Assignment 5 – Part 2

(may be done by a team of at most two students)
Assigned: Monday, November 12
Due: Tuesday, November 22 (11:59 pm)

Part 2: Design by Contract

Posted on `Piazza:Resources → Assignments` is a zip file `CFJ_BST_Iter.zip`. Unzip this file to obtain a directory `CFJ_BST_Iter` containing a fully configured project which you may import into Eclipse by doing: File → Import → Existing Projects into Workspace. The added configurations permit the inclusion of CoFoJa contract annotations in the Java source.

The imported project contains a file `BST_Contract.java` with the familiar `Tree` and `DupTree` classes along with a class `BST_Iterator` which works on both trees and duptrees. The class `DupTree` extends `Tree` and the values in both types of trees are integers. Also included is an `@Invariant(ordered())` clause for class `Tree`.

Your task in this part of the assignment is to write CoFoJa contracts (`@Requires` and `@Ensures` annotations) for the constructor of `BST_Iterator` and the two methods that modify its state, namely, `next()` and `stack_left_spine()`.

Writing Contracts. The contracts should capture the basic requirements and properties of the iterator, namely, that:

1. the iterator only works on binary search trees;
2. the values are returned in ascending order; and
3. the stack invariant (described in Lecture 9) is maintained.

Your contracts may refer to the fields `count`, `value` and `stack` of `BST_Iterator` as well as *functions that do not modify the state* of any object, such as `Tree.min()`, `Tree.max()`, `Tree.ordered()`, `Stack.isEmpty()`, `Stack.peek()`, `BST_Iterator.hasNext()`, etc.

Running the Program. In order to run your program, you need to give the name of the .jar file in the VM Arguments of the Run Configuration, as follows:

```
-javaagent:lib/cofoja+asm-1.3.1-20170424.jar
```

Run `BST_Contract.java` augmented with contracts and ensure that the program works correctly.

***What to Submit*.** Prepare a top-level directory named *A5_Part2_UBITId1_UBITId2* if the assignment is done by a team of two students; otherwise, name it as *A5_Part2_UBITId* if the assignment is done solo. (Order the *UBITId*s in alphabetic order, in the former case.) In this directory, place the directory `BST_CFJ` containing the revised `BST_Contract.java` augmented with contracts. Compress the top-level directory and submit the compressed file using the `submit_cse522` command. Only one submission per team is required.

End of Assignment 5 - Part 2