

Class Exam, January 2002 – post-mortem

Question 1

1a

GIF images are restricted to 256 colours and are compressed with a lossless compression algorithm. JPEG images can represent far more colours but are lossy – reading them into something like Photoshop and rewriting them many times will slowly erode the quality.

Other differences you mentioned which are true but I hadn't expected: JPEG allows you to select the quality, GIF doesn't. GIF has a variant which can store moving clips, JPEG (as far as I know) doesn't.

Some of you said GIF was good for diagrams and JPEG for pictures – that was worth sort of half a mark if you didn't say why.

Some of you said GIF files were smaller (or bigger) than JPEG files. This is not generally true – it depends on the JPEG quality toy selected.

1b.

MIME-encoding is used in the transfer of binary attachments to tell the receiving file what the is file type of the following file.

Some of you said MIME-types were used in Web pages. This is actually true – Web pages are sent over HTML with a header that you don't usually see containing the MIME type.

1c.

A path is a text string containing sufficient information to identify some object, usually a file. “C:\jhb\cl1h\lectures\22.ppt” would be a path. I would argue that a complete URL down to the file name is a path. I would argue that <http://www.dcs.ed.ac.uk> (no file component) isn't and if it looked like you were confusing this kind of URL with a path you got 1 mark rather than 2.

1d.

A Geographical Information System is a spatially aware database, usually layered, containing map information, land 'parcel' information, type of terrain, land value, features etc. You can ask it questions about the geography of an area (what is the value of property in this flood plain"? etc. and display the result.

A route planner uses a specialised GIS to calculate the best route and lets you zoom in on the result. A route planner is an example of a GIS and zooming in is one thing you can do. If you told me a GIS was for zooming in on map data or it was a route planner you only got one mark

A GIS is *not* the same as a GPS (Global Positioning System). The latter is a satellite-based system that tells you your position. Some of you got the two confused.

1e.

Amazing to relate, after the horrors of lecture 3, on balance you did this pretty well. (For comparison, last year I think only one person got it right). You got one mark if you convinced me you knew D follows C and F follows E. You got the other if you managed the roll-over and I forgave the odd error.

1998 7CE
1999 7CF
2000 7D0
2001 7D1
2002 7D2

Average for question: 4.5

Question 2

2a.

People communicating electronically are ‘distanced’ from each other – they can’t see expressions or body language and thus correct adverse reactions to something said. A time lag can exacerbate this.

Result is saying things in the heat of the moment and this can result in an electronic shouting match or ‘flaming’.

Cure is thinking about what you say and using smileys or ‘emoticons’ to add tone and emphasis to what you type.

Some of you took this to mean desktop videoconferencing – different shades of the same problem still exist there.

2b.

1. It conveys spatial concepts and relationships in a way impossible or very difficult in 2D or, as someone said – it frees the brain to consider the problem rather than be bogged down just visualising the situation.
2. The brain can handle a huge amount of information when it is presented this way

2c

I allowed a wide definition of what is in the O/S here:

- . Bootstrapping the machine
- . Acting as an interface to the hardware
- . Managing resources
- . Ensuring (hopefully) there is no interference between programs
- . Providing a file system
- . Presenting a graphical interface for the user

Average for question: 5.3

Question 3

3a.

I said “time and money” here so you lost marks if you didn’t mention the time element.

- Cost of the computer itself and any peripherals; depreciation
- Cost of hardware upgrades
- Time to install them and configure them
- Time to cope with virus attacks
- Time and money to obtain and install software bug fixes and upgrades
- Time to decommission before sale
- Etc. etc.

3b.

I said “history of I.T.” so you lost marks if you told me only about computers or only about networks etc. I also wanted some evidence that you knew which developments were important, rather than putting down the first four things that occurred to you. It helped if you put words around it to tell a narrative.

- Massive hand-built machines used by the military for decryption
- Large corporate mainframes for business use
- Personal machines for office and personal use
- Pervasive computing (next step)

- The stored program (I didn’t expect you to get this)
- Typed input and output by teletype then VDU (probably not this either)
- The Windows/Icon/Mouse style of user interface (invented at Xerox-PARC then commercialised by Apple, *not* by Bill Gates)
- Voice input/output (next step)

- The distributed computer network
- The Internet
- The World-Wide Web
- Wireless networks

Hard-drives were never “many tons” – probably no more than a quarter to half a ton. Large mainframes could certainly mass several tons though and still probably can if you add enough storage capacity and include cooling equipment.

3c

A server is a machine that is capable of offering a service – returning information to a request or performing an operation such as mail or printing. A client is a machine that requests the service. An example would be an airline booking system – the desktop machine is totally dependent on a server of some kind to function.

Average for question: 5.4

Question 4.

4a.

They have to locate each other (addressing); data has to be free of error (error detection and recovery) and delivered at a speed the recipient can accept (flow control). Any two will suffice. One could also say that they have to be connected to a network (needs modem or NIC), have appropriate software (protocol stack) etc. etc.

4b.

Any two of coaxial cable, twisted-pair, phone cable, optical fibre, wireless (various forms including mobile phones).

4c.

IP provides a best-efforts but intrinsically unreliable datagram service; TCP provides a reliable connection over IP.

4d.

To allow a computer to send digital information over a noisy analogue (phone) line.

4e.

Paedophiles preying on children and exchanging pictures; propagation of viruses and worms; Mail forging; terrorists communicating via encrypted mail

Average for question: 5.2

Question 5.

5a.

The algorithm is the 'core' solution to a particular well-defined sub-problem (e.g. sorting, lookup, real-arithmetic, date arithmetic) expressed mathematically or logically. Pseudo-code is an expression of the algorithm in some regular form of natural language. The program is the detailed expression of the algorithm ready for direct translation into machine instructions. They all form part of the process of deconstructing and implementing a solution to a problem.

5b.

This is an invitation to give a general account of the workings of quicksort or bubblesort as described in lectures.

Average for question: 2.9

Question B1

This question wasn't quite the gift it appeared, simply because you could write practically anything and get a few marks so I took that as read. To answer it well you had to sit back and think about the problem and join up what you had been told about *all* aspects of IT (not just the Web). Some of you treated this as a 'how to build a web site' question, which it wasn't. It also asked "what would *you* do?" and just listing a few bullet points of relevant issues wasn't an answer.

Remember: Computer Literacy is something you apply to the world around you so the first step is to think about the situation.

The supplier will be selling a large number of small value items. Her products will be highly visual. She will be buying from distributors and selling on to others. Hers is not a big business but she will need to do book-keeping etc.

OK then: She'll need something to keep the books on; she could have quite a significant stock management problem; It will also help her business if she monitors stock so she knows what is selling well. She'll need to compose invoices and orders. (accounting/small business packages) – all the standard office IT stuff and stuff to maintain it – backup route, anti-virus, mail etc. She could also use a PC to do posters, fliers and so on.

She will need to identify suppliers and potential customers (Web) and keep in touch with them (mail). There may also be interest groups she can contribute to (mail/News/Web). Some of you pointed out that the Web gave her access to international customers and suppliers. Certainly, though not for all products – ordering decorative rocks from the USA may not make sense!. The visual nature of her products lends itself to a Web site with lots of photos and she could back this up with information about her products and how they could be used. She needs to know how to make it look professional (or find someone who does).

Some of you had her building her own Web server. I really don't think so! , not yet anyway. Quite apart from the additional skills needed (for no obvious payback) she'd need a permanent line and remember, cable/DSL lines are set up for fast down (to you) and slow up. My broadband rental specifically forbids Web servers at my home because the traffic goes the wrong way. She'd need a business connection – expensive. No, all she needs is for her ISP to host the pages for her. She might want to set up a domain name and point it at her site – it doesn't have to be expensive.

All of the above bring in training issues and budgets – what can she afford?.

This isn't an exhaustive list but I marked you up for this kind of discussion and evidence that you were thinking about the problem.

76 of you did this option; Average mark: 9.2

Question B2

Again, this could start with saying that a clear statement of the problem is an essential start and that understanding the context and the nature of the people is vital. I gave a lecture on how things can go wrong though and would expect you to tell me about errors in requirements analysis, specification and/or implementation and the need for validation, verification and testing. I mentioned the use of enforced procedures and certification and feedback loops within the design and implementation process. You could talk about HCI – applications that are self-tutoring and encourage experimentation while at the same time protecting the user against destructive actions (and allowing them to undo them). You could mention validation of data on input and integrity enforcement in databases. I mentioned that problems in computer systems rarely had a single cause. You could take the question to refer to problems in machine configurations and tell me that a PC had to have a 'balanced' configuration –

processor, memory and disk – in order to function as expected. All of these would be acceptable in part.

5 of you did this option; Average mark: 8.0

Question B3

From bottom up – nature and function of the machines themselves, interface cards, cabling, repeaters, hubs, routers, switches, firewalls. Protocols – point-to-point, addressing, packet-switching, multiplexing, routing (again), domains – intranet vs. internet. A full description of a selection of these will expand into a significant essay.

8 of you did this option; Average mark: 5.8

Question B4

The machines themselves – smaller, lighter, cheaper, LCD screens, low power consumption; Availability of the mobile phone network and suitable modems; Applications and peripherals – WAP, in-car fax machines, GPS-based information services. Still to come – G3 and adequate speed; wearables, Bluetooth (again), voice input and output (no keyboards). Benefits are constant availability of information irrespective of location and permanent accessibility of the person. Drawbacks include exactly the same things! and also information overload, cyber-stalking, security breaches. Benefits are increased business effectiveness.

33 of you did this option; Average mark: 7.1