

UNIVERSITY OF MALTA
FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
Department of Computer Information Systems

June 2019 Assessment Session

CIS1207 – Principles of Structured Development

3rd June 2019

10:00 – 12:05

Calculators are Allowed

Very important instructions and information to candidates

(Please read and heed – ignore at your own risk)

Point 1 (structure)

You are allocated a **total of two hours** for this paper. Read any question carefully before attempting it. This paper contains **four questions in all**. The questions are divided into **two sections (A & B)**. You are to attempt **all** the questions in Section A and **any one** question from Section B. This paper will be marked out of 100, but carries the allocated study-unit written examination percentage weighting of the final obtainable mark for this study-unit. Your study-unit course-work carries the remaining percentage.

Point 2 (clarity)

It is important that you use legible handwriting and understandable English grammar. **Please be warned** that work presented in unintelligible handwriting and/or unclear English **will not be considered** for marking. The same applies to diagrams and other non-textual representations. ALL WRITTEN AND DRAWN ENTRIES MUST BE IN INK. Entries in pencil will NOT be considered for marking.

Point 3 (maturity)

You should present your thoughts on paper in a mature and reasoned fashion, using interplay of concepts **expounded in class**. Arguments should not just be stated but should follow from fundamentals. **This is a key consideration** and will be highly valued.

Point 4 (presentation)

You should keep **all parts** of any given question together. Scattered answers **will be penalised** or may even **not be considered at all** when marking.

Point 5 (issues)

Any issue and/or incorrectness one might feel exists in any question or part of, should be flagged to the respective invigilator for onward transmission to the study-unit co-ordinator.

All your reasoning should be based on concepts, issues, and situations brought up and discussed during class. To be accepted for assessment, all decisions and statements must be reached, made or expounded in a logical and sequential manner and must be justified in relation to class discussion. This is an objectively assessable exercise and therefore cannot be a showcase of personal opinion.

Mark allocation by question.

Section A:

Question 1 – Compulsory : 25 marks

Question 2 – Compulsory : 25 marks

Section B:

Question 3 – Selectable : 50 marks

Question 4 – Selectable : 50 marks

Obtainable total: 100 marks (*i.e.* A=25+25; B=50)

The use of calculators is allowed.

Section A – Two compulsory questions

Question 1 [Generic] (*a compulsory question for 25 marks*)

(a) Sometimes, the skills of program writing are equated with the skills of algorithmic development. Do you agree with these being equated, or can one be skilled at these independently of each other (i.e. good at one not necessarily good at the other, and vice-versa)? Explain your answer and give one concrete example of what you mean.

[7 marks (2-view; 3-explanation; 2-example)]

(b) A model is another way of describing an algorithm. One of your colleagues at work contends that professional software development does not require the use of models, and can just as effectively be conducted directly through coding. Justify.

[5 marks (2-answer; 3-justification)]

(c) Your organisation is in a position to be able to collect large amounts of data relating to passenger air travel. As the amount of data being collected is large and ever-increasing, and of no direct bearing on the organisation's core business, management does not wish to simply archive or discard this data. Therefore, it is considering transforming its accumulating data into business value and even sell it as a commodity. This "commodity" can take the form of raw data or semi-processed information. What does this mean? As Chief Information Officer of the organisation, you are asked for your opinion on this move (i.e. leveraging the organisation's advantage of access to this stream of data). How would you suggest this be tackled? Please justify all your answers, statements and decisions.

[13 marks (3-what; 5-how; 5-justify)]

Question 2 [Generic] (*a compulsory question for 25 marks*)

(a) As a software development team lead, you notice that, since the compliment under your leadership has increased from two persons to eight, there are now persons with overlapping skills. Therefore, there is an inherent risk of effort duplication when a software project is undertaken by the team. What would you do to address this risk? Explain all your steps and reasoning, and make sure you provide adequate justification for them.

[12 marks (4-steps; 4-reasoning; 4-justification)]

(b) It is generally considered that a model which is predominantly diagrammatic and then uses textual annotations to achieve the necessary detail is a widespread and efficient way of representing an algorithm. Explain why this is so, giving one concrete example of this in your explanation. There could be a tendency to overburden a diagrammatic notation with textual annotation, what does this mean and what is the risk being referred to. Provide one example of such a risk materialising.

[9 marks (2-why; 3-example; 2-meaning; 2-example)]

(c) If part of a software solution is built in a way such that separate modules (processing, say, part of a flight booking record) access the same data structure, this could be viewed both as an example of coupling as well as an example of cohesion? Explain.

[4 marks]

—End of Section A (Section B on next page)—

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Section B – Two selectable scenario-based questions from which to select any one.

Question 3 [Modelling] (a selectable question for 50 marks)

The Level 0 (Context) data flow model in **Figure 1** describes a **hypothetical and simplistic** solution. Now, do the following three tasks:

- a) Explain in clear terms what the diagram in **Figure 1** is describing and its functionality in adequate detail.
[8 marks (4-overall description; 4-functional detail)]
- b) Produce a level 1 DFD from the level 0 shown in figure 1 (clear and complete labelling is a must; no CFDs, STDs/FSMs are required);
[17 marks (6-overall functionality; 4-meaningful labelling; 7-logical correctness)]
- c) Propose DSDs describing the data on the flows labelled “mech_input” and “portal_input” (one DSD for each). Accompany the DSDs with any free text you might feel justifies and/or explains the validity of your DSDs.
[12 marks (6-models; 6-validity & sense)]
- d) Choose any one of the data processes you presented at level 1, from question (b), and produce a level 2 DFD model of it.
[13 marks (4-overall functionality; 4-meaningful labelling; 5-logical correctness)]

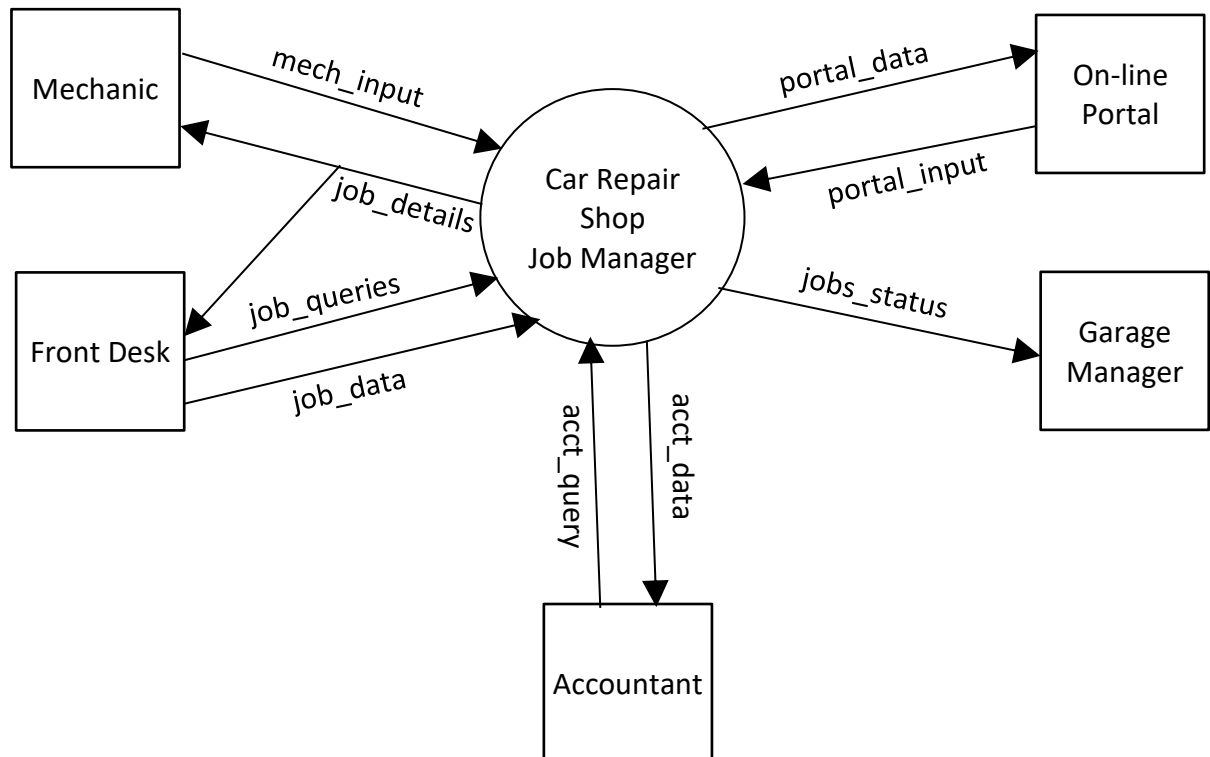


Figure 1.

Question 4 [Practical Development] (a selectable question for 50 marks)

- (a) You are to model the following system through the use of a context level (level 0) DFD, and decompose this up to level 1 to fully and clearly describe your proposed solution. Include any Control Processes you may need in level 1 (these should be two or more). You are then to produce two STDs of any **two** Control Process (one STD per Control Process) of your choice as you decided to include in level 1. At level 1, your model will probably include at least two databases. Produce a DSD of any **one** of them.

The system:

“The system is a recipe proposer. It is a solution meant to aid persons who are after balanced and controlled diets. The solution will take in the name of a recipe, the max number of calories allowable, and any type(s) of undesired ingredient(s) (for example, no potatoes & no pasta, or no sugar, etc.). It will then interact with a series of online databases containing recipes and for each one it finds it isolates the ingredients and their quantity and for each ingredient/quantity it looks up the corresponding calorific value from other online databases. It will then try to find the best (i.e. closest to input values) match recipe, considering the calculated calorific value and the undesired ingredients, and offer this “best match” to the user. The solution should also allow users to share their “finds”. To be able to use the solution, users must register for an account, so the solution must also provide user account management features”.

Please note: Should there be any queries about the above-mentioned system, in the absence of the client, i.e. me, please make any indispensable assumptions, should any be truly necessary, and state these prominently and clearly in writing next to your models. Unnecessary or incorrect assumptions will be penalised.

[50 marks (20-DFDs+CFDs; 12-STDs; 8-DSD; 10-validity of models)]

No more questions

All scenarios and examples in this paper are hypothetical; any resemblance to existing systems, scenarios or situations is unintentional and purely coincidental.
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