



UNIVERSITY of LIMERICK

O L L S C O I L L U I M N I G H

COLLEGE of INFORMATICS and ELECTRONICS

Department of Computer Science
and Information Systems

End-of-Semester Assessment Paper

Academic Year:	2006/07	Semester:	2
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) 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

- Q2. a) Look at the following Document Type Definition (DTD), and then write down a sample document which conforms to it. NOTE: Where document text is needed just use the word 'text'.

```
<!ELEMENT doc (title,contents,body)>
<!ELEMENT title (#PCDATA)>
<!ELEMENT contents (#PCDATA)>
<!ELEMENT body (chapter+)>
<!ELEMENT chapter (title,text)>
<!ELEMENT text (#PCDATA)>
```

4 Marks

- b) Explain exactly what the following ATTLIST definition means. Be careful to cover every aspect of the definition.

```
<!ATTLIST doc
    name CDATA #IMPLIED
    version CDATA #FIXED "1.1"
    number NMTOKEN #REQUIRED
    country (France|Germany|Ireland) "Ireland">
```

6 Marks

- c) Explain what is meant by an Internal Text Entity and show both how to define the Entity in the DTD and how to use it in the document.

4 Marks

- d) Name one application of text entities.

2 Marks

- e) Outline two strengths and two weaknesses of DTDs as compared to Schemas.

4 Marks

- Q3. a) 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.

4 Marks

- b) Consider the following 4 statements: (1) Shift-JIS (or SJIS) supports the characters in JIS X 0208-1997 but not those in JIS X 0212-1990. (2) It is a non-modal system comprising a mixture of one byte and two byte encodings. (3) ASCII characters are valid SJIS. (4) If a byte is in a certain range it is treated in isolation. If it is in a pair of ranges then it is treated as the start of a two byte sequence.

Carefully explain statements 1 to 3.

6 Marks

c) Character Set	1st Byte Range	2nd Byte Range
ASCII/JIS-Roman	33-126	
½ width Katakana	161-223	
JIS X 0208-1997	129-159, 224-239	64-126, 128-252

By referring to the above table, explain precisely the meaning of statement 4 in part (b) above. **Note:** All numbers in the table are decimal (i.e. Base 10).

6 Marks

- d) Name one advantage and one disadvantage of SJIS.

4 Marks

Q4. 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

Q5. 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 select="title"/>
14     </body>
15   </html>
16 </xsl:template>
17
18 <xsl:template match="title">
19   <h1><xsl:apply-templates select="/doc/title/text()"/></h1>
20   <h2><xsl:apply-templates select="../sec1/title/text()"/></h2>
21   <h2><xsl:apply-templates select="../sec2/title/text()"/></h2>
22 </xsl:template>
23
24 </xsl:stylesheet>
25
26 <?xml version="1.0"?>
27 <doc>
28   <title>
29     The Document Title
30   </title>
31   <sec1 id="1">
32     <title>Section 1</title>
33     <text>Text of Section 1</text>
34   </sec1>
35   <sec2 id="2">
36     <title>Section 2</title>
37     <text>Text of Section 2</text>
38   </sec2>
39 </doc>

```

Lines 1-24 show an XSL stylesheet while lines 26-39 show a document. What is the effect of lines 4 and 5?

2 Marks

b) State the effect of the template shown on lines 7-16.

2 Marks

c) Draw a document tree for the example document on lines 26-39.

4 Marks

d) Explain what nodes will be matched by the XPATH expressions `/doc/title/text()` and `../sec1/title/text()` assuming you are at node `title` which is the child of `doc`.

4 Marks

e) Using your tree, explain exactly how the stylesheet will be applied to the document and write down the output which will be produced.

6 Marks

f) If the `apply-templates` on line 13 was removed, what effect would this have on the output produced?

2 Marks

Q6. 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

Q7. 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

- Q8. 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