

XML

Exercise 1

Convert the following DTD to an **XML Schema** WITHOUT using anonymous types. Add to your schema a constraint stating that the courseNb used in a registration must correspond to an existing course number.

```
<!ELEMENT   info           (course+, registration*)>
<!ELEMENT   course         (number, title)>
<!ATTLIST   course   level (UG | GR)  "UG">
               <!-- UG for undergraduate, GR for graduate-->
<!ELEMENT   number         (#PCDATA)>
               <!-- the course number is unique -->
<!ELEMENT   title          (#PCDATA)>
<!ELEMENT   registration   (studentID, courseNb, status?)>
<!ELEMENT   studentID     (#PCDATA)>
<!ELEMENT   courseNb      (#PCDATA)>
<!ELEMENT   status        (#PCDATA)>
```

Check that the following XML document conforms to your XML schema.

```
<?xml version="1.0"?>
<info   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="info.xsd">
  <course level = "UG">
    <number>CMPS 277</number>
    <title>Database Systems</title>
  </course>
  <course level = "GR">
    <number>CMPS 378</number>
    <title>Advanced Databases</title>
  </course>
  <registration>
    <studentID>2004-123456</studentID>
    <courseNb>CMPS 277</courseNb>
  </registration>
  <registration>
    <studentID>2004-234567</studentID>
    <courseNb>CMPS 277</courseNb>
    <status>withdraw</status>
  </registration>
```

```
<registration>
  <studentID>2004-123456</studentID>
  <courseNb>CMPS 378</courseNb>
</registration>
</info>
```

Exercise 2

Take the XML document of exercise 1. Write an **XPath** query to return:

1. the title of undergraduate courses.
2. the level of the “CMPS 378” course.
3. the registrations for which the status is known.
4. the second course and the last registration.
5. the third child of the “info” element.

Run your queries.

Exercise 3

Take the XML document of exercise 1. Write in **XQuery** a query to return:

1. the courses that contain “Database” in their title.
2. the number of registrations in graduate courses.
3. For each student, list the studentID and the courseNb of all courses he/she is (or was) registered in, grouped inside a “reg-student” element.

Run your queries.