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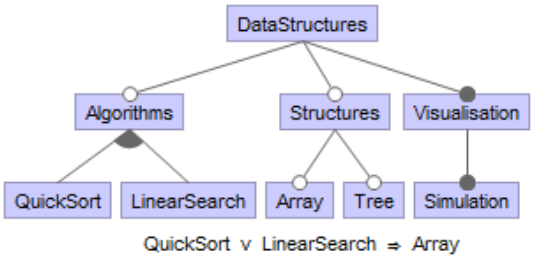
Software Product Lines

Assignment 8

Please prepare a submission for Tasks 1-3. You can use today's lab session to start working on the tasks and to ask questions.

Task 1: Analysis of feature models and configurations



(a) How can one determine if a given feature selection (configuration) is valid with regard to this feature model? Are the following to configurations valid?

```
C1 = {DataStructures, Algorithms, Structures, Array, Tree, Visualisation,
Simulation}
C2 = {DataStructures, Algorithms, QuickSort, LinearSearch, Structures,
Array, Visualisation, Simulation}
```

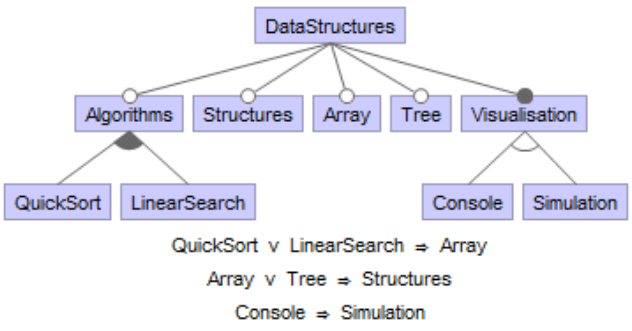
(b) Is the feature model consistent? How can one use a SAT solver to answer this question?

(c) Does the feature model contain any dead features? Which features always have to be activated? How can one use a SAT solver to answer both questions?

Task 2: Comparison of feature models

(a) Which categories of changes of feature models exist? What does each category mean for the set of products arising from the feature model?

(b) Assume that the feature model from task 1 is changed so that the following feature model shows the result of the change. To what category does the change belong?



(c) Give an example for a generalization of the feature model from task 2b.

3. Analysis of code

(a) How can one determine if a preprocessor product line contains any dead code or unnecessary annotations?

(b) How can one use the feature model during this analysis?

(c) Which of these problems occur in the following code excerpt, which is based on the feature model from task 2b?

```
public class Main {
    //#if Array
    static int[] array = new int[10];
    //#endif
    public static void main(String[] args) {
        //#if Array
        System.out.println(array);
        //#if !Structures
        System.out.println("Structures");
        //#endif
        //#endif
        //#if QuickSort
        System.out.println(sort(array));
        //#endif
    }
    //#if QuickSort
    static int[] sort() {
        int[] newArray = new int[10];
        // sorting
        //#if Sim
        System.out.println("Statistics");
        //#endif
        return newArray;
    }
    //#endif
}
```

Submit your solutions to the tasks as a PDF file.