

# Introduction to OOPs

- Languages like Pascal, C, FORTRAN, and COBOL are called procedure-oriented programming languages. Since in these languages, a programmer uses procedures or functions to perform a task. When the programmer wants to write a program, he will first divide the task into separate sub tasks, each of which is expressed as functions/ procedures. This approach is called ***procedure-oriented approach***.
- The languages like C++ and Java use classes and object in their programs and are called Object Oriented Programming languages. The main task is divided into several modules and these are represented as classes. Each class can perform some tasks for which several methods are written in a class. This approach is called “***Object Oriented approach***”.

## OOP Vs POP

	OOP	POP
<b>Definition</b>	OOP stands for Object-oriented programming it focuses on data rather than the algorithm.	POP stands for Procedure-oriented programming, focuses on procedural abstractions.
<b>Programs</b>	Divided into small chunks called objects which are instances of classes.	Divided into small parts based on the functions.
<b>Accessing Mode</b>	Four accessing modes are used in OOP to access attributes or methods – ‘Private’, ‘Public’, ‘default’, and ‘Protected’	No such accessing mode is required
<b>Execution</b>	Various methods can work simultaneously	Follows a systematic step-by-step approach to execute functions.
<b>Security</b>	It is of high secure because of it data hiding feature	There is no such way of data hiding in POP, thus making it less secure.

# Features of OOP

- There are mainly '4' features of OOP's are there, which are listed below.

1. Encapsulation
2. Inheritance
3. Polymorphism
4. Abstraction

## Understanding Encapsulation:

- Generally there are two forms of encapsulation in OOP.

### **First Form:**

- Encapsulation is a technique that packages related data and behaviors into a single unit.
- Here, the common characteristics and behaviors of a student are packaged into a single unit: the Studentclass.
- This is the process of encapsulation.
- Encapsulation hides implementation details of the Student class from other objects.

## Second Form:

- Encapsulation is the technique of making the fields in a class private and providing access to the fields via methods.
- If a field is declared private, it cannot be accessed by anyone outside the class.
- Such that we provide security to the data from outside world without misusing it, which is commonly known as 'Information Hiding' or 'Data Hiding'.
- In process of Information Hiding, the other objects cannot access the data directly. Instead, they have to invoke the getters which are designed to protect the data from misuse or unwanted changes.

## What is the need for Encapsulation?

- **Flexibility:** It's more flexible and easier to change the encapsulated code with new requirements.
- **Reusability:** Encapsulated code can be reused throughout the application or across multiple applications.
- **Maintainability:** If an application is encapsulated in separate units (classes, interfaces, methods, setters, getters, etc) then it's easy to change or update a part of the application without affecting other parts, which reduces the time of maintenance.



## OOP's Features:

- 1) Encapsulation
- 2) Inheritance
- 3) Polymorphism
- 4) Abstraction

### Encapsulation

It is a process of wrapping up of data or binding up of data into a Single unit.

It is a process of making the fields as private & providing access to those fields with the help of public methods, ie. through setters & getters methods.

This is not encapsulation

```
1 package com.pack1;
2
3 public class ClassA
4 {
5     String empName;
6     int empSal;
7     String empDept;
8 }
9
10
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```

```
1 package com.pack1;
2
3 import java.util.Scanner;
4
5 public class ClassB
6 {
7     Scanner sc=new Scanner(System.in);
8     ClassA aobj=new ClassA();
9
10     void meth1()
11     {
12         System.out.println("Implementing Encapsulation\n");
13
14         System.out.println("Enter your Employee Name");
15         aobj.empName=sc.next();
16
17         System.out.println("Enter your Employee Salary");
18         aobj.empSal=sc.nextInt();
19
20         System.out.println("Enter your Employee Department");
21         aobj.empDept=sc.next();
22
23         System.out.println("\n*****Employee Data*****");
24         System.out.println("Employee Name : "+aobj.empName);
25         System.out.println("Employee Salary : "+aobj.empSal);
26         System.out.println("Employee Department : "+aobj.empDept);
27     }
28 }
```

```
<terminated> ClassB [Java Application]
Implementing Encapsul
Enter your Employee N
Kishan
Enter your Employee S
10000
Enter your Employee D
Java
*****Employee Data*****
Employee Name : Kisha
Employee Salary : 100
Employee Department :
```

```

1 package com.pack1;
2
3 public class ClassA
4 {
5     String empName;
6     int empSal;
7     String empDept;
8 }
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```

```

8 ClassA aobj=new ClassA();
9
10 void meth1()
11 {
12     System.out.println("Implementing Encapsulation\n");
13
14     System.out.println("Enter your Employee Name");
15     aobj.empName=sc.next();
16
17     System.out.println("Enter your Employee Salary");
18     aobj.empSal=sc.nextInt();
19
20     System.out.println("Enter your Employee Department");
21     aobj.empDept=sc.next();
22
23     System.out.println("\n*****Employee Data*****");
24     System.out.println("Employee Name : "+aobj.empName);
25     System.out.println("Employee Salary : "+aobj.empSal);
26     System.out.println("Employee Department : "+aobj.empDept);
27 }
28
29 public static void main(String[] args)
30 {
31     ClassB bobj=new ClassB();
32     bobj.meth1();
33 }
34 }
35

```

```

Implementing Encapsulation
Enter your Employee Name
Kishan
Enter your Employee Salary
10000
Enter your Employee Department
Java
*****Employee Data*****
Employee Name : Kishan
Employee Salary : 10000
Employee Department : Java

```

```

1 package com.pack1;
2
3 public class ClassA
4 {
5     private String empName;
6     private int empSal;
7     private String empDept;
8
9     public void assign_empName(String empName)
10    {
11
12    }
13 }
14

```

```

4 public class ClassB
5 {
6     Scanner sc=new Scanner(System.in);
7     ClassA aobj=new ClassA();
8
9     void meth1()
10    {
11
12        System.out.println("Implementing Encapsulation\n");
13
14        System.out.println("Enter your Employee Name");
15        //aobj.empName=sc.next(); // C.E because of accessing a private field
16        aobj.assign_empName(sc.next());
17    }
18
19    /*
20     System.out.println("Enter your Employee Salary");
21     aobj.empSal=sc.nextInt();
22
23     System.out.println("Enter your Employee Department");
24 */
25 }
26

```

```

<terminated> ClassB [Java Application] C:\Program Files\Java\jdk-9.0.4\bin\java.exe
Implementing Encapsulation
Enter your Employee Name
Kishan
I

```

```

1 package com.pack1;
2
3 public class ClassA
4 {
5     private String empName;
6     private int empSal;
7     private String empDept;
8
9     public void assign_empName(String empName)
10    {
11        System.out.println("Method called");
12    }
13 }
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```

```

4 public class ClassB
5 {
6     Scanner sc=new Scanner(System.in);
7     ClassA aobj=new ClassA();
8
9     void meth1()
10    {
11
12        System.out.println("Implementing Encapsulation\n");
13
14        System.out.println("Enter your Employee Name");
15        //aobj.empName=sc.next(); // C.E because of accessing a private field
16        aobj.assign_empName(sc.next());
17    }
18
19    /*
20     System.out.println("Enter your Employee Salary");
21     aobj.empSal=sc.nextInt();
22
23     System.out.println("Enter your Employee Department");
24 */
25 }
26

```

```

<terminated> ClassB [Java Application] C:\Program Files\Java\jdk-9.0.4\bin\java.exe
Implementing Encapsulation
Enter your Employee Name
Kishan
Method called
I

```

```

1 package com.pack1;
2
3 public class ClassA
4 {
5     private String empName;
6     private int empSal;
7     private String empDept;
8
9     public void assign_empName(String empName)
10    {
11        this.empName=empName;
12    }
13    public String get_empName()
14    {
15        return empName;
16    }
17 }
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```

```

10 void meth1()
11 {
12     System.out.println("Implementing Encapsulation\n");
13
14     System.out.println("Enter your Employee Name");
15     //aobj.empName=sc.next(); // C.E because of accessing a private
16     aobj.assign_empName(sc.next());
17
18     /*
19     System.out.println("Enter your Employee Salary");
20     aobj.empSal=sc.nextInt();
21
22     System.out.println("Enter your Employee Department");
23     aobj.empDept=sc.next();
24
25     */
26     System.out.println("\n*****Employee Data*****");
27     //System.out.println("Employee Name : "+aobj.empName); // C.E bec
28     System.out.println("Employee Name : "+aobj.get_empName());
29
30     //System.out.println("Employee Salary : "+aobj.empSal);
31     //System.out.println("Employee Department : "+aobj.empDept);
32
33 }
34 public static void main(String[] args)
35 {
36     ClassB bobj=new ClassB();
37     bobj.meth1();
38 }

```

```

1 package com.pack1;
2
3 public class ClassA
4 {
5     private String empName;
6     private int empSal;
7     private String empDept;
8
9     public void assign_empName(String emp
10    {
11        this.empName=empName;
12    }
13    public String get_empName()
14    {
15        return empName;
16    }
17 }
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```

```

10 void meth1()
11 {
12     System.out.println("Implementing Encapsula
13
14     System.out.println("Enter your Employee Na
15     //aobj.empName=sc.next(); // C.E because o
16     aobj.assign_empName(sc.next());
17
18     /*
19     System.out.println("Enter your Employee Sa
20     aobj.empSal=sc.nextInt();
21
22     System.out.println("Enter your Employee De
23     aobj.empDept=sc.next();
24
25     */
26     System.out.println("\n*****Employee Data
27     //System.out.println("Employee Name : "+ao
28     System.out.println("Employee Name : "+aobj
29
30     //System.out.println("Employee Salary : "+
31     //System.out.println("Employee Department
32
33 }
34 public static void main(String[] args)
35 {
36     ClassB bobj=new ClassB();
37     bobj.meth1();
38 }

```

Implementing Encapsulation  
Enter your Employee Name  
Kishan  
\*\*\*\*\*Employee Data\*\*\*\*\*  
Employee Name : Kishan

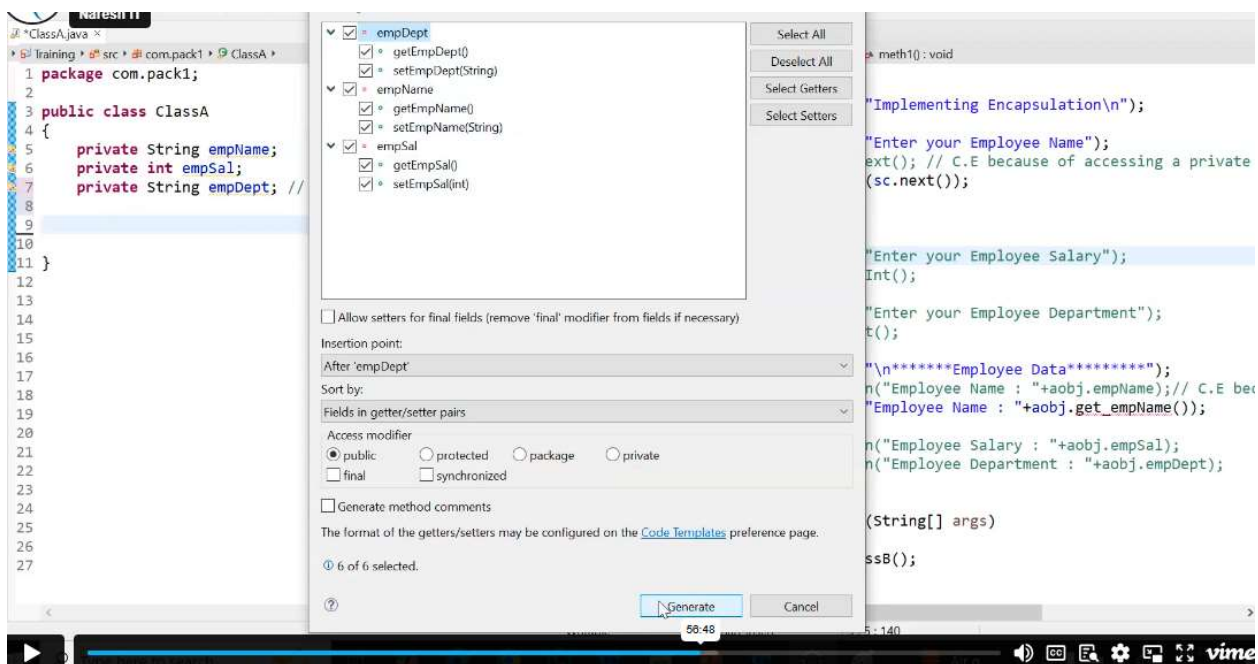
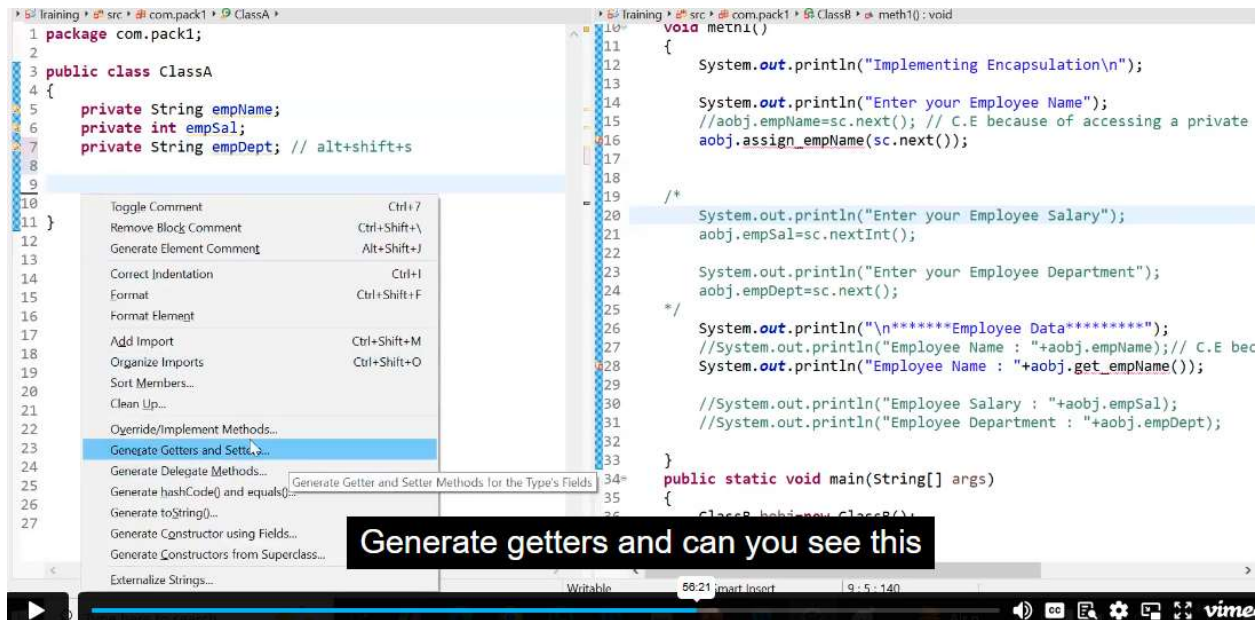
In java we have one class named bean class

It has 4 properties

1. That class should implement serializable. (it should inherit serializable interface).
2. Make all those variables as private.
3. Use setters and getter methods



## 4. You need to have a public constructure



```

Training > src > com.pack1 > ClassA
3 public class ClassA
4 {
5     private String empName;
6     private int empSal;
7     private String empDept; // alt+shift+s
8     public String getEmpName() {
9         return empName;
10    }
11    public void setEmpName(String empName) {
12        this.empName = empName;
13    }
14    public int getEmpSal() {
15        return empSal;
16    }
17    public void setEmpSal(int empSal) {
18        this.empSal = empSal;
19    }
20    public String getEmpDept() {
21        return empDept;
22    }
23    public void setEmpDept(String empDept) {
24        this.empDept = empDept;
25    }
26
27
28
29 }
30

```

```

Training > src > com.pack1 > ClassA > getEmpSal() : int
10 public String getEmpName()
11 {
12     return empName;
13 }
14 public void setEmpName(String empName)
15 {
16     this.empName = empName;
17 }
18 public int getEmpSal()
19 {
20     return empSal;
21 }
22 public void setEmpSal(int empSal)
23 {
24     this.empSal = empSal;
25 }
26 public String getEmpDept()
27 {
28     return empDept;
29 }
30 public void setEmpDept(String empDept)
31 {
32     this.empDept = empDept;
33 }
34
35
36
37 }
38

Training > src > com.pack1 > ClassB > meth1() : void
16 aobj.setEmpName(sc.next());
17
18 System.out.println("Enter your Employee Salary");
19 //aobj.empSal=sc.nextInt();
20 aobj.setEmpSal(sc.nextInt());
21
22 System.out.println("Enter your Employee Department");
23 //aobj.empDept=sc.next();
24 aobj.setEmpDept(sc.next());
25
26
27 System.out.println("\n*****Employee Data*****");
28 //System.out.println("Employee Name : "+aobj.empName); // C.E because of accessi
29 System.out.println("Employee Name : "+aobj.getEmpName());
30
31 //System.out.println("Employee Salary : "+aobj.empSal);
32 System.out.println("Employee Salary : "+aobj.getEmpSal());
33
34 //System.out.println("Employee Department : "+aobj.empDept);
35 System.out.println("Employee Department : "+aobj.getEmpDept());
36
37 }
38 public static void main(String[] args)
39 {
40     ClassB bobj=new ClassB();
41     bobj.meth1();
42 }
43 }
44

```



```

10 public String getEmpName() {
11     return empName;
12 }
13
14 public void setEmpName(String empName) {
15     this.empName = empName;
16 }
17
18 public int getEmpSal() {
19     return empSal;
20 }
21
22 public void setEmpSal(int empSal) {
23     this.empSal = empSal;
24 }
25
26 public String getEmpDept() {
27     return empDept;
28 }
29
30 public void setEmpDept(String empDept) {
31     this.empDept = empDept;
32 }
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```

1 package com.pack1;
2
3 import java.util.Scanner;
4
5 public class ClassB
6 {
7     Scanner sc=new Scanner(System.in);
8     ClassA aobj=new ClassA();
9
10    void meth1()
11    {
12        System.out.println("Implementing Encapsulation\n");
13
14        System.out.println("Enter your Employee Name");
15        //aobj.empName=sc.next(); // C.E because of accessing a private variable
16        aobj.setEmpName(sc.next());
17
18        System.out.println("Enter your Employee Salary");
19        //aobj.empSal=sc.nextInt();
20        aobj.setEmpSal(sc.nextInt());
21
22        System.out.println("Enter your Employee Department");
23        //aobj.empDept=sc.next();
24        aobj.setEmpDept(sc.next());
25
26
27        System.out.println("\n*****Employee Data*****");
28        //System.out.println("Employee Name : "+aobj.empName);// C.E because of accessing a private variable
29        System.out.println("Employee Name : "+aobj.getEmpName());
30
31        //System.out.println("Employee Salary : "+aobj.empSal);
32        System.out.println("Employee Salary : "+aobj.getEmpSal());
33
34        //System.out.println("Employee Department : "+aobj.empDept);
35        System.out.println("Employee Department : "+aobj.getEmpDept());
36
37    }
38    public static void main(String[] args)
39    {
40        ClassB bobj=new ClassB();
41        bobj.meth1();
42    }
43 }

```

## Assignment



```
empName  
empsal  
empExp  
empdept
```

Take 2 classes

If empExp is greater than 10 yrs or above increases the hike by 30%

If the exp is less than 10 yrs, the hike by 5%

Consider the above program as reference.