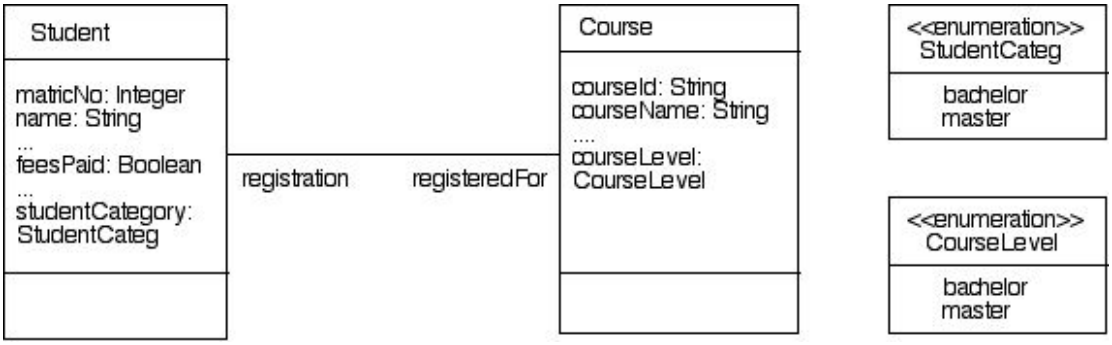
INF3120 Tutorial Exercise on OCL

Students at a University are classified as either Bachelor (cand.mag) or Master (hovedfag). Each student is identified by a unique matriculation number (matricNo), and their name and other details are stored in an object of class Student. All students have to pay fees (feesPaid is true) to be allowed to register for any courses. Each course is identified by a unique course identifier (courseId) and also has a descriptive name (courseName). Every course has a level (courseLevel), which is either Bachelor or Master, in this simplified example. Details of a course are stored in an object of class Course.

The following diagram gives the skeleton of a UML class diagram describing the students and courses.



Note that in this simplified model Student categories (StudentCateg) and Course levels (CourseLevel) both have the same enumeration values but it would not be good design to have single enumeration type for both of these. In the future, we might want to add different values to each of these lists, for example Bachelor courses might be sub-divided into several levels, or perhaps a new level 'diploma' could be added.

1. Write an OCL constraint on Course restricting the course name to between 10 and 25 characters. Write an OCL constraint on Student stating that a student may only be registered for any courses if they have paid their fees.

2. Each Bachelor student may be registered for up to 10 courses but a Master student may only register for a maximum of 8 courses (in each case, provided they have paid their fees). There is no upper limit on the number of student registrations for a course but every Bachelor course must have at least 20 registrations and every Master course at least 10 registrations.
   Add cardinalities to the associations on the above diagram to implement these restrictions as far as possible and write OCL constraints to add more specific restrictions.

3. Suppose that there is a simple rule that Bachelor students may only attend Bachelor level courses and Master students may only attend Master level courses.
   (a) Write OCL constraints for the two basic classes, Student and Course, to express this rule.
   (b) Define subclasses of Student and Course and express these constraints diagrammatically, together with those described in part 2, above.
   (c) Consider using subclasses for either Student or Course together with some OCL constraints.

4. The rules are changed so that Master students may register for one or two Bachelor courses as part of their curriculum. Bachelor students are still restricted to registering for only Bachelor level courses.
   Write an OCL constraint to express these rules, modifying the rules expressed in 3(a) above.