UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

Computer Literacy 1

Degree Examination
SPECIMEN SOLUTIONS

Date: 16 December 2004
Time: 2:30 – 4:00 (one and a half hours)
Place: McEwan Hall

Board of Examiners
Chair: M.R. Jerrum
External Examiner: Robert Irving

Instructions to Candidates

Attempt **ALL** questions in part 'A' and **ONE** question from part 'B'

Marks for questions are indicated in brackets after each question. Each question in part 'A' is worth ELEVEN marks and the total for the exam is 75.

Part "A"

Answer ALL questions from this section

1. (a) List four key stages in the evolution of the modern computer system. [2 marks]

Any two of: Purpose-built hardwired machines -> machines running stored programs + paper tape/cards -> interactive terminals -> WIMPS; war engines -> research projects -> mainframes -> personal machines. Anything that demonstrates some historical awareness gets the marks.

(b) i) Describe two significant differences between the GIF and JPG image file formats. [1 mark]

ii) Images stored in TIFF tend to be bulky and do not display on Web browsers. Why then might you store images in TIFF ? [1 mark]

i. JPG is lossy, GIF isn't. JPG can store true 24-bit images, GIF can only store a maximum of 256 colours.
ii. TIFF is lossless and can cope with 24-bit images or above. It is often used as a format for storing 'reference copies' of images.

(c) List four features of a good application. [2 marks]

Matched to purpose; supportive of novice; unobtrusive to expert; allows experimentation/forgiving of errors; reliable; ergonomically sound/pleasant to use.

(d) Failure of computer hardware affects the machine till the part can be replaced. The replacement part may behave differently from the original and once replaced some work may be necessary to get the computer going again. From a list of:

a) little or no work required.
b) some reconfiguration.
c) major reconfiguration and probable re-installation of operating system.
d) re-installation of operating system and recovery of data from backup.

categorise the likely effects of

i) a mother board failure.
ii) a head crash.
iii) a RAM failure.
iv) a graphics card failure. [3 marks]

i = c; ii = d; iii= a; iv = b. i and ii were in the notes and I mentioned all in lectures. They should get iii if they have understood the building blocks of a PC and iv if they have read or thought a little. They get full marks for three out of four.

(e) What information needs to be supplied in an effective *fault report*? [2 marks]

Name, username, date, time, location, nature of environment (e.g. operating system), the fault itself being careful to distinguish between facts and inferences.

2 (a) Why is Java a popular language for writing Web applications? [2 marks]

Platform independence; availability of suitable class libraries

(b) The HTML statement specifying a web page background colour in hexadecimal is `<body bgcolor="#3f6f9f">` .

i How many bits are represented by this number? [1 mark]
ii What hexadecimal number represents the colour with one more unit of blue than this? [1 mark]

i. 24. ii. #3f6fa0. They need to be able to add one to a hex number and know that colours are represented as R,G,B.

(c) What products and services are likely to arise out of research into Natural Language Processing? [3 marks]

Voice portals; intelligent dashboards; multilingual translators; command interface for PDAs and mobile phones and robots; natural language database searches

(d) How long would it take to download a 1 Megabyte file from
i) a typical modem connected to the phone network.
ii) a typical office Ethernet.
Show your assumptions and working. [2 marks]

Modem: 56Kbit/sec.
say 50 Kbit/sec = 1 Mbit in 20 seconds i.e. a Megabyte in 160 seconds.
Ethernet: 10Mbit/s. 8 Mbits = 0.8 seconds; 100 Mbit/sec. 8 Mbits = 0.08 seconds.

(e) What do you understand by the term "a peer to peer network" ? Give an example. [2 marks]

A network of equivalent communicating entities with no central server. E.g. KaZaa

3 (a) i. Describe three ways in which two relations (tables) may be combined within a database. [3 marks]
ii List four functions of a DBMS. [2 marks]

i. union (lists once all rows occurring within either of two relations); intersection (rows common to two relations); join (adds columns of one relation to another). I'd give a half mark for unary operations such as filter.

ii. allows multiple users; manages accreditation and authorisation; maintains integrity; performs data validation; applies queries, generates reports …

(b) Describe three key requirements for reliable communication between two computers over a single network. [6 marks]

An encoding process to send bits down a wire (modulation/demodulation and breaking data up into packets with a recognisable start and end); Error detection and recovery (CRC etc. and the ability to request retransmission); flow control (holding off potential flooding of the recipient with data); addressing

4 (a) What are the advantages of a vector representation of a line drawing over the bitmap representation? [2 marks]

Can scale indefinitely; file size is small; can easily be transformed without degradation etc.

(b) When is animation appropriate (or not appropriate) in the execution of a web site or presentation? [2 marks]

To illustrate a temporal process such as a chemical reaction; to engage attention; for fun and variety. In all cases to be used with care and not to excess.

(c) Describe four different ways in which intrusive code such as viruses or worms can adversely affect a computer system. [2 marks]

Fill memory and interfere with operating system generally; delete files; test vulnerability of other machines; mail out using mail-lists. All reasonable answers accepted.

(d) Why is it important to understand HTML even when software packages such as Word and Frontpage can generate Web pages that exactly match the visual appearance of a document on the screen? [2 marks]

Because simply seeing a Web page gives no idea of the underlying structure. Without that knowledge one has no idea how the page will behave under e.g. resizing or display in different environments and so cannot troubleshoot.

(e) Why do many large IT projects run late or over budget or have major problems when launched? [3 marks]

Extreme complexity; difficulty in specifying problem at outset; changing goals and technologies; lack of understanding of limitations of technology plus all the problems of all other projects (e.g. overselling).

5 (a) Why might a customer prefer to use a payment scheme such as Paypal as opposed to using a credit card over the telephone? Why not? [2 marks]

Why: Secure; financial exposure is limited to the cash pre-paid. Why not: Consumer Credit Act 1974 protection does not apply to digital cash (PayPal).

(b) What roles do
a) Sound
b) Vision
c) Text
Play in effective social conversation via desktop video / chat services? [3 marks]

Sound: speech – communicates most information if quality is good enough but breaks up to uselessness very readily
Vision: Gives a sense of 'place' and who you are talking to but conveys little information
Text: Conveys information where sound is impractical

(c) What is the purpose of an internet browser cache and where will you find it? [2 marks]
It is a store of recently-visited pages and page fragments stored on the hard disk by the browser. The second and subsequent times the browser is asked to fetch these items it can do so from the (fast) cache rather than the (slower) network resulting in improved performance.

(d) Describe the functions each node in a *mesh* network can perform. [4 marks]

Repeater, router, sender, receiver

Part "B"

Answer ONE question only from this section

B1. Properly used, the Internet is an enormously powerful tool. It does have its dangers however. In what ways can exposure to Internet services be dangerous and what routine precautions should be taken to ensure trouble-free use? [20 marks]

Viruses (anti-virus), Trojans, pestware (elimination programs, inbuilt features such as pop-up blockers), denial-of-service, snooping (firewalls; proper encryption), predation, stalking, fraud, SPAM (education and (for children) protective proxies), identity theft (general security awareness; use of encryption; digital signatures)

B2. Many communications technologies do not use fixed communications links. Describe how different non-wired technologies might feature in the process of delivering a parcel from collection to delivery and monitoring its status and associated business processes. [20 marks]

Bluetooth scanners; I-R/laser barcode readers, PDAs that can be loaded up at the depot via WiFi or are in permanent contact via GPRS, RFID tags, mobile phones, WiFi round the office, GPRS (again) for sales execs on the move …

B3. What issues does the chief Web architect of a multinational corporation have to consider in designing and maintaining the corporation's web sites [20 marks]

Content and corporate style; maintenance; customisation and content management for a multilingual site; observing guidelines and law in respect of disabled users; signing-off of material to ensure corporate editorial control; performance issues; security; compatibility with legacy systems; testing;

B4. What are the principal Grid technologies? In what ways will they support the development of e-science and e-business? [20 marks]

Storage, processor and sensor arrays plus very fast networks and a hierarchy of software to configure and manage it all provide essentially distributed high-performance computing. Features such as resource discovery and XML based exchange of structured information enable creation of 'virtual organisations' which can form amongst potentially rival companies long enough to collaborate on a project. By designing in sensory information the process can create a framework that stays with a product from design through to in-service maintenance. Example: Aircraft – airframe, cockpit, avionics, cabin, business needs all enter model and involve different companies. The finished aircraft can be monitored in the air