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09.30 - 11.30am

CMPU 2021 Syst. Infrastructure & Archit.

Basement 2, Kevin Street

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TECHNOLOGICAL UNIVERSITY DUBLIN

KEVIN STREET CAMPUS

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

Year 2

SEMESTER 1 EXAMINATIONS 2019/20

Systems Infrastructure and Architecture 1

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Two Hours

Instructions to candidates

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

Case Study: CBalloon, a commercial Android application using location based Augmented Reality to collect coupons

The objectives of this system will be to allow customers to retrieve virtual balloons that represent coupons for commercial retailers.

The system will be a mobile application designed to retrieve coupons (balloons) of restaurants or commercial promotions based on location. For example, consider a user on Grafton St., where there are promotions in Camera Shop and Clarkes shoe shop. The mobile application would show two balloons hovering over a map of Grafton St. By tapping the virtual balloons on the screen, users will be able to collect "balloons". Once caught, users will then be able to redeem the balloon-like coupons by going into the relevant store.

Initially, vendors can create a commercial campaign, then they must create associated balloons. At all times, vendors have the ability to view their own campaigns.

A customer can view a map of the area local to them. The system will identify and create notifications for the positions of balloons.

On catching a balloon the customer will go to the shop to redeem the value of the coupon.

The system activities will involve updating user location, notify users of the location of balloons and mapping the virtual balloon objects on to the mobile screen.

1. (a) In relation to the Requirements Elicitation (identification) process, describe the development and use of:

(i) Interviews for gathering requirements from key stakeholders.

(8 marks)

(ii) Questionnaires for gathering requirements from key stakeholders.

(6 marks)

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

(5 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.

(8 marks)

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

(4 marks)

1. (d) (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 above. Briefly describe each of the non-functional requirements.

(6 marks)

2 **(a)** (i) Explain, what is the meaning of the terms *Requirements Validation & Verification* in the Requirements Engineering process.

(4 marks)

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

(3 marks)

(iii) Describe the use of a User Manual as a requirement validation and verification technique. Use an example to support your answer.

(3 marks)

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

(15 marks)

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

(5 marks)

3. (a) Describe in detail, with the aid of diagrams, the Component Assembly model as an approach for systems development. Mention 4 limitations of this method.

(11 marks)

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

(i) Identify and briefly describe the 5 key components of a successful project plan.

(10 marks)

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

(9 marks)

4. (a) Discuss the role of Software Architecture in the design and development of a software system. Briefly discuss *three* advantages of choosing an explicit architecture.

(10 marks)

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

(3 marks)

4 (c) (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)