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Experiment No.1
Basic Program Constructs like Branching and Looping.
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Aim :- To apply programming constructs of decision making and looping.

Objective :- To apply basic programming constructs like Branching and Looping for solving arithmetic problems like calculating factorial of a no entered by user at command prompt .

Theory :-

Programming constructs are basic building blocks that can be used to control computer programs. Most programs are built out of a fairly standard set of programming constructs. For example, to write a useful program, we need to be able to store values in variables, test these values against a condition, or loop through a set of instructions a certain number of times. Some of the basic program constructs include decision making and looping.

Decision Making in programming is similar to decision making in real life. In programming also we face some situations where we want a certain block of code to be executed when some condition is fulfilled. A programming language uses control statements to control the flow of execution of program based on certain conditions. These are used to cause the flow of execution to advance and branch based on changes to the state of a program.

- if
- if-else
- nested-if
- if-else-if
- switch-case
- break, continue

These statements allow you to control the flow of your program's execution based upon conditions known only during run time.

A loop is a programming structure that repeats a sequence of instructions until a specific condition is met. Programmers use loops to cycle through values, add sums of numbers, repeat functions, and many other things. ....Two of the most common types of loops are the while loop and the for loop. The different ways of looping in programming languages are

- while
- do-while
- for loop
- Some languages have modified for loops for more convenience eg :- Modified for loop in java.

For and while loop is entry-controlled loops. Do-while is an exit-controlled loop.

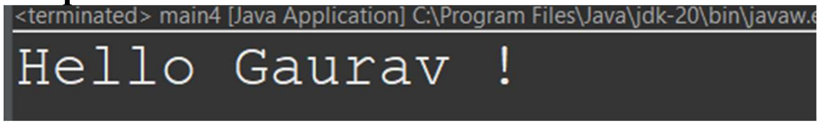
Code:-

1) Hello world

```
class test
{
 public static void main(String []args)
```

```
{
  System.out.println("Hello Gaurav !");
 }
```

Output:



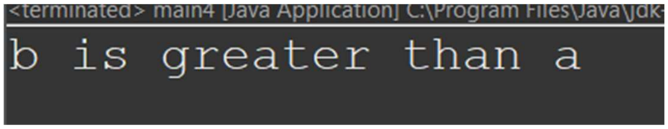
```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-20\bin\javaw.e
Hello Gaurav !
```

```
}
```

2) If-else

```
class test
{
  public static void main(String []args)
{
    int a=5,b=10;
if (a<b)
{
System.out.println("b is greater than a");
}
else
{
 System.out.println("a is greater than b");
}
  }
```

Output:



```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-
b is greater than a
```

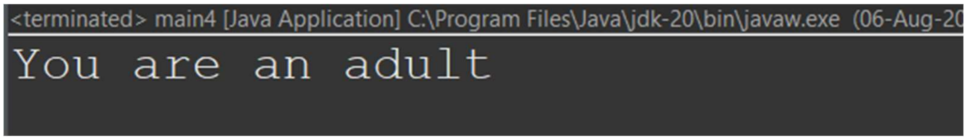
```
}
```

3) Ladder if else

```
class test
{
  public static void main(String []args)
{

   int age=50;
if(age>=18)
{
   System.out.println("You are an adult");

}
 else if(age<=18)
```

```
  {
     System.out.println("You are an teenager");

}


else {
 System.out.println("You are an child");
}
  }

}
```

Output:

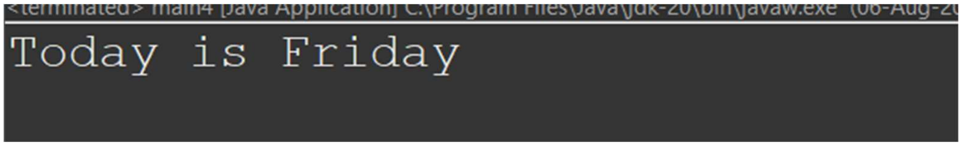


```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-20\bin\javaw.exe  (06-Aug-20
You are an adult
```

4) Switch

```
class test
{
  public static void main(String []args)
{
 int day=5;
switch(day)
{
  case 1:System.out.println("Today is Monday ");
   break;
case 2:System.out.println("Today is Tuesday");
   break;
case 3:System.out.println("Today is Wednesday");
   break;
case 4:System.out.println("Today is Thursday ");
   break;
case 5:System.out.println("Today is Friday");
   break;
case 6:System.out.println("Today is Saturday");
   break;
case 7:System.out.println("Today is Sunday");
   break;
}
}
}
```

Output:

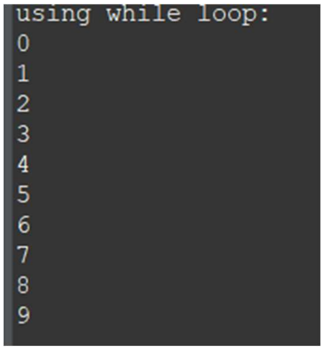


```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-20\bin\javaw.exe (06-Aug-20
Today is Friday
```

5) While loop

```
class test1
{
  public static void main(String []args)
{
int i=0;
System.out.println("using while loop:");
while(i<10)
{
System.out.println(i);
i++;
}



}
}
```

Output:

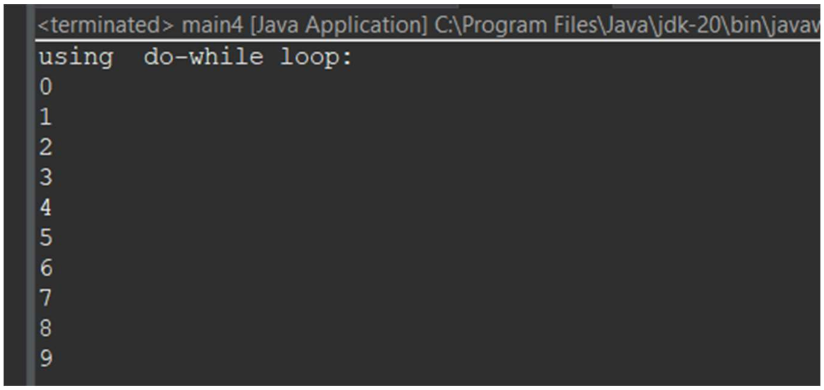


```
using while loop:
0
1
2
3
4
5
6
7
8
9
```

6) Do-while loop

```
class test2
{
  public static void main(String []args)
{
int i=0;
System.out.println("using  do-while loop:");

do{
System.out.println(i);
i++;
}while(i<10);


}
}
```

Output:

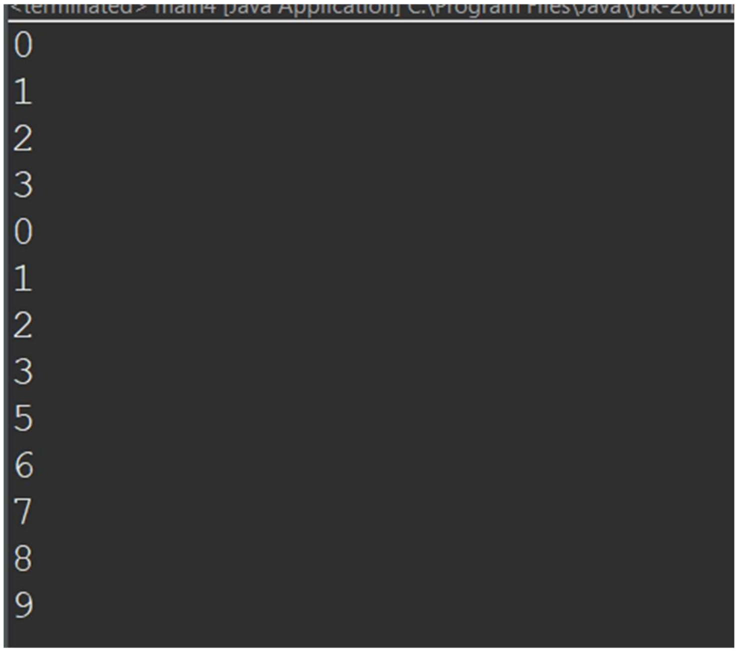


```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-20\bin\javav
using  do-while loop:
0
1
2
3
4
5
6
7
8
9
```

7) Break and continue & for loop

```
class test1
{
  public static void main(String []args)
{
int i;

 for(i=0;i<10;i++)
{
   if(i==4)
{break;
}
System.out.println(i);

}
for(i=0;i<10;i++)
 {
 if(i==4)
{
continue;
}
System.out.println(i);

}
}
}
```

Output:

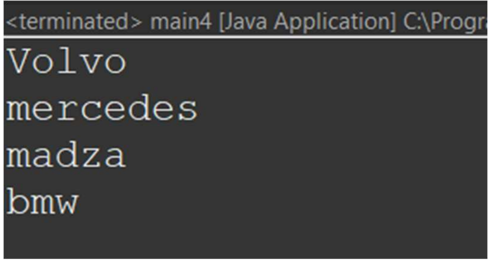


```
<terminated> main4 [Java Application] C:\Program Files\Java\jdk-20\bin
0
1
2
3
0
1
2
3
5
6
7
8
9
```

8) For each loop

```
class test3
{
  public static void main(String []args)
{
  String []cars={"Volvo","mercedes","madza","bmw"};
  for(String i:cars)
{

   System.out.println(i);

}

}
}
```

Output:

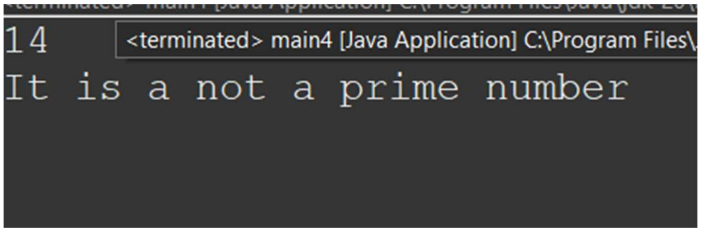


```
<terminated> main4 [Java Application] C:\Progr
Volvo
mercedes
madza
bmw
```

9) Prime no.

```
class test4
{
  public static void main(String []args)
{
int n=14;
int i;
System.out.println(n);
for(i=2;i<=n;i++)
{
  if(n%i==0)
{
  break;

}
}
if(i==n)
{
  System.out.println("It is a prime number ");

}
else
{
  System.out.println("It is a not a rime number");
}
}
}
```

Output:

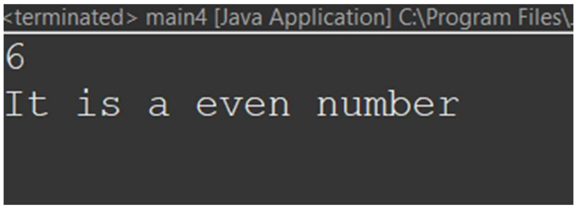


```
14     <terminated> main4 [Java Application] C:\Program Files\
It is a not a prime number
```

10) Even or odd

```
class test4
{
  public static void main(String []args)
{
int n=6;
int i;
System.out.println(n);
if(n%2==0)
{
 System.out.println("It is a even number");
}
else
{
System.out.println("It is a odd number ");
}
}
}
```

Output:

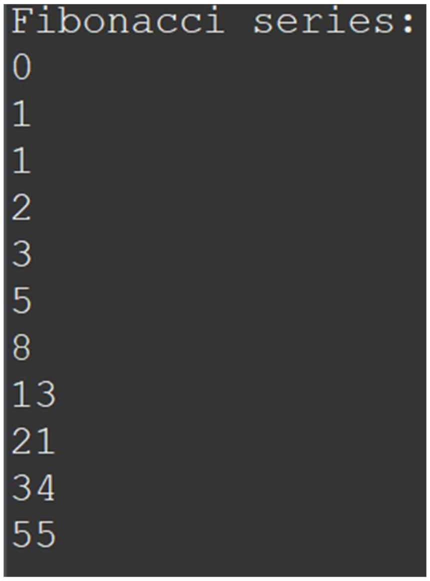


```
<terminated> main4 [Java Application] C:\Program Files\
6
It is a even number
```

11) Fibonacci

```
class test4
{
  public static void main(String []args)
{

        int a = 0;
        int b = 1;
        int c;


        System.out.println("Fibonacci series:");
        System.out.println(a);
        System.out.println(b);

        for (int i = 2; i <= 10; i++) {
            c = a + b;
            System.out.println(c);

            // Update a and b for the next iteration
            a = b;
            b = c;




    }
    }
```

Output:



```
Fibonacci series:
0
1
1
2
3
5
8
13
21
34
55
```

Conclusion:-

Looping and branching process is in very simpler manner and easy to execute. By using these branching and looping constructs effectively, you can control the flow of your program, create dynamic behaviors, and perform tasks efficiently in your code. The application of programming constructs of decision making and looping plays a crucial role in the development of efficient and powerful algorithms and software solutions. Decision-making structures, such as if- else statements and switch-case statements, enable programmers to control the flow of execution based on specific conditions, leading to more flexible and responsive code.
On the other hand, looping constructs, such as for loops, while loops, and do-while loops, allow developers to perform repetitive tasks and iterate over data structures, significantly reducing redundant code and improving the overall efficiency of programs.