U08049 Complex and Structured Data

Examination Rubric

Examination length: **2 hours**.

Answer **all** questions.

Examination Questions

1) **SQL**

a) Explain the difference between outer and inner join types and show an example of code that would be used to query data for each, and what the results would look like.

3 marks

b) Why would you use an indexing within a database schema, and how would you choose the correct tables and fields?

2 marks

c) You need to add some external data to your system. Describe exactly what file structure you would request from a colleague or another company.

2 marks

d) Explain common data problems that could be present in raw data files. Give examples of how you would find such problems and how they could be solved through database design.

3 marks

e) Clearly describe the differences between Transactional, ROLAP, MOLAP and HOLAP database models.

3 marks

f) Describe the difference between a denormalised, first normal form and second normal form table structure, and explain common uses and reasons for using each

6 marks

g) The physical data model for a Cinema database, is outlined below in simple form. Explain how you would add at least one internal and one external source of information (of your own choice) to this model. One addition should enrich the information already present, the other should provide a new dimension or aspect for analysis. Create a new comprehensive physical data model with these additions. Consider all areas of the Cinema retail business when deciding upon your answer.

6 marks

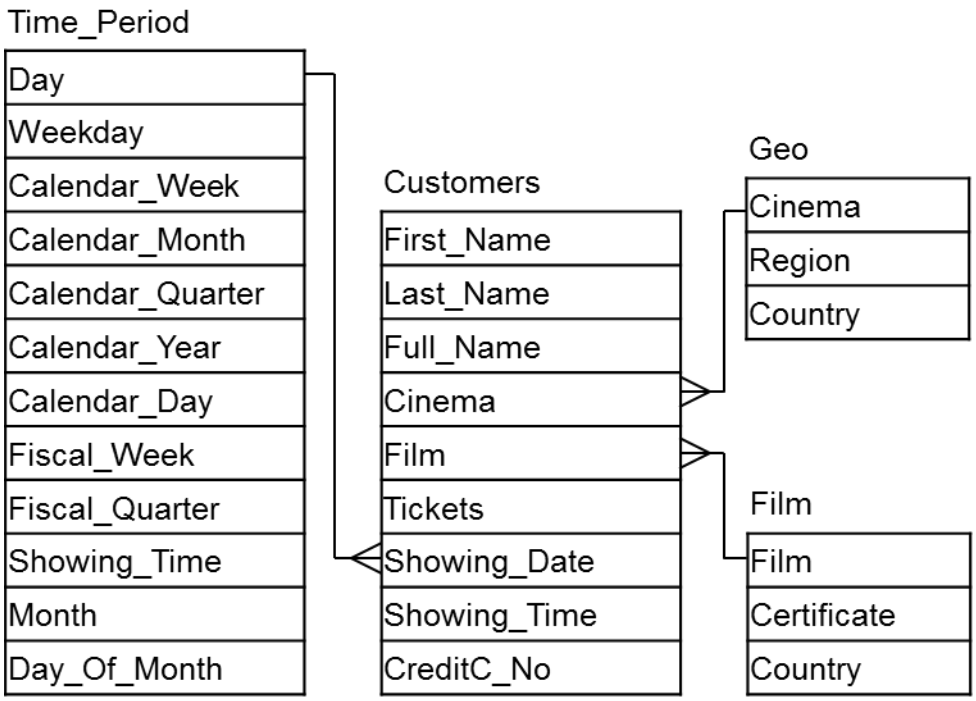

Figure 1

2) **XML**

a) Name 3 different types of XML nodes

1 mark

b) Write an example of how a comment would appear in an XML document.

1 mark

c) For each of the following XML snippets state true or false as to whether or not it is 'Well Formed'? (true = well formed)

i) <printer manufacturer=”Epson” />

ii) <xmldetail language=”php” />

iii)
</br>

iv) <library book title=”XSLT magic” />

v) <line points=”2,3 4,5” />

vi) <line point=”2,3” point=”4,5” />

3 marks

d) List 3 potential issues with using XML

1 mark

e) Name 2 XPATH Axes

1 mark

f) In a DTD, how would you define an entity to include an author's name in a document, using the entity &auth

1 mark

g) Below is a private external DTD. Write out an example of XML that would validate against it. (you can replace any links that you might require with the work LINK)

```
<!ELEMENT albums (album+)>
<!ELEMENT album
(title,description?,song+,cover_image)>
<!ELEMENT title (#CDATA)>
<!ELEMENT description (#CDATA)>
<!ELEMENT song (#CDATA)>
<!ELEMENT cover_image EMPTY>
<!ATTLIST album band CDATA #REQUIRED>
<!ATTLIST cover_image src CDATA #REQUIRED>
```

6 marks

h) Explain the use of an XPath predicate

1 mark

Consider the XML shown below in Figure 2, on the next page, and answer the 2 questions that follow which are based on it.

XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl"
href="XPATH_for_snippet_2.xsl"?>
<offices>
<office id="6">
   <address>
       <street>Horsefairs</street>
       <city>Edinburgh</city>
       <postcode>ED12 5ED</postcode>
   </address>
   <headcount>
       <sales_staff_count>6</sales_staff_count>
       <mkting_staff_count>3</mkting_staff_count>
       <tech_staff_count>9</tech_staff_count>
   </headcount>
   <floorspace units="sqft">2000</floorspace>
   </office>
<office id="12">
   <address>
       <street>Central street</street>
       <city>Glasgow</city>
       <postcode>GL34 8GL</postcode>
   </address>
   <headcount>
       <sales_staff_count>2</sales_staff_count>
       <mkting_staff_count>1</mkting_staff_count>
       <tech_staff_count>5</tech_staff_count>
   </headcount>
   <floorspace units="sqft">1500</floorspace>
   </office>
</offices>
```

Figure 2

i) What result would the following XSLT produce:

```
<?xml version="1.0" encoding="utf-8"?>
   <xsl:stylesheet version="1.0"
xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
   <xsl:output method="text" encoding="UTF-8"/>
        <xsl:template match="/offices">
             <xsl:for-each select="office">
                  <xsl:if test="floorspace &gt; 1750">
                       <xsl:apply-templates select="."/>
                  </xsl:if>
             </xsl:for-each>
        </xsl:template>
        <xsl:template match="office">
             Office <xsl:value-of select="@id" /> :
             <xsl:apply-templates select="address" />
             <xsl:apply-templates select="headcount" />
        </xsl:template>
        <xsl:template match="address">
                  <xsl:value-of select="street" />,
<xsl:value-of select="city" />, <xsl:value-of
select="postcode" />
                  <xsl:text >&#xd;</xsl:text>
        </xsl:template>
        <xsl:template match="headcount">
                  <xsl:text >Headcount:</xsl:text>
                  <xsl:value-of
select="sum(sales_staff_count | marketing_staff_count |
technical_staff_count)"/>
                  <xsl:text >&#xd;</xsl:text>
        </xsl:template>
</xsl:stylesheet>
```

5 marks

j) If the following XSLT file was used, What would be the result if the XPath expressions labelled I. to V. were each inserted on line 10 instead of 'XPATH STATEMENT'?

```
<?xml version="1.0" encoding="utf-8"?>
<xsl:stylesheet version="1.0"
xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
<xsl:output method="text" encoding="UTF-8"/>
        <xsl:template match="/">
                <xsl:apply-templates />
        </xsl:template>
        <xsl:template match="offices">
                <xsl:value-of select="XPATH STATEMENT" />
        </xsl:template>
</xsl:stylesheet>
```

I. <xsl:value-of select="office[last()]/@id" />

II. <xsl:value-of select="office[2]/headcount/sales_staff_count" />

III. <xsl:value-of select="office[1]//marketing_staff_count + office[2]//marketing_staff_count" />

IV. <xsl:value-of select="office[@id>10]/floorspace/@units" />

V. <xsl:value-of select="office/headcount/marketing_staff_count" />

5 marks

End of Examination Paper