

CSC 309S 2009 – Midterm with Answers & Marking Scheme
University of Toronto (St. George)
Thursday March 5th, 2009

Duration: 90 minutes

Open Book and Notes

Last Name: _____ **First Name:** _____

Student No. : _____

Do **not** turn this page until you have received the signal to start. In the meantime, please fill out the identification section above, and read the instructions below carefully.

This midterm consists of 4 questions (numbered 1 to 4) on 9 pages (*including this one*), printed on one side of the paper. When you receive the signal to start, please make sure that your copy of the examination is complete.

Answer each question directly on the examination paper, in the space provided, and **use the reverse side of the page for rough work**. If you need more space for one of your solutions, use the reverse side of the page and indicate **clearly** the part of your work that should be marked.

Be aware that concise, well thought-out answers will be rewarded over long rambling ones. Also, unreadable answers will be given zero (0) so please write legibly.

1. _____ / 22 (HTML & CSS)
2. _____ / 20 (JavaScript & DOM)
3. _____ / 20 (XML, DTD, and Schema)
4. _____ / 18 (Application Architecture and Web Technologies)

_____ / 80 **TOTAL**

Question 1. HTML && CSS [16 marks total]

(a) [1 mark] Which tag is used to create a link in a webpage?

- i. ``
- ii. ``
- iii. `<anchor=""></anchor>`

(b) [1 mark] What is the statement to include a CSS style sheet in an HTML document?

Solution:

```
<link rel="StyleSheet" href="style.css" type="text/css">
```

(a) [4 marks] Write a CSS that defines a class called 'red' that colors the text with red for tags of that class. Show an example HTML files that uses this style sheet to color an `<h2>` element red.

Solution:

```
<html>
<head>
  <style type="text/css">
    <!--.red { color: red }-->
  </style>
</head>
<body>
  <h2 class="red">This heading is red</h2>
</body>
</html>
```

Marking: 1 for style, 1 for <!-- -->, 1 for defining class red, 1 for class= , -0.5 for forgetting the . in .red

(b) [4 marks] The HTML fragment below can be rendered by all popular browsers, but it is not valid XHTML. Write down the valid XHTML fragment that produces the same output with the only change that the numbering of list items starts from 41.

```
<br>Recent presidents of the U.S.A.<br>
<ol>
<li>George H. W. Bush
<li>William J. Clinton
<li>George W. Bush
</ol>
```

Solution:

```
<br />Recent presidents of the U.S.A.<br />
<ol start="41">
<li>George H. W. Bush</li>
<li>William J. Clinton</li>
<li>George W. Bush</li>
</ol>
```

Marking:

1 for
, 1 for start, 1 for . 1 for "41" and not just 41

- (c) [12 marks] Show 3 different ways HTML can be used to achieve the text layout below. Do not worry about the width and height of cells; just give solutions that produce this relative alignment of the text in the five cells.

Text 1	Text 2	Text 4
	Text 3	
	Text 5	

Solution:

This type of layout can be accomplished using

- [4 marks] adding tables inside cells of other tables
- [4 marks] using <div>
- [4 marks] the colspan and rowspan attributes

```
<table>
  <tr>
    <td rowspan="3">Text 1</td>
    <td>Text 2</td>
    <td rowspan="2">Text 4</td>
  </tr>
  <tr>
    <td>Text 3</td>
  </tr>
  <tr>
    <td colspan="2">Text 5</td>
  </tr>
</table>
```

Marking:

- -2.0 for syntax errors in html
- -2.0 or -3.0 for logical errors in html yielding different output

Question 2. JavaScript & DOM [20 marks total]

- (a) [1 mark] Give the name of a DOM function you can use to find a specific element of an HTML document.

Solution:

`getElementById()`

- (b) [2 marks] What happens if you assign a value to an object property that does not exist (the property)? What happens if you read an object property that does not exist?

Solution:

When assigning to an inexistent property, the property is created and the value is stored in it. When reading an inexistent property, the undefined value is read.

Marking:

1 for each explanation. -0.5 if answer does not include a mention of undefined

- (c) [2 marks] Write a JavaScript instruction to change the source of the third image on a page to be the file batman.jpg (which is stored in the same folder as the source code document)

Solution:

`document.images[2].src = batman.jpg;`

Marking:

-0.5 for syntax errors

-0.5 for logical errors

- (d) [3 marks] Show the JavaScript code you would need to insert in between HTML code to generate a horizontal rule tag in the HTML rendered by the browser.

Solution:

```
<script type="text/javascript">
  document.write("<hr>");
</script>
```

Marking:

1 for document.write and 1 for <script>

- (e) [4 marks] Write function named newBackground, which has three input parameters named red, green, and blue. The body of the function should set the background color of the web-page equal to the result of concatenating the three input parameters (so the function call newBackground("AA"," 08"," F6") would set the background color to #AA08F6).

Solution:

```
function newBackground(red, green, blue){
  document.bgColor = "#" + red + green + blue;
}
```

Marking:

1 for #, 1 for function definition, 1 for concatenating parameters, 1 for document.bgcolor

- (f) **[8 marks]** Consider the web-page shown below. It consists of a single form (name it formy) with 3 textboxes and a normal button. It is shown exactly as it would look when first loaded into a browser. Use the names (or ids) ageBox, yearsBox, and resultsBox for the names or ids of the three textboxes.

Enter your current age:

Enter a number of years:

Click this button:

Results:

- (i) **[4 marks]** Write the HTML for this form.

Solution:

```
<form name="formy" id="formy">
<p>Enter your current age: <input type="text" name="ageBox" id="ageBox" value="18"
size="5" /></p>
<p>Enter a number of years: <input type="text" name="yearsBox" id="yearsBox"
value="5" size="5" /></p>
<p>Click this button: <input type="button" value="Click me!" onclick="someFunction()"
/></p>
<p>Results: <input type="text" name="results" id="results" size="30" />
</form>
```

Marking:

-1.0 for syntax errors, -1.0 for logical errors

- (ii) **[2 marks]** Use the onload attribute of the body tag to make sure that the first textbox has the focus and is selected when the page loads.

Solution:

```
<body onload="document.formy.ageBox.focus(); document.formy.ageBox.select();">
```

Marking: 1 for document.formy.ageBox.focus and 1 for .select (-1.0 if student implemented solution correctly but in separate function)

- (iii) **[2 marks]** What (exactly) gets displayed (and where does it appear) if the user clicks the button (with the values shown above in the textboxes), and the button's onclick attribute executes the JavaScript commands below?

```
document.formy.resultsBox.value= "In " + document.formy.yearsBox.value +
    " you will be " + document.formy.ageBox.value +
    document.formy.yearsBox.value + " years old.\r";
```

Solution:

In the textbox named resultsBox, the string "In 5 you will be 185 years old." will appear with a newline after it.

Marking: -1.0 or -2.0 depending on how far student's answer is from above.

Question 3. XML, DTD, and Schema [20 marks total]

(a) [5 marks] Using the following XML file, show the corresponding DOM structure returned by DOM parser.

```
<mail><head><to>ABC</to><fr>CDE</fr><sj>About tomorrow</sj></head> <body  
type = "text/html"><p>Hello<p>Test</p></p></body></mail>
```

Solution:

Check lecture slides

(b) [5 marks] Answer the questions below on XML parsing: True (T) or False (F)

Solution:

- i. A SAX parser reads the entire XML document into memory at once F
- ii. A SAX parser limits XML document access to a single traversal T
- iii. A DOM parser is event-driven, i.e. designed to allow programmer intervention when an event (e.g. particular start/end tag parsed) occurs F
- iv. It is possible to traverse a document in reverse with SAX F
- v. A DOM parser allows easy document modification T

(c) [6 marks] Using following DTD:

```
<!ELEMENT book (opener,subtitle?,introduction?,(section |part)+)>
<!ATTLIST book isbn CDATA #REQUIRED>
<!ELEMENT opener (title_text)*>
<!ELEMENT title_text (#PCDATA)>
<!ELEMENT subtitle (#PCDATA)>
<!ELEMENT introduction (header, p+)+>
<!ELEMENT part (header, chapter+)>
<!ELEMENT section (header, p+)>
<!ELEMENT header (#PCDATA)>
<!ELEMENT chapter (chapter_text)>
<!ATTLIST chapter chapter_num CDATA #REQUIRED>
<!ELEMENT chapter_text (p)+>
<!ELEMENT p (#PCDATA)>
```

Solution:

Based on the above definition, answer the questions below. It is legal to have:

- | | |
|--|-------|
| i. A book with no title_text. | True |
| ii. A book with no paragraphs. | False |
| iii. A book with more than one introduction. | False |
| iv. A book with one section and no parts. | True |
| v. An introduction with no header. | False |
| vi. A part with more than one chapter. | True |

(d) [4 marks] The following XML represents an ill-conceived attempt by a developer (who did not take CSC309) to construct an XML document that is valid against the DTD above. Make any adjustments to this document that may be required to validate it against the DTD. You do not need to write out the entire new document structure--just show the changes required (if any).

```
<book>
  <isbn>01-785352-01</isbn>
  <opener>
    <title_text>All About CSS</title_text>
  </opener>
  <header>All about CSS</header>
  <chapter >
    <chapter_number>chapter 1</chapter_number>
    <chapter_text>
      <p>Glad you want to know about CSS.</p>
      <p>There's so much to say!</p>
      <p>Where should we start?</p>
      <p>How about looking at some examples?</p>
    </chapter_text>
  </chapter>
</book>
```

Solution:

- (a) Make ISBN an attribute of <book> rather than a separate element.
- (b) Remove <chapter_number> tag and make chapter number an attribute of <chapter>.
- (c) Enclose <chapter> element in <part> element.

Marking: 2 for (a) , 1 for (b) and 1 for (c)

Question 4. Application Architecture and Web Technologies [18 marks total]

- (a) [2 marks] Explain briefly what the following sentence means: "HTTP is a stateless protocol."

Solution:

Individual HTTP requests are handled independently from previous ones by the server. There is no information at the web server built based on previous HTTP requests ("server state") that would affect the outcome of a given request.

- (b) [2 marks] How does an HTTP client know that the HTTP server is sending back HTML as opposed to, say, image data?

Solution:

The HTTP response header contains a header field "Content-Type" which indicates the MIME type of the data returned in the response body. The MIME type for HTML is "text/html", and that for a JPEG image is "image/jpeg".

- (c) [2 marks] In message queues, what is the main difference between a queue and a topic?

Solution:

In queues, a message can be consumed by only one client where as in the topic it can be consumed by a number of clients. Queue represents point-to-point communication while a Topic follows a publish/subscribe model.

- (d) [3 marks] What are Pros and Cons of using a stored procedure instead of JDBC calls embedded in Java code?

Solution:

Pros:

- Removed SQL from Java code
- DB group develops SQL independently

Cons:

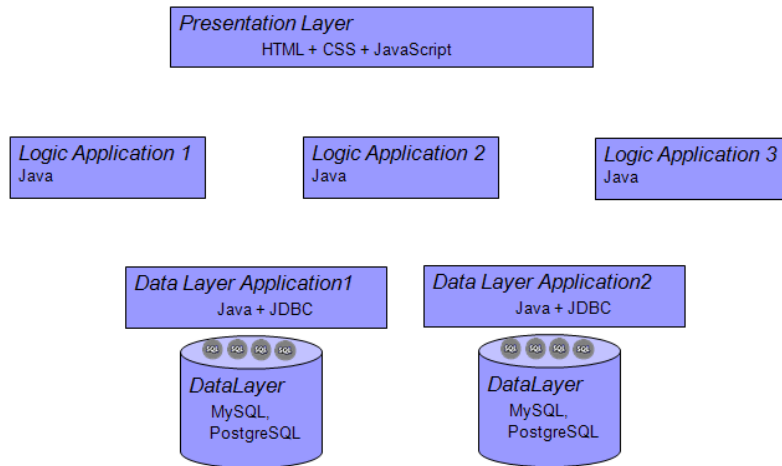
- SP is often interpreted, rarely compiled
- Danger of putting logic in database

- (e) [4 marks] When considering an XML binding library, what are the criteria that you should consider?

Solution:

- Speed of constructing objects from XML (include parsing time, object construction time, object initialization time...)
- Ease of use with marshaling and un-marshaling (how much Java code required...)
- Ease of configuration (how much effort is required to describe the mapping between xml and the Java objects)

- (f) **[5 marks]** One of the advantages of using a message queue broker (e.g. ActiveMQ) is that we can split a monolithic application to smaller independent applications which communicate via application-neutral data representation (e.g. XML) and hence achieve better scalability. For a given web application with one database, is it possible to use the same approach at the data layer level (as illustrated in the following diagram where all applications – represented as rectangles – communicate via message queues. The SQL exists in stored procedures inside the database)?



Solution:

No, you can't split a single database across 2 DBMS instances.

END OF MIDTERM