University of Cape Town

Department of Computer Science

CSC3003s Class Test 1

2006

Marks : 35

Time : 45 minutes

Instructions:

- Answer all questions.
- Show all calculations where applicable.

Question 1: Core XML [10]

a) Why do we use Unicode as an underlying representation for XML instead of ASCII? [1]

b) What is the advantage of using UTF-8 over UCS-4? [2]

c) Under what circumstances would one use UTF-16 instead of UTF-8? What would happen if UTF-8 was used anyway? [2]

d) Give one example of a validity test that DTDs cannot express. Show with an example how this test would be encoded in XML Schema? [3]

e) What is a byte order marker and where is it found in an XML document? [2]

Question 2: XML Languages [15]

a) Give one reason to use a SAX parser instead of a DOM parser. [1]

b) Give one reason to use a DOM parser instead of a SAX parser. [1]

c) Suppose the following DOM statement returns the value '123'. Write a sample XML document that will result in this return value. Write an XPath expression that is equivalent to the DOM statement. Hint: Remember that **item** is zero-based. [3]

documentElement → getElementsByTagName ('store') → item(1) → firstChild → nextSibling → getElementsByTagName ('product') → item(0) → firstChild → data

d) Answer the following questions based on this piece of XML:

```
<test xmlns="http://ns1">
   <date type="iso8601">2006-08-23</date>
   <class>
      <name>CSC3003s</name>
      <venue>Jameson Hall</venue>
   </class>
</test>
```

Assume that the **class** element is infinitely repeatable and required and that **name** and **venue** must both appear exactly once each within each **class**.

i. Write an XML Schema complexType type definition testType corresponding to the content of the test element and its descendents. [4]

ii. Write an XSLT template, using the stylesheet outline provided, to convert the **test** node into the following structure. [4]

```
<class xmlns="http://ns2">
   <who>CSC3003s</who>
   <test>
      <when>
         <type>iso8601</type>
         <date>2006-08-23</date>
      </when>
      <where>Jameson Hall</where>
   </test>
</class>
```

Assume your template will be placed within the following stylesheet:

```
<xsl:stylesheet version="1.0"
   xmlns:xsl=http://www.w3.org/1999/XSL/Transform
   xmlns:source=http://ns1
   xmlns:target="http://ns2">
...
</xsl:stylesheet>
```

e) Briefly discuss 2 advantages of using XML to represent XML Schema. [2]

Question 3: Database Systems [10]

a) Explain briefly

EITHER

i. the terms "physical data independence" and "logical data independence"

OR

ii. **any two (2)** of the letters in "ACID" properties of database transactions

[4]

b) Consider the schema below, which comes from a video store database:

CLIENT (ID, Name, Telno)	// client ID, name and telephone number
VIDEO (Num, Title, Year, Length)	//video no., film title, year made, duration
RENTAL (ID, Num, Day)	// client ID, video no., date taken out
STARS (Num, Actor)	// video no. actor/actress name

Give SQL statements for **each** of the following queries:

i. Give the name and telephone number of every client who has rented the video entitled "Jaws", in alphabetical order of customer name.

ii. Give the ID of all clients who have not rented any videos (i.e. who do not appear in the RENTAL relation).

iii. For each "big customer", give the client ID and the number of videos they have rented. A "big customer" is someone who has rented more than 10 videos.

[6]