



Beijing-Dublin International College



SEMESTER 1 FINAL EXAMINATION - (2019/2020)

School of Computer Science

COMP3013J Object-Oriented Design

Dr. Rosemary Monahan
Assoc. Prof. Chris Bleakley
Dr. Seán Russell*

Time Allowed: 120 minutes

Instructions for Candidates:

Answer **All** Questions.

BJUT Student ID:_____ UCD Student ID:_____

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge:_____ (Signature)

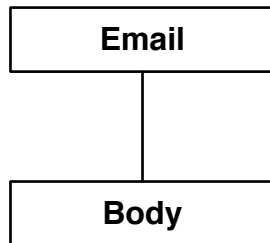
Instructions for Invigilators

Non-programmable calculators are permitted.

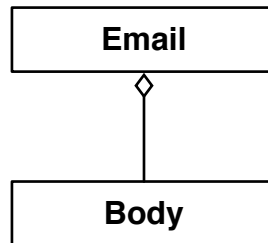
No rough-work paper is to be provided for candidates.

Question 1: Short Questions

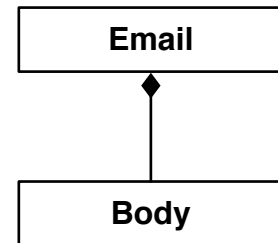
- Explain in your own words the Single Responsibility Principle. What is the desired result of this principle? (5%)
- For each of the three diagrams below (a, b & c), name the type of connection between the classes. What is the difference between b and c?



(a)



(b)



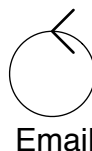
(c)

(5%)

- What is an N-ary association? Draw a diagram showing an n-ary association. (5%)
- Explain the meaning of the term *hotspot* in reference to application frameworks. Describe an example of a hotspot class and where it might be used. (5%)
- Name the five core workflows of the Unified Process (UP). (5%)
- Explain the 'Liskov substitution principle' in your own words. (5%)
- Explain briefly the layered architecture pattern. How does this effect dependencies? (5%)
- For each of the three class diagrams below (a, b & c), what type of class is being represented? For each explain what this tells us about the class.



(a)



(b)



(c)

(5%)

(Question Total 40%)

Question 2: Methodology

- Discuss the importance of testing in large scale software development. In particular, contrast the approaches to testing in the waterfall model and in the unified process. Discuss one risk that the Unified Process minimises in its approach. (10%)
- Describe how the workflows (and the amount of time spent on each workflow) in the Unified Process change as a project moves through various iterations and phases. You should support your explanation with a diagram. (10%)

(Question Total 20%)

Question 3: Patterns

- a. Explain the idea behind the Singleton pattern. Give example code showing how the singleton pattern is implemented. (10%)
- b. Explain the idea behind the Model View Controller (MVC) design pattern. Explain why this pattern is useful? Describe each of the types of classes suggested in this pattern. (10%)

(Question Total 20%)

Question 4: Modelling

- a. Draw a UML domain model that shows the classes that could be used to represent the following facts about a Cinema (Movie Theatre).
 - A cinema has multiple screening rooms that it can use to show movies
 - Each screening room is represented by a number
 - Each screening room contains a number of seats
 - Each seat is identified by a row number and a seat number
 - There are two types of seats, regular and premium (nicer and more comfortable)
 - Each showing (viewing) of a movie is in a screening room at a particular date and time (there can be multiple showings of the same movie)
 - Each movie has a title as well as an age rating

The diagram should include **attributes** (including types), **associations**, **multiplicities** and **role names** where appropriate. (10%)

- b. Based on the class diagram you have completed in the previous question, write the basic definitions of the classes in Java. In these classes you only need to implement the associations and attributes, implementing methods or constructors is not required. (10%)

(Question Total 20%)