

Birkbeck
(University of London)

School of Computer Science and Information Systems

Development of Internet Applications (COIY032P)

Exam Solutions 2006

1. (a) Applications cannot consume HTML easily because of incompatible extensions of HTML. Also most HTML on the Web is incorrect because browsers are very forgiving and therefore it has not been corrected. Finally, HTML elements are not sufficiently descriptive for many applications. (4 marks)
- (b) In HTML, italics elements are used for, inter alia, emphasis, mathematical formulae and phrases in foreign languages. If instead one used **em**, **math** and **lang** elements, one could do louder voice for emphasis in text-to-speech, calculations involving mathematical formulae, and translation of foreign phrases. (6 marks)
- (c)

```
<xsl:template match="/html">
  <html>
    <body>
      <h1><xsl:value-of select="head/title"/></h1>
      <table border="1">
        <xsl:apply-templates select="//a"/>
      </table>
    </body>
  </html>
</xsl:template>

<xsl:template match="a">
  <tr>
    <td><xsl:value-of select="@href"/></td>
    <td><xsl:value-of select="."/></td>
  </tr>
</xsl:template>
```

 (15 marks)
2. (a) Browsers, for example, have the definition (DTD) of HTML built in and therefore know that certain elements can only appear inside certain other elements. This allows browsers to infer missing tags. (4 marks)
- (b) SGML allows the characters used as markup delimiters to be specified in an SGML declaration. SGML requires the presence of a DTD in order for a document to be parsed. (4 marks)
- (c)

```
//CD [@publisher="Decca" and count(performance) > 3]
```

 (7 marks)
- (d) The `transformNode` method allows one to apply a stylesheet (passed as an argument to the method) to an XML document or a node of such a document represented as a DOM object in Javascript. (5 marks)
- (e) The browser sends the DNS name from the URL to a DNS server which maps the DNS name to an IP address that it returns to the browser. The browser then sends an HTTP request to the returned IP address and gets the web page returned as an HTTP response. (5 marks)

3. (a) In order to allow organisations to specify unique namespace names, the W3C decided to reuse an existing mechanism for formulating unique identifiers, namely, URIs. However, this meant that users/designers expected that the URIs used for namespaces should actually exist, with some information (e.g. schema) being provided by the URI, but this is not required. (6 marks)
- (b) $a[b][2]$ can give rise to a different answer to $a[b$ and $2]$ since the former returns the second of those a elements that have a b element as a child, whereas the latter returns the second a element if it has a b child. (6 marks)
- (c) DOM defines an API for HTML and XML documents. This is done by first defining a logical structure (model) of a document as a tree (or forest) of nodes and then defining methods that are available on the structure. Using these DOM methods, programmers can build documents, navigate their structure, and add, modify and delete elements and content. The purpose is to provide portability across web browsers, since DOM is platform-neutral and language-neutral. (8 marks)
- (d) POP and IMAP are responsible for retrieving mail from the server and distributing it to the client. SMTP is responsible for sending mail from the client to the server and relaying mail between e-mail servers. (5 marks)
4. (a) The first is the XML declaration, giving the version of XML and the character encoding used. The second is the document type declaration, stating that the document is of type `plist`, which is specified by the formal public identifier and DTD references given. (7 marks)
- (b) The first declares a parameter entity `plistObject` which is used as the content model for the `plist` element declared on the second line. The third declares an attribute named `version` for the `plist` element, with a default value of 1.0. (7 marks)
- (c) A `dict` element must consist of any number of pairs of `key` and `plistObjects`. Since `array`, `string`, `true` and `integer` are all `plistObjects`, the contents of all `dict` elements are valid. Since an `array` contains a sequence of `plistObjects` of which `dict` is one, both `array` elements are valid. Element `true` is empty, while `string` and `integer` contain text, so the fragment is valid. (11 marks)
5. (a) `book` and `year` are in the namespace `http://www.xxx.com`. `author` and `name` are in the namespace `http://www.yyy.com`. (4 marks)
- (b) XSL permits element reordering, selection of source elements and text generation, none of which is available with CSS. (3 marks)
- (c) `http`, `https`, `ftp`, `telnet` and `mailto`. (5 marks)
- (d) A client can alter the usual response of caches by using the Cache-Control header directives in an HTTP request. The `max-age` directive specifies the maximum time in seconds an unvalidated response is acceptable. The `max-stale` directive specifies the amount of staleness which is acceptable. The `min-fresh` directive specifies the minimum freshness which is required. (8 marks)
- (e) A CGI application runs as separate process which incurs a substantial overhead. CGI applications are platform-dependent. For example, on Unix, communication between the server and the application is via environment variables, the command line, standard input and standard output, whereas on Windows, communication is via temporary files. (5 marks)

6. (a)
- ```

<xsd:element name="player" maxOccurs="2">
 <xsd:complexType>
 <xsd:sequence>
 <xsd:element name="name" type="xsd:string" />
 <xsd:element name="ranking" type="xsd:positiveInteger" />
 <xsd:element name="result">
 <xsd:simpleType>
 <xsd:restriction base="xsd:string">
 <xsd:enumeration value="won"/>
 <xsd:enumeration value="lost"/>
 </xsd:restriction>
 </xsd:simpleType>
 </xsd:element>
 </xsd:sequence>
 </xsd:complexType>
</xsd:element>

<xsd:element name="set" minOccurs="3" maxOccurs="5">
 <xsd:simpleType>
 <xsd:restriction base="xsd:string">
 <xsd:pattern value="\d-\d"/>
 </xsd:restriction>
 </xsd:simpleType>
</xsd:element>

```
- (13 marks)
- (b) The code deletes the element identified by having an id attribute whose value is "target" in the current XML document. (4 marks)
- (c) IP is used for transmitting blocks of data (packets) from source machines to destination machines. IP fragments packets if necessary and each packet is routed independently, based on destination and network load and availability. There is no mechanism for reliable delivery. TCP provides a connection-oriented, reliable service and supports addressing of individual processes via ports. (8 marks)