

PLEASE NOTE

This exam paper was for COMP SCI 1105, a first-year subject.
In addition, Web and Database Computing is a relatively new course covering content in a rapidly changing field.

As such, there will be major differences between the exam for the current offering of COMP SCI 2207, and past exams for Web and Database Computing.

Please consider this exam paper as an example for your reference, and NOT a guide on what content will/will not be covered in the upcoming exam.

Primary Examination, Semester 2, 2014

Web and Database Computing COMPSCI 1105, 1105BR
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Official Reading Time:	10 mins
Writing Time:	120 mins
Total Duration:	130 mins

Questions	Time	Marks
Answer all 6 questions	120 mins	120 marks
		120 Total

Instructions

- Begin each answer on a new page in the answer book.
- Examination material must not be removed from the examination room.

Materials

- Foreign language paper dictionaries permitted.

DO NOT COMMENCE WRITING UNTIL INSTRUCTED TO DO SO

Question 1**HTML, CSS and Design**

- (a) When designing web applications we need to ensure that they are both *usable* and *accessible*.

i. Explain what each of these terms means.

[4 marks]

ii. Give an example of how you could make a site usable.

[2 marks]

iii. Give an example of how you could make a site accessible.

[2 marks]

- (b) Draw what would be displayed in the browser window by the following HTML and CSS

```
<head>
<title>My Web Page</title>
</head>
<body>
<div>
<h1>Section 1</h1>
<p>This is some text</p>
</div>
<h1>Section 2</h1>
</body>
```

```
h1 {font-size:24pt; text-decoration: underline; font-color: blue}
div {font-style: italic}
```

[5 marks]

- (c) The World Wide Web Consortium recommends that all style information about a document should be stored in a separate style sheet. Explain two reasons for this recommendation.

[4 marks]

- (d) Explain the difference between the *class* and *id* selectors. Give an example that demonstrates the use of a class and id selector in HTML and CSS.

[5 marks]

- (e) We used handlebars to incorporate *templates* and *partials* in our web pages. *Explain* the purpose of templates and partials (i.e. why are they useful) and give an example of how a template or partial could be used. Your example can be an explanation or code example.

[4 marks]

[Total for Question 1: 26 marks]

Question 2**Client Server communication - HTTP**

- (a) The client side of your web application needs to send the names and ages of 5 people. The people and their ages are: Jon 15; Eleanor 21; Mark 62; Kerry 88; Jane 45

Show how you would represent this data in JSON.

[5 marks]

- (b) When sending an *entity body* between the server and client (i.e. the requested resource of a GET), the client needs to know what the body contains (i.e. json, text, jpeg, etc) in order to correctly use or display it. How does an HTTP sender let the HTTP receiver know what type of resource the entity body contains? Be as specific as possible.

[3 marks]

- (c) When sending a request to an HTTP server, either GET or POST method can be used. Explain what would determine which method the client should use.

[4 marks]

- (d) When communicating with our web server, we typed the URL
`http://localhost:3000/`
into the browser address bar. Explain what 'http' 'localhost' and '3000' mean?

[5 marks]

- (e) Suppose your *friend finder* application server receives a request for friend data. What would be an appropriate status code to return for each of the following situations?

- i. The server is able to obtain the friend data and is returning it to the client.
- ii. The server is unable to contact Facebook and therefore can't return the data.
- iii. The friend specified in the request does not exist on Facebook.

[3 marks]

[Total for Question 2: 20 marks]

Question 3**Web App Programming**

- (a) A web page contains the following:

```
<p class="p">I went walking one day</p>
<p id="p">The next day I went to the zoo</p>
```

Explain what the following javascript will do:

```
getElementById("p").innerHTML("IMPORTANT");
```

[3 marks]

- (b) The following javascript is being used to dynamically add a paragraph to the bottom of a web page that is being displayed.

```
var newParagraph = document.createElement("P");
var text = document.createTextNode("I'm a new paragraph");
newParagraph.appendChild(text);
document.?????.appendChild(newParagraph);
```

Considering the DOM (document object model) and the fact that we want the new paragraph to appear at the bottom of the page, what should be written in the place indicated by ????

[3 marks]

- (c) When designing a web application, we can run code on the client or on the server.

i. Give an advantage or reason for running code on the client.

[2 marks]

ii. Give an advantage or reason for running code on the server.

[2 marks]

- (d) i. What is a "cookie"?

[2 marks]

ii. When would you use a "cookie" in a web application?

[2 marks]

- (e) Node.js is asynchronous and makes use of callback functions. Given the code below, write what will be printed?

```
function mysteryFunction() {  
    console.log('starting');  
  
    // asyncFunction is an asynchronous function that will  
    // print 'hello' to console.log at some stage before it completes  
    asyncFunction(function() {  
        console.log('finished async');  
    });  
  
    console.log('mystery');  
}
```

[5 marks]

[Total for Question 3: 19 marks]

Question 4**Third Party APIs**

- (a) You are debugging the following Facebook call in your code:

```
FB.api('/me',  
      { access_token: req.session.accessToken },  
      function(response)  
      {  
        if (response && !response.error) {  
          console.log('received: ' + JSON.stringify(response.data));  
          req.session.fbid = response.data.id;  
        }  
        ..... (rest of code).....
```

When you run your program, the following is printed to your console:

received: undefined

TypeError: Cannot read property 'id' of undefined

In trying to debug, you use the Graph API explorer to run the query /me. Graph API Explorer returns the following for the query /me

```
{  
  "id": "1537211446494915",  
  "first_name": "Cheryl",  
  "gender": "female",  
  "last_name": "Pope-wdc",  
  "link": "https://www.facebook.com/app_scoped_user_id/1537211446494915/",  
  "locale": "en_US",  
  "name": "Cheryl Pope-wdc",  
  "timezone": 10.5,  
  "updated_time": "2014-07-30T04:58:00+0000",  
  "verified": true  
}
```

What is the cause of the error and how would you correct it.

[6 marks]

- (b) Facebook stores information as a graph of nodes (like user_id) and edges (like friends). One of the edges on the user_id node is *photos* which represents “Photos this person is tagged in.” Give the Facebook query that would return the photos of yourself.

[4 marks]

(c) Google maps are initialised using the following code:

```
function initialise() {  
  
    var mapOptions = {  
        center: new google.maps.LatLng(-34.918430, 138.582479),  
        zoom: 8  
    };  
    map = new google.maps.Map(  
        document.getElementById("map-canvas"),  
        mapOptions);  
}  
  
google.maps.event.addDomListener(window, 'load', initialise);
```

- i. When will the initialise function be called?
[2 marks]
- ii. Write the HTML tag needed in the web page for the map to appear on the page
[3 marks]
- iii. The javascript code for drawing the map must be available to the browser to display our web page with the google map. Explain how the javascript becomes available to the browser.
[3 marks]

[Total for Question 4: 18 marks]

Question 5**Databases**

- (a) A database is needed for a university student enrolment system. It is determined that it should contain the following information:

- Students have names and ids.
- Students can enrol in multiple subjects.
- Subjects have a name, subject number and maximum enrolment size.

Construct an E-R model for the above scenario.

[8 marks]

- (b) Derive a relation schema for the university student enrolment system described above. Underline the PRIMARY KEY(s) for each table.

[8 marks]

- (c) Given the following specification for adding an SQL CHECK constraint:

```
ALTER TABLE table_name ADD constraint_name (columnA, columnB);
```

Write an SQL command that will add a constraint to make *id* a primary key of the student table.

[3 marks]

- (d) Write a query to get the names of all students enrolled in the subject number 1234

[3 marks]

[Total for Question 5: 22 marks]

Question 6
Security

- (a) Describe *three* security risks for web and database applications and explain what web applications developers can do to reduce the threat of these risks.

[Total for Question 6: 15 marks]