THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 5 Diploma in IT

April 2008

EXAMINERS' REPORT

Principles of Internet Technologies

QUESTION 1

a)   Explain the meaning of the term *blog* (weblog) by describing its typical features.

(5 marks)

b)   Define the terms RSS and ATOM and explain how they could be used to enrich a blog.

(5 marks)

c)   Voice over IP (VoIP) and Video on Demand (VoD) are relatively new applications running over the Internet. Explain the ways in which the demands they make of the technology differ from more conventional Internet applications such as email and web browsing.

(5 marks)

d)   You have been asked to advise your community about setting up an Internet discussion forum. Local people would be able to use it to comment on the community services and make suggestions for improvements.

What advice would you give concerning:
i)   ethical, moral and legal issues;
ii)   access to the forum; and
iii)   technical resources to set up the forum?

(10 marks)

Although this question was attempted by most candidates, the overall performance was disappointing. Few candidates were able to list and describe the main features of a blog and knowledge of RSS and ATOM was poor. In part c) most candidates entirely missed the point of the question which was to focus on the demands of the technology. Many wasted time by describing the features of VoIP and VoD. The final part of the question clearly confused candidates. One described the need for a good conference hall!

Answer Pointers

a) A blog (weblog) is a website typically arranged in **chronological** order i.e. an online journal. Usually the most recent post is at the top of the page with increasingly older entries towards the bottom of the page. As newer posts are made, older entries get removed to an **archive** section. Posts are often put into **categories** which gives an additional method of **access**. Feedback on posts is given in the form of **comments**. Blogs may be **written b**y individuals or collectively and are usually **focussed** on a particular realm of interest (5 marks – 1 for each significant point made).

b) Really Simple Syndication (RSS) and ATOM are rival document formats which are used to define related information known as feeds. The main use is for the syndication of web content. In a blog, this would allow for the real-time updating of information e.g. news feed, sports results or other information, which is frequently updated. (5 marks – 1 for each significant point made).

c) Issues include:

   Bandwidth/connection speed
   Latency
   Packet loss
   QoS
   Security

d) A good answer would be expected to cover most of the following aspects.
   i)   Use of the board for criticising members of the council
         Privacy
         Inappropriate content
         Illegal content and use of the board
   ii)   Would users need to log in? Could they be anonymous? Would different users have different access rights?
   iii) hosting, software, moderation

QUESTION 2

a) i)   Define the term web portal and give an example.
                                                                    (2 marks)

    ii)   Outline the main characteristics of a portal.
                                                                    (2 marks)

    ii)   State two application areas for portals.
                                                                    (2 marks)

b) i)   Outline the challenges faced by companies such as Google™ in ensuring that their search engines are effective.
                                                                    (5 marks)

    ii)   Explain the role of a web crawler (spider).
                                                                    (4 marks)

iii)   State three types of information that might be indexed.

(3 marks)

iv)   State three things that should be considered when setting up an online database.

(2 marks)

c)   i)   Define the term online database.

(2 marks)

ii)   State three things that should be considered when setting up an online database.

(3 marks)

Almost all candidates attempted this question, but only approximately one third passed it. In part a) candidates do not see it as unified – single point of entry – via login. Most thought if a site had a search engine it was a portal. Many candidates discussed content and not structure and customisability of a portal. The general categories were also poorly identified. In part b) many candidates discussed retrieval issues and not the stored index and how this was done. Many thought that the 'bots' were searching for their query on the net – live and not into a database that pointed to the cached/live information. In part c) many used the term 'online' in their definition and did not mention network or internet as the remote access to the structured information.

Answer Pointers

a)   i)   A web portal is a web site, which allows access to diverse information from the web in a unified way. Examples may include Yahoo, MSM and the like.
       ii)   Main characteristics include consistent look and feel, the ability to configure and personalise.
       iii)   Application areas include:
              • Government
              • Corporate
              • Regional
              • Sector specific e.g. estate agents.

b)   i)   Challenges include:
              • The web is growing faster than it is possible to index it with present technology
              • Web pages are frequently updated
              • Much content is dynamic
              • Sites use various tricks to improve their ratings
              • Some types of content are difficult to index e.g. images

       ii)   A web crawler is an automated program or script, which browses the World Wide Web in a methodical, automated manner in order to create an index of pages. It identifies the URLs in a page and adds them to a list of pages to visit.
       iii)   Items such as: keywords, size of document, word length, title, headings.

iv)   They may have a different weighting for the relative importance of the elements of the search terms. The indexes depend on the way that the web crawlers have searched the web, which will obviously differ from site to site.

c)   i)   An online database is a database, which is accessed via a network and usually the Internet.

ii)   When setting up an online database should consider:
- Who has access
- What they have access to
- Who can update the information
- Charging criteria
- Performance/volume issues

QUESTION 3

a)   http://www.bcs.org.uk/index.html is a typical URL. Define the acronym URL and explain the significance of the various elements in this example.

(5 marks)

b)   i)   Why are IP addresses central to the functioning of the Internet?

(2 marks)

ii)   Explain the difference between static and dynamic IP addresses and indicate when each is appropriate.

(4 marks)

iii)   *Network Address Translation* (NAT) is one solution to the shortage of IP addresses. Explain when it can be used and how it addresses the problem.

(4 marks)

iv)   State another solution to the shortage of IP addresses and briefly explain how it addresses the problem.

(2 marks)

c)   i)   Explain how the *Domain Name System* (DNS) allows computers to contact each other to exchane email or display web pages.

(5 marks)

ii)   Give **three** reasons for DNS errors.

(3 marks)

Most candidates attempted this question and the majority passed. Some candidates confused the WWW with the more general Internet when they incorrectly referred to a URL pointing to a Web resource. Others confused IP addresses with URLs by suggestion that the former uniquely identified resources rather than computers and hardware. NAT and the operation of DNS were poorly understood.

Answer Pointers

a) Uniform resource locater is used to uniquely identify individual resources on the web. It consists of:
- Protocol
- Host computer
- Domain
- Country
- Document

b) i) IP addresses uniquely identify individual computers, printers and other hardware connected to the Internet.

ii) If a computer has a static address, it always has the same address and this facilitates the addressing of servers. Dynamic addresses are allocated from a pool when a computer connects by a DHCP server. This is more appropriate for more transitory connections.

iii) NAT is used on local networks which are connected to the Internet via a router. The router allocates a local address which is then translated to a public address. Multiple local networks can reuse the same local addresses thus easing the burden on IP addresses. The translation makes use of ports to allow the sharing of the public address.

iv) IPv6 brings a much bigger address space as it uses 128 bits instead of the 32 bits of IPv4.

c) i)
- DNS performs address resolution
- Hierarchy
- Local name servers
- Root domain servers
- Primary/secondary name servers

ii) URL doesn't exist, query times out, local domain server is down/uncontactable…

QUESTION 4

a)   i)   Give **three** examples of the use of the client-server protocols on the internet.

(6 marks)

        ii)   Give three methods of making an Internet connection and for each method state when it would be appropriate and when it would be inappropriate.

(9marks)

b)   i)   Electronic mail (e-mail) relies on a number of protocols to facilitate the sending, transfer and receiving of mail. State three such protocols and briefly describ their roles.

(6 marks)

        ii)   How does Webmail differ in the protocols that it uses?

(2 marks)

        iii)   Why is the practise of operating an open mail relay frowned upon?

(2 marks)

Most candidates attempted this question which was generally well done. Some candidates incorrectly used TCP/IP as an example of a client – server protocol. Some candidates missed the point of part b) they were not expected to write about the features of each connection method but to say when they were appropriate / inappropriate. Many suggested that ADSL was inappropriate for home use. The roles of the mail protocols were a mystery to some candidates. Many thought that IMAP was the protocol used in Webmail. Few understood the implications of an open mail relay.

Answer Pointers

a)   i)

Client	Server
Web browser	Web server
Email client	POP/IMAP/SMTP
FTP Client	FTP Server
News reader programme	News server etc.

ii)

Method	Appropriate	Inappropriate
Dialup	Remote areas with telephone line but too far for ADSL	If a fast connection is necessary e.g. VoIP
ADSL	For fast connections close to exchange	For light use where cost is a factor
Cable	For fast connections when service available	If area not cabled!
WiFi	For mobile applications	For static applications where other methods are available

b)   i)

Protocol	Role
SMTP	Sending and relaying
POP3	Retrieval
IMAP	Retrieval

ii)   Webmail uses HTTP between the web browser and the web server/ mail server for sending and receiving mail. SMTP will then be used for transmission in the normal way.

iii)   An open mail relay will allow spammers to send mail.

QUESTION 5

a)   What do the following terms stand for:

XML
AJAX
DTD
XHTML

(8 marks)

b)   What is the relationship between XHTML and HTML and what constraints do XHTML tags have?

(4 marks)

c)   What is XSLT used for in conjunction with XML>

(4 marks)

d)   Give a brief description of the purpose of each of the following XSLT elements?

i)   *<xsl:stylesheet>*
ii)   *<xsl:value-of>*
iii)   *<xsl:for-each>*

(9 marks)

Approximately one third of the candidates attempted this question with two thirds passing it. The majority of people attempting part a) of the question knew the acronyms. Most candidates knew the requirement to have the closing tag on each element for part b and many candidates knew that the 'T' stood for transform, but not so many for what it would convert it to. In part d) many candidates knew what and how these XSLT elements worked.

Answer Pointers

a)   XML – extensible Markup Language
      AJAX - Asynchronous Javascript And XML
      DTD - Document Type Definition
      XHTML - Extensible HyperText Markup Language

b)   XHTML is a **stricter and cleaner** version of HTML
      XHTLM should be in lowercase letters, and NEVER skip ending tags
      (like </p>).

c)   XSLT is used to transform an XML document into another XML document, or another type of document that is recognized by a browser, like HTML and XHTML.

d)   i)   Correct Style Sheet Declaration
             The root element that declares the document to be an XSL style sheet is <xsl:stylesheet> or <xsl:transform>.

             Note: `<xsl:stylesheet>` and `<xsl:transform>` are completely synonymous and either can be used.

      ii)   The `<xsl:value-of>` element can be used to extract the value of an XML element and add it to the output stream of the transformation.

      iii)   The `<xsl:for-each>` element allows you to do looping in XSLT. The XSL `<xsl:for-each>` element can be used to select every XML element of a specified node-set.

QUESTION 6

a)   State **three** benefits of including dynamic content in a website.
      (*Hint*: Keep each listed benefit to a short sentence or point.)
                                                            (3 marks)

b)   Describe the benefits of including a scripting language on the client's browser.
                                                            (3 marks)

c)   Describe the drawbacks in relying on client-side scripting.
                                                            (3 marks)

d)   Embed JavaScript in an HTML page to generate the following output:
(10 marks)

£(1)	$(1.6)	$	£
250	400	250	156.25
260	416	260	162.5
270	432	270	168.75
280	448	280	175
290	464	290	181.25
300	480	300	187.5
310	496	310	193.75
320	512	320	200
330	528	330	206.25
340	544	340	212.5
350	560	350	218.75
360	576	360	225
370	592	370	231.25
380	608	380	237.5
390	624	390	243.75
400	640	400	250

e)   Write a JavaScript function called **convertcase**() as part of a basic
HTML page to accept one input value and convert the text to uppercase.
The input text should be read from an input text box and the output
displayed in another text box. Here is an example of the screen after the
button has been pressed:

Input: input

Output: INPUT

Convert to upper case   Click this Button

(**Hint**: Make use of JavaScript method **toUpperCase()** within your function.)
(6 marks)

For the small number that attempted this question most were capable at writing
versions of the code that approached a valid solution for parts d) and e). In part
a) candidates could have included either server or client side scripting benefits.
In part b) most candidates noted the improved robustness of the data
transferred to the server and that it only would be transferred when necessary
and in c) most candidates recognised the drawbacks to JavaScript.

Answer Pointers

a)

	Dynamic
Benefit 1	Regularly updated and can be customized specifically for users
Benefit 2	Cheaper to maintain
Benefit 3	Possibility to connect to use a relational database management system (RDBMS)

b) On client-side – Javascript/Jscript/VBScript offers embedding code that to verify data before the synchronous transmission to the server. This can save time in communication to the server and return to client.

c) Needs browser to have JavaScript functionality turned on
May deal with interaction with DOM in different ways
Debugging is difficult and poorly supported
Password could be listed in client source.

d) Embed JavaScript in an HTML page to generate the following output:

```
<html>
  <head>
  </head>
  <body>
        <table border="1">
                <th>£(1)</th><th>$(1.6)</th><th>$</th><th>£</th>
                <script language="javascript">
                <!-- Begin to hide script contents from old browsers.
                for(var i = 250; i <= 400; i=i+10)
                        document.write("<tr><td>"+i
                                        +"</td><td>"+(i*1.6)
                                        +"</td><td>"+i+
                                        "</td><td>"+(i/1.6)+"</td></tr>");
                // End the hiding here. -->
                </script>
        </table>
  </body>
</html>
```

e)
```
<html>
<head>
  <script type="text/javascript">
        function convertcase()
        {
                document.getElementById("out").value=
                document.getElementById("in").value.toUpperCase();
                //or document.form1.out.value =
                document.form1.in.value.toUpperCase();
        }
  </script>
</head>
<body>
  <form name="form1">
        Input: <input type="text" id="in" size="20"  />
        <br /><br />
        Output: <input type="text" id="out" size="20" />
        <br /><br />
        Convert to upper case
        <input type="button" value="Click this Button"
                onclick="JavaScript: convertcase()">
  </form>
</body>
</html>
```