

Document must have a single root

1. Find and correct the errors in the following document:

No closing tag

```
<course name="Advanced Databases" code="2ID45">  
  <lecturer fname="Toon" sname="Calders">  
  <lecturer fname="Jan" sname="Paredaens">  
    <affiliation>University of Antwerp</affiliation>  
  </lecturer>  
  <instructor fname="Toon" sname="Calders"/>
```

No matching closing tag

```
<material>  
  <required>  
    <book>  
      <title>Databases: System Concepts</title>  
      <author>A. Silberschatz</author>  
      <author>H. F. Korth</author>  
      <author>S. Sudarshan</author>  
      <publ>McGraw-Hill</publ>
```

Paper element must be closed before the enclosing book element can be closed.

```
    <paper>  
    </book>  
      <title>LiXQuery: A formal foundation for XQuery research</title>  
      <author>J. Hidders</author>  
      <author>P. Michiels</author>  
      <author>J. Paredaens</author>  
      <author>R. Vercammen</author>  
      <journal>ACM SIGMOD Record</journal>
```

```
    </paper>  
  <wikipedia>  
    <a href="http://en.wikipedia.org/wiki/XML">Wikipedia page on XML</a>  
  </wikipedia>  
</material>
```

```
<room>  
  A7  
</room>  
<room>  
  A15  
</room>  
</course>  
  
<course name="Datamining and Knowledge Based systems" code="2II15">  
  <lecturer fname="Toon" sname="Calders"/>  
  <room>  
    A8  
  </room>  
</course>
```

2. Construct the tree for the following document:

```
<courses>
<course name="Advanced Databases" code="2ID45">
  <lecturer fname="Toon" sname="Calders"/>
  <lecturer fname="Jan" sname="Paredaens">
    <affiliation>University of Antwerp</affiliation>
  </lecturer>
  <instructor fname="Toon" sname="Calders"/>

  <material>
    <required>
      <book>
        <title>Databases: System Concepts</title>
        <author>A. Silberschatz</author>
        <author>H. F. Korth</author>
        <author>S. Sudarshan</author>
        <publ>McGraw-Hill</publ>
      </book>
      <paper>
        <title>LiXQuery: A formal foundation for XQuery research</title>
        <author>J. Hidders</author>
        <author>P. Michiels</author>
        <author>J. Paredaens</author>
        <author>R. Vercaemmen</author>
        <journal>ACM SIGMOD Record</journal>
      </paper>
    </required>
    <wikipedia>
      <a href="http://en.wikipedia.org/wiki/XML">Wikipedia page on XML</a>
    </wikipedia>
  </material>

  <room>
    A7
  </room>
  <room>
    A15
  </room>
</course>

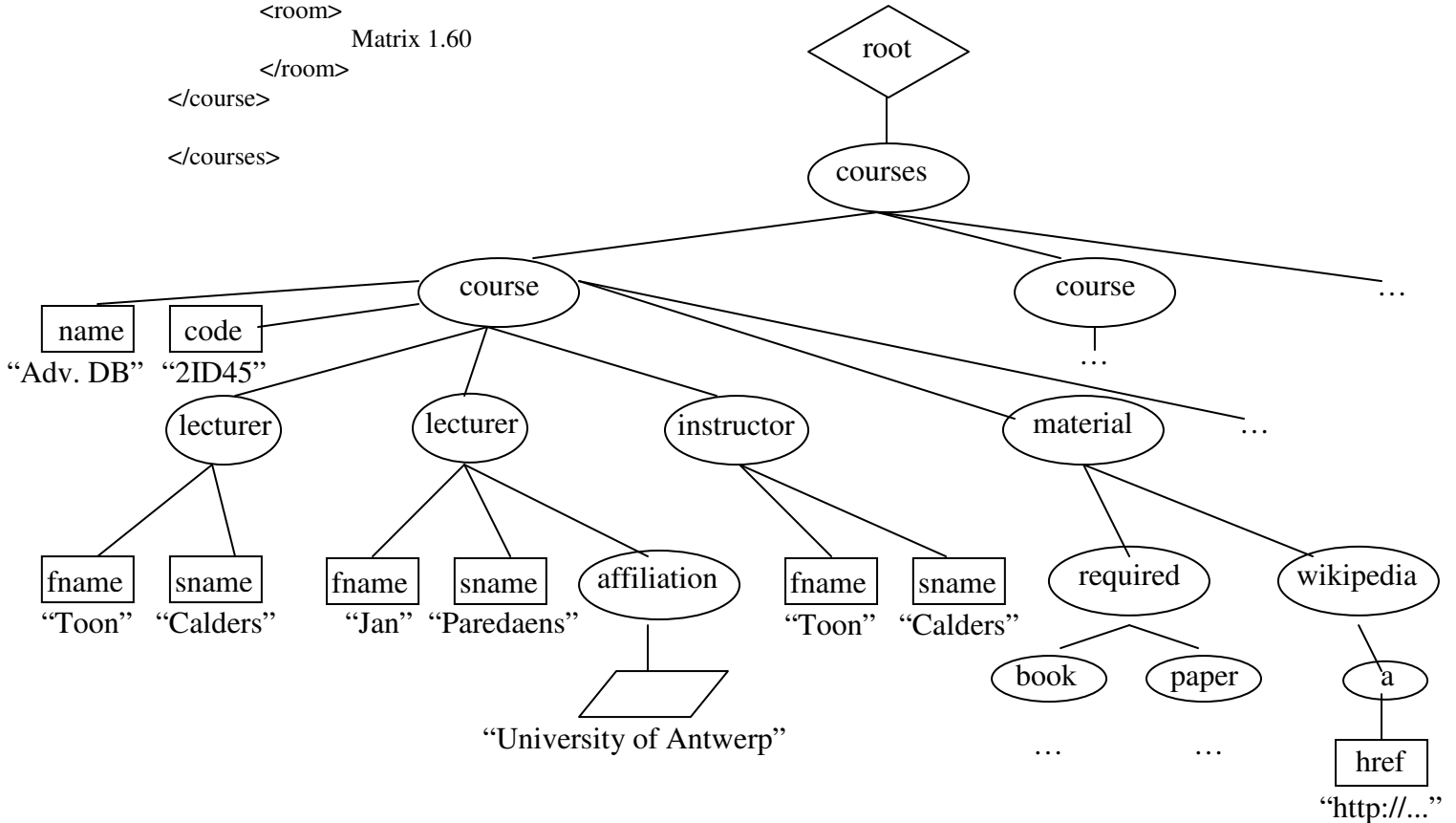
<course name="Datamining and Knowledge Based systems" code="2II15">
  <lecturer fname="Toon" sname="Calders"/>
  <material>
    <required>
      <book>
        <title>Introduction to Data Mining</title>
        <author>P.-N. Tan</author>
        <author>M. Steinbach</author>
        <author>V. Kumar</author>
        <publ>Pearson</publ>
      </book>
    </required>
    <book>
      <title>Principles of Data mining</title>
    </book>
  </material>
</course>
```

```

    <author>D. Hand</author>
    <author>H. Mannila</author>
    <author>P. Smyth</author>
    <publ>The MIT press</publ>
  </book>
</material>
<room>
  A8
</room>
</course>

<course name="Datamodeling and databases" code="2ID05">
  <lecturer fname="Paul" sname="De Bra"/>
  <instructor fname="Mykola" sname="Pechenizkiy"/>
  <material>
    <required>
      <book>
        <title>Databases: System Concepts</title>
        <author>A. Silberschatz</author>
        <author>H. F. Korth</author>
        <author>S. Sudarshan</author>
        <publ>McGraw-Hill</publ>
      </book>
    </required>
  </material>
</course>
  A7
  Matrix 1.60
</course>
</courses>

```



3. Write XPath-expressions that select:

a) All book elements in the document

`/descendant-or-self::book`

b) Give all book elements for the required books for courses for which Calders is lecturer.

**`/descendant-or-self::course[child::lecturer/attribute::sname="Calders"]
/child::material/child::required/child::book`**

c) Give the codes of all lectures for which there is a mandatory book of which McGraw-Hill is the publisher.

**`/child::courses/child::course[child::material/child::required/
child::book/child::publ[text()='McGraw-Hill']]/attribute::code`**

d) Give the title-elements of all books in the document.

`/descendant-or-self::book/child::title`

4. What is the result of the following XPath expressions:

a) `/descendant::material/child::*[child::publ]`

All children of material-elements in the document that do have a publ-element as a child.

b) `/descendant-or-self::*[child::*[position()=2]]`

All second elements in the list of children of any element in the document. Notice that for the position, the text elements and the attribute elements are not considered.

Explanantion:

`/descendant-or-self::*` selects all elements in the document.

These will be the *context-nodes* for the following axis

`child::*[position()=2]` selects, for every node from the previous step, all children of the context node, and in this list, the second one is selected.

c) /descendant-or-self::*[position()=last()-1]

The one-but-last element of the document. Again attribute and text-nodes are not considered.

Explanation:

/	selects the root
descendant-or-self	is the axis that is followed; i.e., all nodes descendant of the root, including the root itself.
::*	the node test: selects all element nodes
[position()=last()-1]	the predicate selects from this list the one-but-last element. Predicates are always evaluated against the list of nodes generated by the axis and node test w.r.t. the context node.

Notice that, as one of the students remarked, the answer that was given in the instruction session was incorrect.

The XPath expressions have been tested with the MonetDB/XQuery that has been developed in the CWI research institute. For an overview of MonetDB and to download this database system, visit: <http://monetdb.cwi.nl/> .