Methods

In this lesson, you will get to know about the role of methods in classes.

WE'LL COVER THE FOLLOWING

The Purpose of Methods

Methods act as an interface between a program and the data fields of a class in the program.

These methods can either alter the content of the data fields or use their values to perform a certain computation. All the useful methods should be **public**, although, some methods which do not need to be accessed from the outside could be kept private.

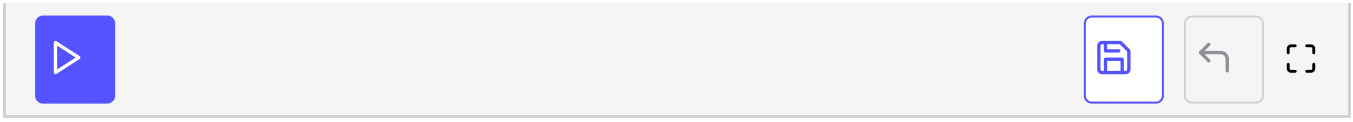
Definition and Declaration

> A method is a group of statements that performs some operations and may or may not return a result.

Here is an example of a method in Java:

```
class Car {
```

```
  // Public method to print speed
  public void printSpeed(int speed) {
    System.out.println("Speed: " + speed);
    }

}

class Demo {

  public static void main(String args[]) {
    Car car = new Car();
    car.printSpeed(100); // calling public method
  }

}
```



Method Parameters, Return Type

Method parameters make it possible to pass values to the method and **return type** makes it possible to get the value from the method. The parameters are declared inside the parentheses after the method name while the `return` type is declared before method name.

Return Statement

For methods that define a return type, the **return statement** must be immediately followed by return value.

```
// public method with one parameter speed.
public int printSpeed(int speed) {
  // ...


  return speed + 5; // return statement
}
```

This method adds 5 to the parameter `speed` passed to it and returns the result.

The return type, `int`, which comes before the method name **PrintSpeed**, indicates that this method returns an `int`.

Getters and Setters

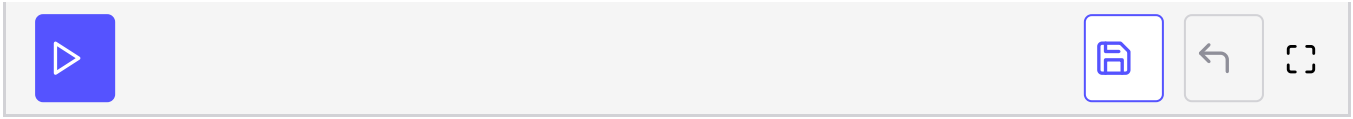
These two types of methods are very popular in OOP. A **get** method retrieves

the value of a particular data field, whereas a **set** method sets its value.

It is a common convention to write the name of the corresponding member fields with the `get` or `set` command.

Let's write get and set methods for the 'speed' in our `Car` class:

```
// Car class
class Car {

  private int speed; // member field speed

  // Setter method to set the speed of the car
  public void setSpeed(int x) {
    speed = x;
  }

  // Getter method to get the speed of the car
  public int getSpeed() {
    return speed;
  }

}

class Demo {

   public static void main(String args[]) {
     Car car = new Car();
     car.setSpeed(100); // calling the setter method
     System.out.println(car.getSpeed()); // calling the getter method
   }

}
```



Method Overloading

> Overloading refers to making a method perform different operations based on the nature of its arguments.

Methods can be overloaded in Java.

We could redefine a method several times and give it different arguments and method types. When the method is called, the appropriate definition will be selected by the compiler!

Let's see this in action by overloading the `product` method in the Calculator class:

```
class Calculator {

  public double product(double x, double y) {
    return x * y;
  }

  // Overloading the function to handle three arguments
  public double product(double x, double y, double z) {
    return x * y * z;
  }

  // Overloading the function to handle int
  public int product(int x, int y){
    return x * y;
  }

}

class Demo {

  public static void  main(String args[]) {
    Calculator cal = new Calculator();

    double x = 10;
    double y = 20;
    double z = 5;

    int a = 12;
    int b = 4;

    System.out.println(cal.product(x, y));
    System.out.println(cal.product(x, y, z));
    System.out.println(cal.product(a, b));
  }

}
```

In the code above, we see the same method behaving differently when encountering different types of inputs.

> **Note**: Methods which have no arguments and differ only in the return types cannot be overloaded since the compiler won't be able to differentiate between their calls.

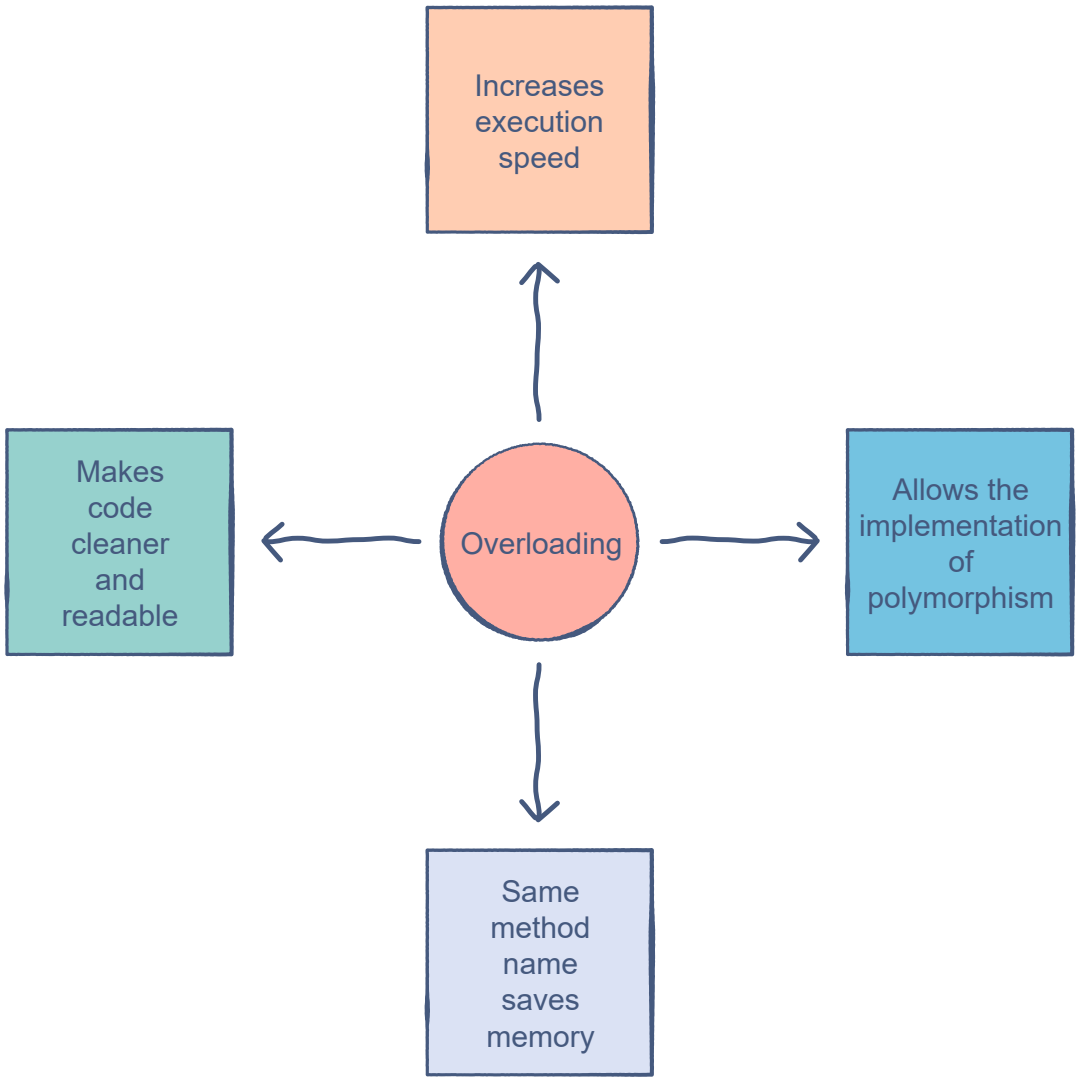
Advantages of Method Overloading

One might wonder that we could simply create new methods to perform different jobs rather than overloading the same method. However, under the hood, overloading saves us memory in the system. Creating new methods is more costly compared to overloading a single one.

Since they are memory-efficient, overloaded methods are compiled faster compared to different methods, especially if the list of methods is long.

An obvious benefit is that the code becomes simple and clean. We don't have to keep track of different method.

Polymorphism is a very important concept in object-oriented programming. It will come up later on in the course, but method overloading plays a vital role in its implementation.



At this point, we know all about the attributes of a class. However, the most crucial part is still left to explore. How do we define what happens when an object of our class is created? We'll find out in the next lesson.