FETAC
Further Education and Training Awards Council
Comhairle na nDámhachtainí Breisoideachais agus Oiliúna

(National Council for Vocational Awards)

Suggested Solutions

Computer Architecture & Systems C20012

May 2010

Duration: Two Hours

INSTRUCTIONS TO CANDIDATES:

*Answer any **ten** questions from Section A*
*Answer any **two** questions from Section B*
All questions in each section carry equal marks
Return this exam paper when finished along with your answer book

This written exam counts as 40% of the total module

NAME (PRINT): **Suggested Solutions**

PPS NUMBER: _____

DATE: **2010**

Section A (20%)

Answer any ten questions. All questions carry equal marks (2 marks each). If you answer more than ten questions the best ten marks will be chosen.

1. What is the function of a network interface card (**NIC**)? It allows a network cable to be connected, enabling the computer to use the network. While network cards had to be added manually in the past most modern computers have some network connection method inbuilt.

2. How many megabytes are in a gigabyte? 1024.

3. Name two advantages of a broadband Internet connection. Faster than non-broadband connections; always on so no connection delay; generally have a monthly fixed rate allowing for better budgetting.

4. Convert the binary value **1101 0010** into decimal. 210.

5. List two benefits of e-mail over traditional mail. Faster, cheaper, can support attachments without additional media being transmitted, *eg. Sending a music file by traditional post requires sending the physical storage medium.*

6. What do the letters **CMYK** stand for? In what context are they used? **C**yan, **M**agenta, **Y**ellow, **B**lack; they are the colours used in colour inkjet and laser printers.

7. List four common I/O devices. Write a note on two. Monitor, Mouse, Keyboard, Speakers. The monitor is the primary I/O device of the computer and displays that output on screen. Speakers are a secondary I/O device and can provide and audible clue to the computer operation, as well as facilitating the playing of music.

8. What do the letters **ASCII** stand for? Why and where is **ASCII** used? **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange. It is used to ensure that different make and models of computers used the same numeric codes to represent letters. It is used extensively on the Internet to ensure an email from a computer in one country is readable on a different make of computer in any other country.

9. When a Linux X-Windowing system locks what keyboard combination can you use restart it without needing to restart the computer? CTRL-ALT-BACKSPACE.

10. What is the function of the LINUX command **rm**? What is the command to change directory? rm=remove (delete) file or directory. Change Directory=cd.

11. What danger do email attachments represent? What steps can be take to minimize this danger? Emails may contain viruses or other forms of malware. Use of AV software and filtering software may defend against this type of attack. Though not specifically attachments, phishing emails seeking private information about you to unknown others. Simple caution and common sense can defend against this form of attack.

12. What is the purpose of the Data Protection Act? Outline two provisions of the Act. The purpose of the Data Protection Act is to protect your fundamental right to privacy. It was introduced as a result of the perception that Information Technologies could be more easily used to abuse this right to privacy. 1) You can access and correct data about yourself. 2) Those who keep data about you have to comply with data protection principles. 3) Data may not be given to third parties. 4) Data may only be used for the purpose for which it was gathered.

Section B (20%)

*Answer any **two** questions. All questions carry equal marks (10 marks each). If you answer more than two questions the best two marks will be chosen.*

1. (a) List the main components required to create a computer network. Write a description of the most important ones, explaining the function of each.

A computer network implies the presence of more than one computer – so at least two computers are required; these can than be used to share data or to access shared data or resources.

Most commonly some form of wiring or cabling is required. Though wireless usage is increasing it probably hasn't reached the level of penetration of wired networks yet. In any case, wireless networking is based on a lower level of wired networks. The wireless signal will almost always be sent to an **W**ireless **A**ccess **P**oint. These provide wireless access to the underlying cables. The cabling facilitates the transmission of signals between devices/computers.

This cabling has to be able to connect to the computers on the network. Each computer therefore must have an appropriate network card (NIC).

While bus networks – which connect computers to each other directly – were once common, star topologies where computers are wired to a central point are much more common now; he central point is called a hub (or a switch for better performance). Such hubs provide a central point to connect each computer to – rather like a central data exchange.

Each computer on the network will also need appropriate software to enable them to communicate via the network. At a lower layer this may be a combination of TCP/IP and at the top layer the use of applications such as Browsers and FTP client to give a practical reason to use the network in the first place.

6 marks.

(b) What are FTP, SSH, HTTPS and TELNET? Write a note on each.

FTP is the File Transfer Protocol. It allows data to be easily moved from one computer to another. It is widely used in the development of websites.

SSH is the Secure SHell protocol. It is used to securely access a remote CLI user account. It is deemed secure because the traffic is encrypted.

HTTPS is a variant on the standard http web access method. The variation is the addition of a Secure (encrypted) connection to prevent eavesdropping. It is widely used for e-commerce to ensure that sensitive financial data transmitted as part of an on-line transaction cannot be intercepted easily. No monetary online transaction should be carried out without the presence of the https prefix on the remote website.

TELNET would be identical to SSH – and is used for the same purpose – except that there is no encryption used. All traffic is passed across the network *en-clair* (in plain text) allowing the easy interception of both usernames and passwords!

4 marks.

2. (a) List the main components you would expect to find in a modern PC, including peripherals. Write a note on each explaining its function, and if necessary, an example of its use. Not less than 6 items should be listed.

CPU – (Central Processing Unit) does all key operations in the computer.

RAM – (memory) stores computer programs while they are being executed.

Hard Disk – stores programs and data when they are not being used. This retains it's storage even when the computer is turned off. It is a form of internal fixed storage.

Printer – most computer based work is intended to generate paper output. The printer is used for this.

Graphics Card – the CPU signals via this device what is to be displayed on the monitor. The quality of the output – and the speed of games – is hugely affected by the graphics card.

Optical Drive – all modern computers have optical drives. These may be CD, DVD or Blu-ray type drives. Additionally CD and DVD *drives* may be able to burn as well as read *discs*. They provide a useful form of removable portable storage. (*Don't confuse discs with drives!*)

6 marks

(b) Is the processor speed of the CPU alone a good indicator of computer system performance? Discuss in detail.

By itself a processor is **not** a good indicator of system performance. A fast

processor with very little RAM in which to run programs will have to swap the programs between RAM and the harddisk. This will slow down the fastest of processors. The operation of most computers can be speeded up by adding more RAM – which can generally be bought for a fraction of the cost of buying a slightly faster processor.

4 marks

3. (a) Fedora Linux is an operating system developed under the Open Source model. Microsoft Windows is a proprietary operating system developed by a private company. From your experiences compare the two operating systems under these headings:

- Cost
- Reliability
- Security

The normal assessment of the cost of an operating system is initially based on its purchase price. As Linux is free to obtain it generally is accepted to be cheaper than the non-free Microsoft Windows.

However, there may appear to be a slightly greater time investment initially with Linux – but as anyone who has ever tried to get a device working under Windows without a driver will tell you, both systems may require a time investment.

Once installed and working, most forms of Linux are considered more reliable and stable. Furthermore, to a non-beginner, when something goes wrong with a Linux system the reason can be very apparent. Under Windows finding out the reason 'why' can challenge even the most experienced of users.

That said, it should never be thought that Linux cannot crash. It is just that as it is based on a more mature OS (Unix) that crashes are rarer and better handled; therefore the full OS rarely fails when one application fails.

It also seems to be true that Linux and Unix generally do not slow down over time as much as Microsoft Windows. This is generally attributed to the degradation of the file system under Windows leading to file fragmentation and therefore slower access times.

Under the heading of security both OSes can be accused of having problems.

Windows is known to be plagued by security issues – which to the suspicion of some has led to an enormous market in Windows security software. Part of the problem with Microsoft Windows is often attributed to the fact that under anything other than the professional versions of that OS **every** user is a privileged – or super – user. The fact that Windows has such a huge portion of market-share also makes it a more profitable target for attack.

Both systems need regular patching but Linux – using a crowd-sourcing model – releases more patches faster.

However, it is accurate to say that there is an amount of trust in all patches and software installations; in this regard, Linux becomes very vulnerable if the computer user regularly or without caution makes use of the root – superuser – account. In short, the safest car will still crash if deliberately driven towards a wall!

5 marks

(b) OpenOffice.org is also a product of the Open Source community. How does it compare with Microsoft Office? Compare it under the headings:

- Cost
- Compatibility
- Ease of Use
- Functionality

The comparison above on cost (Q3 part (a)) largely holds true also for OpenOffice. However, MS Office is available at different levels; the full suite (with all applications) is **very** expensive. Purchase with an academic license is more affordable.

The compatibility issue is often simply thought of as whether the OO suite is compatible with MS Office. Taking MS Word and OO Writer as examples, there is a very high degree off file format compatibility. Whilst Word doesn't read OO files, OO does read (and write) Word files.

Thankfully, MS in the past ported Word to the Apple Mac platform. As such OO files – if saved in Word format – can be used on Linux, Windows as well as Apple Mac OS platforms. The fact that Mac OS X is a certified Unix helps also. OO runs on Windows, Linux and Mac OS. This is not true of all office productivity software.

For ease of use both office suites are comparable. The only significant problem that existing users of one suite will experience when changing to the other is that of slightly different locations for options and different toolbar icons. But that this 'problem' exists no matter in which direction one is changing – and that it disappears with practise – indicates that this is merely an issue of familiarity. Humans are slow to change from established practices; this reduces this changeover issue to a passing ergonomic one.

For functionality, or features, both suites are highly comparable. It is my experience that all key functions once performed in MS Office can be performed in OO.

It also appears that OLE (Object Linking and Embedding) developed by Microsoft is equivalently implemented in OO.

One of the significant applications developed by Microsoft in the past, Publisher, is not file compatible with OpenOffice – nor is it fully compatible with other MS Office products! But it is easily replaced with OO Draw. Further, with the continued development of Word the value of Publisher in the MS Office suite must be questioned.

Finally MS Access is a popular database product. While OO can read it Access files, the reverse again appears not to be true. But since Access pales in comparison with serious database products – which are easily used with OO – then even this has to have its position reviewed.

In short both suites are equally usable with comparable functions; if cost, compatibility and regularly available updates are important, OO comes out on top.

5 marks