

OLLSCOIL NA hÉIREANN, GAILLIMH
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER I EXAMINATIONS 1999/2000

Examination in Higher Diploma in Software Design and Development

CT859: OBJECT ORIENTED DESIGN

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Time allowed: TWO hours

Answer both parts of question **ONE** and any **two** other questions of your choice
All questions carry equal marks

1. **(a)** Construct a Class Diagram, illustrating the relevant classes (attributes and operations), and their relationships (including inheritance and multiplicity) for the system described below.

You are asked design a system to computerise the operations of a vehicle service garage. The garage has a certain number of service bays available, each of which can be occupied by just one vehicle at a time. The employees of the company are the garage supervisor and the mechanics. When a customer calls to arrange servicing or repair, it is booked in, taking the owner's details (name, address, contact, telephone number) and the vehicles details (registration number, make, model). The supervisor is responsible for allocating the vehicle to an available service bay at a date and time when it is available. Depending on the job type (service or repair), the bay is booked for 1 hour (service) or two hours (repair). Occasionally, an emergency call is received, which requires one of the mechanics to assist in a roadside breakdown situation. In this case the mechanic is not available until he reports back for duty. For billing purposes, similar information must be recorded for the emergency jobs as for the normal service and repair jobs.

(15)

- (b)** Explain the purpose of interaction diagrams (sequence and collaboration), using a sample interaction from the system described above to illustrate your answer.

(5)

2. Write notes on any three of the following, using examples to illustrate your answer:

Inheritance
 Multiplicity
 Components
 CRC Cards
 The iterative development process

(20)

3. **(a)** UML adopts a "4+1" views approach to describing the architecture of a system. Explain this approach, and identify the particular perspective and models incorporated in each view. Support your explanation using a practical system example (either from your own experience or drawing on any system description used in other questions in this paper).

(12)

(b) An object has state, behaviour and identity. Explain each of these concepts and how they are handled by the UML.

(4)

(c) Describe the role of deployment models in the UML, using an example to illustrate your answer.

(4)

4. **(a)** A class "Employee" has two attributes: attribute "name" of type "String" and attribute "employeeID" of type "Integer". The initial value of the attribute "employeeID" is zero. The class has an operation called "getID" of type integer, which takes a single argument of type "String". Draw the class diagram icon for the class.

(12)

(b) The class "Employee" described above publishes the operation "getID" as an interface. Illustrate the two ways this can be shown in a class diagram.

(4)

(c) Describe the use of stereotypes in the UML.

(4)

5. **(a)** A home heating system is normally either idle or active. After the system is switched on it is automatically in idle mode. The system is activated when the room temperature falls below a certain predefined temperature. When the system is activated it must first fire up the boiler, and then transition to the heating state. The system continues to heat until the desired temperature is reached, when it goes back to the idle state.

Draw the state diagram to represent the heating system described above.

(12)

- (b)** Write notes on the following, using examples to illustrate your responses:

Guard Conditions

Event triggers with parameters

Entry and exit actions

(8)