Theory: Fields and methods in enum

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We use enum to define a set of unchangeable variables. After we defined them, we may need to extend the functionality of the enum and add values to the constants. Just like a class, an enum can have fields, constructors and methods. This feature makes enum a powerful tool for working with values you're not going to change.

To prove that, let's consider the following example.

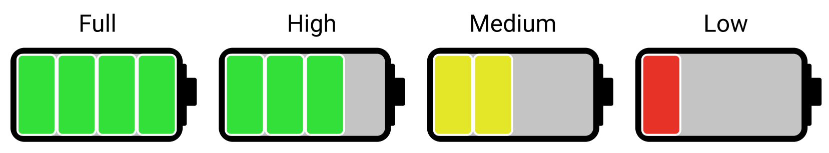
§1. Sample enum

Suppose we have to write a program that displays the battery level of a smartphone, power bank or any device with a discrete scale.

First of all, let's create an enum with several threshold levels that represent a battery level of charge:

```
public enum ChargeLevel {
    FULL, HIGH, MEDIUM, LOW
}
```

Suppose that we need to display the level of battery charge visually. We want it to be divided into several segments and have a color indication as well, in this way:



To do this, we will add corresponding fields and values to our enum. When we define them, we must supply values to the constructor of the enum. Here, we created a constructor in `ChargeLevel` enum and added two fields `sections` and `color`. Also, there are two methods `getSections()` and `getColor()` that return the values of fields respectively.

Current topic:

✓ Fields and methods in enum

Topic depends on:

✓ Constructor Stage 6

✓ Static members

✓ Enums in Java

Table of contents:

```java
public enum ChargeLevel {

    FULL(4, "green"),
    HIGH(3, "green"),
    MEDIUM(2, "yellow"),
    LOW(1, "red");

    int sections;
    String color;


    ChargeLevel(int sections, String color) {

        this.sections = sections;

        this.color = color;

    }


    public int getSections() {

        return sections;

    }


    public String getColor() {

        return color;

    }

}
```

Note that all of these instances are created by JVM in the same way as a static field of a class. This is the reason why an enum ***cannot*** contain a public constructor. This means we ***cannot*** create enum objects by invoking enum constructor by the `new` keyword but have to choose one of the predefined instances instead.
Keep in mind that if your enum contains fields and methods, you should always define them ***after*** the list of constants in the enum.

Now we have a class with additional info gathered in one place: the number of sections to highlight and color.

```java
System.out.println(ChargeLevel.LOW.sections); // 1
System.out.println(ChargeLevel.LOW.color); // red
```

It is possible to extend enum by adding custom static methods. For example, let's add a method that finds `ChargeLevel` instance by the given number of sections:

```
public enum ChargeLevel {

    FULL(4, "green"),
    HIGH(3, "green"),
    MEDIUM(2, "yellow"),
    LOW(1, "red");

    int sections;
    String color;


    ChargeLevel(int sections, String color) {

        this.sections = sections;

        this.color = color;

    }


    public int getSections() {

        return sections;

    }


    public String getColor() {

        return color;

    }


    public static ChargeLevel findByNumberOfSections(int sections) {

        for (ChargeLevel value: values()) {

            if (value.sections == sections) {

                return value;

            }

        }

        return null;

    }

}
```

Inside `findByNumberOfSections()` method, we iterated over possible values using a `for-each` loop. Here's an example of our method's output:

```
System.out.println(ChargeLevel.findByNumberOfSections(2)); // MEDIUM
```

§2. Conclusion

Since enum is a special class type in Java, we can add constructors, fields, and methods to it. Thus, it is possible to enhance our enum to include the values we need. The values of the constants are defined when we declare the enum. If you want to add enum fields, methods and constructors, you should do it after the enum constants' declaration.

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