Person programming task

This is an English version of Objektstrukturer - Person-oppgave, and is concerned with a Person class and the consistency of the child-parent association.

An important part of the implementation of associations is to ensure consistency, i.e. that objects are correctly linked to each other in both directions. An example is associations between children and parents in a family tree. In this programming task, you will implement a Person class with logic for correctly adding (and removing) children, as illustrated below.

The Person class must support a name (a String) and gender (a character, 'F' eller 'M'), both of which must be provided in the constructor and not be settable later, and mother, father and children, which are other Person objects. The Person class must have the following methods for reading the state:

- getName() - returns the name of this Person object
- getGender() - returns the character representing the gender, either 'F' or 'M'
- getMother() - returns the Person object representing the mother, or null
- getFather() - returns the Person object representing the father, or null
- getChildCount() - returns the number of children of this Person object
- getChild(int n) - returns child number n (another Person object), or raises an appropriate exception if n is too big (or small)

The Person class has two sets of mutation methods, related to the two roles of each end of the children-mother/father association.

From the children perspective we have the following two methods:

- addChild(Person) - links this Person object to a child (another Person object). If this Person object is a woman then she should also become the child's mother, and alternatively, if this Person object is a man then he should become the child's father.
- removeChild(Person) - removes a link from this Person object to a child (another Person object). If this Person object is the mother of the argument, then the mother link must be removed, and alternatively, if this Person object is the father of the argument, then the father link must be removed.

From the mother/father perspective we have the following two methods:

- setMother(Person) - sets the argument (a woman) as this Person object's mother. This Person object should also become a child of the argument.
- setFather(Person) - sets the argument (a man) as this Person object's father. This Person object should also become a child of the argument.

Note that both sets of methods, addChild/removeChild og setMother/setFather, must include logic to handle the link the opposite direction, so addChild/removeChild must call setMother/setFather and vice versa, or have corresponding effect. This can be a bit tricky, since you both must ensure consistency and avoid infinitely nested calls (until you get a StackOverflowException).

The figures below illustrate some of the cases that must be handled, and which are tested by our tests.
The task is split in two parts, the first handles the children- and mother/father roles in isolation without considering consistency, while the other must ensure consistency.

The Exercise panel

Use the Exercise panel, open the Person.ex file (tests > objectstructures > Person.ex) in the panel before you start programming.

Part 1

- Implement the addChild and removeChild methods so the getChildCount and getChild methods work as expected. These methods only handle the children role.
- Implement the setMother and setFather methods so the getMother and getFather methods work as expected. These methods only handle the mother/father roles.

Test the methods by creating Person object structures corresponding to your own family. You'll have to use all the three methods addChild, setMother and setFather. Try with at least three generations.

Part 2

Extend the methods to handle consistency. Test by creating the same Person object structures as in part 1, this time by only using addChild and by only using setMother and setFather.

Test code for this task can be found here: objectstructures/PersonTest.java. The original jextest code can be found here: objectstructures/Person.jextest.