

Methods and Example Programming Problems

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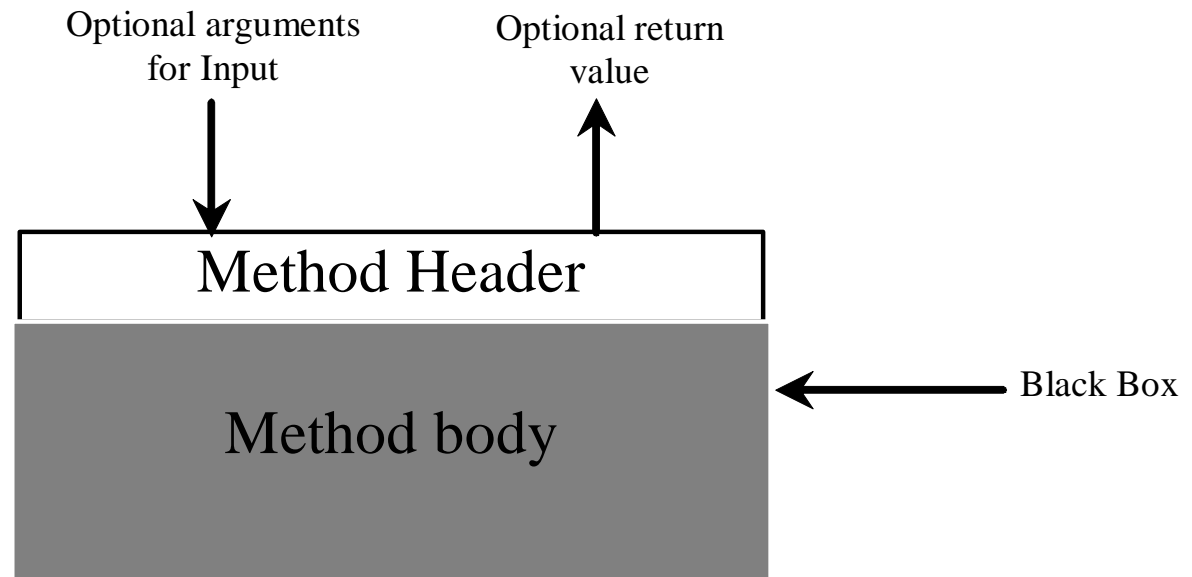
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Objectives

- To apply the concept of method abstraction in software development (§6.10).

Method Abstraction

- You can think of the method body as a black box that contains the detailed implementation for the method



Benefits of Methods

- Write a method once and reuse it anywhere.
- Information hiding.
 - Hide the implementation from the user.
- Reduce redundancy and complexity.

Problem. Generating Random Characters

- Write a program to generate random characters, such as, random lower case letters.

Review and Background: Characters in Java

- Each character has a unique Unicode between 0 and FFFF in hexadecimal (65535 in decimal, this is a simplification, since Unicode has ...).

- To generate a random character is to generate a random integer between 0 and 65535, e.g.,

```
(int)(Math.random() * (65535 + 1))
```

- The Unicode for lowercase letters are consecutive integers starting from the Unicode for 'a', then for 'b', 'c', ..., and 'z'. The Unicode for 'a' is

```
(int)'a'
```

- So, a random integer between (int)'a' and (int)'z' is

```
(int)((int)'a' + Math.random() * ((int)'z' - (int)'a' + 1))
```

Some Simplification

- All numeric operators can be applied to the char operands.
- The char operand is cast into a number if the other operand is a number or a character.
- So, the preceding expression can be simplified as follows

`'a' + Math.random() * ('z' - 'a' + 1)`

- So a random lowercase letter is

`(char)('a' + Math.random() * ('z' - 'a' + 1))`

Generate Random Characters

- To generalize the foregoing discussion, a random character between any two characters `ch1` and `ch2` with `ch1 < ch2` can be generated as follows

```
(char)(ch1 + Math.random() * (ch2 - ch1 + 1))
```


Solution. Generate Random Characters

```
public class RandomCharacter {  
    /** Generate a random character between ch1 and ch2 */  
    public static char getRandomCharacter(char ch1, char ch2) { // TODO }  
  
    /** Generate a random lowercase letter */  
    public static char getRandomLowerCaseLetter() { // TODO }  
  
    /** Generate a random uppercase letter */  
    public static char getRandomUpperCaseLetter() { // TODO }  
  
    /** Generate a random digit character */  
    public static char getRandomDigitCharacter() { // TODO }  
  
    /** Generate a random character */  
    public static char getRandomCharacter() { // TODO }  
}
```

Questions