Test Examination for the course XML-processing, methods, tools and theories

ITU

Spring 2005

Below you find 6 questions. Subquestions have equal weight.

You may write your answers in Danish or English.

Question 1 (15 %)

Rewrite the HTML document below so that it contains only the logical information and write a CSS stylesheet that takes care of the physical layout. The output in a browser should look like the output of the HTML below.

```
<html>

<head>
<title>CSS assignment</title>
</head>
<body bgcolor="red">
<h1><font color="yellow">CSS Assignment</font></h1>
Here is a small HTML document.
Your job is to
<ol>
   <li><font color="blue">Separate the logical contents from the
 physical layout</font></li>
   <li><font color="blue">Write a CSS stylesheet that takes care
 of the physical layout</font></li>
   <li><font color="green">Rewrite the HTML document so that
it contains only the logical information</font></li>
</ol>
<b>NB:</b><em><font-style="italic">When linking your CSS stylesheet
 with the rewritten HTML document, the output should look like this
```

```
HTML document does when viewed in a browser.
</font></em>
</body>
</html>
```

Question 2 (25%)

```
<?xml version="1.0"?>
<!DOCTYPE context [
<!ELEMENT context ((building | pda)*)>
<!ELEMENT building (info?, floor*)>
<!ATTLIST building name ID #REQUIRED>
<!ELEMENT floor (info?, (room | pda)*)>
<!ATTLIST floor level ( -1 | 0 | 1 | 2 | 3 | 4 | 5) #REQUIRED>
<!ELEMENT room (info?, pda*)>
<!ATTLIST room type (canteen|office) #REQUIRED
               name CDATA #IMPLIED>
<!ELEMENT pda EMPTY>
<!ATTLIST pda name ID #REQUIRED>
<!ELEMENT info (#PCDATA)>
]>
<context>
 <building name="ITU">
  <floor level="0">
   <room name="eatIT" type="canteen">
    <info>Todays menu is hot tomato soup with bread crumbles!</info>
    <pda name="hniss"/>
    <pda name="hilde"/>
    <pda name="tofte"/>
   </room>
  </floor>
  <floor level="4">
   <info>At this floor you find offices of researchers</info>
   <room name="Hildebrandt" type="office">
    <info>Office hours every monday between 10 and 11</info>
   </room>
  </floor>
 </building>
 <pda name="guest"/>
 <building name="KUA">
  <floor level="0">
   <room name="Kantinen" type="canteen">
    <info>Today we have a buffet with chicken, salmon and veg. lasagne</info>
```

```
    <pda name="peter"/>
    <pda name="susan"/>
   </room>
  </floor>
 </building>
</context>
```

1. Consider the DTD in the XML document above. Which of the following sequences of elements are valid contents of the floor element? (Justify your answers)
   (a) `(info, room, pda, pda, room)`
   (b) `(room, info, pda)`
   (c) `(info, info, room)`
   (d) `()`
2. Is it allowed to have character data as content of the `floor` element? (Justify your answer)
3. Change the DTD such that a building has an extra, optional attribute named `type` with values `public` or `private` and default value `public`.
4. Would the XML document be valid if the room with attribute `name="Kantinen"` was renamed by setting `name="eatIT"` ? (Justify your answer)
5. How would you define an XMLSchema key expressing that two rooms in the *same* building can not have the same name, but allowing two rooms in different buildings to have the same name?
6. Can you change the DTD such that building also can have character data as content, and still exactly the same sequences of elements? (Justify your answer)
7. Write XMLSchema types for the `floor` element and the `level` attribute.

Question 3 (10%)

1. Draw the XML-document above as a tree where attributes are children of their elements. (Ignore the DTD)
2. Give an XPath expression that selects all `pda` elements inside an element `room` with attribute `type="canteen"` descendant of a `building` element with attribute `name="ITU"`.

Question 4 (20%)

1. What is the output of applying the XSLT stylesheet below on the XML document above ?

```
xsl:stylesheet version="2.0"
     xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
<xsl:template match="context">
<canteens>
<xsl:apply-templates select="//room[@type='canteen']"/>
</canteens>
</xsl:template>

<xsl:template match="room[@type='canteen']">
<canteen name="{@name}">
  <xsl:value-of select="info/text()"/>
</canteen>
</xsl:template>
</xsl:stylesheet>
```

2. Give an XQuery expression that shows the same information as the stylesheet above for any XML document valid according to the DTD above. (Assume that the XQuery prolog has bound the xml document to the variable $context).

Question 5 (15%)

1. If you should implement an XML-editor, would you use the (J)DOM API or the SAX API? Justify your answer
2. What does a JAXP binding compiler produce when it is used to bind a schema?
3. Write the output of the Java code below if it is run on the XML document from Question 2

```
import java.io.*;
import java.util.*;
import org.jdom.xpath.*;
import org.jdom.*;
import org.jdom.input.*;
import org.jdom.output.*;

public class XPathContext {
  public static void main(String[] args) {
    try {
      Document d = new SAXBuilder().build(new File(args[0]));
      XPath p = XPath.newInstance("//room[pda/@name='hilde']");
      ListIterator i = p.selectNodes(d).listIterator();
      Element clean = new Element("hilde");
      while (i.hasNext()) {
        Content r = (Content)i.next();
        clean = clean.addContent((Content)r.clone());
      }
      Document n = new Document(clean);
      new XMLOutputter().output(n, System.out);
    } catch (Exception e) {e.printStackTrace();}
  }
}
```

Question 6 (15%)

1. Write an xml-document with root element `results` that is valid according to the XMLSchema below
2. Write a DTD corresponding to the XMLSchema, with root element `results`

```
<?xml version="1.0" encoding="UTF-8"?>
<schema targetNamespace="http://www.itu.dk/ixmr/tips" xmlns:tips="http://www.itu.dk/

<element name="results" type="tips:daresultstype"></element>
<attribute name="thedate" type="date"></attribute>
<element name="result" type="tips:result"></element>

<simpleType name="result">
<restriction base="string">
 <enumeration value="1"></enumeration>
  <enumeration value="X"></enumeration>
  <enumeration value="2"></enumeration>
 </restriction>
 </simpleType>

<complexType name="resultstype">
  <sequence>
    <element maxOccurs="13" minOccurs="13" ref="tips:result"></element>
   </sequence>
 </complexType>

<complexType name="daresultstype">
  <complexContent>
   <extension base="tips:resultstype">
<attribute name="thedate" type="date" use="required"></attribute>
</extension>
   </complexContent>
 </complexType>
</schema>
```