DUBLIN INSTITUTE OF TECHNOLOGY

BSc. (Honours) Degree in Computer Science

Year 3

WINTER EXAMINATIONS 2014

SOFTWARE ENGINEERING III [CMPU3038]

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

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.*

1. (a) A company assigns one of its staff members to support a maximum of five of its customers at any given time. A staff member may occasionally be not assigned to any customer. A customer will have one or more active projects and the staff member will assist in the progress of each of these projects. Assume that all queries and processing will be met by navigating from staff member to customer and from customer to project.

Draw a class diagram to model these requirements showing clearly the attributes and associations. Include the navigational and multiplicity notation for each association in the diagram along with suitable role-names where appropriate.

[15 Marks]

(b) **(i)** Given the class diagram below, explain in detail the meaning of the association.

[8 Marks]

(ii) Using code examples, describe, giving your reasoning, how the association in the class diagram below could be implemented (***note**, you do not need to provide code in your answer to implement referential integrity*).

[5 Marks]

(iii) Using the class diagram example below, outline what is meant by *Referential Integrity*.

[5 Marks]

2. **(a)** Briefly outline what is meant by the *Principle of Least Knowledge*.

[5 Marks]

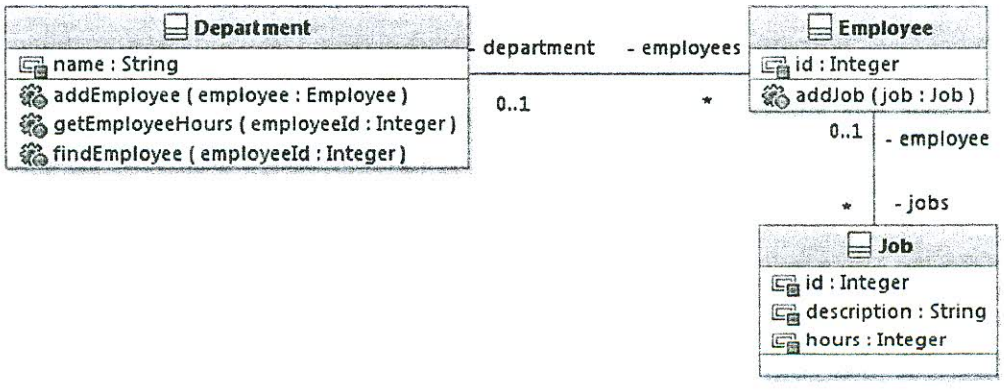
(b) Describe three of Demeter's guidelines that would help designers and developers adhere to the *Principle of Least Knowledge*. In your answer, provide UML notation for each guideline.

[12 Marks]

(c) With regard to the *Class Diagram* below, consider the following *Use Case*:

A manager wants to retrieve the number of hours worked for a given employee

Provide a *Sequence Diagram* which would realise this *Use Case* using instances of the classes shown. Ensure your solution conforms to the structural model below in every way, highlighting any additional operations that may be required (***note**, getter and setter methods have been omitted from the class diagram but can be assumed to exist*).



[16 Marks]

3. **(a)** Outline what is meant by *Creational Design Patterns*.

[5 Marks]

(b) Explain the *Intent* of each of the following patterns:

(i) Command
(ii) Simple Factory
(iii) Front Controller

[12 Marks]

(c) Describe in detail, using a *Sequence Diagram* and an example of your choice, how the *Command*, *Simple Factory* and *Front Controller* patterns could be used collaboratively in the design of a web application.

[16 Marks]

4. **(a)** Describe what is meant by *Unit Testing* in the context of object oriented development giving its goal and its benefits. In your answer discuss a traditional approach to developing unit tests.

[9 Marks]

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

[8 Marks]

(c) Discuss three benefits of a *Test Driven Development* approach.

[8 Marks]

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

[8 Marks]