

BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

NETWORK INFORMATION SYSTEMS

Monday 20th March 2017 – Morning

Answer any THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours.

**Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B**

The marks given in brackets are **indicative** of the weight given to each part of the question.

For all questions illustrate your answers with diagrams where appropriate

Calculators are **NOT** allowed in this examination.

Section A

Answer Section A questions in Answer Book A

A1.

- a) Outline the main differences between unicast, broadcast and multicast internet protocol usage.

(6 marks)

- b) An Internet Service Provider wishes to provide services for domestic customers. These services are: access to the Internet; a customer facing web service; security through a firewall router; a Domain Name System (DNS) server; multicast IP television services. Customers will connect to the ISP by various technologies but you may consider these as point to point links for this purpose.

Describe, with the aid of a diagram, an appropriate network topology for this network. Ensure that you clearly label all major network elements.

(10 marks)

- c) Taking the network topology in b), describe the way in which multicast provides the television services by ensuring data flow to users of the services without impacting on non-users.

(5 marks)

- d) Explain why the company would probably not choose to use multicast for a video on demand service.

(4 marks)

A2.

- a) ISO 27001 (and formerly BS7799) creates a key concept of an information security triad of Confidentiality, Integrity and Availability (CIA).

Describe what is meant by each of these.

(6 marks)

- b) A company wishes to share data through a website with a portal that trusted users can log into using a username and password combination.

Describe the extent to which the CIA triad is met by the following implementations:

- (i) An HTTP based web page accessed through a password and with IP address access control.

(3 marks)

- (ii) An HTTP based web page that can only be accessed by first connecting via VPN into the company's secure intranet.

(3 marks)

- (iii) An SSL/TLS based web page with password based access.

(3 marks)

- (iv) A web page that may only be accessed by coming into the company's office.

(3 marks)

- c) Make a recommendation as to the most appropriate solution above, describing briefly how you would implement this.

(7 marks)

A3.

A social media company is developing an application for sharing targeted educational videos to subscribers based on user preferences and profiling data. The videos are specially produced with language subtitles to assist language learners.

The application distributes data across multiple regional data centres to avoid network bottlenecks for viewers of the videos. The company maintains a single server for central data processing, and videos are uploaded to the central server and distributed from there to the regional data centres.

For EACH of the THREE data transfer scenarios listed below, discuss the strengths and weaknesses of the use of SOAP web services for the data transfer mechanism over the use of an in house protocol designed around the use of Secure File Transfer Protocol (SFTP).

In your answer, consider network performance issues and the need to accommodate firewalls and network security. Make a recommendation as to which mechanism to use in each case.

- a) The profile data of subscribers needs to be transmitted from regional data centres and processed daily. In the first instance there are estimated to be 50,000 subscribers but the business plan hopes to see that number increase to 500,000 within two years.

(8 marks)

- b) Video creators need to be able to upload new content from a number of different locations. Owing to the specialised nature of the content, it is thought that there will be no more than 100 videos uploaded per day.

(9 marks)

- c) Video creators need to be able to retrieve usage summaries of their uploaded content, which will also be used to calculate advertising revenue. The reports will be downloaded from a number of different locations. There will be no more than 1000 report requests per day.

(8 marks)

Section B
Answer Section B questions in Answer Book B

B4.

- a) Name the computer network architecture shown in Figure 1 and explain how it works.

(3 marks)

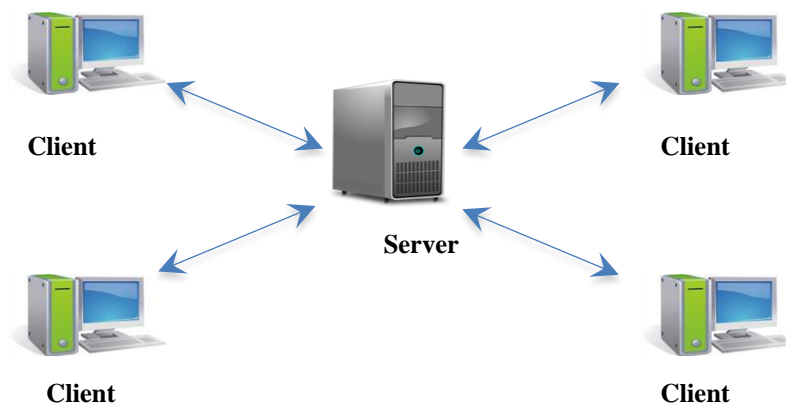


Figure 1

- b) Describe the most important characteristics of the building blocks of the architecture shown in Figure 1 above.

(4 marks)

- c) Explain the advantages and disadvantages of this architecture.

(6 marks)

- d) Explain the differences between the following types of client-server architecture and give a brief description of how each type works. Include a drawing of EACH architecture in your answer.

- (i) 1-tier architecture
- (ii) 2-tier architecture
- (iii) 3-tier architecture

(12 marks)

B5.

- a) Define a wide area network.

(4 marks)

- b) Give a short description of the characteristics of each of the following WAN technologies:

i) Circuit Switching

(4 marks)

ii) Message Switching

(4 marks)

iii) Packet Switching

(4 marks)

c) Define Switched Multimegabit Data Service (SMDS) and explain its main advantages and disadvantages.

(4 marks)

d) Explain which WAN technology is shown in Figure 2 and list its advantages and disadvantages, especially with respect to SMDS.

(5 marks)

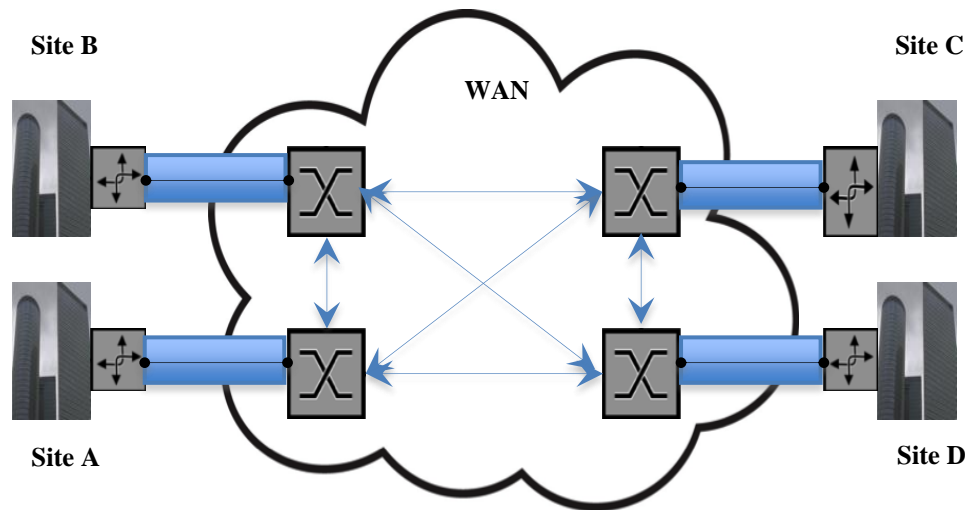


Figure 2