PÉCSI TUDOMÁNYEGYETEM
TERMÉSZETTUDOMÁNYI KAR

“Methodology of Programming I”

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PTE

Zahra Ahmadipour

Zahra@gamma.ttk.pte.hu

Expressions:

An expression is a construct made up of variables, operators, and method invocations, which are constructed according to the syntax of the language, that evaluates to a single value.

Statements:

Statements are roughly equivalent to sentences in natural languages. A statement forms a complete unit of execution.

Blocks:

A block is a group of zero or more statements between balanced braces and can be used anywhere a single statement is allowed.

Expressions are the core components of statements;

statements may be grouped into blocks.

Scope:

The scope of a variable is the range of statements in which the variable is visible. A variable is visible in a statement if it can be referenced in that statement.

A variable is **local** in a program unit or block if it is declared there.

The **nonlocal** variables of a program unit or block are those that are visible within the program unit or block but are not declared there.

Global variables are a special category of nonlocal variables.

Data structure is an arrangement of data in a computer's memory (or sometimes on a disk). Data structures include linked lists, stacks, binary trees, and hash tables, among others.

Algorithms manipulate the data in these structures in various ways, such as searching for a particular data item and sorting the data.

- The correct choice of data structure allows major improvements in program efficiency.
- An algorithm is a procedure for carrying out a particular task.
- In Java, an algorithm is usually implemented by a class method.
- Some data structures are used as programmer's tools: they help execute an algorithm.
- Other data structures model real−world situations, such as telephone lines running between cities.

Method

Methods are used to perform certain actions.

A method is a block of code which can be reused.

For a typical method declaration, the required elements of a method are:

the method’s return type, method’s name, a pair of parentheses (), and a body between braces {}.

Parameters:

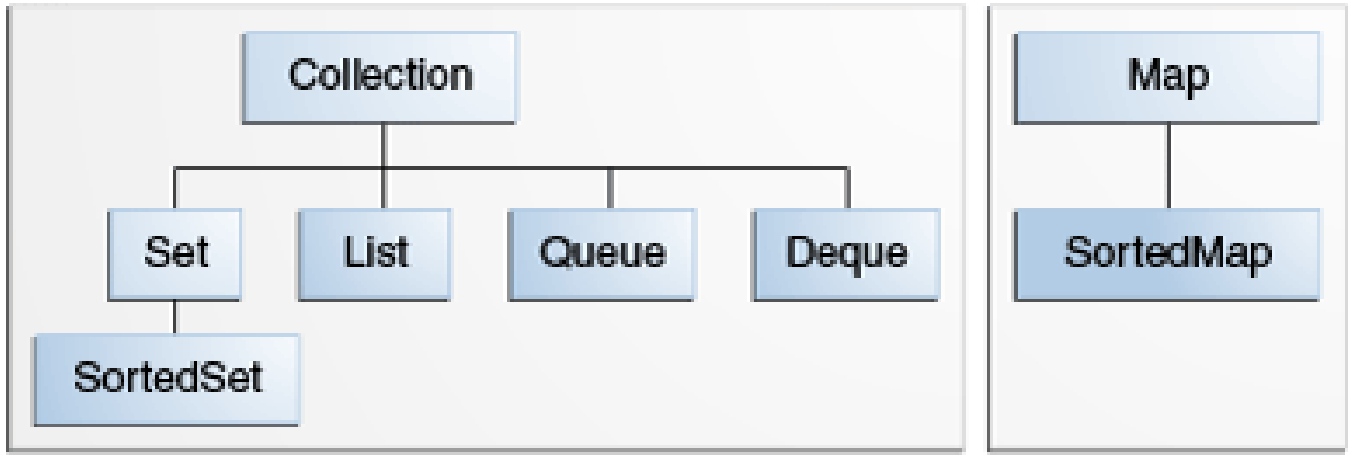
Information can be passed to methods as parameter.

A method can take a comma-separated list of parameters as an input.

Collections

A collection is simply an object that groups multiple elements into a single unit.

Collections are used to store, retrieve, manipulate, and communicate aggregate data.



When you declare a Collection instance you should specify the type of object contained in the collection.

Set: Collection that cannot contain duplicate elements.

List: An ordered collection which can contain duplicate elements.

Queue: A Queue is a collection for holding elements prior to processing.

Map: An object that maps keys to values.

ArrayList

The ArrayList class is a collection which can contain many objects of the same type.

It is a resizable array, which can be found in the java.util package.

- add() Add elements
- get() Access an item by its index
- set() Change the specified index's, value
- remove() Removes the element of the specified index
- clear() Removes all elements of the ArrayList
- size() Find the number of elements in the ArrayList

LinkedList

The LinkedList class is a collection which can contain many objects of the same type.

The LinkedList class has all of the same methods as the ArrayList class because they both implement the List interface plus some additional methods.

- addFirst() Add an item to the beginning of the list
- addLast() Add an item to the end of the list
- removeFirst() Remove an item from the beginning of the list
- removeLast() Remove an item from the end of the list
- getFirst() Access the first item of the list
- getLast() Access the last item of the list

The ArrayList class and the LinkedList class can be used in the same way, but they are built very differently.

The ArrayList class has a regular array inside it. When an element is added, it is placed into the array. If the array is not big enough, a new, larger array is created to replace the old one and the old one is removed.

The LinkedList stores its items in "containers." The list has a link to the first container and each container has a link to the next container in the list. To add an element to the list, the element is placed into a new container and that container is linked to one of the other containers in the list.

HashMap

A HashMap stores items in "key/value" pairs.

One object is used as a key (index) to another object (value).

The key objects and the value objects can be of different types.

- put() Add items as a key value pair
- get() Access the value of the specified key
- remove() Remove the item of the specified key
- clear() Remove all of the items
- size() Find the number of items in the HashMap
- keyset() Access all the keys
- values() Access all the values

HashSet

A HashSet is a collection of items where every item is unique.

- add() Add items to the HashSet
- contains() To check whether an item exists in the HashSet
- remove() Removes the value passed
- clear() Remove all of the items
- size() Find the number of items in the HashSet

By using Collections class

The following method can be used for all collections:

- Collections.sort() Sorts items alphabetically or numerically
- Collections.shuffle() Randomly permutes the items
- Collections.reverse() Reverses the order of the items

References:

"Data Structures and Algorithms in Java" by Robert Lafore

https://docs.oracle.com/javase/tutorial/tutorialLearningPaths.html

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