Exercises for Softwaretechnik II

Sheet 1 — Issue date: 20.04.2017, Solution due by: 27.04.2017

Task 1.1:  Collections in the OCL
[ medium / Examination processing time ca. 15 Min.; actually: ______; preparatory reading: ______ ]

Read the section on collections in the OCL specification, in particular the predefined operations of the different types of collections.

Task 1.2:  Collections in the OCL
[ mittel / Examination processing time ca. 15 Min.; actually: ______; preparatory reading: ______ ]

Specify the result of the evaluation of the following OCL expressions. If an expression is invalid specify “undefined” as solution. Example:

- Set{1,4,7,10} - Set{4,7} = Set{1,10}
- a. OrderedSet{12,9,6,3} - Set{1,2,3}
- b. Set{1,2,3,4} -> sum()
- c. Set{1,2,3,4} -> size()
- g. Sequence{‘h’, ‘a’, ‘l’, ‘l’, ‘o’} -> at(2)
- h. Sequence{‘h’, ‘a’, ‘l’, ‘l’, ‘o’} -> indexOf(‘l’)
- l. Set{1,2,3,4,5} -> subOrderedSet(2, 4)
- m. Set{1,4,7,10} -> symmetricDifference (Set{4,5,7})
- n. Set{1,3,5} -> union(Set{2,4,6})
- o. Bag{1,3,5} -> union(Set{2,4,6})
- p. Set{1,3,5} -> union(Bag{2,4,6})
- q. Set{1,2,-1,-2} -> isUnique(e|e=e)
- r. Set{1,2,-1,-2} -> asOrderedSet()
- s. Set{Set{1,2,3,4}, Set{3,4,5,6}} -> flatten()
- t. Bag{Set{1,2,3,4}, Set{3,4,5,6}} -> flatten()

Task 1.3:  Application of the OCL
[ mittel / Examination processing time ca. 20 Min.; actually: ______; preparatory reading: ______ ]

The following data are used in an application: Vehicles, persons and trips, with the usual attributes. Vehicles have attributes which specify the number of wheels and the number of seats. Every vehicle has exactly one person as owner; vehicles are either cars or bicycles. A trip involves exactly one vehicle and one or more transported persons.

a. Draw a corresponding class diagram.

Write down the following invariants textually as OCL conditions:

b. The owner of a car must be at least 18 years old.
c. Cars have 4 wheels, bicycles have 2 wheels.d. The owner must be present during each trip.e. The number of persons transported must not exceed the number of seats.f. At one day, a person may only participate at one trip.

Enter appropriate pre- and post-conditions for the following operations:

g. an operation which adds an additional person as a companion to a trip

h. an operation which removes a traveling person of trip