

## **Please read**

This exam paper was for the first-year students (WDC 1105).

There will be **a major difference** between the exam questions of this year (2018) and of the past exam (2016). Please consider this exam paper as an example for the question format.



## Primary Examination, Semester 2, 2016

### Web and Database Computing COMPSCI 1105, 1105BR

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

- Paper dictionaries permitted.

DO NOT COMMENCE WRITING UNTIL INSTRUCTED TO DO SO

**Question 1****HTML, CSS and Design**

- (a) The HTML shown below has two errors of usability or accessibility. Identify the two errors and show how you would correct them.

```
<html>
  <table>
    <tr><td>Navigation Menu</td><td>Main News Story</td></tr>
    <tr><td>Local News</td><td></td></tr>
  </table>
</html>
```

[4 marks]

- (b) 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]

- (c) Explain the difference between the *class* and *id* selectors. Explain a situation when a HTML tag needs to be assigned both an id selector and a class selector?

[5 marks]

- (d) Explain the contents of a DOM hierarchy. How do these contents relate to object-oriented programming methodology?

[2 marks]

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

```
<head>
  <title>My First Web Page</title>
</head>
<body>
  <div>
    <h1>Section 1</h1>
    <p>Here is the first introduction </p>
  </div>
  <h1 class="normal">Section 2</h1>
</body>
```

```
body {
  font-style: italic;
}

h1 {
  font-color: red;
  font-size: large;
  text-decoration: underline;
}

.normal {
  font-style: normal;
}
```

[5 marks]

- ii. Do any necessary changes to make "Section 1" and "Here is the first introduction" to appear in blue and in italic. Other parts of the web page should remain unchanged.

[5 marks]

**[Total for Question 1: 25 marks]**

**Question 2****Client Server communication - HTTP**

- (a) AJAX (Asynchronous Javascript and XML) is used by web application clients to communicate with server side scripts.

What four XMLHttpRequest functions are required to make and handle an AJAX call? In your answer, you must explain what each step is doing (don't just list the function names).

[8 marks]

- (b) When sending data between web application clients and servers, JSON (Javascript Object Notation) is frequently used. Give one advantage of using JSON and give an example of an alternative data format.

[3 marks]

- (c) You are writing a web application that displays and updates an address book. An address entry has the following information: first name, last name, and phone numbers (mobile, landline, work). A user wants to update the mobile number of two friends John Smith to 0123 456 789 and Jessica Smith to 0987 654 321. Show the data in JSON format that would need to be sent to the server to process this request.

[4 marks]

- (d) What is the difference between an HTTP POST and an HTTP GET? Give an example of when each would be used.

[4 marks]

- (e) When communicating with our web server, we typed the URL `http://localhost:3000/` into the browser address bar. If we did not type the 3000, what would happen?

[3 marks]

- (f) Explain what each of the status codes below mean.

i. 200

[1 mark]

ii. 404

[1 mark]

iii. 500

[1 mark]

- (g) Explain the purpose of cookies and sessions. How do they differ?

[3 marks]

**[Total for Question 2: 28 marks]**

**Question 3****Server Side Programming**

- (a) What *express* code would you write to make your express server return the status code 500?

[2 marks]

- (b) An express server has a route defined as shown below:

```
router.post('/changeCount', function(req, res) {  
    count = req.body.newCount;  
    res.send(200);  
});
```

- i. What HTTP request (method and URL) would cause this route to be called?

[2 marks]

- ii. Where does the value `req.body.newCount` get set?

[2 marks]

- (c) The following handlebars template appears in a web page:

```
<h1>My Friends</h1>  
<table>  
  {{#each people}}  
  <tr><td>{{firstName}}</td><td>{{lastName}}</td>  
  <td>{{location}}</td></tr>  
  {{/each}}  
</table>
```

- i. What html would be generated by this template? You can draw a picture or explain in words.

[2 marks]

- ii. This template will be rendered with: `res.render("friends", friendData)`. Give an example of how you would define the variable `friendData` for two friends.

[3 marks]

- (d) Using `node.js`, javascript can be run on the client (browser) or the server (`express`). Explain how you would decide whether to run the javascript on the client or the server when designing your application.

[4 marks]

- (e) In *express*, in what directory and file would you find javascript that will be run on the server? where would you find javascript that will be run on the client?

[2 marks]

**[Total for Question 3: 17 marks]**

**Question 4****Third Party APIs**

Examine the code given below:

```
var adelaideBounds, marker, infoWindow, map;

function initialize() {
    var Adelaide = new google.maps.LatLng(-34.9290, 138.6010);

    adelaideBounds = new google.maps.LatLngBounds(
        new google.maps.LatLng(-34.943481, 138.577672),
        new google.maps.LatLng(-34.865488, 138.660756));

    var mapOptions = {
        center: Adelaide,
        zoom: 10
    };
    map = new google.maps.Map(
        document.getElementById("map-canvas"), *****
        mapOptions);
    marker = new google.maps.Marker({
        position: Adelaide,
        title: "Adelaide!",
        draggable: true,
        map: map
    });
    infoWindow = new google.maps.InfoWindow({
        content: "You have found Adelaide",
    });
    google.maps.event.addListener(marker, 'dragend', checkAdelaide);
}

function checkAdelaide() {
    if (adelaideBounds.contains(marker.getPosition())) {
        infoWindow.open(map, marker);
        marker.setAnimation(google.maps.Animation.BOUNCE);
    } else
        marker.setAnimation(null);
}
google.maps.event.addDomListener(window, 'load', initialize);
```

- i. Explain what the code will do. Be as detailed as possible describing how a user could interact with the map and exactly what would be displayed.

Please go on to the next page...

[8 marks]

- ii. Explain the purpose of the line `document.getElementById("map-canvas")`, marked with \*\*\*\*\* in the code above. What does this line do?

[3 marks]

- iii. Explain the line `map:map` (Hint: what does the first word `map` refers to? What does the second word `map` refers to?)

[2 marks]

**[Total for Question 4: 13 marks]**



**Databases****Question 5**

- (a) Using an example, explain data redundancy within the context of databases. Then explain how data redundancy can be minimised using the same example.

[4 marks]

- (b) A database is needed for a DVD store. The database should contain the following information:

- Customer ids, names and addresses.
- Date and time each DVD was hired and the customer who hired the DVD
- Title and year of production of each DVD

- i. Construct an E-R model for the above scenario.

[8 marks]

- ii. Derive a relational schema for the DVD store described above.

[8 marks]

- iii. What primary key would you choose for the DVD table? Explain your choice.

[4 marks]

- iv. Write a query to get a list of the DVD titles hired by a given customer.

[3 marks]

**[Total for Question 5: 27 marks]**

**Security**

**Question 6**

- (a) For each of the web application security risks given below, explain the attack and how to prevent the attack.

i. Cross-Site Scripting (XSS)

[5 marks]

ii. SQL injection

[5 marks]

**[Total for Question 6: 10 marks]**