MSc Business Information Technology 2010/2011

Revision for Exam

Exam Structure

The exam is 3 hours, in which time the students have to answer 3 questions from 5 (worth 33 marks each).

Note that the exam paper has changed in structure recently - old papers may reflect a slightly different structure.

This document reproduces ALL the appropriate questions from the previous papers with hints and comments. You do not need to track down old papers as all the content is here. You should look at the newer questions first (i.e. last years questions have more relevance than the questions from 2002/2003 for example).

Essay questions from 2002/2003

Using examples, explain the factors that would have to be taken into account when deciding between an Open Source product and a comparable closed source commercial product. Use this information to explain how Linux has been successful in the server market, but less so in the desktop market. **(33 marks)**

Describe the main characteristics of the Relational Data Model, including the properties of relations and the rules for relational integrity. Use appropriate examples to compare this with the Object Data Model. How would an Object Oriented methodology (such as UML) be modified to fit a relational database implementation? **(33 marks)**

The on-line multiple choice described in Question 2 is to be implemented with a web based interface. Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, the web server and the underlying database technology for a sample question and answer session. Write down any assumptions you have made. **(33 marks)**

A relation scheme for a library must model the following:

A local library holds stocks of books, some of which it lends to its members. Reference books cannot be borrowed. The library maintains a catalogue of books that it holds. In this catalogue, each book title is allocated a reference number, a Dewey category, and where there is more than one copy held, a copy number. The author or authors are also listed. When a reader becomes a member of the library, his or her name, address, telephone number are taken, and a unique member number assigned. Readers may have up to five books on loan at a time. A fine is levied on books which become a week overdue. A reminder about overdue books is sent each week for ten weeks, after which the details are passed to the legal department. Readers who consistently fail to return books are denied borrowing rights. Books in the catalogue that are currently out on loan can be reserved at a request of a library member.

Identify the relations in this scheme and then normalise it to an appropriate level. Your discussion should identify what functional dependencies exist and ensure that a dependency preserving decomposition is generated. Explain the steps you have followed, along with any additions or assumptions you have made. **(33 marks)**

A garage is to use a relational database to store information on jobs and mechanics for costing purposes as follows:

Each mechanic has a unique identifier and competence level, along with the typical information stored in a personnel table such as address, phone number etc. Each car has a make, model, registration number and owner. A booking consists of work on a single car and may consist of several jobs. A job is performed by a specific mechanic (who typically has at least one specialism) with an associated labour cost and time. Typical customer details should be stored, both for individual clients and for organisations which may have many cars.

Define a relational scheme for the garage justifying the level of normalisation used. Clearly explain any assumptions you have made. **(33 marks)**

Microsoft claims that the GNU GPL does not support innovation. Explain the GNU General Public license, the effect that this license has on the software development process and then support or counter Microsoft's argument using examples. **(33 marks)**

Describe the main characteristics of the Relational Data Model, including the properties of relations and the rules for relational integrity. Use appropriate examples to compare this with the Object Data Model. How would an Object Oriented model (developed using UML) be modified to fit a relational database implementation? **(33 marks)**

A student questionnaire is be created with a web interface. Students will be able to login and enter comments about individual modules along with suggestions or improvements. Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and/or code extracts that show the interaction between the client, the web server and the underlying database technology for a sample student login session. Write down any assumptions you have made. **(33 marks)**

Essay questions from 2004/2005

Using examples, explain the factors that would have to be taken into account when deciding between an Open Source product and a comparable closed source commercial product. Use this information to explain why some organisations are now evaluating the use of Open Source solutions for the enterprise stack. **(33 Marks)**

An organisation wishes to fully embrace the use of the Internet in its internal and external communications. A commercial ISP offers the following feature set: DNS, Dynamic IP addresses, Host name registration and support, external web space and a back end email system. Use examples to explain these features. The introduction of these technologies could radically change the organisation internally. Discuss what other factors or features must be considered. **(33 Marks)**

A small shop which sells hand made sculptures is considering placing its stock on line so that purchases can be made via the Web. As the items are expensive and limited in supply, it will be important that the web site effectively integrates with the existing shop based systems.

Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, the web server and the underlying database technology for a sample session. Write down any assumptions you have made. **(33 Marks)**

Essay questions from 2005/2006

It is now possible for an organisation to use Open Source solutions for the entire enterprise stack, from backend servers to office productivity software. Use examples to evaluate the features and different pieces of software that could be used at each of the various layers, comparing them to the conventional closed source choices. **(33 Marks)**

A relation scheme for a video rental shop must store information on films, customers and rentals. Minimum attributes that should be stored include Film Name, Film Director, Date of Release, Principle Star, Category, Customer Name, Address and Phone. Customers are allowed to take a certain number of films for overnight rental. Charges are levied for overdue videos. If a customer successfully refers someone who becomes a new member, they gain a discount on future rentals.

Identify the relations in this scheme and then normalise it to an appropriate level. Your discussion should identify what functional dependencies exist and ensure that a dependency preserving decomposition is generated. Explain the steps you have followed, along with any additions or assumptions you have made. **(33 Marks)**

An SME wishes to fully embrace the use of the Internet in its internal and external communications. Use examples to explain the facilities and feature sets that would be expected from a commercial ISP. The introduction of these technologies could radically change the organisation internally. Discuss what other factors or features must be considered. **(33 Marks)**

The introduction of AJAX based technologies has enabled the development of many feature rich internet applications. Use examples to explain how AJAX works and differs from conventional web-based applications. What types of applications are better suited to AJAX implementations? **(33 Marks)**

Essay questions from 2006/2007

Recent agreements between Novell and Microsoft have increased the pressure for a new General Public License.

   a) Discuss GPL3 and highlight the differences to the previous version.

   b) Use this agreement and the new license to explain the differences between the Open Source and the Free Software movement.

(33 Marks)

A relation scheme is to be constructed to record information about television programmes and viewing figures. A television programme has a unique identifier and name, and can be watched by millions of viewers when it is shown on a channel at a particular time and date. Programmes can be repeated and sometimes the viewing figures for the separate transmissions are added together. Channels are owned by particular organizations (e.g. BBC1, Channel 4).

Identify the relations in this scheme and then normalise them to an appropriate level. Explain the steps you have followed, along with any additions or assumptions you have made. Your discussion should identify what functional dependencies exist and ensure that a dependency preserving decomposition is generated.

(33 Marks)

An organisation wishes to fully embrace the use of the Internet in its internal and external communications. A commercial ISP offers the following feature set: Dynamic IP addresses, DHCP, DNS, Host name registration and support, external web space and a back end email system.

a) Use examples to explain these features.

b) The introduction of these technologies could radically change the organisation internally. Discuss what other factors or features must also be considered.

(33 Marks)

A social networking site allows a user to create an account, maintain blog style HTML entries, attach image or song files and interact with users through a discussion board.

Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, the web server and the underlying database technology for a sample session. Write down any assumptions you have made.

(33 Marks)

The introduction of AJAX-based technologies has enabled the development of many feature rich internet applications.

a) Use examples to explain how AJAX works and differs from conventional web-based applications.

b) What types of applications are better suited to AJAX implementations?

(33 Marks)

Essay questions from 2007/2008

Recent announcements about patents in Linux allegedly owned by Microsoft have highlighted the need for a new version of the General Public License.

Explain the history and characteristics of the GPL3 and highlight the main differences between this and earlier versions. How does this version attempt to overcome the patent threat?

(33 Marks)

Explain the main characteristics of the Relational Data Model, including the properties of relations and the rules for relational integrity. Use appropriate examples to compare this with the Object Data Model. What would be the best solution for manipulating semi-structured data?

(33 Marks)

An organisation wishes to fully embrace the use of the Internet in its internal and external communications. A commercial ISP offers the following feature set: Dynamic IP addresses, DHCP, DNS, Host name registration and support, external web space and a back end email system.

Use examples to explain these features. What are the security and privacy issues associated with this change?

(33 Marks)

A delivery company wishes to develop a web site that will allow clients to book collection and delivery slots along with the facility for customers to track the current location of ordered items. It will be important that the web site effectively integrates with the existing delivery mechanisms (bike and van courier systems).

Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, the web server and the underlying database technology for a sample session. Write down any assumptions you have made.

(33 Marks)

Rich Internet Applications are a new class of web based programs that have many of the characteristics of traditional desktop applications and are often called Web 2.0 applications.

Use examples to explain how AJAX based RIAs work and differ from conventional web-based applications (web 1.0 applications)

What could Web 3.0 be?

(33 Marks)

Essay questions from 2008/2009
An office-based business is considering switching to an Open Source desktop. Explain how Open Source works, the advantages and disadvantages of such a move and the possible problem areas that may arise.

(33 Marks)

Part way through the development cycle, a decision must be taken as to whether development should progress with a relational, object or semi-structured data model. Compare these approaches and explain the implementation consequences of each.

(33 Marks)

An organisation wishes to fully embrace the use of the Internet in its internal and external communications. A commercial ISP offers the following feature set: Dynamic IP addresses, DHCP, DNS, Host name registration and support, external web space and a back end email system.

Use examples to explain these features.

What are the security and privacy issues associated with this change?

(33 Marks)

A social networking site allows a user to create an account, maintain blog style HTML entries, attach image or song files and interact with users through a discussion board.

Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, web server and the underlying database technology for a sample session. Write down any assumptions you make.

(33 Marks)

(a) Use appropriate examples to explain the characteristics of a Web 2.0 application compared to that of a Web 1.0 application. What could Web 3.0 be?

(b) Many applications offer secure pages where users login to access content. Explain how a secure web area is setup and implemented, contrasting it with a conventional HTTP / HTML session.

(33 Marks)

Essay questions from 2009/2010

Explain the history and characteristics of the General Public License 3 (GPL3) and highlight the main differences between this and earlier versions. How does this version attempt to overcome the patent and DRM threat?

(33 Marks)

Part way through the development cycle, a decision must be taken as to whether development should progress with a relational, object or semi-structured data model. Compare these approaches and explain the corresponding implementation consequences.

(33 Marks)

An organisation wishes to fully embrace the use of the Internet in its internal and external communications. A commercial ISP offers the following feature set: Dynamic IP addresses, DHCP, DNS, Host name registration and support, external web space and a back end email system. It also offers HTTPS and certificate support. Use examples to explain these features.

(33 Marks)

A delivery company wishes to develop a web site that will allow clients to book collection and delivery slots along with the facility for customers to track the current location of ordered items. It will be important that the web site effectively integrates with the existing delivery mechanisms (bike and van courier systems).

Discuss how such a system could be implemented. Your discussion should include a detailed description and explanation of the technologies required along with algorithms and code extracts that show the interaction between the client, web server and the underlying database technology for a sample session. Write down any assumptions you make.

(33 Marks)

Rich Internet Applications (RIA) are a new class of web-based programs that have many of the characteristics of traditional desktop applications.

   a) Use examples to explain how AJAX based RIAs work and differ from conventional web-based applications.

   b) Both Microsoft and Adobe are promoting a different architecture for RIA. Explain these and highlight the advantages/disadvantages of using these proprietary approaches.

(33 Marks)

General notes about the exam questions

Questions about Open Source Vs Closed source have been a common occurrence on the paper. The difference between Open Source and Free Software has become more apparent with the new version of the GPL – students should be aware of current advancements/changes in the FLOSS world.

Questions about data models require the students to know the characteristics of both the relational and (typically) the object model. You should know these and be able to write comparisons / examples between the two. Deciding the best way to store semi-structured data (i.e. XML or HTML) can be an addition to these types of questions.

One of the questions is typically about designing a solution for a web based application. This can be a broad question that can accept architectural discussions (web servers, server side scripting languages and back end database products), along with an analysis of the typical three-tier web application framework. Often these questions ask for an analysis of a sample transaction. This could entail an explanation of a browser request being issued (with explanations of TCP/IP, DNS look ups, HTTP get requests, database lookups Server side code responses shown in simple English and response transmission).

A large amount of the course is about the importance of Internet standards and the use / applicability of these technologies. Students should be fluent in the use of appropriate terminology, along with the ability to provide detailed explanations of their use / advantages / disadvantages. Students gain marks in these questions by applying the techniques explained in the next section.

A recent addition has been the consideration of new technologies, such as a movement away from server side applications to Web 2.0 applications (feature rich applications built using AJAX or RIAs). Students should be capable of explaining how these technologies work, the advantages / disadvantages of these approaches, along with a critical analysis of proprietary approaches (flash/silverlight) over HTML5/Canvas element.

Points to note about answering essay questions

Marks are not awarded for waffle, so long answers containing few points (or a few points explained in laborious detail) will not get a lot of marks. 33 marks are available for each question so answers must have breadth / depth and answer all parts of the question. Often the question actually contains multiple parts embedded within it, so each must be individually addressed.

Time management should not be a problem in this exam. Any student who fails to answer three questions overall will have a hard time gathering enough marks to pass overall. Remember that the first 10 marks of a question are much easier to get than the last 5 marks of a question, so if forced to choose between completing a question or starting a new one, it makes sense to start the new question and then to return to the unfinished question later if there is time.

In attempting a long essay question it can be useful to bear the following points in mind:

If describing a technology, it is useful to know a bit about how the technology was / is being developed. Be clear about the difference between a protocol, a software implementation and a 'standard' (be cautious here as some standards are more standard than others)

- If the technology is an acronym, then explain what it means, i.e. FTP stands for File Transfer Protocol

- Try to explain some of the background history, i.e. whether it was created by an individual, a company or some other organisation and when

- Summarise what the technology actually does, i.e. its purpose and use

- Explain an actual example (if explaining a protocol, you could mention some software that implements the protocol)

Often a question may have a final part which is a chance for the better 'well-read' students to apply the knowledge in the previous parts of the question to recent developments or events that they may be aware of from their own background reading. For example a Web 2.0 question could ask about Web 3.0, discussions of data models could talk about storing and manipulating semi-structured data, or a question about technology could ask about how the implementation of the technology could change an organisation internally.

Model answers are **not** provided for previous questions, as in the past students have not attempted the questions properly and have simply read through the answers – this doesn't work as a revision strategy.