Computer Science 571 2nd Exam
Prof. Horowitz
Tuesday, December 4, 2012, 9:30am – 10:45am & 11:00am-12:15pm

Name: **Student ID Number:**

This is a closed book exam.
Please answer all questions on the test

- Javascript + Ajax [20 pts]
- JSON [10 pts]
- XML Schemas [15 pts]
- Java Servlets [20 pts]
- REST in Java [10 pts]
- Tomcat [20 pts]
- Web Site Performance [5 pts]

JavaScript and AJAX Questions [20 total pts]

Below is a file containing source code used by Yahoo to help it implement the Yahoo search sidebar that you see in the snapshot below. The questions following the source code can be answered by examining the code below.

```
function Yahoo_Search() {}
Yahoo_Search.baseURL = function () {
 return "http://api.search.yahoo.com/WebSearchService/V1/";  }
Yahoo_Search.appid = function () { return "YahooSearchSidebar"; }
Yahoo_Search.baseArgs = function () { return "appid=" + this.appid();  }
Yahoo_Search.Results = function (args) {
 var xmlUrl = this.baseURL() + "webSearch?"
      + this.baseArgs()
      + "&query=" + args["Doc"]
      + "&zip="
      + "&start=" + args["First"]
      + "&results=" + args["Count"];
 var xmlhttp = new XMLHttpRequest();
 xmlhttp.open("GET", xmlUrl, false);
 xmlhttp.send(null);
 return this.readXML(xmlhttp.responseXML);
}
Yahoo_Search.readXML = function (xmlDoc) {
 try {
   var retVal = new Array();
   var resultSet = xmlDoc.getElementsByTagName("ResultSet")[0];
   var totalResultsAvailable = parseInt(resultSet.getAttribute("totalResultsAvailable"));
   var totalResultsReturned = parseInt(resultSet.getAttribute("totalResultsReturned"));
   var firstResultPosition = parseInt(resultSet.getAttribute("firstResultPosition"));
   var start = firstResultPosition;
   var end = firstResultPosition + totalResultsReturned - 1;
   var results = xmlDoc.getElementsByTagName("Result");
   for (var i = 0; i < results.length; i++) {
     var result = results[i];
     var title = result.getElementsByTagName('Title')[0].firstChild.nodeValue;
     var summary = '';
     if (result.getElementsByTagName('Summary')[0].firstChild) {
       summary = result.getElementsByTagName('Summary')[0].firstChild.nodeValue;
     }
     var clickUrl = result.getElementsByTagName('ClickUrl')[0].firstChild.nodeValue;
     var url = result.getElementsByTagName('Url')[0].firstChild.nodeValue;
     retVal[i] = { I: start + i, Title: title, Summary: summary, ClickUrl: clickUrl, Url: url };
   }
   return retVal;
 } catch(exception) {
   alert('Exception occurred while reading XML (i=' + i + '; start=' + start + ';end=' + end + '): ' + exception);
 }
}
```

1. [3 pts] What language is the code written in?
Answer: JavaScript

2. [3 pts] What are baseURL, appid, baseArgs, Results, readXML?
Answer: functions

3. [3 pts] What line of the program sends the request to Yahoo?
Answer: xmlhttp.send(null);

4. [3 pts] What line of the program receives the result from Yahoo?
Answer: return this.readXML(xmlhttp.responseXML);

5. [3 pts] The above program uses DOM functions. Name two.
Answer:
getElementsByTagName('AnyValue').firstChild.nodeValue;
getElementsByTagName(' AnyValue ')[0].firstChild.
getElementsByTagName("AnyValue");

Note: any of the above two is OK. Use of [] is not important
6. [3 pts] What type of file is Yahoo returning?
Answer: XML

7. [2 pts] What are Title, ClickUrl and Url?
Answer: tag names

JSON Question [10 total pts]

Below is an XML file. Your task is to transform it into an equivalent JSON notation.

```
<!DOCTYPE glossary PUBLIC "-//OASIS//DTD DocBook V3.1//EN">
 <glossary><title>example glossary</title>
  <GlossDiv><title>S</title>
   <GlossList>
    <GlossEntry ID="SGML" SortAs="SGML">
     <GlossTerm>Standard Generalized Markup Language</GlossTerm>
     <Acronym>SGML</Acronym>
     <Abbrev>ISO 8879:1986</Abbrev>
     <GlossDef>
      <para>A meta-markup language, used to create markup languages.</para>
      <GlossSeeAlso OtherTerm="GML">
      <GlossSeeAlso OtherTerm="XML">
     </GlossDef>
     <GlossSee OtherTerm="markup">
    </GlossEntry>
   </GlossList>
  </GlossDiv>
```

8. [10 pts] Place your answer here:

Answer

```
{   "glossary": {
        "title": "example glossary",
                "GlossDiv": {
                   "title": "S",
                        "GlossList": {
                 "GlossEntry": {
                     "ID": "SGML",
                        "SortAs": "SGML",
                        "GlossTerm": "Standard Generalized Markup Language",
                        "Acronym": "SGML",
                        "Abbrev": "ISO 8879:1986",
                        "GlossDef": {
```

```
            "para": "A meta-markup language, used to create markup languages.",
                                "GlossSeeAlso": ["GML", "XML"]
                        },
                            "GlossSee": "markup"
                    }
                }
            }
        }
}
```

Grading Note: the students don't have to get the indentation as I have it

XML Schema Questions [15 total pts]

Below is an xml schema file defining the Web search response for the Yahoo sidebar.

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="urn:yahoo:srch"
  xmlns="urn:yahoo:srch"
  elementFormDefault="qualified">
      <xs:element name="ResultSet">
            <xs:complexType>
                  <xs:sequence>
<xs:element name="Result" type="ResultType" minOccurs="0" maxOccurs="50" />
                  </xs:sequence>
            <xs:attribute name="totalResultsAvailable" type="xs:integer" />
            <xs:attribute name="totalResultsReturned" type="xs:integer" />
            <xs:attribute name="firstResultPosition" type="xs:integer" />
            </xs:complexType>
      </xs:element>
      <xs:complexType name="ResultType">
            <xs:sequence>
                  <xs:element name="Title" type="xs:string" />
                  <xs:element name="Summary" type="xs:string" />
                  <xs:element name="Url" type="xs:string" />
                  <xs:element name="ClickUrl" type="xs:string" />
      <xs:element name="ModificationDate" type="xs:string" minOccurs="0" />
            <xs:element name="MimeType" type="xs:string" minOccurs="0" />
                  <xs:element name="Cache" type="CacheType" minOccurs="0" />
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="CacheType">
            <xs:sequence>
                  <xs:element name="Url" type="xs:string" />
                  <xs:element name="Size" type="xs:string" />
            </xs:sequence>
      </xs:complexType>

</xs:schema>
```

9. [15 pts] Write out an XML file that is an instance that conforms to the above schema. Remember to define the necessary namespaces.

```
<ResultSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="urn:yahoo:srch" xsi:schemaLocation="urn:yahoo:srch
http://api.search.yahoo.com/WebSearchService/V1/WebSearchResponse.xsd"
totalResultsAvailable="3610652" totalResultsReturned="1"
firstResultPosition="1">
  <Result>
    <Title>Madonna</Title>
    <Summary>official site, with news, music, media, and fan club.  Includes
information on Madonna's 2009 Re-Invention tour.</Summary>
    <Url>http://www.madonna.com/</Url>
<ClickUrl>http://rds.yahoo.com/S=2766679/K=madonna/v=2/XP=yws/SID=e/l=WS1/R=
1/SS=33338411/H=1/IPC=us/SHE=0/SIG=11b8pqr3e/EXP=1106183712/*-
http%3A//www.madonna.com/</ClickUrl>
  </Result>
  </ResultSet>
```

Grading Note:

- For namespaces if students specify xmlns=”any urn1”, xmlns:xsi=”any urn2”, xmlns:schemaLocation=”any urn3” its OK. Just make sure that the three urns are not the same. (6 points)
- **2 points each for** totalResultsAvailable, totalResultsReturned and totalResultsPosition and they can have any non-negative value.
- **2 points each for title,summary, URL and ClickUrl tags with any legitimate value in them.**

Java Servlet Questions [20 total pts]

Below is a Java servlet. Read it over and then answer the questions below.

```
/* the usual imports */
public class ShowSession extends HttpServlet {
 public void doGet(HttpServletRequest request,
                   HttpServletResponse response)
  throws ServletException, IOException {
    response.setContentType("text/html");
    PrintWriter out = response.getWriter();
    String title = "Tracker";
    HttpSession session = request.getSession(true);
    String heading;
    Integer accessCount =  (Integer)
     session.getAttribute("accessCount");
    if (accessCount == null ) {
      accessCount = new Integer (0);
      heading = "Welcome";
    } else { heading = "Welcome";
accessCount = new Integer(accessCount.intValue() + 1);
    }
```

```
    session.setAttribute("accessCount", accessCount);
out.println(
     "<html><head><title>Count</title></head>\n" +
     "<body><h1>" + heading + "</h1>\n" +
     "<h2>Information</h2>\n" +
     "<table border=1><tr><th>Info
         type</th><th>Value</th>\n" +
     "<tr><td>ID</td><td>" + session.getId() +
     "<tr><td>Creation time</td><td>" +
     new Date(session.getCreationTime()) +
     "<tr><td>Time </td><td>\n" +
     new Date(session.getLastAccessedTime()) +
     "<tr><td>Number</td><td>" +
    accessCount + "</td></table></body></html>");
  }
}
```

10. [5 pts] What imported files are missing?

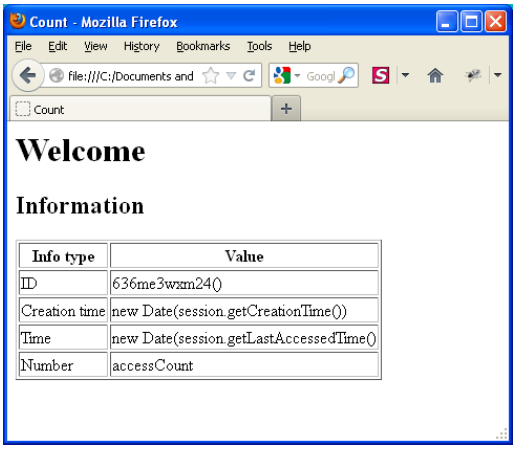
Answer:

```
import java.io.*;
import java.util.*;
import javax.servlet.*;
import javax.servlet.http.*;
```

11. [5 pts] In a sentence or two describe what the servlet does.

Answer: It keeps track of the number of accesses to the page. It also prints the session ID, the time the session was created, and the time of the last visit.

12. [10 pts] Draw a sample output for the servlet. You can make up any data that is not specified.



REST in Java Questions [10 pts]

The following code issues a request and returns the entire response as one long string. Some of the code has been removed. Answer the 4 questions below supplying the missing code.

```
public static String httpGet(String urlStr)
      throws IOException
  { URL url = new URL(urlStr);
HttpURLConnection conn = (HttpURLConnection) url.13.XXXXXXXXXXX();
    if (conn.getResponseCode() != 14.XX) {
      throw new IOException(conn.getResponseMessage()); }
BufferedReader rd = new BufferedReader(
   new InputStreamReader(conn.getInputStream()));
StringBuilder sb = new StringBuilder();
String line;
while ((line = rd.15.XXXXXX()) != null) {
    sb.append(line); }
rd.close();
conn.disconnect();
return sb.16.XXXXXX(); }
```

13. [3 pts]
Answer: openconnection

14. [3 pts]
Answer: 200

15. [2 pts]
Answer: readLine

16. [2 pts]
Answer: toString

Tomcat (Assignment #7) Questions [20 total pts]

17. [2 pts] In one sentence describe the contents of the file whose name is server.xml?

Answer: a simple XML-based configuration file that sets ServerAdmin, ServerRoot, Port, and ErrorLog

18. [2 pts] Name two methods that are handled by this web server.

Answer: GET and POST

19. [2 pts] What is the condition that causes the web server to return a 304 status code?

Answer: when the Etag is not changed since the last visit

20. [2 pts] What does SOAP stand for, and what is its purpose?

Answer: Simple Object Access Protocol is a lightweight protocol for exchange of information in a decentralized, distributed environment

21. [3 pts] What is Apache Axis?

Answer: Apache Axis is an implementation of SOAP

22. [3 pts] Define the acronym WAR and in one sentence give its definition:

Answer: Web Application aRchive is a JAR file used to distribute a collection of JavaServer Pages, servlets, and associated HTML and related files that together constitute a Web application

23. [2 pts] What is a major difference between Tomcat and Apache?

Answer: Tomcat supports the execution of Java Servlets, whereas Apache requires additional modules to execute Java servlets.

24. [2 pts] In what folder of Tomcat does one place Java servlets that are part of a user-developed application?

Answer: WEB-INF/classes

25. [2 pts] Below are 4 possible addresses of Apache servers for this class, but only one is correct. Choose the correct one.

a. http://www-scf.usc.edu:9980/index.jsp
b. http://cs-server.usc.edu:80/index.jsp
c. http://www-scf.usc.edu/~csci571/index.jsp
d. http://cs-server.usc.edu:9980/index.html

Answer: d

High Performance Web Sites [5 total points]

27. [5 pts] The lecture on high performance web sites listed 14 ways to improve the download performance of a website. List 5 of the ways that were presented by providing one or two sentences that describe what they are.

a. Make fewer http requests

b. Use a CDN

c. Add and expires header

d. Gzip components

e. Put stylesheets at the top

f. Move scripts to the bottom

g. Avoid CSS expressions

h. Make JS and CSS external

i. Reduce DNS lookups

j. Minify JavaScript

k. Avoid redirects

l. Remove duplicate scripts

m. Configure Etags

n. Make AJAX cacheable

(note: I have not included the one sentence descriptions. Please read them carefully as there may be several correct variations of this answer)