COMM049/6/LSA 2014/2015

© UNIVERSITY OF SURREY

Faculty of Engineering & Physical Sciences

Department of Computing

Undergraduate Programmes in Computing

Module COMM049; 15 Credits

HTML5 and CSS3 for Mobile Applications

FHEQ Level 7 (MSc) Examination

Time allowed: Two hours

Late Summer Assessment 2014/2015

Answer all three questions

Each question carries 33 marks.

Where appropriate the mark carried by an individual part of a question is indicated in square brackets [ ].
Approved calculators allowed

SOLUTIONS

1: This question covers general aspects of rich client applications.

(a) JavaScript is used extensively on Web applications and one of the most important usages is input validation. Explain in a few words why validating input data with JavaScript is important. [5 marks]

Ans: Validation is the process of making sure that the data entered by the user is complying to the expected format and rules of your application and is a key part of the Web application, and one of the most important uses of JavaScript. [2 marks] Validating the data on the client-side could save a lot of hassle, as it avoids round trips and also improves the user experience. [1 mark] Form-level validation is the most common way of validating the data. Common types of validation include: numeric, required, range, or a specific format (such as email, zip code, etc.). [2 marks]

(b) Ajax is a popular technique in Web applications that allows developers to build rich Web applications.

(i). Define Ajax and explain what the main functions are. [5 marks]

(ii). What is the JavaScript object that allows for the implementation of Ajax? [1 mark]

(iii). Explain as pseudocode or your own words, the main steps needed for a Web application to make an Ajax call to the server and retrieve the response. [5 marks]

Ans: AJAX stands for Asynchronous JavaScript And XML, and is not a new programming language but a new way of using existing standards [1 mark]. Ajax is JavaScript and uses HTTP requests to communicate with a remote service [1 mark]. Ajax can be used to access remote sources and dynamically update the GUI without refreshing the browsers page [1 mark]. It can request small amounts of data from a server without having to request and reload the entire page and therefore can turn a web page into a desktop-like application [2 marks].

The XMLHttpRequest object is used to exchange data with a server. [1 mark]

Data is exchanged via the standard request/response principles that web applications use [1 mark]. A message is submitted by the user to a server that processes it, and then returns a new message to the user all that without refreshing the page (i.e. in the background) [1 mark]. In order to send a request to a server, we can use two methods: open() send() [1 mark]
The open() method takes three arguments: 1st the method to use (i.e. get or post) 2nd the URL of the page to be accessed 3rd a Boolean value declaring if the request is asynchronous [1 mark]
The send() method takes one parameter, the data to be transmitted. We can use null because there is nothing to send, or because all parameters are on the URL
xmlHttp.open(”GET”,”apage.jsp”,true); xmlHttp.send(null); [1 mark]

(c) Another technology used to build rich client applications is jQuery. Explain what is jQuery and how it supports the Unobtrusive JavaScript concept. [10 marks]

Ans: jQuery focuses on retrieving elements from HTML pages and performing operations upon them, and its main purpose is to make page manipulation straightforward in order to speed up development [2 marks]. Rather than spending time juggling the complexities of advanced JavaScript, designers can leverage their existing knowledge of:
Cascading Style Sheets (CSS) Hypertext Markup Language (HTML) Extensible Hypertext Markup Language (XHTML) and straightforward JavaScript [2 marks]
Unobtrusive JavaScript states that structure, style, and behaviour should be clearly separated [2 marks]. jQuery's core is optimised for producing Unobtrusive JavaScript [2 marks]. Unobtrusive JavaScript considers ANY JavaScript expressions or statements embedded in the <body> of HTML pages to be incorrect! [2 marks]

(d) Cookies have traditionally been used in web applications for session management, personalization and tracking. What are the disadvantages of using cookies and what alternative technique does the course recommend? [7 marks]

Ans: All cookies are sent with each http request, tying up bandwidth [2 marks]. Cookies are limited to 20 cookies at 4kb each per domain – total 80kb [2 marks]. In contrast, local and session storage standards allow for several MB of data to be stored (depending on browser) without the need to transfer data in the http requests. [3 marks]

Total [33 marks]

SEE NEXT PAGE

2: This question covers a range of general aspects of developing web applications.

(a) What are the five key technologies that make up *Ajax*? Briefly describe the role each technology plays within a rich client interface.

[10 marks]

Solution:
JavaScript for tying together all the other Ajax technologies. [2 marks]
XML to structure the data that is exchanged between client and server. [2 marks]
The XMLHttpRequest object for asynchronously exchanging structured data between client and server. [2 marks]
HTML and CSS for marking and styling content that is to be rendered in a browser. [2 marks]
The Document Object Model, which enables the dynamic interaction with and alteration of web page layout and style. [2 marks]

(b) *Ajax* supports an "asynchronous" interaction style between client and server. Briefly explain what this means and why it can provide an improved user experience for interactive web applications.

[4 marks]

Solution:
For mention of non-blocking [2 marks]
So user can continue with some activity while the response to a request is being processed at the server side. [2 marks]

(c) Suppose we want to "dynamically" add some content into a document. In the following example (a little contrived, for simplicity), we *intend* that the text "to the world of JavaScript" be added just below the text "Welcome".

(i) What will actually happen if a web browser loads the following code? [4 marks]
(ii) How would you modify the code in order to ensure the intended behaviour actually occurs? Explain your changes (You do not need to rewrite the whole example. Just be clear about what needs to be modified and where any additional lines need to be placed.) [6 marks]

Solution:
In its current form, the invocation of GreetPlayer() will overwrite any text in the document with "to the world of JavaScript". [4 marks]

To correct this, we need to insert a target div below the level 1 heading:
  [3 marks]
and replace the body of the function with a statement that inserts the required text into this target element:
document.getElementById("TrgDiv").innerHTML= "to the world of JavaScript";
[3 marks]

```
<html>
```

```
<head>
  <script type="text/javascript">
     function GreetPlayer() {
        document.write("to the world of
                                        JavaScript");
     }
  </script>
</head>
<body onload=GreetPlayer()>
     <h1>Welcome</h1>
</body>
</html>
```

(d) Write a JavaScript statement to accomplish each of the following tasks:

(i) Declare variables `sum` and `x`.

(ii) Assign `1` to variable `x` and `0` to variable `sum`.

(iii) Add variable `x` to `sum` and assign the result to `sum`.

(iv) Print `"The sum is: "` followed by the value of the variable `sum`. to a "`div`" element whose identifier is "`result`".

[9 marks]

(i) var sum, x;[2 marks]

(ii) x = 1;
sum = 1; [2 marks]

(iii) sum += x; or sum = sum + x: [2 marks for former, 1 mark for latter]

(iv) document.getElementById("result").innerHTML= "The sum is:" + sum; [3 marks]

Total [33 marks]

SEE NEXT PAGE

3: This question covers a range of aspects of designing mobile web applications.

(a) Pixels (px) is often used as a unit of measurement for sizing html elements and fonts. The course recommends to alternative units of measurement. What are they, and what are their advantages?

[11 marks]

Ans: Express widths as percentages of their containing elements [2 marks]. This will enable child elements to be scaled proportionately if a containing element is resized either by the user or by a media query [2 marks] Use ems for font sizes, paddings and margins [3 marks]. This enables fonts to be proportionally resized across an application by simply changing the default font size [2 marks]. Using ems for paddings and margins means that white space will scale with the font size, which provides a more natural scaling [2 marks].

(b) When designing a new web app, I could review all the current smartphones and tablets and provide media queries to size the layout for each and every one. Why is that not a good idea, and what strategy should I use instead?

[5 marks]

Ans: This leads to a very hard to maintain style sheet as well as the design being very fragile to changes in device spec or the introduction of new devices [2 marks]. Instead, it is much better to use a fluid layout and then provide media queries for two or three breakpoints where the fluid layout naturally needs to be rearranged to accommodate reductions in the viewport size. [3 marks]

(c) As well as media queries, quite a lot of useful support for responsive web design is being added into the HTML5 and CSS3 standards. Describe in detail two additional features that were recommended in the course.

[17 marks]

Ans: These are the column property in HTML5, and Flexbox in CSS3 [2 marks]. The column property is used to divide text intensive elements up into columns [2 marks]. The maximum number and optimal width of columns can be specified [2 marks]. A browser will then automatically balance number of columns versus column width as the viewport is resized, reducing the number of columns each time the column size falls significantly below the optimal width [3 marks]. Flexbox provides a box model for container elements [2 marks]. The contained elements of a flexbox can be laid out horizontally or vertically, with unused space being either assigned to a child element or distributed across child elements by assignment of "flex" to the children that should expand. [3 marks]. An added advantage is that the layout of a flexbox can be changed with media queries, with it even being possible to change the order of presentation of children [3 marks].

Total [33 marks]

END OF PAPER

INTERNAL EXAMINER: Prof. Paul Krause
EXTERNAL EXAMINER: Prof. Mahesan Niranjan