Programme Code: TU856, TU858
Module Code: CMPU 2019
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TECHNOLOGICAL UNIVERSITY DUBLIN

Grangegorman

TU856 - BSc. (Honours) Degree in Computer Science

TU858 - BSc. (Honours) Degree in Computer Science (International)

Year 2

SEMESTER 1 EXAMINATIONS 2022/2023

CMPU2019 Software Engineering 1

Internal Examiner(s):
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External Examiner:
Ms. Pamela O'Brien

Instructions To Candidates:

Attempt 4 out of 5 questions. All questions carry equal marks.

Exam Duration: 2 hours

Special Instructions /Handouts/ Materials Required: None

1. (a) Provide a usecase description for each of the following 3 usecases for a Library system:

- return book
- borrow book
- borrow book and pay fine

and draw a corresponding usecase diagram.

(10 marks)

(b) Describe briefly two other roles usecases may have besides requirements description.

(5 marks)

(c) What is the difference between **generalisation** and **<<extends>>** in linking two related usecases?

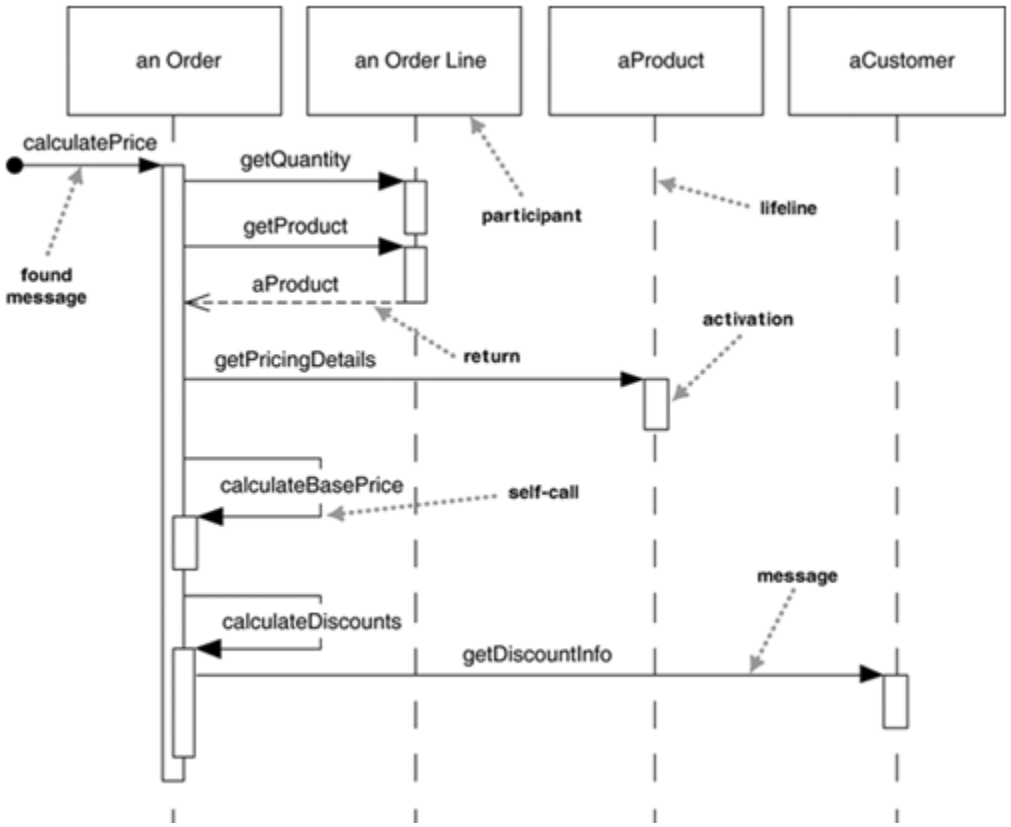
In the Unified Process, outline two situations where you might use the **<<extends>>** stereotype to split a usecase.

(10 marks)

2. (a) Explain what is meant by coupling and cohesions and elaborate on how object-oriented programming addresses the design concerns of coupling and cohesion.

(10 marks)

(b) Given the following sequence diagram, comment on it in terms of coupling and cohesion and whether it is in the spirit of object-oriented design.



(7 marks)

(c) Provide an alternative diagram to that in part (b) and outline how it improves on concerns about coupling and cohesion.

(8 marks)

3. (a) What is meant by *Requirements Engineering*? Describe the activities in requirements engineering and show them and their outputs in a process diagram.

(10 marks)

(b) Briefly outline two approaches to Prototyping and describe their main purpose, paying particular attention to the one which relates more to requirements.

(10 marks)

(c) Comment on the claim that Agile Methodologies are adaptive rather than predictive.

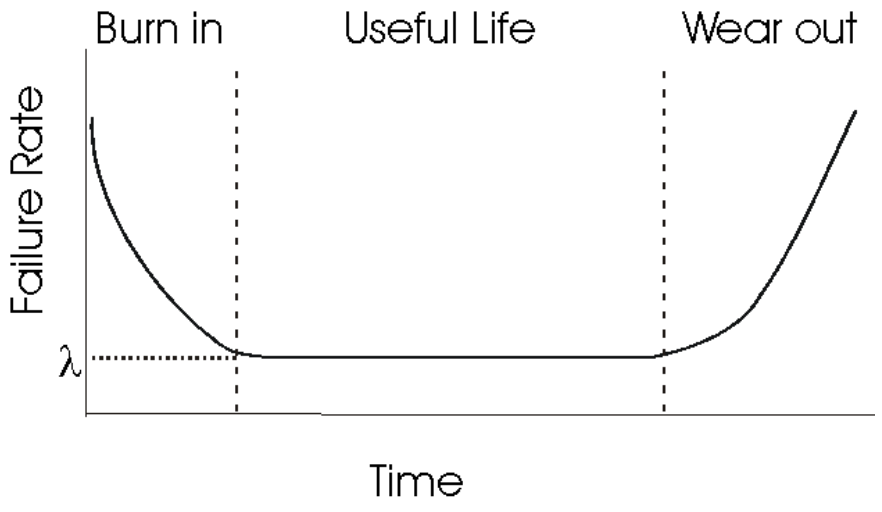
(5 marks)

4. (a) Explain what is meant by Formal Specification and Verification and describe a significant advantage of each. Mention a disadvantage that applies to both.

Describe briefly two situations where this approach to software development would be suitable.

(15 marks)

(b) Given the following diagram which shows hardware reliability over time, draw similar diagrams which express software reliability for both the idealised and the actual situations. Comment on the shape of the curves drawn and why they differ from the hardware curve below.



(10 marks)

5. (a) Given the class diagram in Figure 1 below, write USE class definitions for the classes ***Order*** and ***OrderLine***. Include a SOIL implementation for the operation ***addLineItem()*** but not for ***calculatePrice()***. Also provide a SOIL implementation for ***processOrderLine(q, p)*** but not for ***getPrice()***.

(15 marks)

(b) Write a class constraint or invariant in OCL for class ***Order*** which says: if an order's customer has a poor credit rating, then the order's ***isPrepaid*** attribute must be ***True***.

(4 marks)

(c) Write an appropriate precondition and postcondition for ***updateStock(q : Integer)*** in class ***Product***.

(6 marks)

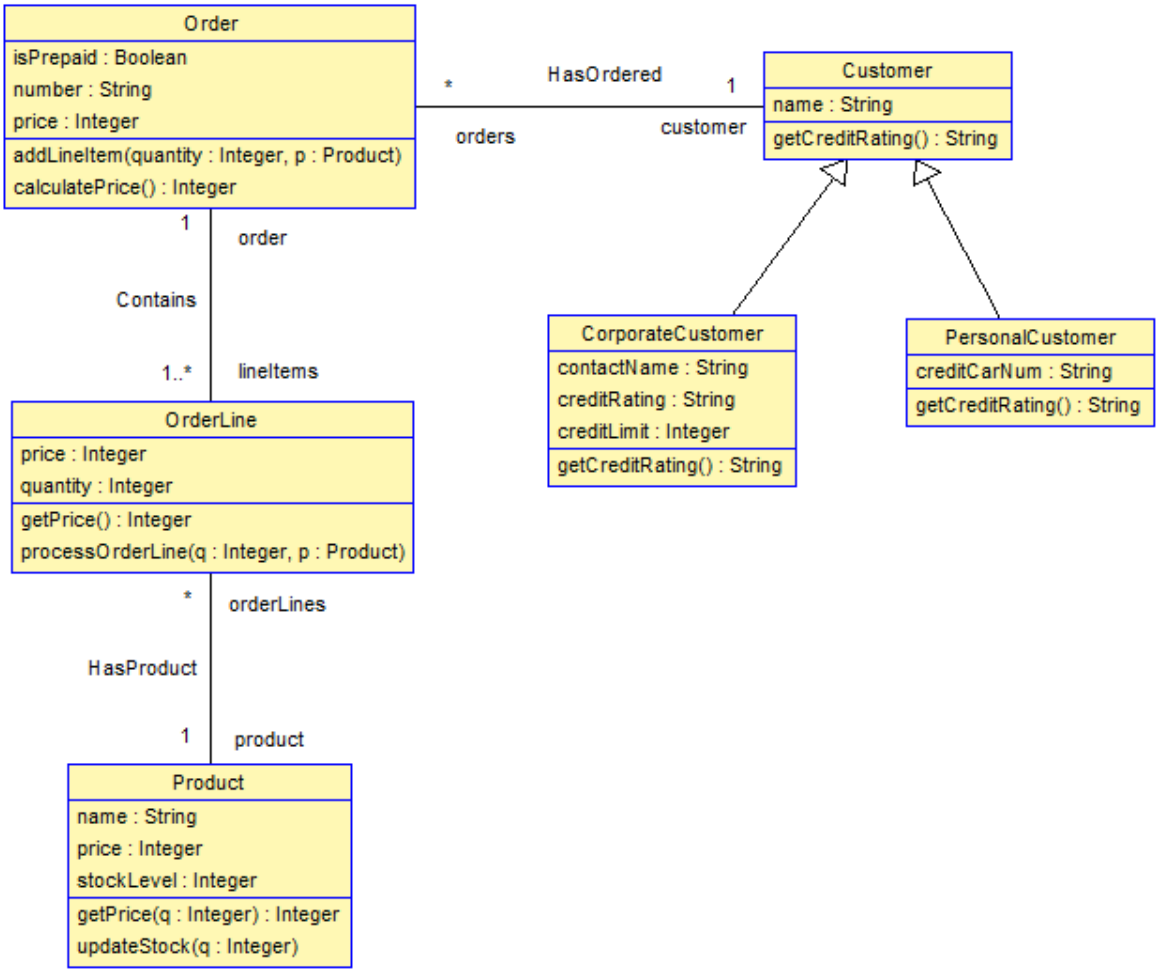


Figure 1