DUBLIN INSTITUTE OF TECHNOLOGY

BSc. (Honours) Degree in Computer Science

Year 3

WINTER EXAMINATIONS 2016

SOFTWARE ENGINEERING III [CMPU3038]

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WEDNESDAY 17TH JANUARY 9.30 A.M. – 11.30 A.M.

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2 HOURS

ANSWER **THREE** QUESTIONS OUT OF **FOUR**.

ALL QUESTIONS CARRY 33 MARKS EACH.

ONE COMPLIMENTARY MARK SHALL BE AWARDED.

Note: *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)** The *Simple Factory Pattern* can be categorised as a creational design pattern. Explain what is meant by a *creational design pattern*. In your answer, include a brief description of the intent of the *Simple Factory Pattern*.

[8 Marks]

(b) The *Command Pattern* can be categorised as a behavioural design pattern. Explain what is meant by a *behavioural design pattern*. In your answer, include a brief description of the intent of the *Command Pattern*.

[8 Marks]

(c) **(i)** Explain how you could combine, using an *interface*, the *Simple Factory* and *Command* patterns in the design of a web application in order to handle a variety of different requests.

[12 Marks]

(ii) Discuss the potential benefits that you gain by utilising the design that you have discussed in **c (i)** above.

[5 Marks]

Q.2 **(a)** Explain what is meant by the term *Structural Design Pattern*. In your answer, give the *intent* of a structural design pattern of your choice (other than those given in part **2 (b)** of this question).

[6 Marks]

(b) For each of the following structural design patterns, explain, in detail, their intent and design. In your answer, use UML to show their structure. Provide an example use of each pattern.

(i) Adapter

[9 Marks]

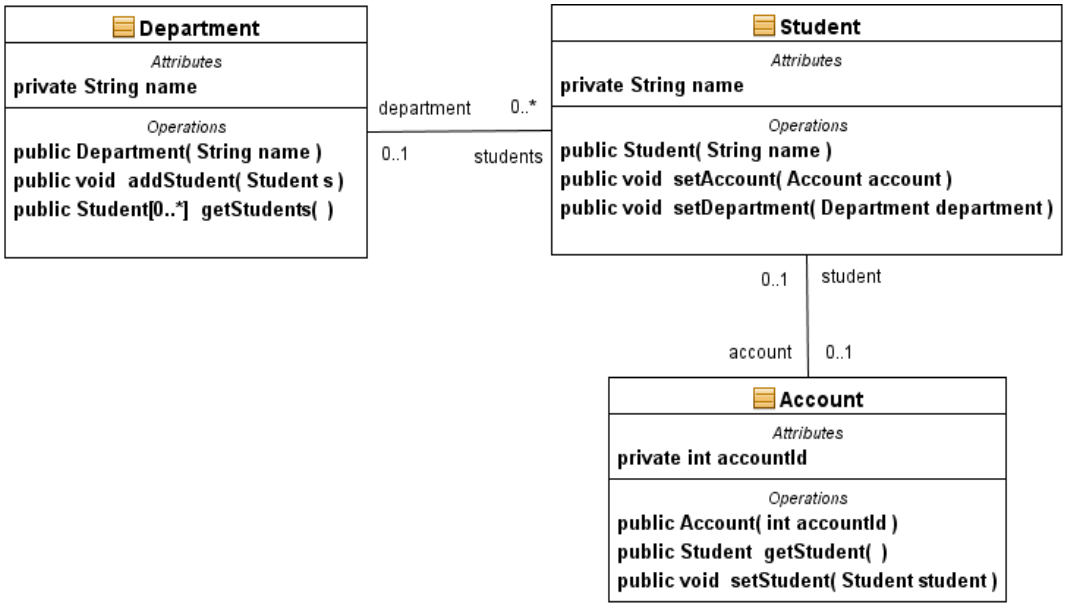
(ii) Decorator

[9 Marks]

(iii) Bridge

[9 Marks]

Q. 3 With regards to the structural model below, answer the following questions.



(a) Explain the meaning of the associations between the classes in terms of directionality, multiplicity and optionality.

[7 Marks]

(b) Provide some sample code that shows how the associations would be implemented.

[5 Marks]

(c) Use this model to discuss what the term *Referential Integrity* means within the context of object oriented development.

[8 Marks]

(d) Provide some sample code that would be required in order to ensure the runtime referential integrity of this model.

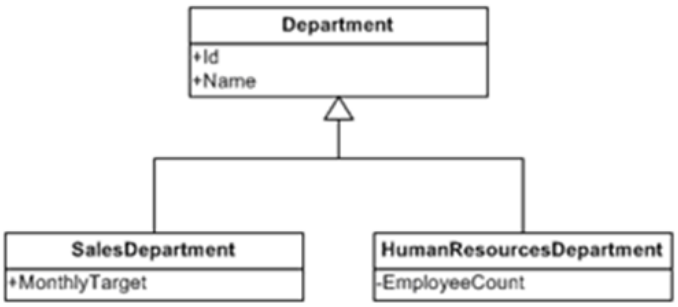
[13 Marks]

Q.4 (a) **(i)** Outline what is meant by the term *Object Relational Mapping (ORM)*.

[3 Marks]

(ii) Given the following class diagram, describe three different ways in which the classes could be mapped to a relational database. For each of the three ways, provide one advantage and one disadvantage that it provides.

[12 Marks]



(b) **(i)** Describe what is meant by *Test Driven Development*. In your answer, discuss the steps that are followed in developing / testing code using this approach.

[9 Marks]

(ii) Explain why and how *Mock Objects* can be utilised in a *Test Driven Development* approach and what benefit they can provide.

[9 Marks]