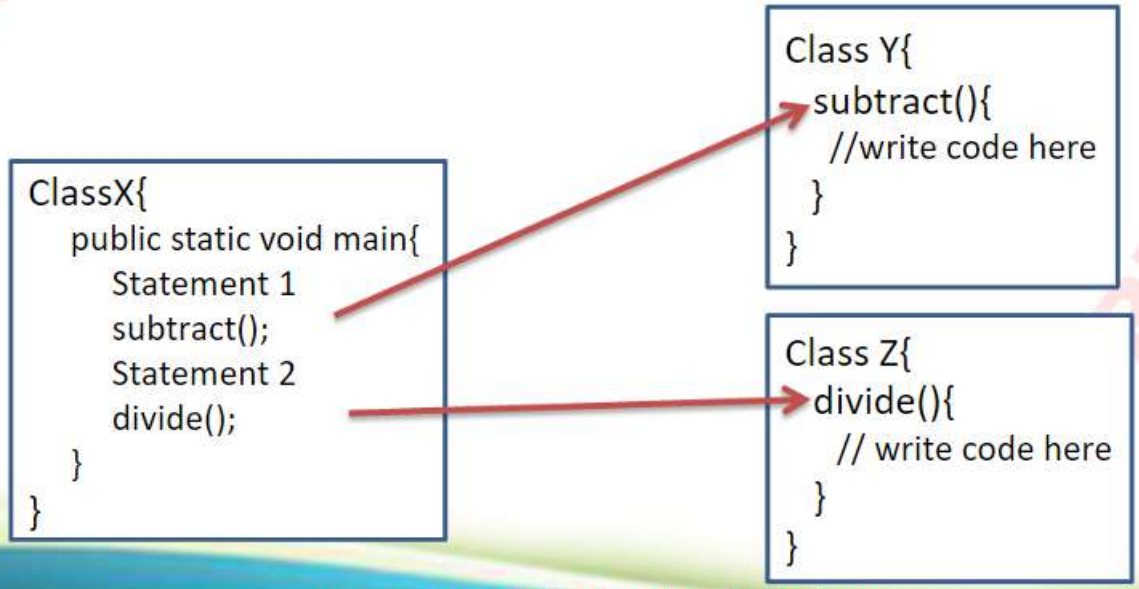
Java Methods

Click to Continue

- **Java method**s are set of statements to perform a specific operation which can be added inside a java class.
- This set of statements can be invoked by other methods in the same(or) different class by using the method name.

Illustration: Main method in class X invokes method *"subtract"* in class Y and method "*divide*" in class Z.



Method Declaration

Click to Continue

Syntax:

```
<specifier> <returnType> <methodName>(<parameter>*) {
        <statement>*
}
```

Example:

```
public int add(int x, int y){
        int sum = x+y;
        return sum;
}
```

Returning values from method

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return is a keyword used to return values from a method.

Syntax:

return <return Value>;

Where,

- <return Value> is the variable whose value needs to be returned.
- The "return Value" data type must be same as the one specified in the method signature..
- **Returning control:** If you need to stop the method execution and pass the control back to the calling method use the return without returning any value.

  Syntax: return;

Multiple Return from a method

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- A method can have any number of return statements
- You can also return constants from methods.

Below is an example of a code having multiple return statements

```
package com.accessspecifier;

public class ReturncDemo {

    public int calculateSalary(int age) {
        int salary = 0;

        if (age > 18) {
            salary = 10000 + 5000;
            return salary;
        } else {
            return 5000;
        }

    }
}
```

Returning a variable which holds a value

Returning a constant value this could be any constant boolean, long , string etc,

NOTE: It is NOT a good practice to return multiple times in a method. This results in poor maintainability and readability of the code.

How to avoid multiple return; Click to Continue

```
package com.accessspecifier;

public class ReturnGoodDemo {

    public int calculateSalary(int age) {
        int salary = 0;

        if (age > 18) {
            salary = 10000 + 5000;

        } else {
            salary = 5000;
        }

        return salary;
    }
}
```

Value stored in a variable and returned once.

Try It out – Methods And Solution

Click to Continue

Develop the following class,

1. Create a Java class "Circle.java" with a method "calculateCircumference"
2. This method should accept radius as argument, calculate the circumference and return the circumference.
3. The main method should invoke the Circle objects "calculateCircumference" method by passing a value for the length, say 10.
4. The main method should also print the circumference (result returned by the calculateCircumference method).

Try It out – Methods And Solution

Click to Continue

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1. Create a Java class “Circle.java” with a method “calculateCircumference”
2. This method should accept radius as argument, calculate the circumference and return the circumference.
3. The main method should invoke the Circle objects “calculateCircumference” method by passing a value for the length, say 10.
4. The main method should also print the circumference (result returned by the calculateCircumference method).

```
package com.accessspecifier;

public class Circle {

    public int calculateCircumference(int radius) {
        float circumference = 0;
        circumference = 2 * 3.14f * radius;
        return circumference;
    }

    public static void main(String args[]) {
        Circle c = new Circle();
        float circumference = c.calculateCircumference(10);
        System.out.println("The circumference of circle is " + circumference);
    }
}
```

What and How of Encapsulation?

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Encapsulation is a OOP concepts it is also called "***Data Hiding***" which,

- Is a protective barrier which protects the data in a class from being directly accessed by the code outside the class.
- Access to the data is controlled by defining a wrapper method which process the variable.

How is a class variable Encapsulated?

- The fields in a class are made **private** so that it cannot be accessed by any other class.
- The encapsulated fields can be **accessed** only by using the **public methods** specified in the class.
- Encapsulated data is accessed using the "**Accessor (getter)**" and "**Mutator (setter)**" methods.
  - **Accessors** – Methods to retrieve the hidden/encapsulated data.
  - **Mutators** – Methods to change hidden /encapsulated data

Application of encapsulation.

Click to Continue

Encapsulation is used in developing **transfer objects** or **value objects** in applications. These objects act as a bundle to carry forward data from presentation to back end tiers.

Illustration:

- Assume you are trying to register in a social media site by entering name and address.
- **RegistrationVO** – this will be the transfer object with encapsulated fields **name** & **address.**
- The data you enter will be placed inside **RegistrationVO** sent to the server to be processed.

Try it out – Transfer object

Click to Continue

Assume that you are developing a registration screen where you need to capture the fields name,DOB, email , phone. Develop a transfer object *RegistrationVO* with respective fields and getters and setters.

NOTE: Follow naming convention for attribute and methods and also ensure that they are meaningful.

Try it out – Transfer object

Click to Continue

```java
import java.util.Date;

public class RegistrationVO {

    private String name;
    private String email;
    private String phone;
    private Date dateOfBirth;

    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public String getEmail() {
        return email;
    }
    public void setEmail(String email) {
        this.email = email;
    }

    public String getPhone() {
        return phone;
    }

    public void setPhone(String phone) {
        this.phone = phone;
    }

    public Date getDateOfBirth() {
        return dateOfBirth;
    }

    public void setDateOfBirth(Date dateOfBirth) {
        this.dateOfBirth = dateOfBirth;
    }
```

Getters and setters to access the encapsulated fields.

Try it out – Transfer object

Click to Continue

```java
import java.util.Date;

public class RegistrationVO {

    private String name;
    private String email;
    private String phone;
    private Date dateOfBirth;

    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
    public String getEmail() {
        return email;
    }
    public void setEmail(String email) {
        this.email = email;
    }

    public String getPhone() {
        return phone;
    }

    public void setPhone(String phone) {
        this.phone = phone;
    }

    public Date getDateOfBirth() {
        return dateOfBirth;
    }

    public void setDateOfBirth(Date dateOfBirth) {
        this.dateOfBirth = dateOfBirth;
    }
```

Getters and setters to access the encapsulated fields.

How do you create the object and set the desired values

```java
package com.accessspecifier;

import java.util.Date;

public class Encapsulation {

    public void populateRegistrationVO() {
        RegistrationVO vo = new RegistrationVO();

        vo.setEmail("abc@gmail.com");
        vo.setName("Jack");
        vo.setPhone("9883391919");
        vo.setDateOfBirth(new Date("14/07/2012"));


        Date dob = vo.getDateOfBirth();
        String email = vo.getEmail();
        String name = vo.getName();
        String phone = vo.getPhone();

    }
}
```

The data is set using mutators

The values are retrieved using accessors.

Method Overloading

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Method overloading is two different versions of the same method available in the same class.

How is method overloading done?

This is done by either,

- Changing the input parameter type
- Changing the number of parameters.

Illustration:

```
package com.accessspecifier;

public class Overload {

    public float calculateCircumference(int radius) {
        float circumference = 0;
        circumference = 2 * 3.14f * radius;
        return circumference;
    }


    public float calculateCircumference(float radius) {
        float circumference = 0;
        circumference = 2 * 3.14f * radius;
        return circumference;
    }


    public float calculateCircumference(int radius, float pieValue) {
        float circumference = 0;
        circumference = 2 * pieValue * radius;
        return circumference;
    }
}
```

Data type changed.

Number of parameters changed.

Try It out & Solution - Method Overloading

Click to Continue

Create a calculator class and implement a method *add.*

Method 1: add(int a, int b) – adds two integers and returns a integer.

Method 2: add(float a, float b) – adds two integers and returns a float.

Method 3: add(int a, int b, int c) – adds three integers and returns the sum.

Invoke the three methods from the main method and print the returned value.

Try It out & Solution - Method Overloading

Click to Continue

Create a calculator class and implement a method *add.*

Method 1: add(int a, int b) – adds two integers and returns a integer.

Method 2: add(float a, float b) – adds two integers and returns a float.

Method 3: add(int a, int b, int c) – adds three integers and returns the sum.

Invoke the three methods from the main method and print the returned value.

Solution

```
public class Calculator {

    public int add(int a, int b) {
        int c = a + b;
        return c;
    }

    public float add(float a, float b) {
        float c = a + b;
        return c;
    }

    public int add(int a, int b, int c) {
        int d = a + b + c;
        return d;
    }

    public static void main(String[] args) {
        int result;
        float resultFloat;
        Calculator c = new Calculator();
        result = c.add(10, 20);
        System.out.println(result);
        resultFloat = c.add(10.5f, 20.4f);
        System.out.println(resultFloat);
        result = c.add(10, 20, 30);
        System.out.println(result);
    }
}
```

Access modifier- Static

Click to Continue

What is static?

Static keyword is used with method or variable. Let us look at what they means in the next subsequent slides.

Illustration:

```
variable: private static int age = 0;
method: public static calculateSalary(){
            // some code here
        }
```

Static variables are variables which are globally available across all the instances of an object.

Illustration: Assume there is a class Employee with a member variable "*String company*" declared as static. Assume we create two instances of the employee object *E1 and E2* . If in one instance the company name set as "*Ripples*". IF we try to print the company name of *E2* this will print *Ripples* this is because the company is static and shared by all the Employee objects.

Salient Points:

- If an object is declared static there will only be only one instance of that object.
- Static method or variable of an object can be referenced without creating an object instance.

Try It Out – Static variable

Click to Continue

Static variable – Let us develop the following code to understand how static behaves.

```
package com.accessspecifier;

public class StaticDemo {

    static int num1 = 100;
    int num2 = 200;

    public void changeValue(int value1, int value2) {
        num1 = value1;
        num2 = value2;

    }

    public static void main(String args[]) {
        StaticDemo c1 = new StaticDemo();
        c1.changeValue(300, 400);
        StaticDemo c2 = new StaticDemo();
        System.out.println("Value of C1 num 1--->" + c1.num1);
        System.out.println("Value of C1 num 2--->" + c1.num2);
        System.out.println("Value of C2 num 1--->" + c2.num1);
        System.out.println("Value of C2 num 2--->" + c2.num2);
    }
}
```

Output

```
Value of C1 num 1--->300
Value of C1 num 2--->400
Value of C2 num 1--->300
Value of C2 num 2--->200
```

Reason:

Since num1 is defined as static the variable value will be shared by both the objects C1 & C2. So though C1 initialize num1 it will be reflected in C2 also.

Static method

Click to Continue

*"**static**"* method of a class can be invoked without creating an instance of the class, so it can be invoked using the class name as reference.

```
package com.accessspecifier;

public class StaticMethodDemo {

    public static int num1 = 100;

    public static void changeValue(int value1) {
        num1 = value1;
    }

    public static void main(String args[]) {
        StaticMethodDemo.changeValue(200);
        StaticMethodDemo.num1 =300;
    }
}
```

Variables accessed using Class name.