S228/209

DUBLIN INSTITUTE OF TECHNOLOGY

DT228 BSc. (Honours) Degree in Computer Science

Year 2

SUMMER EXAMINATIONS 2016/2017

SOFTWARE ENGINEERING II [CMPU2020]

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WEDNESDAY 17TH MAY 4.00 P.M. – 6.00 P.M.

TWO HOURS

ATTEMPT FOUR OUT OF FIVE QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS.

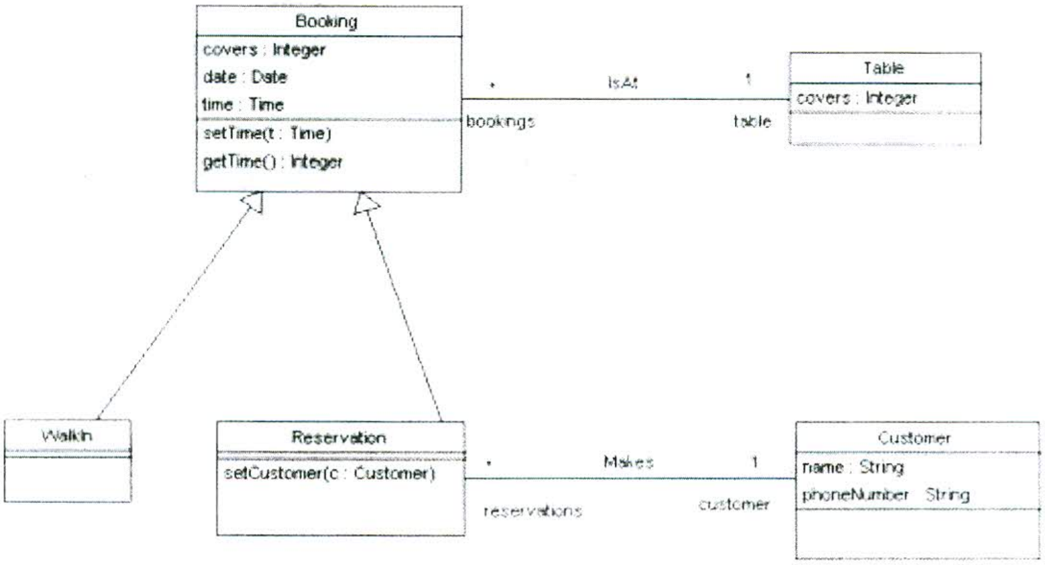
1. (a) Describe what is meant by *Test Driven Development* (TDD), outline the TDD cycle and possible advantages of TDD.

(15 marks)

(b) Describe the Adapter design pattern and elaborate on the differences between class adapter and object adapter.

(10 marks)

2. The following class diagram is an incomplete UML analysis level model for a restaurant booking system. OCL will be used to specify business rules and in order to test the specification it has been decided to model it in USE (UML Specification Environment).



(a) One business rule to be added to the specification is: "bookings for the same table must not overlap". Express this in OCL. You can assume that a booking requires 2 hours and that **getTime()** returns the starting time of a booking in minutes.

(5 marks)

(b) Suppose an extra operation for Booking is declared:

assignTable(t : Table)

Write a SOIL implementation for this operation and an OCL precondition that represents the constraint: "the table must be large enough to seat all the people in a booking".

(5 marks)

(c) Provide a USE implementation of the classes Booking and Reservation, including a SOIL implementation of the 3 operations.

(8 marks)

(d) Provide a more comprehensive analysis level class diagram which includes the above class diagram, showing the control class and any other appropriate class.

(7 marks)

3. You are required to do some object-oriented design for a standalone restaurant software system that mainly manages bookings. The restaurant software should be able to handle advance reservations, walk-in bookings, assigning tables to reservations and so on.

(a) A layered architecture allows for separation of concerns. Explain what is meant by this. Then describe an appropriate layered architecture for the restaurant system given that it will be implemented as standalone software.

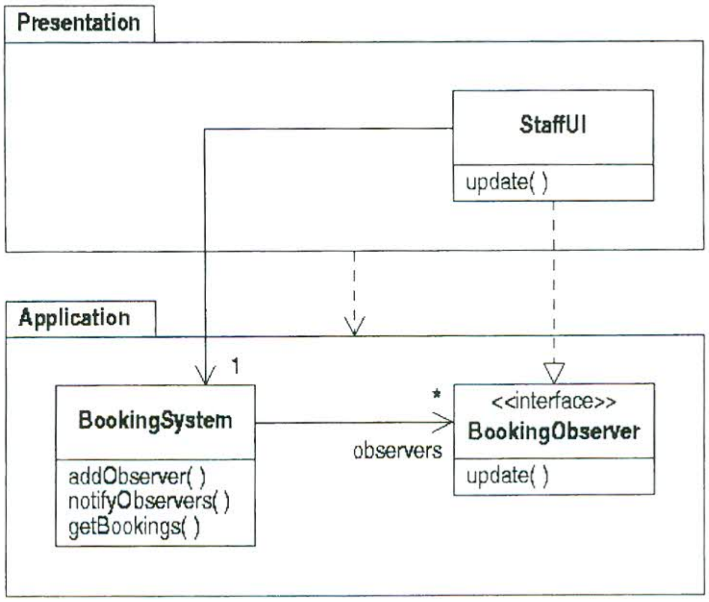
(5 marks)

(b) In light of your architecture from part (a), suggest an appropriate design which would allow for persistency/storage concerns without compromising the cohesion of the application classes. Comment on the reasons for your design choices.

(10 marks)

(c) Given the package/class diagram below showing the interdependency between the presentation and application layers, explain in writing how the Observer pattern is incorporated here into the design. Why go to this trouble?

Also, provide a sequence diagram to illustrate the object interactions for this design.



(10 marks)

4. (a) Explain what is meant by *Design by Contract* (DbC). Elaborate on how a contract is affected by subclassing/polymorphism.

(9 marks)

(b) Within the context of DbC, comment on benefits and obligations for both client code and provider code. Mention when exceptions might be appropriate.

(6 marks)

(c) Comment on DbC from the following viewpoints:

i) Precision versus Detail

ii) DbC and Quality Assurance

(6 marks)

(d) Write an appropriate contract in Spec# for a method ***`int ISqrt(int x)`*** that computes the integer square root of x.

(4 marks)

5. (a) Describe six of the key practices of the agile methodology XP.

(12 marks)

(b) Discuss *Essential versus Accidental Complexity* in software design.

(13 marks)