Semester one of academic year (2015—2016) of BJUT

Object Oriented Design

COMP3013J

Exam Instructions: Answer part 1 and any other 3 parts

Honesty Pledge:

I have read and clearly understand the Examination Rules of Beijing University of Technology and University College Dublin and am aware of the Punishment for Violating the Rules of Beijing University of Technology and 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 would accept the punishment thereof.

Pledger:_____ Class No:_____
BJUT Student ID:_____ UCD Student ID:_____

Notes:

The exam paper has 5 parts on 4 pages, with a full score of 100 points. You are required to use the given Examination Book only.

Instructions for Candidates:

Full marks will be awarded for complete answers to **All** questions.

Instructions for Invigilators:

Candidates are allowed to use non-programmable calculators during this examination.

Obtained Score

Part: 1 Short Questions

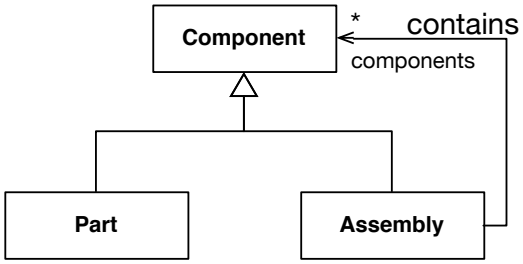
a. Explain what is meant by object identity. Describe how can this identity be realised in persistent storage. **(5 Points)**

b. Classes `A` and `B` both implement the interface `Inf`. A new method must be that makes sense for `A` but not for `B`. Explain briefly the possible solutions and the advantages and disadvantages of each solution. **(5 Points)**

c. Distinguish between Iterative development and Incremental development. **(5 Points)**

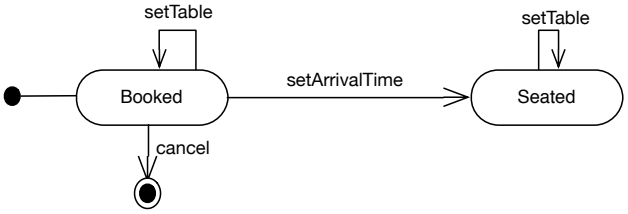
d. In modelling with UML, what is the key goal in building interaction diagrams? What models may change as a result of this process? **(5 Points)**

e. What type of object structure is denoted by the following class diagram? Why might aggregation be more appropriate?



(5 Points)

f. Explain in words the meaning of the following statechart.



(5 Points)

g. Explain the 'no concrete superclass' principle. **(5 Points)**

h. Explain the includes and extends relationships in use case modelling. **(5 Points)**

(Total 40 Points)

Obtained Score

Part: 2 UML Modelling

a. Draw a UML class diagram that models the following facts about a library. Carefully explain the design decisions that you have made, as well as any limitations of your model.

- For each book held in the library, the catalogue contains a title and ISBN number of each book
- Each book may have multiple authors.
- There may be multiple copies of a book in the library, each copy of a book has a unique acquisition number.
- There are many registered readers belonging to the library, each of whom is issued with a number of tickets.
- The system records the name and address of each reader, and the number of tickets which they have been issued.
- Readers can borrow one book for each ticket with which they have been issued.
- The system keeps a record of which books the reader has borrowed along with the date by which the book should be returned

(20 Points)
(Total 20 Points)

Obtained Score

Part: 3 Methodology

a. Describe the waterfall model of software development. Describe the limitations of this model.

(10 Points)

b. Describe an alternative to the waterfall model. Explain how this methodology addresses the limitations of the waterfall model

(10 Points)
(Total 20 Points)

Obtained Score

Part: 4 Patterns

a. Explain the idea behind the Observer pattern. Draw a typical class diagram for this pattern.

(10 Points)

b. Explain the idea behind the Singleton pattern. Give example code showing how the singleton pattern is implemented.

(10 Points)
(Total 20 Points)

Obtained Score

Part: 5 Implementation

a. Dependencies impose constraints on the order in which components can be created and tested. Describe the two basic approaches to this. What are the advantages and disadvantages of each approach.

(10 Points)

b. Describe an alternative approach to choosing the order in which components are created and constructed.

(10 Points)
(Total 20 Points)