JOBSHEET 7

OVERLOADING AND OVERRIDING

1. Competence

After taking this subject, students are able to:

a. Understand the concepts of overloading and overriding,
b. Understand the difference between overloading and overriding,
c. Accuracy in identifying overriding and overloading methods
d. Accuracy in practicing instructions on the jobsheet
e. Implement overloading and overriding methods.

2. Introduction

2.1 Overloading

is to rewrite a method with the same name on a class. The goal is to facilitate the use/invocation of methods with similar functionality. The Overloading method declaration rules are as follows:

- The method name must be the same.
- The list of parameters should be different.
- The return type can be the same, or it can be different.

There are several lists of parameters on overloading can be seen as follows:

- The difference in the list of parameters does not only occur in the difference in the number of parameters, but also in the order of the parameters.
- For example, the following two parameters:
  - Function_member (int x, string n)
  - Function_member (String n, int x)
- The two parameters are also considered different in the list of parameters.
- The parameter list is not related to the naming of the variables present in the parameter.
- For example, the following 2 list of parameters:
  - function_member(int x)
  - function_member(int y)

- The two lists of parameters above are considered the same because the only difference is the naming of the variable parameters.

Overloading can also occur between the parent class and its subclass if it meets all three overload conditions. There are several overloading rules, namely:

- Primitive widening conversions take precedence over overloading over boxing and var args.
- We can't do the widening process from one wrapper type to another (changing the Integer to Long).
- We can't do the widening process followed by boxing (from int to Long)
- We can do boxing followed by widening (int can be an Object via an Integer)
- We can combine var args with either widening or boxing

2.2 Overriding

is a Subclass that seeks to modify behaviors inherited from super classes. The goal is that the subclass can have more specific behavior so that it can be done by redeclaring the parent class's method in the subclass.

The method declaration in the subclass must be the same as the one in the super class. Similarities on:

- Name
- Return type (for return type: class A or is a subclass of class A)
- List of parameters (number, type and order)

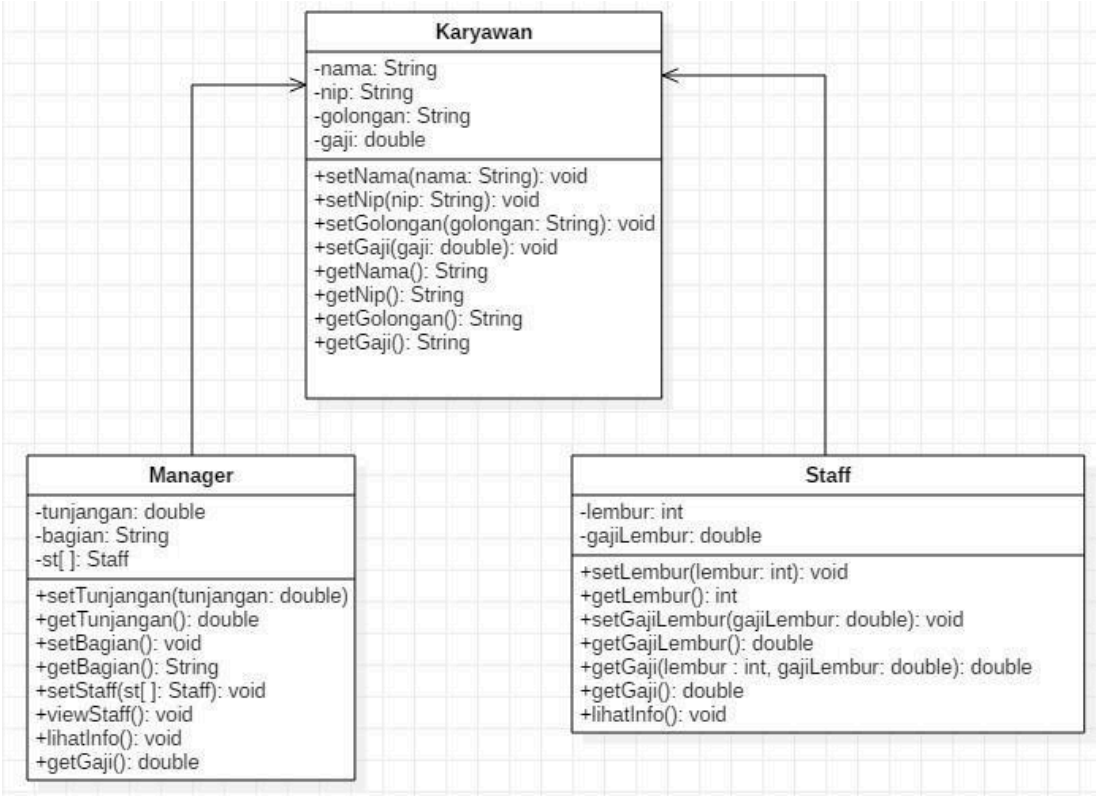
So that the method in the parent class is called the overridden method and the method in the subclass is called the overriding method. There are several method rules in overriding:

- The access mode of the overriding method must be the same or broader than the overridden method.
- A subclass can only override a superclass method once, there must not be more than one method in the exact same class.
- The overriding method must not throw checked exceptions that are not declared by the overridden method.

3. Practicum

3.1 Experiment 1

For the following example case, there are three classes, namely Karyawan, Manager, and Staff. Employee Class is a superclass of Manager and Staff where the Manager and Staff subclasses have different methods for calculating salaries.



3.2 Karyawan

```
public class Karyawan {

    /**
     * @param args the command line arguments
     */
  //  public static void main(String[] args) {
        // TODO code application logic here
private String nama;
private String nip;
private String golongan;
private double gaji;

public void setNama(String nama)
{
 this.nama=nama;
}
public void setNip(String nip)
{
 this.nip=nip;
}
public void setGolongan(String golongan)
{
 this.golongan=golongan;
```

```
  switch(golongan.charAt(0)){
   case '1':this.gaji=5000000;
     break;
   case '2':this.gaji=3000000;
     break;
   case '3':this.gaji=2000000;
     break;
   case '4':this.gaji=1000000;
     break;
   case '5':this.gaji=750000;
     break;
  }
}
public void setGaji(double gaji)
{
 this.gaji=gaji;
}
public String getNama()
{
 return nama;
}
public String getNip()
{
 return nip;
}
public String getGolongan()
{
 return golongan;
}
```

```
 public double getGaji()
 {
  return gaji;
 }
}
```

3.3 Staff

```
 public class Staff extends Karyawan {
private int lembur;
private double gajiLembur;

public void setLembur(int lembur)
{
 this.lembur=lembur;
}
public int getLembur()
{
 return lembur;
}
public void setGajiLembur(double gajiLembur)
{
 this.gajiLembur=gajiLembur;
}
public double getGajiLembur()
{
 return gajiLembur;
}
public double getGaji(int lembur,double gajiLembur)
{
 return super.getGaji()+lembur*gajiLembur;
}
 public double getGaji()
 {
  return super.getGaji()+lembur*gajiLembur;
 }
 public void lihatInfo()
 {
  System.out.println("NIP  :"+this.getNip());
  System.out.println("Nama  :"+this.getNama());
  System.out.println("Golongan :"+this.getGolongan());
  System.out.println("Jml Lembur :"+this.getLembur());
  System.out.printf("Gaji Lembur :%.0f\n", this.getGajiLembur());
  System.out.printf("Gaji  :%.0f\n",this.getGaji());
 }
}
```

Overloading

Overriding

3.4 Manager

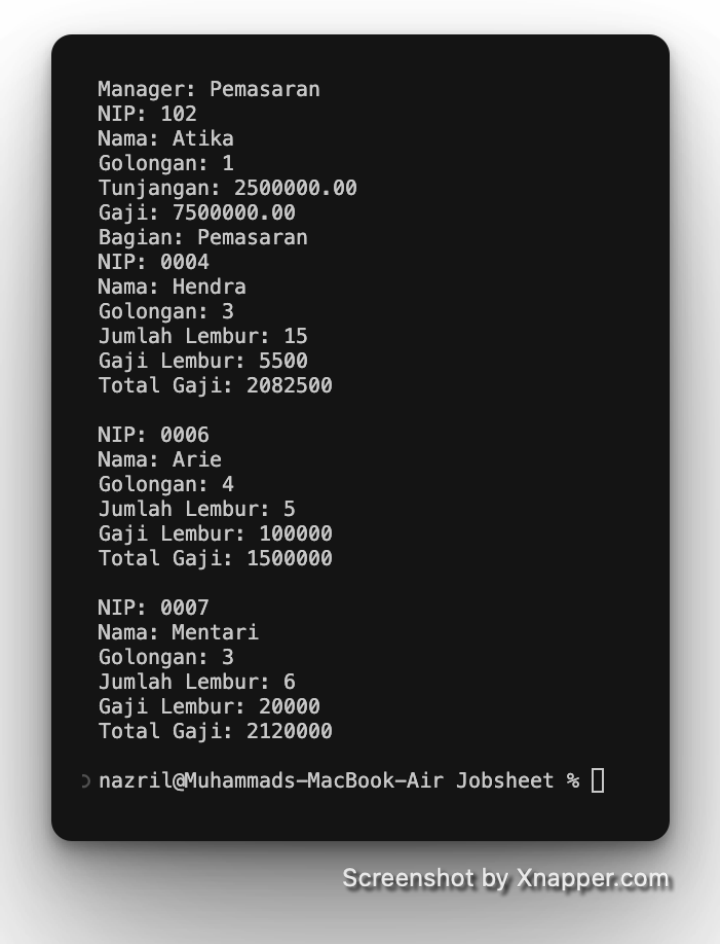
```
public class Manager extends Karyawan {
private double tunjangan;
private String bagian;
private Staff st[];

public void setTunjangan(double tunjangan)
{
 this.tunjangan=tunjangan;
}
public double getTunjangan()
{
 return tunjangan;
}
public void setBagian(String bagian)
{
 this.bagian=bagian;
}
public String getBagian()
{
 return bagian;
}
public void setStaff(Staff st[])
{
 this.st=st;
}

public void viewStaff()
{
 int i;
 System.out.println("-------------------");
 for(i=0;i<st.length;i++)
 {
  st[i].lihatInfo();
 }
 System.out.println("-------------------");
}
public void lihatInfo()
{
 System.out.println("Manager  :"+this.getBagian());
 System.out.println("NIP  :"+this.getNip());
 System.out.println("Nama  :"+this.getNama());
 System.out.println("Golongan :"+this.getGolongan());
 System.out.printf("Tunjangan :%.0f\n",this.getTunjangan());
 System.out.printf("Gaji  :%.0f\n",this.getGaji());
 System.out.println("Bagian  :"+this.getBagian());
 this.viewStaff();
}
public double getGaji()
{
 return super.getGaji()+tunjangan;
}
}
```

3.5 Main

```
public class Utama {
public static void main(String[] args)
{
 System.out.println("Program Testing Class Manager & Staff");
 Manager man[]=new Manager[2];
 Staff staff1[]=new Staff[2];
 Staff staff2[]=new Staff[3];

 //pembuatan manager

 man[0]=new Manager();
 man[0].setNama("Tedjo");
 man[0].setNip("101");
 man[0].setGolongan("1");
 man[0].setTunjangan(5000000);
 man[0].setBagian("Administrasi");

 man[1]=new Manager();
 man[1].setNama("Atika");
 man[1].setNip("102");
 man[1].setGolongan("1");
 man[1].setTunjangan(2500000);
 man[1].setBagian("Pemasaran");

 staff1[0]=new Staff();
 staff1[0].setNama("Usman");
 staff1[0].setNip("0003");
 staff1[0].setGolongan("2");
 staff1[0].setLembur(10);
 staff1[0].setGajiLembur(10000);

 staff1[1]=new Staff();
 staff1[1].setNama("Anugrah");
 staff1[1].setNip("0005");
 staff1[1].setGolongan("2");
 staff1[1].setLembur(10);
 staff1[1].setGajiLembur(55000);
 man[0].setStaff(staff1);

 staff2[0]=new Staff();
 staff2[0].setNama("Hendra");
 staff2[0].setNip("0004");
 staff2[0].setGolongan("3");
 staff2[0].setLembur(15);
 staff2[0].setGajiLembur(5500);
```

```
staff2[1]=new Staff();
staff2[1].setNama("Arie");
staff2[1].setNip("0006");
staff2[1].setGolongan("4");
staff2[1].setLembur(5);
staff2[1].setGajiLembur(100000);

staff2[2]=new Staff();
staff2[2].setNama("Mentari");
staff2[2].setNip("0007");
staff2[2].setGolongan("3");
staff2[2].setLembur(6);
staff2[2].setGajiLembur(20000);
man[1].setStaff(staff2);

//cetak informasi dari manager + staffnya
man[0].lihatInfo();
man[1].lihatInfo();
}
```

OUT PUT



4. Exercise

```
public class PerkalianKu {

 void perkalian(int a, int b){

  System.out.println(a * b);

 }

 void perkalian(int a, int b, int c){

  System.out.println(a * b * c);

 }

 public static void main(String args []){

  PerkalianKu objek = new PerkalianKu();

  objek.perkalian(25, 43);
  objek.perkalian(34, 23, 56);
 }
}
```

4.1 From the source coding above, where is the overloading?

```
void perkalian(int a, int b)
void perkalian(int a, int b, int c)
```

4.2 If there is overloading, how many different parameters are there?

The first method has **2 parameters** (`int a, int b`).
The second method has **3 parameters** (`int a, int b, int c`).

```
public class PerkalianKu {

 void perkalian(int a, int b){

  System.out.println(a * b);

 }

 void perkalian(double a, double b){

  System.out.println(a * b);

 }

 public static void main(String args []){

  PerkalianKu objek = new PerkalianKu();

  objek.perkalian(25, 43);
  objek.perkalian(34.56, 23.7);
 }
}
```

4.3 From the source coding above, where is the overloading?

```
void perkalian(int a, int b)
void perkalian(double a, double b)
```

4.4 If there is overloading, how many different types of parameters are there?

The first method uses **int** parameters (`int a, int b`).

The second method uses **double** parameters (`double a, double b`).

```
  class Ikan{
   public void swim(){
      System.out.println("Ikan bisa berenang");
   }
}
class Piranha extends Ikan{
   public void swim(){
      System.out.println("Piranha bisa makan daging");
   }
}
public class Fish {
    public static void main(String[] args) {
       Ikan a = new Ikan();
      Ikan b = new Piranha();
      a.swim();
      b.swim();
    }
   }
```

4.5 From the source coding above, where is the overriding?

Overriding occurs in the `swim` method within the `Piranha` class. The `Piranha` class overrides the `swim` method from its superclass `Ikan` with a new implementation.

4.6 Describe when sourcoding above if there is overriding?

Ketika `a.swim()` dipanggil, ia akan memanggil metode `swim` dari kelas `Ikan`, yang menghasilkan output "Ikan bisa berenang".

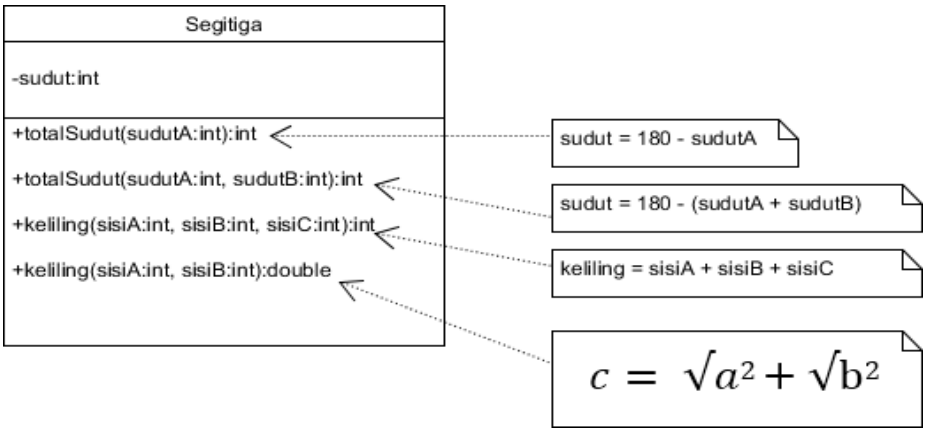
Ketika `b.swim()` dipanggil, karena `b` adalah instance dari `Piranha` (meskipun dideklarasikan sebagai tipe `Ikan`), ia akan memanggil metode `swim` yang telah dioverride di dalam kelas `Piranha`, sehingga menghasilkan output "Piranha bisa makan daging".

---

5. Tasks

5.1 Overloading

Implement the overloading concept in the diagram class below:




```java
package Jobsheet7;

public class Segitiga {
    private int sudut;

    public int totalSudut(int sudutA) {
        return 180 - sudutA;
    }

    public int totalSudut(int sudutA, int sudutB) {
        return 180 - (sudutA + sudutB);
    }

    public int keliling(int sisiA, int sisiB, int sisiC) {
        return sisiA + sisiB + sisiC;
    }

    public double keliling(int sisiA, int sisiB) {
        return Math.sqrt((sisiA * sisiA) + (sisiB * sisiB));
    }
}
```

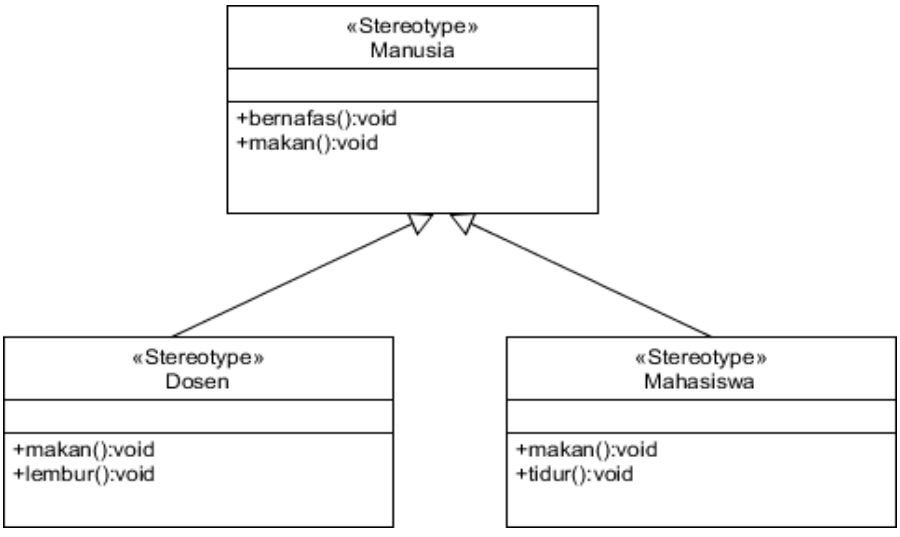
```java
package Jobsheet7;

public class MainSegitiga {
    public static void main(String[] args) {
        Segitiga segitiga = new Segitiga();

        int sudutTersisa1 = segitiga.totalSudut(60);
        System.out.println("Sisa sudut dengan sudut A = 60°: " + sudutTersisa1 + "°");

        int sudutTersisa2 = segitiga.totalSudut(50, 60);
        System.out.println("Sisa sudut dengan sudut A = 50° dan sudut B = 60°: " + sudutTersisa2 + "°");

        int keliling1 = segitiga.keliling(3, 4, 5);
        System.out.println("Keliling segitiga dengan sisi 3, 4, 5: " + keliling1);

        double keliling2 = segitiga.keliling(3, 4);
        System.out.println("Panjang sisi miring segitiga siku-siku dengan sisi 3 dan 4: " + keliling2);
    }
}
```

```
Sisa sudut dengan sudut A = 60°: 120°
Sisa sudut dengan sudut A = 50° dan sudut B = 60°: 70°
Keliling segitiga dengan sisi 3, 4, 5: 12
Panjang sisi miring segitiga siku-siku dengan sisi 3 dan 4: 5.0
nazril@Muhammads-MacBook-Air Jobsheet %
```

Screenshot by Xnapper.com

5.2 Overriding

Implement the diagram class below using the dynamic method dispatch technique:



```java
package Jobsheet7;

public class Manusia {
    public void bernafas() {
        System.out.println("Manusia sedang bernapas...");
    }

    public void makan() {
        System.out.println("Manusia sedang makan...");
    }
}

```

```java
package Jobsheet7;

public class Dosen extends Manusia {
    public void makan() {
        System.out.println("Dosen sedang makan di kantor...");
    }

    public void lembur() {
        System.out.println("Dosen sedang lembur...");
    }
}

```

```java
package Jobsheet7;

public class Mahasiswa extends Manusia {
    public void makan() {
        System.out.println("Mahasiswa sedang makan di kantin...");
    }

    public void tidur() {
        System.out.println("Mahasiswa sedang tidur...");
    }
}

```

```java
package Jobsheet7;

public class MainTaks2 {
    public static void main(String[] args) {
        Manusia manusia;

        manusia = new Dosen();
        manusia.bernafas();
        manusia.makan();
        ((Dosen) manusia).lembur();

        System.out.println();

        manusia = new Mahasiswa();
        manusia.bernafas();
        manusia.makan();
        ((Mahasiswa) manusia).tidur();
    }
}

```

```
Manusia sedang bernapas...
Dosen sedang makan di kantor...
Dosen sedang lembur...

Manusia sedang bernapas...
Mahasiswa sedang makan di kantin...
Mahasiswa sedang tidur...
nazril@Muhammads-MacBook-Air Jobsheet %
```