# Dasar-Dasar Pemrograman 2: Generics

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# Why?

Try this one:

Create a method to print each element of ArrayList of Integers vertically.

# Why?

Try this one:

Create a method to print each element of ArrayList of Strings vertically.

# Why?

Try this one:

Create a method to print each element of ArrayList of Doubles vertically.

# All the methods are similar, the only difference is the element type!

```
public static void printInt(ArrayList<Integer> lst) {
    for(int i = 0; i < lst.size(); i++) {
        System.out.println(lst.get(i));
    }
}

public static void printStr(ArrayList<String> lst) {
    for(int i = 0; i < lst.size(); i++) {
        System.out.println(lst.get(i));
    }
}

public static void printDouble(ArrayList<Double> lst) {
    for(int i = 0; i < lst.size(); i++) {
        System.out.println(lst.get(i));
    }
}
```

# Generics parameterize types!

```
public static <T> void print(ArrayList<T> lst) {
    for(int i = 0; i < lst.size(); i++) {
        System.out.println(lst.get(i));
    }
}
```

# Generics parameterize types!

```
public static <T> void print(ArrayList<T> lst) {
    for(int i = 0; i < lst.size(); i++) {
        System.out.println(lst.get(i));
    }
}
```

Generics are variables, but for types.
They can be used for methods and classes!

# Quiz time: Create a generic method to print any object with "Hello, " + object

```
hello("Hello");
hello(new Integer(5));
String[] strArr = {"1", "2", "3"};
hello(new ArrayList<String>(Arrays.asList(strArr)));
```

**Output:**
Hello, Hello
Hello, 5
Hello, [1, 2, 3]

# Quiz time: Create a generic method to print any object with "Hello, " + object

```
public static <T> void hello(T obj) {
        System.out.println("Hello, " + obj);
}
```

# Quiz time: Create a generic method to print any object with "Hello, " + object

```
public static <Bla> void hello(Bla obj) {
        System.out.println("Hello, " + obj);
}
```

The naming of the generics does not have to be T.

# Quiz time: Create a generic method to print any object with "Hello, " + object

```
 public static <Bla> void hello(Bla obj) {
        System.out.println("Hello, " + obj + " of type "
+ obj.getClass().getName());
 }
```

Print the object's type

# Generics for classes

- **Without generics for ArrayList**

```
ArrayList ageList = new ArrayList();
ageList.add(new Integer(46));
ageList.add("50");

Integer sum = new Integer(0);
for (Object age : ageList) {
    sum = sum + ((Integer) age);
}
```

# Generics for classes

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ageList.add(new Integer(46
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Integer sum = new Integer(0);
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    sum = sum + ((Integer) age);
}
```

**RUNTIME ERROR:**
**Exception in thread "main" java.lang.ClassCastException: class java.lang.String cannot be cast to class java.lang.Integer**

# Generics for classes

- **With generics for ArrayList**

```
ArrayList<Integer> ageList = new ArrayList<Integer>();
ageList.add(new Integer(46));
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Integer sum = new Integer(0);
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**COMPILE TIME ERROR:**
**java: incompatible types: java.lang.String cannot be converted to java.lang.Integer**

# Generics for classes

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Compile time error is better than runtime error, because errors can be detected earlier!

Casting is not needed when using generics!

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Casting is not needed when using generics!

We know what is the type, so we can directly state it here!

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Integer sum = new Integer(0);
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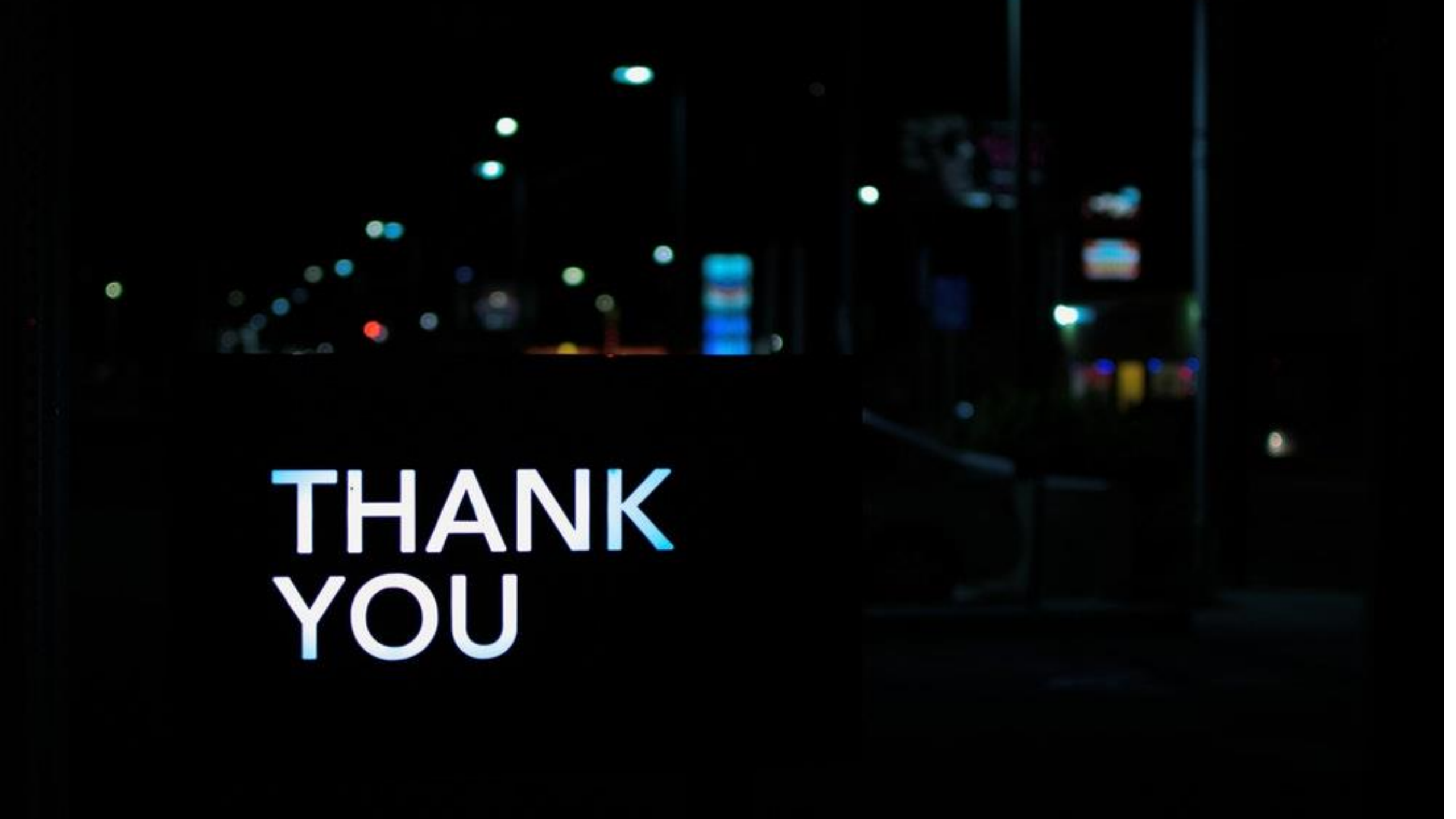
Fixed, looks better now.


THANK
YOU