

Lab “Semantic Technologies” WS 2019

Problem 2 (to be handed in Thursday, December 19, 2019)

A simple XML document (see enclosed file university_students.xml – no need to type this in per hand) has the structure

```
<?xml version="1.0" encoding="UTF-8"?>
<university>
  <students>
    <student sid="sckl9999">
      <name>Schmitt</name>
      <firstname>Klaus</firstname>
      <courses>
        <course cid="IM120">
          <grade attempt="1" term="WS13" type="simple">4.7</grade>
          <grade attempt="2" term="SS14" type="simple">5.0</grade>
          <grade attempt="3" term="WS14" type="simple">1.3</grade>
        </course>
        <course cid="IM130">
          <grade attempt="1" term="SS14" type="complex">2.1</grade>
          <course cid="IM131">
            <grade attempt="1" term="WS14" type="simple">2.0</grade>
          </course>
          <course cid="IM132">
            <grade attempt="1" term="SS14" type="simple">2.3</grade>
          </course>
          <course cid="IM133">
            <grade attempt="1" term="WS14" type="simple">2.0</grade>
          </course>
        </course>
        <course cid="IM140">
          <grade attempt="1" term="WS14" type="simple">1.7</grade>
        </course>
      </courses>
    </student>
    <student>(Further students with similar entries)</student>
  </students>
</university>
```

etc. For the beginning we assume, that at most 5 courses per student are chosen.

a.) Study the lecture material on XML Schema. Write an XML Schema for the above XML file which also defines two grading scales (datatypes) for XML elements

“simple”: allowed are only values

1.0, 1.3, 1.7, 2.0, 2.3, 2.7, 3.0, 3.3, 3.7, 4.0, 4.7, 5.0

“complex”: Allowed are all decimal values from 1.0 – 5.0.

Verify the XML file against this schema.

b.) Is it possible to throw a validation error, when a simple grade has a value that is not allowed ? If yes, implement this in the schema. If not: How would one have to modify the XML file in order to implement this ?

Is it possible to throw a validation error when the attempt counter is greater than 1, but other grades are missing ? If yes, implement this in the schema. If not: How would one have to modify the XML file in order to implement this ?

c.) Write an XSL style sheet which checks the above XML file for errors of the type described in point c.).

d.) Of course you understand, that a complex grade arises when more than one simple grade enter the final grade for this module: IM130 has a grade which is the average of IM131, IM132, IM133. Write an XSLT style sheet which calculates the complex grade for IM130 – but only if its three sub-courses IM131, IM132 and IM133 have been passed.