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TECHNOLOGICAL UNIVERSITY DUBLIN

CITY CAMPUS - GRANGEGORMAN

TU856 - BSc. (Honours) Degree in Computer Science

Year 3

SEMESTER 1
EXAMINATIONS 2023/24

Software Engineering III

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External Examiner: Ms. Pamela O'Brien

Exam Duration: 2 hours

Instructions: e.g. Answer ***three*** **out of four** questions. All questions carry 33 marks each. One complimentary mark shall be awarded.

Special Instructions/Handouts:

If asked in any question to provide an example of code, you may use any appropriate language of your choice or pseudo code in your answer.

Q.1 **(a)** State the four guidelines of the *Principle of Least Knowledge*.

(5 marks)

(b) Explain how an *association* or *dependency* relationship between two classes can be thought of as a path of communication between instances of those classes.

(5 marks)

(c) Using an example of your choice, describe how a use case could be implemented where the functionality works correctly but the behavioural model (sequence diagram) does not conform with the structural model (class diagram). Use the following headings in your answer and include class and sequence diagrams where appropriate:

(i) Example use case & structural model.

(10 marks)

(ii) Behavioural model that does not conform with the structural model.

(9 marks)

(iii) Modified behavioural model that does conform with the structural model.

(4 marks)

Q.2 Some software design patterns are categorised as *structural* or *behavioural*. For **each** category, discuss **one** design pattern of your choice using the following to structure your answer *(the marks indicated are per design pattern)*:

(i) Outline what type of design patterns are included in the category.

(2½ marks)

(ii) Outline the *intent* of the design pattern you have chosen.

(3 marks)

(iii) Provide a class **or** sequence diagram that would illustrate the pattern's general structure/behaviour.

(4 marks)

(iv) Provide an example use of the pattern (using a class or sequence diagram).

(7 marks)

Q.3 **(a)** **(i)** Briefly describe what is meant by a *creational* design pattern.

(3 marks)

(ii) The *Singleton* and *Factory* are two *creational* software design patterns that are used in some architectural frameworks. State the *intent* of each pattern and provide a code example that illustrates how it would be implemented.

(8 marks x 2)

(b) **(i)** In the context of software architecture, state what the acronym *REST* stands for.

(3 marks)

(ii) In terms of an *architectural style*, describe what *REST* is. Use the following headings to structure your answer:

- Resources

(3 marks)

- HTTP Methods

(5 marks)

- Parameter Passing

(3 marks)

Q.4 **(a)** Object-Oriented analysis and design models align closely in structure and content to the resultant software. Discuss how the *correctness* and *consistency* of these models play a role in testing such a software system.

(8 marks)

(b) **(i)** Briefly explain what is meant by *white box* and *black box* testing.

(6 marks)

(ii) Considering that the architecture of Object-Oriented software is a network of collaborating classes, discuss how a *white box* testing approach might be applied to such software systems.

(6 marks)

(c) Explain what is meant by *Test Driven Development*. Use the following headings to structure your answer:

- Overview of the approach.

(3 marks)

- The process/steps that are followed.

(6 marks)

- Two benefits of the approach.

(4 marks)