Fundamentals of Object Oriented Programming

CSN- 103

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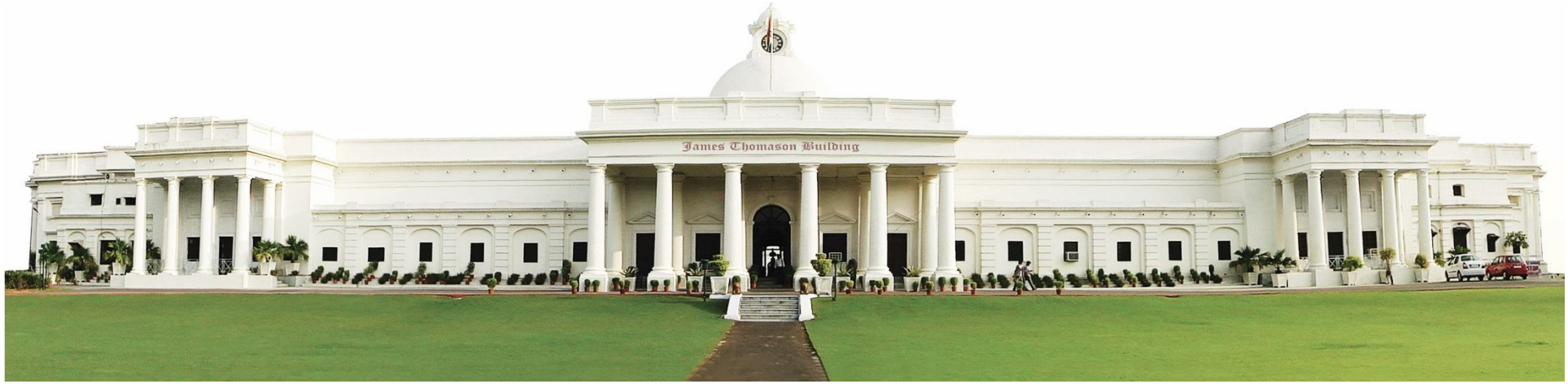


Write a JAVA program to generate Hemachandra series, 1, 2, 3, 5, 8, 13, 21..

```java
import java.util.Scanner;
public class Hemachandra {

   public static void main(String args[]) {
      int H0= 1;
      int H1= 2;
      int H2;
      int n;

    Scanner in = new Scanner(System.in);
    System.out.print("Enter the number\n");
    n = in.nextInt();
    System.out.print(" " +H0);
    System.out.print(" " +H1);

      for(int i = 2; i <= n; i++) {
          H2=H0+H1;
          if (i==n)
          System.out.println("  " +H2);
          else
         System.out.print("  " +H2);
          H0=H1;
          H1=H2;
          }
   }
}
```

H0 = 1
H0 H1 = 2
H1 H2 = 3

Terminal

```
sh-4.3$ javac Hemachandra.java
sh-4.3$ java Hemachandra
Enter the number
12
 1 2  3  5  8  13  21  34  55  89  144  233  377
sh-4.3$
```

To generate first ten Prime numbers

```java
public class Primev1{
    public static void main(String []args){
        int N = 10;
        int count = 0;
        int num = 2;
        while(count != N) { // while count!= number of prime numbers entered keep searching..
        boolean prime = true;// to determine whether the number is prime or not
        for (int i = 2; i <= Math.sqrt(num); i++) { //efficiency matters
        if (num % i == 0) {
        prime = false; // if number divides any other number its not a prime so set prime to false and break the loop.
        break;
        }
            }
        if (prime) {
        count++;
        System.out.println(num);
        }
    num++; //see if next number is prime or not.
     }
    }
}
```

2, 3, 5

num → 4
num → 5

```
Default Term  +  Browser
sh-4.4$ javac Primev1.java
sh-4.4$ java Primev1
2
3
5
7
11
13
17
19
23
29
sh-4.4$
```

https://ideone.com/InS70B

$\frac{\sqrt{n}}{2} \rightarrow O(\sqrt{n})$

for (i = 2; i <= n-1; i++)

↓

Math.Sqrt(n)

$(\log_2 n)^{12}$

↓

$(\log_2 n)^6$

Primes is in P

↙

Annals of Mathematics — Agarwal, Kayal & Saxena — IIT Kanpur 2003

AKS Algorithm

$O((\log n)^{12})$

Write a Java Program to find the maximum of n numbers using do-while loop

```java
import java.util.Scanner;
public class Maxfind{

    public static void main(String []args){
        int max;
        int n;
        int a;

        System.out.println("enter the number");

        Scanner input=new Scanner(System.in);

        n=input.nextInt(); //number of numbers
        a=input.nextInt();
        max=a;
        int i=1;
        do{
        a=input.nextInt();
        if (a>max)
        max=a;
        i++;
        }
        while (i<n);
        System.out.println("Maximum is " + max);
    }
}
```

```
Terminal
sh-4.3$ javac Maxfind.java
sh-4.3$ java Maxfind
enter the number
5
10
20
70
40
30
Maximum is 70
sh-4.3$
```

for loop

```
int i=10;
for( ; i<100; i++)
{
```

```
}
```

```
1  public class HelloWorld{
2
3      public static void main(String []args){
4          for(;;)
5          System.out.println("Hello World");
6      }
7  }
8
```

Terminal

```
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
```

∧ 2

Books to develop algorithms

- How to solve it by Computer by R. J. Dromey, Prentice-Hall India EEE Series
- Introduction to Algorithms by CLRS (Cormen, Leiserson, Rivest, Stein), MIT Press

The Enhanced for loop

```
for (Type Identifier : Expression)
{
// statements;
}
```

The Enhanced for loop

$a_0, a_1, a_2, \ldots a_9$

```
1  public class TestFor1{
2
3      public static void main(String []args){
4          int[] numbers =
5                  {10,20,30,40,50,60,70,80,90,100};
6          for (int item : numbers) {
7              System.out.println("Count is: " + item);
8          }
9      }
10 }
```

numbers[0] → 10
numbers[1] → 20
numbers[2] → 30
⋮
numbers[9] → 100

Terminal

```
sh-4.3$ javac TestFor1.java
sh-4.3$ java TestFor1
Count is: 10
Count is: 20
Count is: 30
Count is: 40
Count is: 50
Count is: 60
Count is: 70
Count is: 80
Count is: 90
Count is: 100
sh-4.3$
```

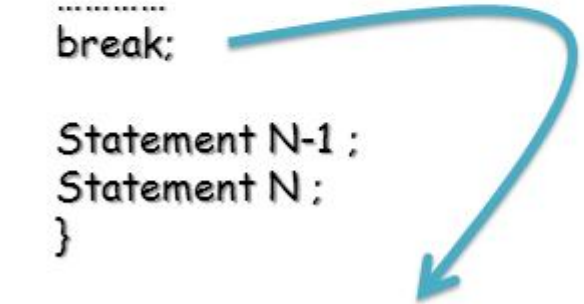
break statement

```
while (isOK)
{
    ...
    if (anotherCondition)
        break;
    ...
}
// Statement
// Statement
```

```
Initialization;
do
  {
   Statement 1 ;
   Statement 2 ;
   Statement 3 ;
   ..........
   ..........
   if ( If Condition)
     break;

   Statement N-1 ;
   Statement N ;
   Increment;
  } while (condition);

OutsideStatement 1;
```

break statement

```
for ( initialization ; condition ; increment )
   {
   Statement 1 ;
   Statement 2 ;
   Statement 3 ;
   ……
   ……
   ……
   break;

   Statement N-1 ;
   Statement N ;
   }

OutsideStatement 1;
```



continue Statement