DUBLIN INSTITUTE OF TECHNOLOGY

DT228 BSc. (Honours) Degree in Computer Science

Year 2

DT282 BSc. (Honours) Degree in Computer Science (International)

Year 2

WINTER EXAMINATIONS 2017/2018

SOFTWARE ENGINEERING 1 [CMPU2019]

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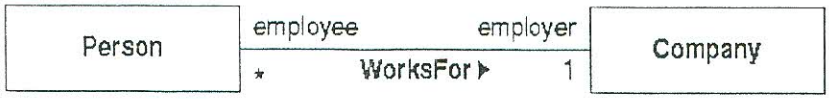
MONDAY 15TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

INSTRUCTIONS TO CANDIDATES
ANSWER **FOUR** QUESTION OUT OF **FIVE**.
ALL QUESTIONS CARRY EQUAL MARKS.

1. **(a)** Show how the following class diagram could be reified by introducing a linking class so that a person can work more than 1 job at a company or work for different companies.

   Then provide an object diagram to show a snapshot of this design.

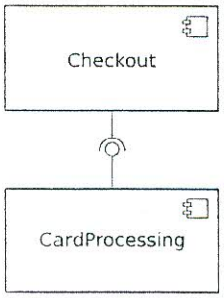


(7 marks)

(b) Provide a USE specification for the class diagram in part (a) including any operations and attributes you deem appropriate. In your USE code, include SOIL implementation of the operations.

(10 marks)

(c) Explain what an interface is and provide two ways of showing one in UML. Then comment on the meaning of the following UML diagram.



(8 marks)

2. **(a)** Provide a use case description for the following 3 library use cases:
   - return book
   - borrow book
   - borrow book and pay fine

   and draw a corresponding use case diagram.
   When is it appropriate to split a use-case using extends?

(10 marks)

(b) Outline two advantages and two disadvantages in using use cases for describing requirements.

(5 marks)

(c) Create a USE model without implementing the relevant operations which can be used to do a use-case realisation for the "return book" use case from part (a). Then describe briefly how "return book" might be simulated. Include a sequence diagram as part of your answer.

(10 marks)

3. **(a)** Describe the four phases of the Unified Process (UP) paying particular attention to the Elaboration and Construction phases.

(13 marks)

(b) Mention four ways in which the UP differs from the Waterfall process model.

(12 marks)

4. **(a)** Explain what is meant by the terms *modularity* and why it is important in programming and software design.

Draw a diagram which shows the trade off in "cost of effort" between the effort per module when increasing the number of modules and the corresponding cost of integration.

(10 marks)

(b) How are coupling and cohesion affected by using object-oriented design and/or programming principles?

(9 marks)

(c) Describe three types of coupling.

(6 marks)

5. **(a)** Explain what design patterns are and comment on how they may help software design.

(8 marks)

(b) Draw an example object diagram which illustrates what is meant by a part-whole hierarchy.

With the aid of a class diagram and comments, describe an appropriate design for interacting with part-whole hierarchies in a uniform way. List two advantages of this design.

(12 marks)

(c) How can a one-to-many class association be implemented in Java?

(5 marks)