10/1/2019

09.30 - 11.30am

Courtyard, DIT Aungier Street

DUBLIN INSTITUTE OF TECHNOLOGY

DT211C BSc. (Honours) Degree in Computer Science (Infrastructure)

Year 2

WINTER EXAMINATIONS 2018/2019

SYSTEMS INFRASTRUCTURE AND ARCHITECTURE 1 [CMPU2021]

MR. CIARAN O'DRISCOLL
DR. DEIRDRE LILLIS
MS. PAULINE MARTIN

THURSDAY 10TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

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

Case Study 1: An E-Learning app to Teach a Programming Language

The objective of this system is the teaching of programming for a single programming language.
The e-learning system should allow students to learn the background of a language. It should show students how to write and execute simple programs using a basic development environment.

Students learn a language by watching tutorials of how to write programs and see how they operate through videos of lectures. Videos are stored in a database. Students then attempt to write programs based on the lecture material viewed. The system indicates how much of the code is correct. Students will be provided with quizzes to test their understanding after each lecture session. Students will assess their progress through the results of the quizzes.

Lecturers upload videos of lecture presentations for each teaching session. Lecturers will be able to design quizzes, analyse results of quizzes and include each quiz result as a part of the overall module results.

1. (a) In relation to the Requirements Engineering process, briefly describe the three phases involved in *requirements capture*. Use a diagram to support your answer.

(7 marks)

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

(4 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 *three* requirement validation and verification techniques. Use examples to support your answer.

(9 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 what a feasibility study is and briefly outline why it is important to complete one in a software development process?

(6 marks)

3 **(a)** Describe, with the aid of diagrams, the following two design methodologies:

(i) The Incremental model as an approach for systems development. Mention two advantages of this method.

(9 marks)

(ii) The spiral model as an approach to systems development.
Outline the potential cost implications in using this method.

(9 marks)

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

(4 marks)

(ii) 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)** In relation to object oriented programming, briefly, explain the following:

(i) What is inheritance?

(3 marks)

(ii) What is the difference between a public and private class member.

(3 marks)

4 (b) (i) Briefly explain the term *relationship* for a class diagram.

(3 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)

(iii) Explain a *composition* relationship between two classes. Use an example and draw a diagram as part of the answer.

(7 marks)

(iv) Explain a *generalisation* relationship between two classes. Use an example and draw a diagram as part of the answer.

(7 marks)