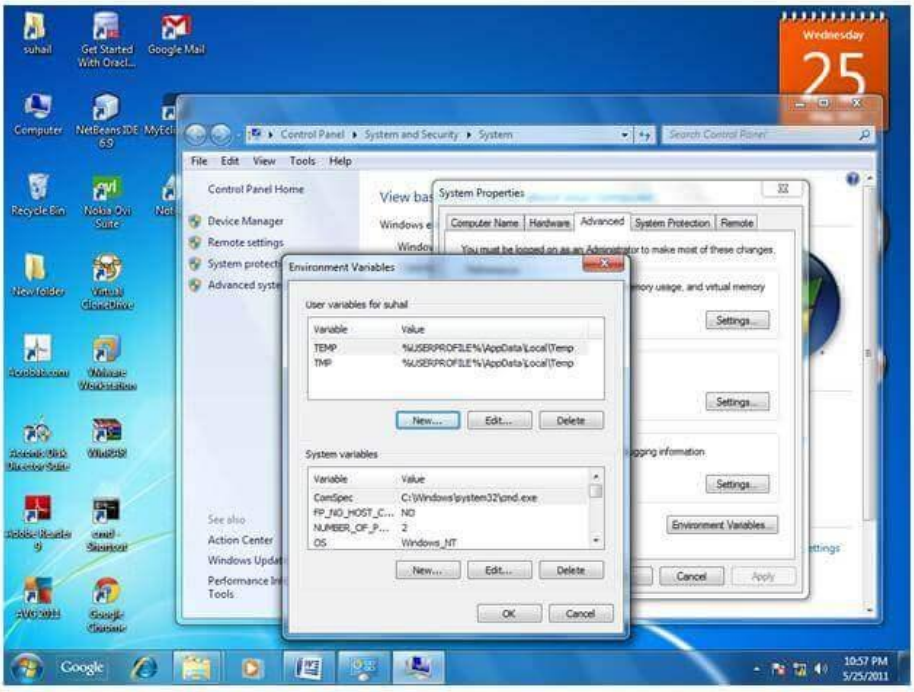
1) Go to MyComputer properties

2) Click on the advanced tab

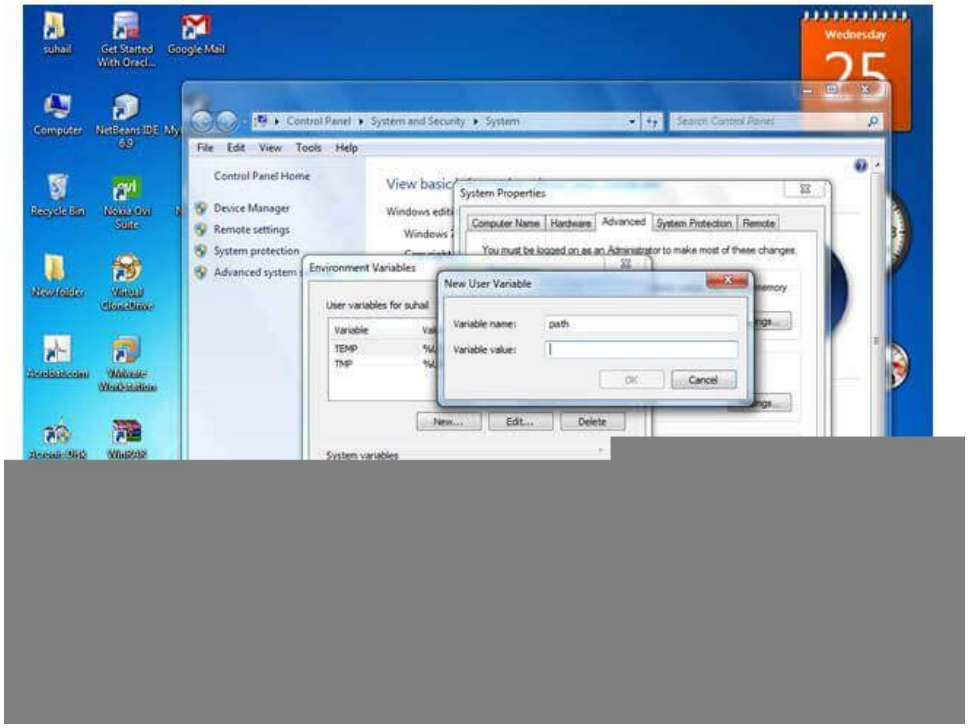
3)Click on environment variables



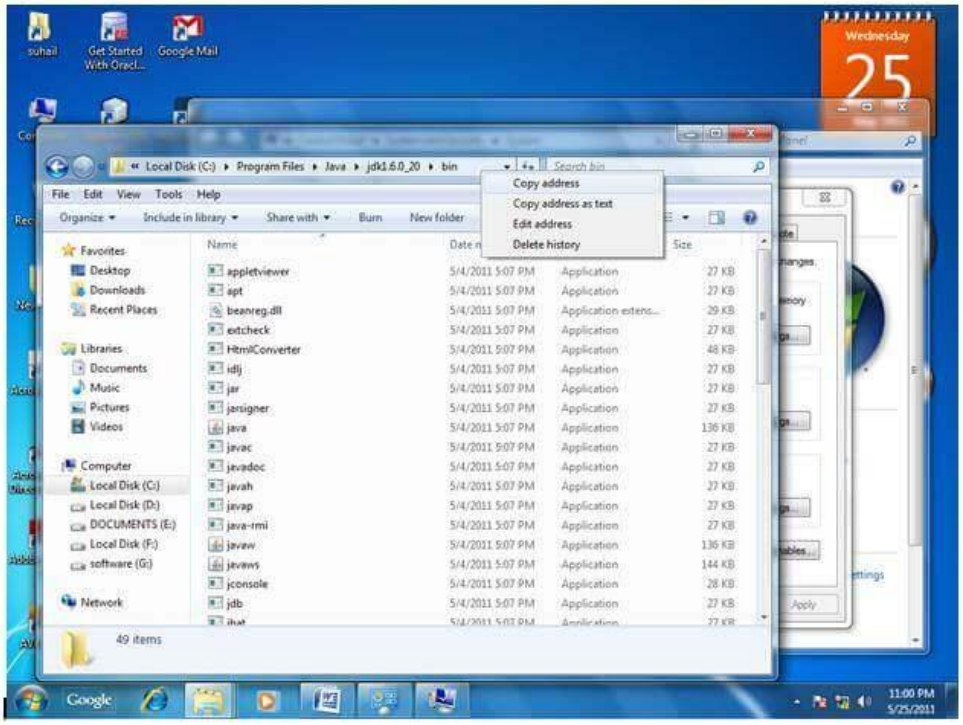
4) Click on the new tab of user variables



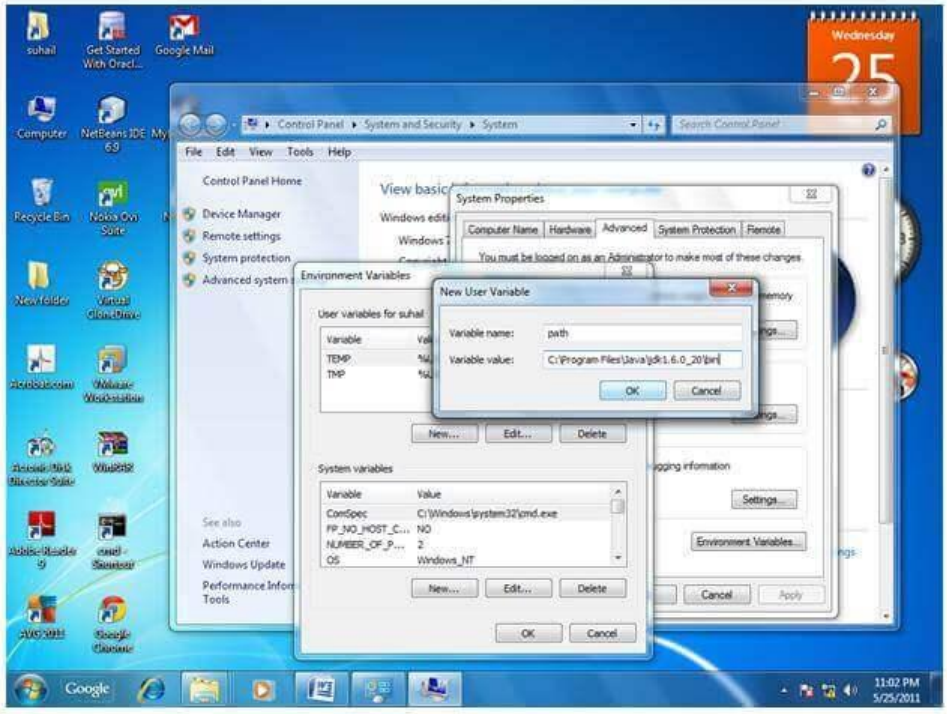
5) Write the path in the variable name



6) Copy the path of bin folder



7) Paste path of bin folder in the variable value



8) Click on ok button till all the tabs are closed.

WEEK 2:

(a) Program to display "HelloWorld!" on the careen.

```
/*My first Java Program*/
class first
{
 public static void main(String args[])
{
  System.out.println("Hello World!");
 }
}
```

(b) Write a Java program that receives two integer numbers via keyboard, does their summation, and displays the result. Ensure that only integer values are processed.

```
//program to determine the summation of two integers inputted via keyboard
import java.util.Scanner;
class summation
{
public static void main(String args[])
{
Scanner input=new Scanner(System.in);
System.out.print("Enter first number");
int number1=input.nextInt();
System.out.print("Enter second number");
int number2=input.nextInt();
int result;
result=number1+number2;
System.out.println("Result obtained after addition is: " +result);
}
}
```

(c) Write a Java program that creates a 2D integer array with 5 rows and varying number of columns in each row. Using '*for each*' variant of *for* loop display each element of every row.

//Using for each variant of the for loop to display elements of a 2D array

```
import java.util.Scanner;
class twodarray
{
public static void main(String args[])
{
```

```
int twoD[][]=new int[5][];
twoD[0]=new int[3];
twoD[1]=new int[5];
twoD[2]=new int[4];
twoD[3]=new int[6];
twoD[4]=new int[2];
int k=0;
Scanner input=new Scanner(System.in);
System.out.print("Enter array elements");
for(int i=0;i<5;i=i+1)
    {
     k=0;
     for(int j:twoD[i])
          {
          twoD[i][k++]=input.nextInt();
          }
     }
//for eachvariant to print the array
for(int i=0;i<5;i=i+1)
    {
    for(int j:twoD[i])
        {
         System.out.print(j+"   ");
        }
  System.out.println("");
    }
}
}
```

Do it yourself:

(a) Write a Java program that prints the season name corresponding to its month number using *If-else* and *switch-case* statements.

(b) Write a Java program that sorts (using *bubble sort*) an integer array using *for* loop.

(c) Write a Java program that calculates factorial of a number (inputted via keyboard) recursively.

WEEK 3:

(a) Write a Java program in which a Class overloads a method *sum()*, which takes 2 parameters. The overloaded methods should perform summation of either integer or floating-point values.

```
// Java program to demonstrate working of method  overloading in Java.

import java.util.Scanner;
class Sum
{
 // Overloaded sum(). This sum takes two int parameters
 public int sum(int x, int y)
 {
 return (x + y);
 }

 // Overloaded sum(). This sum takes two double parameters
 public double sum(double x, double y)
{
 return (x + y);
}

 public static void main(String args[])
{
 int i=1,option;
 Scanner input=new Scanner(System.in);
 Sum s=new Sum();
 while(i==1)
        {
        System.out.println("Press (1) to add two integers");
        System.out.println("Press (2) to add two floating point numbers");
        System.out.println("Press (3) to exit");
        option=input.nextInt();
        switch(option)
                {
                  case 1:
                  System.out.print("Enter first number");
                  int number1=input.nextInt();
                  System.out.print("Enter second number");
                  int number2=input.nextInt();
```

```
                System.out.println("The sum of numbers=" +s.sum(number1,number2));
                break;

                 case 2:
                 System.out.print("Enter first number");
                 double num1=input.nextDouble();
                 System.out.print("Enter second number");
                 double num2=input.nextDouble();
                 System.out.println("The sum is equal to " +s.sum(num1,num2));
                 break;

                case 3:
                 i=0;
                 break;
                 }     //switch
            }   //while
     } //main
}//class ends
```

Do it Yourself:

(a) Write a Java program that creates a Class, namely *Student*.

i. Ensure that *Age* instance variable of the Class is never accessed directly, and its value is never less than 4 and greater than 40 for any Object of the Class (use methods to validate and assign the value).

ii. Ensure that the constructor always assigns a unique value to *Enrollment_No* instance variable for every Object of the Class (use a *static* class variable for counting objects, say *Object_Counter*).

iii. Ensure that when an Object is removed, the *Object_Counter* is automatically decremented (use *finalize()*), and whenever required the variable can only be accessed using a method even without an Object reference (make the counter private and use a *static* method to access it).

WEEK 4

Write a Java program that creates a Class namely*A* that has a private instance variable and method, a protected instance variable and method, a default instance variable and method, and a public instance variable and method. Create another Class say *B* that inherits from *A*.

a. **Show that all except private members are inherited.**

```
import java.lang.*;
class A
{
private int a;
protected int b;
int c;
public int d;

private void show_a()
{
System.out.println("Value of private variable a =" +a);
}

protected void show_b()
{
System.out.println("Value of protected variable b =" +b);
}

void show_c()
{
System.out.println("Value of default variable c =" +c);
}

public void show_d()
{
System.out.println("Value of public variable d =" +d);
}

}

class B extends A
{

/*void update_a()
{
a=a+10;
System.out.println("Value of private variable a =" +a); wont compile as a is a private
member of the super class A
}*/
```

```
void update_b()
{
b=b+10;
System.out.println("Value of protected variable b after update =" +b);
}

void update_c()
{
c=c+7;
System.out.println("Value of default variable c after update =" +c);
}

void update_d()
{
d=b+c;
System.out.println("Value of public variable d after update =" +d);
}

public static void main(String args[])
{
B obj1=new B();
//obj1.show_a();                    //wont compile as show_a is a private method
obj1.show_b();
obj1.show_c();
obj1.show_d();
//obj1.update_a();
obj1.update_b();
obj1.update_c();
obj1.update_d();
}
}
```

ii. Show that an inherited instance variable can be shadowed (with the same or weaker access visibility) but can be accessed using *super* keyword in the sub-class.

```
import java.lang.*;
class A
{
private int a;
protected int b;
int c;
public int d;

private void show_a()
{
```

```
System.out.println("Value of private variable a =" +a);
}

protected void show_b()
{
System.out.println("Value of protected variable b =" +b);
}

void show_c()
{
System.out.println("Value of default variable c =" +c);
}

public void show_d()
{
System.out.println("Value of public variable d =" +d);
}

}

class B extends A
{

private int b=30;

void update_b()
{
b=b+10;     //local variable b accessed
System.out.println("Value of protected variable b after update =" +b);  //output b=40
b=super.b+10;     //superclass variable b accessed
System.out.println("Value of protected variable b after update =" +b);  //output b=10

}

void update_c()
{
c=c+7;
System.out.println("Value of default variable c after update =" +c);
}

void update_d()
{
d=b+c;
System.out.println("Value of public variable d after update =" +d);
}
```

```
public static void main(String args[])
{
B obj1=new B();
obj1.show_b();
obj1.show_c();
obj1.show_d();
obj1.update_b();
obj1.update_c();
obj1.update_d();
}
}
```

iii. Show that the reference variable of type A or B can't access an overridden method of A in the Object of B.

```
import java.lang.*;
class A
{
void callme()
{
System.out.println("Inside class A's callme method");
}
}

class B2 extends A
{
void callme()
{
System.out.println("Inside class B's callme method");
}

public static void main(String args[])
{
A a=new B();
B b=new B();
b.callme();  //B's callme method called when a reference variable of type A refers to an object of
B
a.callme(); //B's callme method called
}
}
```

Do it yourself:

i. Show that an inherited method can be overridden (with the same or weaker access visibility) but canbe accessed using *super* keyword in the sub-class.
ii. Show that the reference variable of type A can access a shadowed data member of A in the Object of B.