



UNIVERSITY of LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE of INFORMATICS and ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	2006/07	Semester:	Summer Resit
Module Title:	Document Architectures	Module Code:	CS4146
Duration of Exam:	2½ Hours	Percent of Total Marks:	80
Lecturer(s):	Richard F. E. Sutcliffe	Paper marked out of :	100

Instructions to Candidates:

- Answer any FIVE questions
- Do not answer more than FIVE questions
- All questions carry equal marks

Q1. a) A markup language allows a portion of text to be demarcated so that information can be associated with it. How is this done in an XML language? Explain using an example.

4 Marks

b) It has been argued that attributes are to an extent redundant because they can always be replaced by elements. Explain exactly how this is so using as an example an element with two attributes.

8 Marks

c) The XML family of languages are closely related to the SGML family. Describe four of the major differences.

8 Marks

Q2. a) What is the purpose of an XML Schema?

2 Marks

b)

```
01 <?xml version="1.0"?>
02 <xs:schema
03   xmlns:xs="http://www.w3.org/2001/XMLSchema"
04   elementFormDefault="qualified">
05   <xs:element name="message_seq">
06     <xs:complexType>
07       <xs:sequence>
08         <xs:element name="message" maxOccurs="unbounded">
09           <xs:complexType>
10             <xs:sequence>
11               <xs:element name="contents" type="xs:string"/>
12               <xs:element name="route" type="xs:int"/>
13             </xs:sequence>
14             <xs:attribute name="id" type="xs:positiveInteger"/>
15             <xs:attribute name="date" type="xs:date"/>
16           </xs:complexType>
17         </xs:element>
18       </xs:sequence>
19     </xs:complexType>
20   </xs:element>
21 </xs:schema>
22
23 <?xml version="1.0" encoding="UTF-8"?>
24 <message_seq
25   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
26   xsi:noNamespaceSchemaLocation="message_seq.xsd">
27   <message id="10" date="2006-09-20">
28     <contents>The contents</contents>
29     <route>10a</route>
30   </message>
31   <message id="11" date="2006-09-21">
32     <contents>The contents</contents>
33   </message>
34 </message_seq>
```

In the above, lines 1-21 show a schema while lines 23-34 show a sample document referring to it.

What does line 3 state and what is the exact significance of `xmlns:xs`?

4 Marks

c) Is there a processing instruction in lines 1-21 and if so what does it indicate?

2 Marks

d) An element called `message_seq` is being defined. Describe the required structure and content of this element including any attributes.

4 Marks

e) Look at the document on lines 23-34. Does it conform to the schema or not? Answer by going through it line-by-line explaining how it conforms to the schema. **Note:** You are not required to say anything about the attributes of element `message_seq`.

8 Marks

- Q3. a) What is the purpose of XPath in the XSL language?
4 Marks
- b) An XPath expression consists of an Axis Specifier, a Node Test and zero or more Predicates. Explain briefly what these are.
3 Marks
- c) How can the structure of a document be represented as a tree? Answer by drawing trees corresponding to the following descriptions:
- A manual consists of a version_spec, three chapters and an index.
 - A manual consists of a version_spec, an introduction, two chapters and an index. Each chapter comprises an outline followed by two sections.
- 4 Marks
- d) In the context of document trees, what is the difference between a relative path and an absolute path? Answer by showing any two absolute paths and any two relative paths using the second tree you have drawn.
4 Marks
- e) Explain the meaning of the following XPath expressions:
- `child::chap`
`ancestor::title/child::level`
`doc//index`
`appendix/*/data`
`writer[@firstname="Ronan"]`
- 5 Marks

Q4. a) Korean is normally written using Hangul. How does Hangul relate to Jamo? 2 Marks

b) Are Hangul a form of Chinese Hanzi or not? Explain. 2 Marks

c) The Japanese writing system involves four different scripts: Kanji, Hiragana, Katakana and Roma-ji. Explain what these are and what purpose they serve in the language. 6 Marks

d) A Japanese Kanji or Chinese Hanzi is made up of one or more radicals each comprised of one or more strokes. Explain this statement using an ideograph of your own invention.

Note: The ideograph does not need to exist in Japanese or Chinese; Anything is acceptable as long as it illustrates your points clearly. 6 Marks

e) Two methods of entering Kanji or Hanzi are by stroke count and by pronunciation. Explain how these work. 4 Marks

Q5. a) In SGML there is only one way of specifying abstract syntax. What is it? 1 Marks

b) In XML there are three methods by which the abstract syntax can be specified. What are they (trick question)? 3 Marks

c) The structure of a document can be represented as a series of context-free grammar rules. Consider the XML example below. What rules would capture the structure shown?

NOTE: Write each rule in English as a single sentence. There is no unique answer to this question, so any set of rules which are adhered to by the example shown will be considered correct.

```
<a>
  <b>x</b>
  <c>
    <d>y</d>
    <d>z</d>
  </c>
</a>
```

4 Marks

d) Write down part of a Document Type Definition (DTD) which would capture the information in your rules. 6 Marks

e) Now write down part of a Schema which is equivalent to your DTD fragment. 6 Marks

Q6. a) What is meant by the term Document Type Definition (DTD)?

2 Marks

```
01 <?xml version="1.0" encoding="UTF-8" ?>
02
03 <!ELEMENT corpus (q+)>
04
05 <!ELEMENT q (language+)>
06 <!ATTLIST q
07         cnt CDATA #REQUIRED
08         category (D|F) "D"
09         answer_type (LOCATION|ORGANISATION|PERSON|TIME)
10         #IMPLIED>
11
12 <!ELEMENT language (question,answer+)>
13 <!ATTLIST language
14         val (BG|DE|EN|ES|FR|IT|NL|PT) #REQUIRED
15         original (FALSE|TRUE) #REQUIRED>
16
17 <!ELEMENT question (#PCDATA)>
18 <!ATTLIST question
19         group (BTB|DFKI|ELDA|IRST|LING|UNED|UoA) #REQUIRED>
20
21 <!ELEMENT answer (#PCDATA)>
22 <!ATTLIST answer
23         n CDATA #REQUIRED
24         docid CDATA #IMPLIED>
25
26
27 <?xml version="1.0" encoding="UTF-8" ?>
28
29 <!DOCTYPE corpus SYSTEM "qa_corpus.dtd">
30 <corpus>
31 <q cnt="1" category="G" answer_type="LOCATION">
32 <language val="EN" original="TRUE">
33 <question group="IRST">The question</question>
34 <answer n="1" docid="1234">The answer</answer>
35 <reason>The reason</reason>
36 </language>
37 </q>
38 </corpus>
```

b) The figure above shows an example Document Type Definition (DTD) followed by a document instance. Note that the numbers on the far left are to identify lines in this question and are not part of the document itself. What is the purpose of line 1?

2 Marks

c) Explain exactly what the ELEMENT definitions of lines 5, 12 and 17 mean.

6 Marks

d) Explain exactly what the ATTLIST definition starting on line 6 means.

2 Marks

e) Look at the example document in lines 27-38. Does it conform to the DTD or not? Answer by going through the document explaining carefully how each tag, attribute or entity arises from the definitions in the DTD.

8 Marks

Q7. a)

```

01 <?xml version="1.0"?>
02 <xsl:stylesheet
03   version="1.0"
04   xmlns:xsl=
05     "http://www.w3.org/1999/XSL/Transform">
06
07 <xsl:template match="doc">
08   <HTML>
09     <HEAD>
10       <TITLE>Transformed Doc1</TITLE>
11     </HEAD>
12     <BODY>
13       <xsl:apply-templates/>
14     </BODY>
15   </HTML>
16 </xsl:template>
17
18 </xsl:stylesheet>

01 <?xml version='1.0'?>
02 <doc>
03 This is a document.
04 </doc>

```

XSLT is a language for transforming XML documents. A template rule in XSLT consists of a pattern together with a template. Above you will see an example stylesheet containing one template. Following this is an example document.

Identify the pattern and the template in terms of line numbers.

2 Marks

- b) What is the role of the pattern in XSLT and what effect will the above pattern have exactly?
4 Marks
- c) XSLT works by traversing a document tree. Draw a document tree for the example document above and explain what it means to traverse it.
4 Marks
- d) What is the function of `apply-templates` and what will happen if this is left out?
4 Marks
- e) A namespace is being used in the example template. Which is it and what is its function?
2 Marks
- f) State what output will be produced when the above template is applied to the document and explain why this is the case.
4 Marks

Q8. a) A style sheet allows an HTML document to be displayed in different ways for different purposes. Explain exactly why this is so.

4 Marks

b) In the Cascading Style Sheet (CSS) language, a style sheet consists of a series of Statements. Explain the purpose of the Selector and Declaration within a statement.

4 Marks

c) Consider the following:

```
chapter
{
text-align: justify;
}
```

What is the purpose of the word `chapter`?

2 Marks

d) Write down a fragment of HTML to which the example of part (c) would apply.

2 Marks

e) In the example of part (c) what does the line `text-align: justify;` mean?

2 Marks

f) Consider the following:

```
.instruction {font-weight: bold}
```

What is the purpose of this construct?

2 Marks

g) Write down an HTML fragment to which the example of part (f) would apply.

4 Marks