Late Binding

- ***Early binding*** or ***static binding***
  - **which method is to be called** is decided at compile-time
    - ***Overloading****: an invocation can be operated on arguments of more than one type*
- ***Late binding*** or ***dynamic binding***
  - **which method is to be called** is decided at runtime
    - ***Overriding***: a derived class inherits methods from the base class, it can change or override an inherited method

Lab: Early binding (through overloading)

```
public class SayHello {

  public String sayHello(String name){
    return "Hello! "+ name;
  }

  public String sayHello(String name, String gender){
    if(gender.equals("boy")){
      return "Hello! Mr. "+ name;
    }
    else if(gender.equals("girl")){
      return "Hello! Miss. "+ name;
    }else{
      return "Hello! "+ name;
    }
  }

  public static void main(String[] args){
    SayHello hello = new SayHello();
    System.out.println(hello.sayHello("S.J.")); //decided at compile time
    System.out.println(hello.sayHello("S.J.","boy")); //decided at compile time
  }
}
```

Lab: Late binding (through overriding)

```
public class Payment {
  public void pay(){
    System.out.println("Pay in cash");
  }
  public void checkout(){
    pay();
  }
}
```

```
public class Store {
  public static void main(String[] args) {
    Payment p1 = new Payment();
    p1.checkout();
  }
}
```

Lab: Late binding (through overriding)

```
public class CreditCardPayment extends Payment{
  public void pay() {
    System.out.println("Pay with credit card");
  }
}
```

```
public class Store {
  public static void main(String[] args) {
    Payment p1 = new Payment();
    p1.checkout();

    Payment p2 = new CreditCardPayment();
    p2.checkout();
  }
}
```

Pitfall: No Late Binding for Static Methods

- Java uses **static binding** with **private**, **`final`**, and **static** methods
  - In the case of **`private`** and **`final`** methods, late binding would serve no purpose
  - However, in the case of a static method invoked using a calling object, it does make a difference