Programme Code: TU857
Module Code: CMPU 2021

TECHNOLOGICAL UNIVERSITY DUBLIN

Grangegorman

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TU857: BSc. (Honours) Degree in Computer Science (Infrastructure)

Year 2

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SEMESTER 1 EXAMINATIONS 2022/23

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CMPU 2021: Systems Infrastructure and Architecture 1

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External Examiner(s): Ms. Caroline McEnroy

Instructions to Candidates:

Answer Question (1) and ***any two*** other questions
Question (1) carries **40** marks.
Questions (2), (3), (4) carry **30** marks each

Exam Duration: Two Hours

Case Study 1: An Automated Library Application

The objective of this system will be to support people using a library in a college environment.

The system will manage the operation of the library for borrowing books. The system provides end users with an application on their smart phone to use the automated library.

The library contains books that will be borrowed using the smart phone application. The end users will search for a book through a search option. The application will then provide a map, with directions, to where the book is located. The end user will use the application on the mobile phone to scan the book and mark it as borrowed by the end user. End users can only borrow a limited number of books.

The system will indicate to the end user when they must return the book. End users that return books late will have to pay a fine. End users can only borrow books if they have paid all fines.

The system will update the book status and the end users account details in a central location, a library database.

1. (a) In relation to the Requirements Engineering process:

(i) Briefly describe the three phases involved in *requirements capture*. Use a diagram to support your answer.

(7 marks)

(ii) Describe the development and use of Interviews for gathering requirements from key stakeholders.

(7 marks)

(b) (i) Draw a Use Case diagram modelling main system features in Case Study 1 above. The diagram should have at least *two* Use Cases and *two* Actors.

(3 marks)

(ii) Describe *one* Use Case narrative for one of the Use Cases identified in the Use Case diagram. Include *one* error flow or alternative flow in the narrative.

(9 marks)

(c) (i) Explain what is meant by functional requirements in the software requirements gathering process.

(3 marks)

(ii) Identify *four* functional requirements for the Case Study 1 above. Briefly describe each of the functional requirements.

(4 marks)

1 **(d)** (i) What is the meaning of the terms *Requirements Validation & Verification*?

(4 marks)

(ii) Describe the use of a disposable Prototype as a requirement validation and verification technique. Use an example to support your answer.

(3 marks)

2 **(a)** (i) Explain what is meant by non-functional requirements in the software requirements gathering process.

(3 marks)

(ii) Identify *two* non-functional requirements for the Case Study 1 above. Briefly describe each of the non-functional requirements.

(6 marks)

(b) Write *two* test cases to test *two* functional requirements, and *one* test case testing *one* non-functional requirement of Case Study 1.

(15 marks)

(c) Describe the role of completing a feasibility study is and briefly outline why it is important to complete one as part of a software development process.

(6 marks)

3 (a) (i) Describe, with the aid of a diagram, the design methodology: the Incremental model as an approach for systems development.

(5 marks)

(ii) In particular discuss each phase of this model.

(5 marks)

(iii) Identify two advantages this method.

(2 marks)

(b) (i) Discuss the role of Software Architecture in the design and development of a software system.

(4 marks)

(ii) Briefly discuss *three* advantages of choosing an explicit architecture.

(6 marks)

(iii) Choosing a suitable Architecture is an important initial phase in designing and developing a software system.

Using a diagram, describe the Model View Controller (MVC) architecture. In particular mention the advantages and disadvantages of this architectural pattern.

(8 marks)

4 (a) (i) In relation to object oriented programming, briefly, explain the difference between a public and private class member.

(4 marks)

(ii) Explain an *association* relationship between two classes and the property *multiplicity* of an association. Use an example and draw a diagram as part of the answer.

(7 marks)

4. (b) Project Management requires a variety of elements to be properly addressed in order to plan and complete a project successfully.

(i) Describe, in detail, the role of three key stakeholders in the development of a project plan.

(9 marks)

(ii) Describe, with the aid of a diagram, the Work Breakdown Structure (WBS) and how it is used in the project planning process.

(6 marks)

(iii) Describe, briefly, the role of the Action Plan in the project planning process.

(4 marks)