

Day 5

Java Technology

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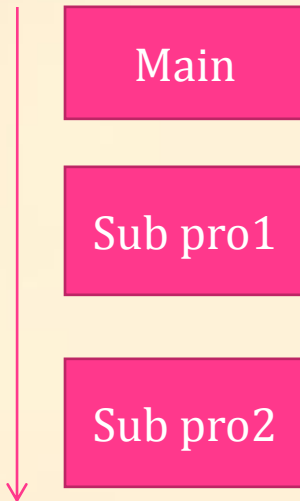
Procedures and Functions

Procedure : sub program which doesn't
return a value

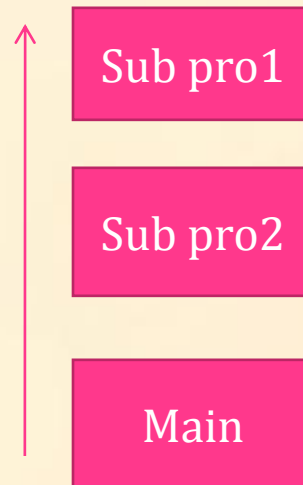
Function : sub program which return a
value

Functions and Procedure's Structure

Top-Down



Bottom-up



Sandwich



Procedure

```
class class_name{  
    //procedure definition;  
    static void procedure_name( parameters )  
    {  
        statement(s);  
    }  
    public static void main(String[] args)  
    {  
        procedure_name(values);  
        // procedure call;  
    }  
}
```

Eg of Procedure

```
class Square
```

```
{
    static void sq()    // procedure definition
    {
        int n = (int)(Math.random()*9)+1 ;
        System.out.println("Square of "+ n + " is "+ (n*n) );
    }
    static void cu()
    {
        int n = (int)(Math.random()*9)+1 ;
        System.out.println("Cube of "+ n + " is "+(n*n*n));
    }
    public static void main(String[] args)
    {
        sq();    // procedure call
        cu();
    }
}
```

Class Work :

1. Write a java program with two procedures
 - a. adding two anonymous integers
 - b. subtracting two anonymous integers

Return Value:

a value that carry from sub to main program

Function

```
class class_name{  
    //function defintion;  
    static type function_name( parameters )  
    {  
        statement(s);  
        return return_value ;  
    }  
    public static void main(String[] args)  
    {  
        var = function_name(values);  
        // function call  
    }  
}
```


Eg of Function:

```
class Square
{
    static int sq()// function definition
    {
        int n = (int)(Math.random()*9)+1 ;
        return (n*n) ;
    }
    public static void main(String[] args) // function call
    {
        System.out.println(sq());
    }
}
```

Class Work of Function and Procedure

1. Write a java program with two functions
 - a. multiply any two doubles
 - b. divide any two doubles
2. Write the following functions to run at a single class
 1. to decide even or odd.
 2. to decide positive or negative or zero.
3. Write a java program with one procedure and one function
 - a. find the area of circle
 - b. find the area of your room

Parameters

- a value or a set of values that carry from main program to sub program
- Use in both Procedures & Functions

Syntax of using Parameter

```
class class_name
{
    static type func_proc( type var1, type var2, type var_N )
    {
        statement(s);
    }
    public static void main(String[] args)
    {
        func_proc_call( value1, value2, value_N );
    }
}
```

Eg of Parameter

```
class Test
{
    static void square(int n)
    {
        System.out.println("Square of "+n+" is "+n*n);
    }
    static int cube(int n)
    {
        return n*n*n;
    }
    public static void main(String[] args)
    {
        int num = (int)(Math.random()*10)+1;
        square(num);
        int c = cube(num);
        System.out.println("Cube of "+num+" is "+c);
    }
}
```

Global and Local Variable

1. Global variable

```
class {  
  
    static type global_variable;  
  
    public static void main(String[] args)  
    {  
  
    }  
}
```

Local Variable

```
class {  
  
    static void proceduare()  
    {  
        type local_variable;  
    }  
  
    public static void main(String[] args)  
    {  
        type local_variable;  
    }  
}
```

Eg of Global Variable

```
class Global
{
    static int num ;
    static void square ()
    {
        System.out.println("Square of "+num+" is "+(num*num));
    }
    static int cube()
    {
        return (num*num*num);
    }

    public static void main (String[] args)
    {
        num = (int)(Math.random()*10)+1;
        square();
        int c = cube ();
        System.out.println("Cube of "+num+" is "+c);
    }
}
```


Example:

```
class Test{
    public static void main(String[] args){
        int[] ia = { 1,2,3,4,5 };
        for (int i=0; i<ia.length; i++)
            System.out.print("\t"+ia[i]);
        System.out.println();
        modify(ia);
        for (int i=0; i<ia.length; i++)
            System.out.print("\t"+ia[i]);
        System.out.println();
    }
    static void modify(int tmp[]){
        for (int j=0; j<tmp.length; j++)
            tmp[j]+=5;
    }
}
```

Class Work of Day 5:

1. Write a java program with one procedure and one function
 - a. find the area of circle ($\pi * r * r$)
 - b. find the volume of sphere ($\pi * r * r * h$)
2. Write the following function to run at a single class
 1. sum of three numbers
 2. average of three numbers
 3. largest value from three numbers
 4. smallest value from three numbers

Class Work of Day 5:

3. Write a java program that includes `int sumDigits(int num)` method which accepts an integer argument and returns an integer result which is the sum of all the digits in the input arguments. For example, `sumDigit(113355)` returns a value of 18, which is the result of $(5+5+3+3+1+1)$ where as `sumDigits(10)` return a value of 1, which is the result of $(0+1)$.

Class Work of Day 5:

4. Write a Java program that includes a method `monthName(int month)` which returns the name of month whose number is passed to it. Write a user class to test your program with various numbers.

Class Work of Day 5:

5. Write a Java program below which generate 5 random numbers ranging from 15 to 30 (inclusive) and reports the highest number. Your program output should resemble the following.

Number 1: 15

Number 2: 15

Number 3: 25

Number 4: 30

Number 5: 18

Highest Number is 30

Class Work of Day 5:

6. What is the output of the following program?

```
class Mystery{  
    public static void main(String args[])  
    {  
        int i=10,j=20,k=7;  
        System.out.println(k/i-j);  
        System.out.println(i/(double)j);  
        System.out.println(i%(j+k));  
        System.out.println(i++ - --k);  
        System.out.println(i);  
        k=++j * 3%5;  
        System.out.println(j);  
        System.out.println(k);  
    }  
}
```

Class Work of Day 5:

7. A matrix starts with numbers 10 and ends with 99. Write a Java program that prints only the first occurrence of a number divisibly 3 for each row of number instead of for every number divisibly by 3.

Class Work of Day 5:

8. A company "SkyLimit" pays its employees according to the position (0: Engineer, 1: Technician) of the employee in the company and the number of hours worked. Employees will be paid on overtime rate of 1.5 times of the employee's basic pay if the total number of hours worked exceeds 160 hours. The hourly rate for an Engineer and Technician is \$30.00 and \$ 25.50 respectively.

Class Work of Day 5:

9. Write a java program that includes printReverse(int num) method that takes in an integer and print the num in reverse order. For example, a method called on printReverse(5623) prints 3265.

Class Work of Day 5:

10. Write a `convertToSecond(int hour,int minute)` method that return the second equivalent of the hour and minute passed to the method. For example, calling `convertToSecond(1,2)` returns 3720 seconds. Write a user class to test your program.

Class Work of Day 5:

11. Write a java program that includes gcd(int num1,num2) method which returns the greatest common divisor of integer num1 and num2. The GCD (greatest common divisor) is the largest integer that evenly divides each of the two numbers. Use while loop to implements your method.

Class Work of Day 5:

12. Write a Java program that includes gcd(int num1, int num2) method which returns the greatest common divisor of integer num1 and num2. Implement your method using the following algorithm.

If num2 is equal to 0

gcd (num1,num2) is num1

Else

gcd(num1,num2) is gcd (num2, num1%num2)

Class Work of Day 5:

13. Write a `isLeapYear(int year)` method that returns true if argument year is a leap year. A year is a leap year, if it is divisible by 4 and it is not in the hundred unless it is also divisible by 400. For example, 1900 is not a leap year while 2000 is a leap year (since 2000 is divisible by 400 while 1900 is not). Write a user class to test your program.

Class Work of Day 5:

14. Write a method called `removeAlt` that takes in a non-null String as a formal parameter and returns the String with every other character removed starting from the second character. Examples:

`removeAlt("abcdef")` returns "ace"

`removeAlt("Hi Nemo")` returns "H eo"

`removeAlt("Hello there")` returns "Hlotee"

`removeAlt("H")` return "H"

`removeAlt(" ")` return " ".

Class Work of Day 5:

15. Write a method called `removeAlt` that takes in a non-null String as a formal parameter and returns the String with every other character removed starting from the second character. Examples:

`removeAlt("abcdef")` returns "ace"

`removeAlt("Hi Nemo")` returns "H eo"

`removeAlt("Hello there")` returns "Hlotee"

`removeAlt("H")` return "H"

`removeAlt("")` return "".

Class Work of Day 5:

16. Write a recursive method called `isSumOdd` that takes in an non-negative int parameter and returns true if the sum of the individual digits is odd, false otherwise. For example:

❖ `isSumOdd(5)` return true

❖ `isSumOdd(912)` return false since $9+1+2=12$ is even.

Class Work of Day 5:

17. Write a Java program that includes isMultiple method that takes in two integers and return true if the first integer is a multiple of the second integer. Then, makes use of the isMultiple mehtod to write a method isEven that takes in the third integer and returns true if that integer is even. Finally make use of the isEven method to write a method isOdd that takes in the fourth integer and returns true if that integer is odd.

Class Work of Day 5:

18. A class consists of 20 students. Each of these students have register and taken 3 modules. The marks as obtained by each student for each module have been recorded and input into a computer system as a sequence of 4 items: name, module1 mark, module2 mark, module3 mark. Write a program to produce the equivalent grade for each mark obtained based on the following table.

Class Work of Day 5:

- You should use five methods. `initArrays()`, `readInputValues (int i, String args[])`, `getGrades(int i)`, `convertMarksToGrades(int i)`, `printDetails(int i)` to implement this program.

Grade	From	To
A	80	100
B	65	79
C	50	64
D	40	49
E	0	39

Class Work of Day 5:

Mark Chua

Chemistry	77	B
Mathematics	80	A
Physics	60	C
Average	72	B

Simon Goh

Chemistry	65	B
Mathematics	45	D
Physics	89	A
Average	66	B

Recursive Method

What is the value of f1(234)?

```
public static int f1(int n)
{
    if(n<10)
        return n;
    else
        return n%10 * f1(n/10);
}
```

What is the value of f2(10)?

```
public static int f2(int n)
{
    if(n==1)
        return n;
    else
        return n+f2(n-2);
}
```

What does f3 compute? Assume that $n > 0$.

```
public static int f3(int n)
{
    if(n==1)
        return 1;
    else
        return 2 * n-1 + f3(n-1);
}
```


Factorial:

Write a factorial number by using the recursive method.

Triangle

- Write a triangle by using recursive method.

Thank You
Presented by : Myint Myint