

**OLLSCOIL NA hÉIREANN**  
THE NATIONAL UNIVERSITY OF IRELAND, CORK  
**COLÁISTE NA hOLLSCOILE, CORCAIGH**  
UNIVERSITY COLLEGE, CORK

SAMPLE EXAMINATION

**CS1102 Internet Computing**

Dr. D.G. Bridge

Answer **Question 1** and **three** of the remaining four questions.  
Silent non-programmable calculators may be used.

Time allowed: Three hours

1. (40 marks) Give **brief** answers to each of the following.

- i) Explain the difference between *block-level elements* and *inline-level elements* in (X)HTML.
- ii) Explain how inheritance of a CSS property can be *blocked*.
- iii) Explain why people sometimes say that text is more *accessible* than images.
- iv) Explain the advantages of *progressive* JPEGs.
  
- v) Explain what it means to say that a data communications technology is *asymmetric*.
- vi) Explain *why* the Internet is packet-switched rather than circuit-switched.
- vii) Explain the main *differences* between the email access protocols POP and IMAP.
- viii) Explain what it means to say that connections can be *persistent* in HTTP 1.1.
  
- ix) Explain the difference between *static* and *dynamic* web pages.
- x) Explain what is meant in PHP by *interpolation*.
- xi) Explain when to use the HTTP *GET* method and when to use the HTTP *POST* method for submission of form data.
- xii) Explain what PHP programmers mean by a *self-processing page*.
  
- xiii) Explain the difference between a *thin client* and a *fat client*.
- xiv) Explain why people say that HTTP is a *stateless protocol*.
- xv) Explain the main differences between a *persistent cookie* and an *in-memory cookie*.
- xvi) Explain why *AJAX* may reduce web response times.

2. (40 marks) Give a well-formed, valid XHTML document and CSS stylesheet to produce the web page shown below.

- In your XHTML, you may omit the 'preamble' (i.e. the xml prolog and the DOCTYPE declaration). But you must include the head, title, link and body. (3 marks)
- The body of the XHTML and the CSS stylesheet must address the following points:
  - The banner is a JPEG image (banner . jpg), which is already the correct size (800 pixels wide by 200 tall). It is positioned using fixed positioning. (5 marks)
  - The menu of links on the left has also been positioned using fixed positioning. The links in the menu are relative URLs to the following documents: rules .html, history .html and sandwiches .html, respectively. The links have been given some padding, a bottom border and a right border. (16 marks)
  - The main part of the page contains several headings, a paragraph of text; a table; and a nested list. This part of the web page is positioned using absolute positioning. The table elements have been given some padding and borders. (16 marks)

UCC Bushkashi Club - Mozilla Firefox

File Edit View History Bookmarks Tools Help

[Club rules](#)

[Club history](#)

[Club sandwiches](#)

## Welcome

Welcome to the *UCC Bushkashi Club*. In our club we have just about as much fun as it is possible to have with a goat.

### Club officers

President:	Genghis Khan
Treasurer:	Borat Sagdiyev

### Forthcoming events

- Charity events:
  1. Goat wrestling (naked) (in mud)
  2. Karaoke (mounted) (on horses)
- Social events:
  - Bar-B-Q after every match!
- Visit to the Asian steppes (transport not provided)

3. (40 marks) Read these two news articles (abridged and adapted from *Computerworld*) and answer the questions that follow.

### **Article I: Two DNS servers hit by denial-of-service attacks**

*Over the weekend, Joker.com, a domain-name registrar in Germany, was hit with a denial-of-service (DDoS) attack that disrupted service to customers. "Upstream providers reported traffic peaks of about 1.3 Gigabits per second on a single line", Joker.com said. "This was enough to overload our lines, causing communication problems between our border routers and the upstream providers."*

*Joker.com responded to the attack by adding more name servers.*

*According to Netcraft Ltd., more than 550,000 domains are registered with Joker. "Any of those domains that use Joker's DNS servers are likely to be affected," Netcraft said in a note posted on its Web site.*

*Attacks against DNS servers, though relatively rare until now, are considered especially critical because of their potential to bring down large numbers of Web sites.*

*In October 2002, all 13 of the Internet's root DNS servers were victims of a massive DDoS attack that raised concerns about the Internet's infrastructure but did little damage otherwise.*

### **Article II: VeriSign details massive denial-of-service attacks**

*VeriSign Inc. said that about 1,500 organizations worldwide were attacked earlier this year by unknown hackers who employed botnets and Domain Name System (DNS) servers to swamp networks with unmanageable torrents of data.*

*In this case, attackers sent spoofed domain-name requests from botnets of zombies to DNS servers, which processed the requests and then sent replies to the spoofed victims. When the number of requests is in the thousands, the attacker could potentially generate a multigigabit flood of DNS replies directed at the spoofed server.*

- i) (8 marks) Explain domain name registration in DNS, including the role that a company such as Joker.com plays.
- ii) (8 marks) Explain how domain name resolution works in DNS.
- iii) (16 marks) With regard to the first article, answer the following:
  - a. In what way would the owners of the 550,000 domains registered with Joker be affected by an attack on Joker's domain name servers?
  - b. How is Joker.com's response intended to alleviate the problem?
  - c. Why is an attack on the Internet's 13 root servers potentially even more serious?
  - d. How does DNS attempt to reduce this vulnerability?
- iv) (8 marks) With regard to the second article, answer the following:
  - a. What is meant by a zombie?
  - b. Which of the two attacks (the one in article I or the one in article II) do you think is the more serious, and why?

4. (40 marks) A MySQL database called `eurovision` contains a table called `winners`, a fragment of which is shown here:

year	country	points
1993	Ireland	187
1994	Ireland	226
1995	Norway	148

This shows that Ireland won Eurovision in 1993, scoring 187 points, for example.

A web developer has already written an XHTML form that allows the user to enter either a year or a number of points. The user's data is sent to the server using an HTTP GET request and is available to a PHP script using `$_GET['year']` and `$_GET['points']`.

The web developer has also written parts of a PHP script, as follows, which you can assume will correctly connect to the `eurovision` database:

```
<?php
$dbconnection = mysql_connect('localhost', 'myuserid', 'mypasswd');
if ( ! $dbconnection )
{
    die('Unable to connect!');
}
$dbselection = mysql_select_db('eurovision');
if ( ! $dbselection )
{
    die('Unable to select database');
}

?>
```

Write the rest of the script as follows:

- If the user has entered a year but has not entered a number of points, use the following SQL query  
"SELECT \* FROM winners WHERE year = {\$\_GET['year']}";  
If the user has entered a number of points but has not entered a year, use the following:  
"SELECT \* FROM winners WHERE points >= {\$\_GET['points']}";  
If the user has entered both a year and a number of points, use the following:  
"SELECT \* FROM winners  
WHERE year = {\$\_GET['year']} AND points >= {\$\_GET['points']}";
- If the query result-set is non-empty, output the result-set as a well-formed XHTML table.
- If the user has entered neither a year nor a number of points, or if the result-set is empty, output an error message to the user.

In your XHTML, you may omit the 'preamble' (i.e. the xml prolog and the DOCTYPE declaration); and a stylesheet is not required.

You may use any PHP built-in functions that you wish, including:

- `$dbresult = mysql_query($sql)` to issue query `$sql` to the database,
- `mysqlnum_rows($dbresult)` to find out how many rows of data the result-set contains, and
- `$row = mysql_fetch_assoc($dbresult)`, which returns the next row of the result-set or `false` when there are no more rows.

5. (40 marks)

- i) (7 marks) Explain what an SQL injection attack is. Include an example in your explanation.
- ii) (6 marks) Explain what the following PHP function does and, using an example, explain how you would use it to resist SQL injection attacks.

```
function clean($str)
{
    return mysql_real_escape_string(trim($str));
}
```

- iii) (12 marks) Explain how PHP sessions might be used to implement user authentication (where users are required to login and logout, and where user details are stored in a database).
- iv) (15 marks) Consider a webapp that accepts user input via a sticky XHTML form. The webapp must validate the user's data and must display any error messages on the same form, so that the user can correct what s/he has typed.

Compare the following three approaches to implementing this webapp:

- Using client-side JavaScript for the data validation;
- Using a server-side script in PHP that validates the data when the form is submitted;
- Using client-side JavaScript to send the data using an XMLHttpRequest to a server-side script in PHP. The server-side script validates the data and returns a list (possibly empty) of error messages to the client-side script for display on the form.