More Sophisticated Behaviour

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Review: Sophisticated Behaviour

- Use Iterators to iterate over collections.
- Java array is a fixed-size collection. You can and must specify type of object stored in the array.
- Use Java class libraries.
- Use Java documentation to find the methods in a class.
- Use import statement to import a class in a library into the current scope.

String class

- `toLowerCase()`, `trim()` are examples of methods in the String class.
- A String is an immutable object; once a String is created, a method in the String class cannot modify the instance.
String Equality

- `if (input == "bye")`: tests if the object references pointing to the Strings are equal.
- `if (input.equals("bye"))`: tests if the String objects themselves are equal.
- Almost always, you should compare Strings using the `equals()` method.
Interface vs. Implementation

- **Interface** of a class describes what a class can do and how you can use the class.
- **Implementation** of a class is the source code that defines the class.
Class documentation: Interface vs implementation

- The documentation includes the interface of the class
  - the name of the class
  - a general description of the class
  - a list of constructors and methods
  - return values and parameters for constructors and methods
  - a description of the purpose of each constructor and method

- The documentation does not include the implementation of the class
  - private fields (most fields are private)
  - private methods
  - the definition (source code) for each method
Elements of Documentation

- Documentation for the class
  - the class name
  - a comment describing the overall purpose and characteristics of the class
  - a version number
  - the authors’ names
  - documentation for each constructor and each method
Elements of Documentation

- Documentation for each constructor and method:
  - the name of the method
  - the return type
  - the parameter names and types
  - a description of the purpose and function of the method
  - a description of each parameter
  - a description of the value returned
Using javadoc

- Read Chapter 5.10 in Barnes and Kölling on writing class documentation.
- From now on, every class you write (especially homeworks and the final project) should contain complete documentation.
BlueJ Example: TechSupport class

- Improve functionality of TechSupport class.
- Previous version we studied gave the same response to all questions.
- New version tries to understand the user’s question.
- Use Random, Map/HashMap, Set/HashSet, and StringTokenizer class libraries.
Using the Random class

- You can use the library class Random to generate random numbers.

- Random number can be
  - boolean
  - byte, int, long
  - float, double, gaussian
Using the Map/HashMap class

- Maps are collections that contain pairs of values.
- A HashMap is an implementation of Map that we can use.
- A pair consists of a key and a value.
- Lookup works by supplying a key, and retrieving a value.
- A telephone book is an example.
- What about examples in biology?
Using the Set/HashSet class

- A Set is a collection that contains no duplicate elements.
- A HashSet is an implementation of Set that we can use.
Using the StringTokenizer class

- Split a String into “tokens.”
- Use hasMoreTokens() and getToken() methods to retrieve all the tokens.
Access Modifiers

- Keywords `public` and `private` are access modifiers.
- Access modifiers define the visibility of a field, constructor, or method.
- `public`: can be invoked or accessed from outside the class (using the "." notation).
- `private`: can be accessed only by a member function of the class.
- Interface $\equiv$ `public` methods signatures and comments.
- Implementation $\equiv$ source code for methods and fields.
- Information hiding: internal details of a class’s implementation should be hidden from other classes.
Static variables

- Use the `static` keyword to define a variable that is stored with the class.
- Exactly one copy of this variable exists for the class.
- Use the `final` keyword to indicate that a variable is a constant.
- You must initialise a `final` keyword at the point where you declare it.