Assignment 1 – Part2

(may be done by a team of at most two students)
Assigned: Wednesday, September 11, 2019
Due: Monday, September 23, 2019 1 (11:59 pm)

Part 2: Transform Inheritance in terms of Delegation

An important technique in the study of Object-Oriented Design is the use of *delegation* to replace *class inheritance*. A systematic approach for this transformation was presented in Lectures 4 and 5. Apply this approach to the program `Resources → Assignments → Delegation.java`. This program defines classes `A, B, C, D, E,` and `F`. The result of your transformation should be definition of classes called `A2, B2, C2, D2, E2,` and `F2` which correspond to classes `A, B, C, D, E,` and `F` respectively, but do not make use of class inheritance. The original program and the transformed program, when executed, should produce the same results for the given test cases.

A systematic approach involves the following steps:

1. Define an interface hierarchy with interfaces `IA`, `IB`, `IC`, `ID, IE`, and `IF` based upon classes `A, B, C, D, E`, and `F`. (Optimize the interfaces to avoid redundancy.)
2. Define new classes `A2, B2, C2, D2, E2`, and `F2` which implement `IA, IB, IC, ID, IE,` and `IF` respectively.
3. Set up the delegation hierarchy, define delegation methods, and provide a translation for every protected abstract method.
4. Translate the pseudo-variables `this` and `super` as `this2` and `super2` respectively. Access superclass attributes by '`super2`-chaining', e.g., `super2.super2.` …
5. In the translated program, you will also need to define two constructors for every non-leaf non-abstract class of the original class hierarchy, i.e., for classes `B2` and `D2`.

The file `Delegation.java` contains the definitions of classes `A … F` and also contains two tester classes called `Delegation` and `Delegation2`. It also contains the outline of the classes `A2 … F2`. Define the interfaces `IA … IF` and the classes `A2 … F2` in the same file.

Run both test cases through JIVE and save the object and sequence diagrams in files named `A1_Delegation_obj.png` and `A1_Delegation_seq.png` (for the first test case) and `A1_Delegation2_obj.png` and `A1_Delegation2_seq.png` (for the second test case). For object diagrams, choose 'Objects with Tables'. For sequence diagrams, choose 'Expand Lifelines'.

***Important**: Credit will be given only if the transformation is done in a systematic way. An ad hoc translation that produces correct results is not an acceptable solution for this assignment.*

***What to Submit*.** Prepare a top-level directory named *A1_Part2_UBITId1_UBITId2* if the assignment is done by a team of two students; otherwise, name it as *A1_Part2_UBITId* if it is done solo. (Order the *UBITId*s in alphabetic order, in the former case.) Place `Delegation.java` and all diagrams in this directory. Compress the directory and submit the resulting compressed file using the `submit_cse522` command. Only one submission per team is required.

End of Assignment 1 Part2