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Birkbeck
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MSc E-Commerce

Development of Internet Applications—Solutions

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1. (a) To do XSLT processing on the client, the client must have an XSLT processor built in. The whole XML document is sent to the client before processing can be done. This will be inefficient if the document is large, and it also exposes all the XML data to the client. If XLST processing is done on the server, HTML can be sent to the client. All clients should be able to interpret HTML. Only that fragment of the data requested by the client is sent to it, thereby improving performance and possibly security or privacy. A disadvantage of server-side processing is the additional processing capacity needed. (8 marks)

   (b)
```
<script language = "JavaScript">
   var total = 0;    // to store the marks total
   var counter = 0; // to store the number of marks entered
   var average = 0; // to store the average mark

   mark = window.prompt("Enter integer mark, -1 to quit:", "0");
   while( mark != -1 ) {
      total = total + parseInt(mark);
      counter++;
      mark = window.prompt("Enter integer mark, -1 to quit:", "0");
   }

   if( counter > 0 )
      document.writeln("<p>The average is ", total/counter, "</p>");
   else
      document.writeln("<p>No marks entered</p>");
</script>
```
(12 marks)

   (c) A attribute of type `ID` is used as a unique identifier for elements in an XML document. An attribute of type `IDREF` is used as a reference to a uniquely identified element. In a valid document, no two elements can have attributes of type `ID` that have the same value, and every value that appears in an `IDREF` attribute must also appear as the value of some attribute of type `ID`. (5 marks)

2. (a) i. `#PCDATA` means that the element contains parsed character data, i.e., text which must not contain any markup. `#IMPLIED` means that the corresponding attribute is optional. (3 marks)

   ii. The corresponding content group can occur zero or more times. (1 marks)

   iii. (i) `/group/person[id(@spouse)[name='John']]` (ii) `id(/group/person[name='Janet']/@spouse)` (6 marks)

   (b) CGI defines an interface between servers and external programs. It is language-neutral; unlike Java servlets, it can be used with many different languages. The CGI application runs as a separate process, whereas servlet code runs inside the web server. This is more efficient but means that the server must implement the Java virtual machine. CGI applications are platform-dependent: communication between the server and applications uses different techniques under Unix and under Windows. With servlets, the same code runs everywhere.

Unlike CGI and servlets, JSP and ASP allow code to be embedded in an HTML page. JSP uses Java programs, while ASP uses VBScript or JavaScript. This overcomes need to generate entire pages using a script which can be tedious. (15 marks)

3. (a) Traditional EDI solutions are expensive, complex and use proprietary software. Thus the usage of EDI has been limited to large corporations. The advent of the Internet and availability of free or cheap software provides an affordable way for customers and small-to-medium enterprises to exchange information electronically. This exchange of information is aided by the use of a universal, open and readable representation such as XML. (10 marks)

   (b) (i) As part of a DTD:

```
<!ENTITY % address "(houseNumber | houseName), street, villlage?, town" >
<!ELEMENT billingAddress %address; >
<!ELEMENT deliveryAddress %address; >
```

   (ii) As part of an XML schema:

```
<xsd:complexType name="address">
   <xsd:sequence>
      <xsd:choice>
        <xsd:element name="houseNumber" type="xsd:string"/>
        <xsd:element name="houseName" type="xsd:string"/>
      </xsd:choice>
      <xsd:element name="street" type="xsd:string"/>
      <xsd:element name="village" type="xsd:string" minOccurs="0"/>
      <xsd:element name="town" type="xsd:string"/>
   </xsd:sequence>
</xsd:complexType>

<xsd:element name="billingAddress" type="address"/>
<xsd:element name="deliveryAddress" type="address"/>
```

(15 marks)

4. (a) XHTML element names (tags) must be in lowercase, empty elements must use the abbreviated closing tag, attribute values must be in quotes, and attribute names must be present. (3 marks)

   (b) i. (A) The ancestor axis includes elements with id values e3 and e1. (B) The preceding axis includes elements with id values e8, e7, e6 and e2. (6 marks)

      ii. One set of XSLT rules is as follows:

```
<xsl:template match="/lecture">
   <html>
       <xsl:apply-templates/>
   </html>
</xsl:template>

<xsl:template match="slide">
   <xsl:apply-templates/>
   <hr/>
</xsl:template>

<xsl:template match="figure">
   <p>Figure to go here</p>
</xsl:template>
```

```
<xsl:template match="list">
   <ul>
      <xsl:for-each select="item">
         <li><xsl:value-of select="@id"/></li>
      </xsl:for-each>
   </ul>
</xsl:template>
```

(16 marks)

5. (a) Elements book and the second title are in the http://www.abc.com namespace, while author, lastname and the first title are in the http://www.xyz.com namespace. (5 marks)

   (b) Content negotiation is used between clients and servers to determine which representation of a resource to use. This is useful because clients may have varying capabilities, users may different preferences and resources may exist in different variants according to language, quality or encoding. (9 marks)

   (c) The 3 components are the service provider, the service requestor (or client) and the directory service (or broker). The service provider describes its services that are available, typically using the Web Services Description Language (WSDL). These are advertised in the directory service, which stores WSDL definitions in a Universal Description, Discovery and Integration (UDDI) registry. A client looks up services in the directory and then interacts with the service, typically using the Simple Object Access Protocol (SOAP). (11 marks)

6. (a) Derivation can be by one of (i) list: a list of values of an existing data type, (ii) union: allows values from two or more data types, or (iii) restriction: limits the values allowed by an existing data type using a range of values (e.g., years from 1900 to 1999), a length (e.g., of string or list), a number of digits, a list of values (enumeration), or a string pattern. (6 marks)

   (b) (i) The performance elements which are children of the context node and which do not have a soloist element as a child. (ii) The second of those performance child elements which have a soloist element as a child (if any). (6 marks)

   (c) When applied to a particular node in a DOM tree, getElementByTagName finds all descendant nodes whose name matches that given as an argument to getElementByTagName. As an alternative, we would have to use the method childNodes to retrieve the collection of children, and check their names using nodeName. This would have to be done repeatedly for each descendant of the given node. (7 marks)

   (d) Caching is used to reduce response time, reduce network load and save money by avoiding access to Internet. Semantic transparency means that the client should receive exactly the same response from the cache as from the origin server (except for headers); the cache is meant only to improve performance. (6 marks)

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