İTÜ Computer Engineering Department
BLG252E Object Oriented Programming
3rd Homework

Due Date: May 22, 2011 09.00 AM

Before starting coding, it is highly recommended to examine the game. You can play the game on http://www.robmathiowetz.com/.

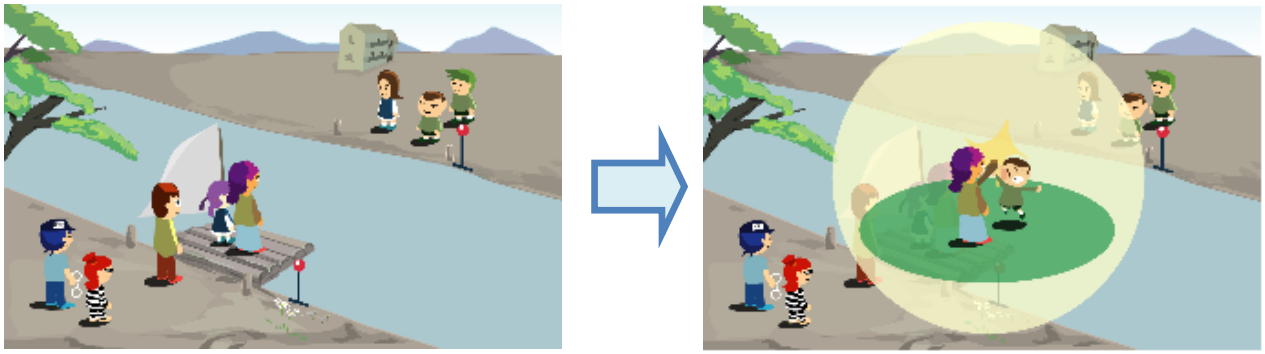
There is a game to pass some people across the river with some constraints. The goal is to pass all the 8 people(The father, the mother, two daughters, two sons, a policeman and a thief) across the river by using the only available raft with capacity of carrying 2 people.

The following rules apply:

- Only 2 people can be on the raft at a time.
- The father cannot stay with any of the daughters, without their mother's presence.
- The mother cannot stay with any of the sons, without their father's presence.
- The thief (striped shirt) cannot stay with any family member, if the policeman is not there.
- Only the father, the mother and the policeman know how to operate the raft.

Requirements:

- In the beginning, all the people and the raft are on the left side of the river. The aim is to pass everyone across the river without violating the rules of the game.
- There are two basic actions in the game, getting on the raft and sailing across.
    - For a person to get on the raft, he/she must be on the same side of the river with the raft and the raft must not be full.
    - To be able to sail across successfully, there must be at least one person on the raft being able to operate it and situation after sailing must not violate mother-son, father-daughter and thief-family consistencies.
- Consistencies for mother-son, father-daughter and thief-family are to be checked in both sides of the river. However, the couple on the raft does not have to be consistent with each other.
- If there is an inconsistency during sailing across the river, your program must **throw an exception**. You do not need to throw an exception when there is not an operator on the raft.



- You **must not** use STL templates for this homework. You are expected to design a data structure for maintaining people which is required to be in the following format,

```
Container<Operator, ...> operators(3);
Container<NonOperator, ...> non_operators(5);
```

where Operator and NonOperator are C++ classes. These containers may be designed as a generic array of given type. A sample design like the one given above provides distinction for operators and non-operators. It makes searching for solution easier and more effective, if it is used to ensure there is at least one operator on the raft.

In this assignment, you will design&implement all the classes to model and **solve the problem** while **avoiding code repetition** for all classes and providing **data hiding**. You can use any search approach to find and print a consistent solution on the screen. Your design is required to be consistent with the **requirements** mentioned above and on the first page.

Submission Procedure:

1. Your source code archive should contain everything you implemented to solve the problem.
2. **Use comments** wherever necessary in your code to explain what you did and provide a **report** containing details of your design&implementation, UML diagrams of classes and visual representation of data structures.
3. **Grading will be as 70% for the code and 30% for the report.**
4. Make sure you write your name and number to all the header files with the following format.

```
/*
 *
 *  BLG252E
 *  2011 Spring
 *  3rd Homework
 *
 *
 *
 *
 * Student Name: !! enter here !!
 * Student ID  : !! enter here !!
 *
 *
 */
```

5. After you make sure that everything is compiled smoothly, archive all the files into a zip file. Submit this file through www.ninova.itu.edu.tr. Ninova enables you to change your submission before the submission deadline.

Academic dishonesty including but not limited to cheating, plagiarism, collaboration is unacceptable and subject to disciplinary actions. Any student found guilty will get grade -100.