



Liverpool John Moores University
School of Computing and Mathematical Sciences

Semester 2 Examinations, 1999/00

CMSCD3005 Software Systems: Planning & Design

Duration 3 hours

Instructions to candidates

Do not open this question paper until you have been told to do so by the invigilator.
A figure in [] denotes the number of marks available for that question or part of question.

There are 6 questions, 3 in Section A and 3 in Section B.

Answer 4 questions.

If you present answers to more than 4 questions, the first 4 of these answers will be assessed.

Questions carry 25 marks each.

The total number of marks available is 100.

Section A

- A1 a)** You are involved in a software project in which activity duration is measured in days. A project management process has produced the PERT/CPM diagram shown in Appendix QA1. Determine the following by annotating the diagram in Appendix QA1. You must hand in the Appendix with your answer book.
- i)** Earliest completion time (ECT) for each event. [5]
 - ii)** Latest completion time (LCT) for each event. [5]
 - iii)** Critical path. [5]
 - iv)** Slack time for events (a) 3 and (b) 4. [2]
- b)** The development of a PERT/CPM chart for an actual project is often said to involve an iterative process coupled with management review. Assume that you are a junior manager preparing for an important project presentation to a group of other managers. In order to enhance your explanation during your presentation, diagrammatically represent the iterative process of developing a PERT/CPM chart that will lead to the documentation of plans and a schedule for a project. [8]
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- A2 a)** The software industry is said to be confronted by various problems that include both technical and non-technical perspectives. Experts have identified a significant aspect of such problems to be due to the '*lack of adequate systems analysis and specifications*'. Justify this claim by giving at least *four* specific examples of failures of major IT-systems with an appropriate cost (or loss) for each failure. [7]
- b)** Based on your study of software systems planning and design, briefly state at least other *three* reasons that can be attributed to IT-systems (or software) project failures. [4]
- c)** Your senior manager needs to effectively predict the size of the software involved in a client's project in order to carry out software systems planning and design and cost estimation. Unfortunately, your manager is uncertain about how to predict the software size. Consequently, they have decided to discuss the issue with you and a few other colleagues. During the discussion a colleague inadvertently uttered the words '*Function Point Metrics*' and your manager is eager to know what the term means. Unfortunately your colleague is unable to explain the term and has turned to you for help: (i) to elucidate the term, and (ii) to state and explain at least *four* attributes of the term. [3 + 5]
- d)** Effective software system planning and design often (if not always) requires at least some aspect of project management techniques. Justify this statement by briefly specifying at least *five* roles of software project management. [6]
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- A3 a)** As a part of your responsibility in project management, you are required to keep adequate records of all stages of the Systems Development Life Cycle (SDLC) for an information system project. With the aid of a diagram, explain how you would carry out a *document production process* for any stage of the SDLC. [9]

- b) Effective team leadership may be considered essential for achieving various goals at different stages in the process of analysing and developing an information system.
- i) From your experience in developing information systems (ISs), explain briefly at least *three* factors necessary when selecting members for an IS project team. [4]
 - ii) State at least four characteristics of effective team leadership. [6]
- c) In order to assess the possible development of a new information system, *existing documentation* in an organisation is often considered to be a logical starting point for an Information Systems Analyst (ISA), as a means of *finding out* details in the organisation including users' needs. But the documentation available to the ISA often has limitations.
- i) Give at least two possible limitations associated with such use of available documentation in an organisation. [2]
 - ii) From your study of software systems planning and design explain briefly two possible logical steps you may revert to as an ISA, in order to account for such limitations. [4]

Section B

- B1**
- a) Present, with reasons, six objectives that a software system design method should aim to meet [12]
 - b) "*Information Engineering is a method that employs the same underlying philosophy as JSD.*" Explain why someone might hold this view and state, with reasons, whether you agree or disagree with it. [8]
 - c) "*Gane and Sarson's method is ideal for designing real-time computer software systems.*" State, with reasons, whether you agree or disagree with this opinion. [5]

B2 Enthusiasts of particular methods (especially the so-called 'structured methods') will argue, often quite convincingly, that their chosen method should be used on all projects because of the advantages the method brings. However, in our view a true methodologist would agree with Tom DeMarco who wrote: "*The idea that a single method should govern even two different projects is highly suspect: the differences between projects are much more important than the similarities*".

Michael Jackson (in *Software Requirements & Specifications*) used the notion of the *problem frame* as a means for describing the principal parts of a problem and hence as a means for describing the differences between software development projects. The argument is that having identified the frame of a problem, picking a method that fits the frame means that the system design method will work.

Discuss the differences between the method-enthusiast's and DeMarco's views of methodology. Explain whether the views are mutually exclusive (in which case state, with reasons, which view you agree with), or whether there is a way of reconciling both approaches. [25]

B3 A compiler system has been created that, in addition to compiling and running programs, allows the source code to have its layout formatted according to user-defined preferences. Figure 1 shows a possible view of the system as a JSD network diagram.

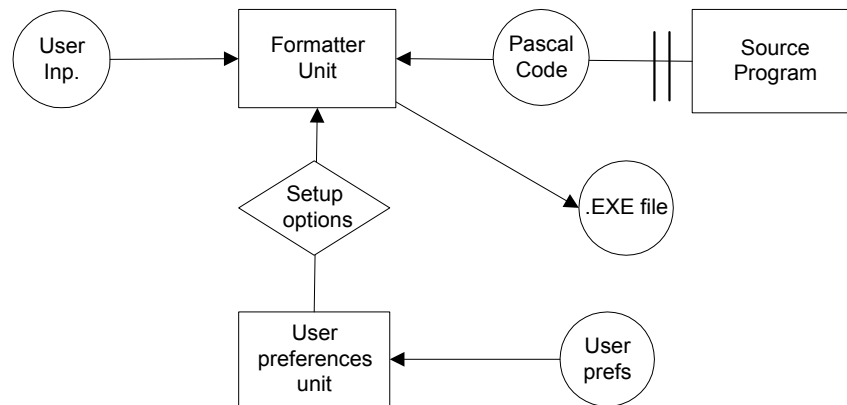


Figure 1: Formatter Network Diagram

The formatter unit is the collection of functions and procedures that deal with parsing, formatting (adjusting the layout) and compiling the original source code. The user preferences unit is responsible for updating the system with user-chosen values of such system-wide aspects such as indentation size, choice of keyword colours, etc. The source program component models the life of a source code program within the system.

- a) It is required to generate a report listing the number of times that an individual program has been loaded, formatted, compiled and run. The report should be generated when the user selects an appropriate menu option. Elaborate the network in Figure 1 to reflect this change. [7]
- b) A program may be viewed as having the following life history: first it is loaded and parsed. Then it may be formatted any number of times. After the first formatting event it may be compiled any number of times. Following the first compilation the program may be executed any number of times.

Draw a JSD process structure diagram to show the life history of the process *Program*. [8]

- c) It is claimed that JSD and Information Engineering both lead to the development of more-maintainable systems. Explain why such claims are made for the two methods. Describe and explain any similarities and/or differences between the two claims. [10]

Appendix QA1

To be handed in with answers to question A1

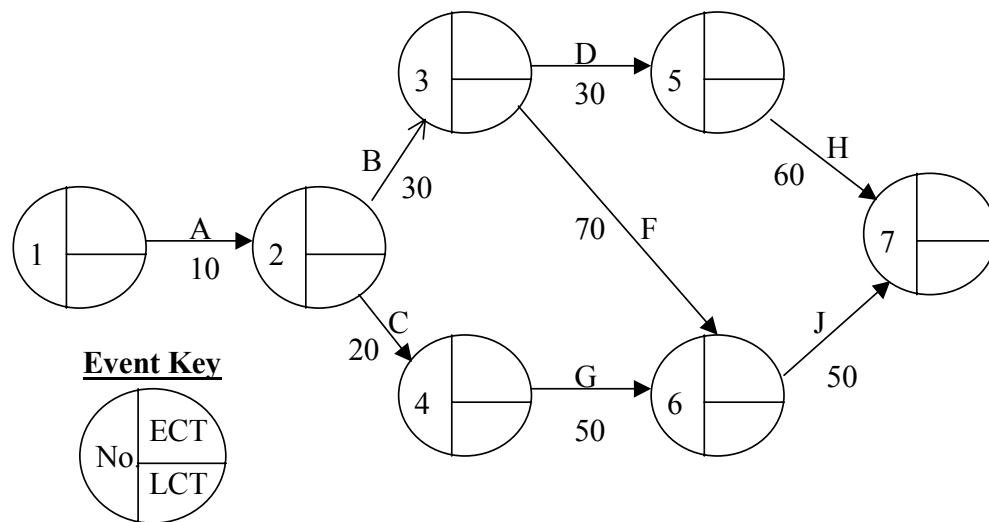


Figure A1.01: PERT/CPM chart for supporting 'Software Project Management'

Name of Student:

Registration Number:

