# <u>CS 101 Lecture Notes</u> <u>Prepared by Alper Özdamar & Fakih Karademir</u> <u>Notes on Week 10 (04-06 April, 2007 )</u>

## FOR STATEMENT

n! = { 1 if n = 0 }  $\{n * (n - 1) \text{ if } n > 0\}$ n! = 1 \* 2 \* 3 .... n n > 0 int nfac = 1; int i = 1; while (i < = n){ nfac = i \* nfac; i++;  $\rightarrow$  infinite loop example } int nfac,i; for  $(nfac = 1, i = 2; i \le n; i++)$ update initiallization check condition nfac = i \* nfac; statement initialization false K cond ition true statement update ₹

```
Find the even numbers from 1 to n(n > 1)
int i;
int sum = 0;
```

```
for ( i = 2 ; i < = n ; i = i + 2 )
sum = sum + i ;
```

while versiyon of upper statement :

```
int i = 2;
while ( i < = n)
{
sum = sum + i ;
i = i + 2;
}
```

another version of for:

```
int sum = 0;
int i = 2;
for ( ; i < = n )
{
sum = sum + i
i = i + 2;
}
```

```
public int findEvenSum(int n)
{
    int sum = 0;
    int i = 2;
        while( i < = n )
        {
            sum = sum + i
            }
    return (sum);
}
main ()
{
    int k =findEvenSum(12)
    n = scan.nextInt();
    k = findEvenSum(n);</pre>
```

```
*
****
*****
int maxlines;
int line;
for (int line =1 ; line <= maxline ; line ++)
{
    for (int i = maxline - line ; i >= 0; i-- )
        System.out.print ( " ");
    for (int j= 1 ; j <= 2 * line - 1; i++ )
        System.out.print ( " *");
        System.out.print ( " \n");
    }
</pre>
```

Find the summation of input numbers. Perform the summation as long as the input number is [1,100] otherwise stop int sum = 0;

```
int inputNo;
inputNo = scan.nexInt();
for ( sum = 0; input >= 1 && inputNo <= 100)
    {
     sum = sum + i;
     System.out.print("Enter an integer");
     inputNo = scan.nextInt();
    }
Iterators: Iterator is an object that has methods that allow you to process a collection
of items one at a time.
   Scanner is an iterator
has Next()
has NextInt ()
has NextDouble()
java.sun.com/j2se/5.0 --- java.sun.com --- parse the file
                           j2se
                            5.0
import.java.util.Scanner;
import.java.io.*;
 public class URLDissector
 String url;
 Scanner fileScan, urlScan;
```

fileScan = new Scanner(new File("url.inp")),

// read and process each line of the file



# }

# JAVA CONDITIONALS & LOOPS QUESTIONS

<u>Question</u>: Design and implement a Java program which prints a shape like a diamond by using asterisk ('\* ') characters. And the shape must have the size which user will enter at the beginning of the output. The user will determine the width of the diamond shape.

Sample Diamond Shape:

\*

\*\*\*

```
// Author: FAKİH KARADEMİR Date:18.04.2007 Wednesday
// This program will print a diamond shape by using asterisks.
import java.util.Scanner;
public class Diamond
{
   public static void main (String [] args)
   {
      Scanner scan=new Scanner(System.in);
       int maxlines; // maxlines shows the width of the diamond.
      System.out.println("Enter the width of your diamond:");
       maxlines=scan.nextInt();
       // maxlines should be an odd integer to draw a solid shape.
       while(maxlines%2==0)
       {
          System.out.println("Enter an odd integer please:");
          maxlines=scan.nextInt();
       }
       // We are using for statements to facilitate our work.
       for(int line=1;line<=maxlines;line++)</pre>
         {
            for(int i=maxlines-line;i>=0;i--)
                System.out.print(" ");
            for (int j=1; j<=2*line-1; j++)</pre>
                System.out.print("*");
                System.out.print("\n");
         }
       for(int lin=maxlines;lin>0;lin--)
         {
             for(int a=maxlines-lin;a>=0;a--)
               System.out.print(" ");
            for(int j=2*lin-1;j>0;j--)
                System.out.print("*");
                System.out.print("\n");
        -}
   }
• }
```

### **OUTPUT:**

```
General Output
                  -----Configuration: <Default>-----Configuration: <Default>-----Configuration:
  Enter the width of your diamond:
  8
  Enter an odd integer please:
  12
 Enter an odd integer please:
  5
        *
       * * *
       ****
     ******
   * * * * * * * * *
       * * * * *
       * * *
  Process completed.
```

<u>Question:</u> When would we use a 'for' loop instead of a 'while' loop? <u>ANSWER:</u> A 'for' loop is usually used when we know,or can calculate, how many times we want to iterate through the loop body. A 'while' loop handles a more generic situation.

**<u>Question:</u>** What is an infinite loop? Specifically, what causes it?

<u>ANSWER:</u> An infinite loop is a repetition statement that never terminates. Specifically, the body of the loop never causes the condition to become false.

<u>Question:</u> Design and implement a program which computes the factorial of a number given by the user.

```
// Author:Fakih Karademir Date:18.04.2007 Wednesday
// This program will compute the factorial of a number given by the user.
import java.util.Scanner;
public class Factorial
{
   public static void main(String [] args)
   {
      int n; // n represents the number
           // whose factorial we want to compute in here.
      int i=1,nFac=1;
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter an integer: ");
      n=scan.nextInt();
      while(i<=n)</pre>
        {
          nFac=i*nFac;
          i++:
        3
      System.out.print("You have entered: "+n+" Its factorial: "+nFac);
   }
· }
```

# **OUTPUT:**

General Output ------Configuration: <Default>-----Enter an integer: 7 You have entered: 7 Its factorial: 5040 Process completed.

Question: Design and implement a Java program which prints a 'x\*x'

square by using loop statements and the print should consist of '#'

characters.

Sample Square Shape: # # #

# # #

```
// Author: Fakih Karademir Date:18.04.2007 Wednesday
// This program prints a square-like shape by using '#' characters.
import java.util.Scanner;
public class Squarrel
ł
   public static void main(String [] args)
   Ł
      int x,y; // x shows the length of the sides of the square.
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter the length: ");
      x=scan.nextInt();
      v=x;
      while(y>=1)
      {
         for(int a=x;a>=1;a--)
            System.out.print("#");
            System.out.println();
         y--;
      }
   }
· }
```

# **OUTPUT:**

G	General Output					
	Configuration: <default></default>					
	Enter the length:					
	5					
	#####					
	#####					
	#####					
	#####					
	#####					
	Process completed.					

<u>Question:</u> Design and implement a Java program which prints a squarelike shape with dimensions 'x\*x' and x will be determined by the user. Use 'o' characters to print this square with its gap inside.Don't forget about that inside of the square will not include characters.

#### Sample Square having a hole: o o o o

0			0	
0			0	
0	0	0	0	

#### **ANSWER:**

```
// Author:Fakih Karademir Date:18.04.2007 Wednesday
// This program prints a shape like square but its inside is gap.
import java.util.Scanner;
public class Gap
{
   public static void main(String [] args)
   {
      int x,y=1; // x shows the dimension of the square.
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter the length: ");
      x=scan.nextInt();
      // Our square will has only the sides.
      // Its inside is not filled.
     for (int a=1;a<=x;a++)
           System.out.print("o");
           System.out.println();
     while(y<=x-2)</pre>
         {
             System.out.print("o");
          for(int n=1;n<=x-2;n++)</pre>
             System.out.print(" ");
             System.out.print("o");
             System.out.println();
          y++;
         }
     for (int b=1;b<=x;b++)
         System.out.print("o");
         System.out.println();
   -}
3
```

## **OUTPUT:**

<u>Question:</u> Design and implement a Java program which computes the sum of any power of the numbers till a certain number. The bound number will

be determined by the user with Scanner class. I mean the program should be able to compute the sum of the squares of the numbers from one to one hundred or the sum of the cubes or the fourth powers of the numbers from one to twenty five and etc.

**ANSWER:** 

```
//*******
                      Date:18.04.2007 Wednesday
// Author: Fakih Karademir
// This program computes the sum of the powers of the numbers till a certain value.
import java.util.Scanner;
public class Sumpower
{
   public static void main(String [] args)
   {
      int x,y; // x shows the last number.
            // y shows which power of the numbers will be cumulated.
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter an integer: ");
      x=scan.nextInt();
      System.out.println("Enter the power: ");
      y=scan.nextInt();
      // Other variables of the program.
      int a=1;
      double n=0;
      // Loop statement consisteing of 'while'.
      while (a \le x)
       {
          n=Math.pow(a,y)+n;
          a++;
       }
      System.out.print("The sum of the "+y+", powers of the numbers from 1 to "
                   +x+" is "+(int)n);
   }
}
```

# **OUTPUTS OF SUMPOWER PROGRAM:**

```
General Output
```

```
-----Configuration: <Default>-----
Enter an integer:
4
Enter the power:
2
The sum of the 2. powers of the numbers from 1 to 4 is 30
Process completed.
```



General Output				
ſ		Configuration: <default></default>		
l		Enter an integer:		
l		10		
l		Enter the power:		
l		4		
l		The sum of the 4. powers of the numbers from 1 to 10 is 25333		
l		Process completed.		
l				
l				
l				

<u>Question:</u> By using 'while' loop design and implement a program which shows all the integers starting from 1 to any point determined by the user. The user will also determine the difference between consecutive numbers.You'll try to write an arithmetic serie actually.

```
// Author:Fakih Karademir Date:18.04.2007 Wednesday
// This program writes a arithmetical serie.
import java.util.Scanner;
public class Serie
{
   public static void main(String [] args)
   {
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter extremum number: ");
      int a=scan.nextInt();
      System.out.println("Determine the common rate: ");
      int b=scan.nextInt();
      int num=0;
      // Here we have a while loop to print the serie.
      while(num<a)</pre>
         {
            num+=b;
            System.out.print(" "+num);
         }
   }
}
OUTPUT:
General Output
       -----Configuration: <Default>-----
 Enter extremum number:
 28
 Determine the common rate:
 4
```

4 8 12 16 20 24 28 Process completed.

**<u>Question:</u>** Write a 'for' loop to print the odd numbers from 1 to 43 (inclusive). <u>ANSWER:</u>

#### **OUTPUT:**

**General Output** 

```
-----Configuration: <Default>-----
 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43
Process completed.
```

Question: Write a 'while' loop that verifies that the user enters a negative integer value.

```
ANSWER:
          // Author:Fakih Karademir Date:18.04.2007 Wednesday
// This program verifies that you entered negative value.
import java.util.Scanner;
public class Intminus
{
   public static void main(String [] args)
   {
      Scanner scan=new Scanner(System.in);
      System.out.println("Enter an integer: ");
      int a=scan.nextInt();
      // Here we have a while loop.
      // It gives an error message till
      // the user enters a negative integer.
      while (a \ge 0)
      Ł
         System.out.println(" NO ! You should have entered "+
                        "a negative integer. Try :");
         a=scan.nextInt();
      }
   }
}
OUTPUT:
```

General Output ------ Configuration: <Default>------Enter an integer: 4 NO ! You should have entered a negative integer. Try : 100 NO ! You should have entered a negative integer. Try : -2345 Process completed.



# END OF JAVA LOOP EXAMPLES