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CIT Semester 2 Examinations 2018/19

Note to Candidates:	Check the <u>Programme Title</u> and the <u>Module Description</u> to ensure that you have received the correct examination. If in doubt please contact an Invigilator.		
Module Title:	OO Analysis and Design		
Module Code:	SOFT7005		
Programme Title(s):	BSc Software Development Y2 BSc (Hons) Software Devel Y2 BSc Hons Computer Systems Y2 BSc (Hons) Web Development Y2 HC Software Dev Y2 ACCS		
Block Code(s):	KCOMP_7_Y2 KWEBD_8_Y2	KSDEV_8_Y2 KCOME_6_Y2	KDNET_8_Y2
External Examiner(s):	Dr. Michael Brady		
Internal Examiner(s):	Ms. Mary Davin, Ms. Deirdre Dunlea, Ms. Samreen Umer		
Instructions:	Answer any 4 out of 5 questions		
Duration:	2 hours		
Required Items:			

Q1

- (a) Differentiate between an **object diagram** and a **class diagram**.

[12 marks]

- (b) Illustrate the following information on an object diagram. [7 marks]

Mary is the owner of a dog named Bradley who was born on the 24/3/2016. Bradley is a Labrador breed of dog. Labradors are considered to be family friendly. Mary is also the owner of Jack, a poodle born on the 3/3/2017 and family friendly. Joe is the owner of a dog named Caesar who is also a Labrador. His date of birth is the 5/4/2011. Peter is the owner of a Rottweiler breed of dog named Sam. Sam was born on the 4/4/2013. Rottweilers are not considered to be family friendly dogs.

- (c) Draw a class diagram that would support the object diagram you drew in part (b). [4 marks]

- (d) Draw a class diagram to model the following information. [12 marks]

Each medical clinic has several General Practitioners (GP). To use the services of the clinic a child must become a registered patient of one GP. The following details are required to register a child, Personal Public Service number (PPS number), first name, surname, gender, date of birth. The clinic provides a vaccination service. Vaccinations are available to protect children against infections. When a child is vaccinated the following details need to be recorded, the date of vaccination, vaccine name and dose number. Each vaccine requires at least one or more doses. For example, the Hepatitis B requires 3 doses.

Q2

- (a) What is meant by the following terms when related to an object?

[3 marks]

- i. State.
- ii. Identity.
- iii. Behaviour.

- (b) Explain the meaning of each of the following **OO** characteristics.

[6 marks]

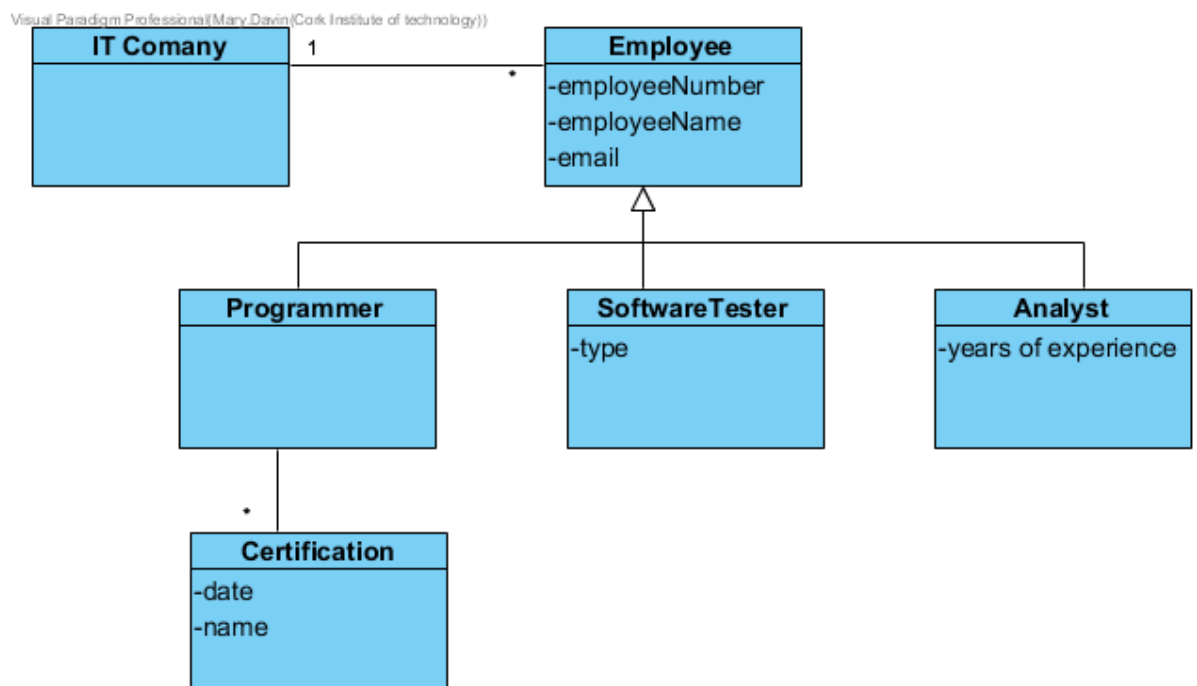
- i. Polymorphism.
- ii. Dynamic binding.
- iii. Responsibility driven design.

(c) What is the purpose of creating a domain model? [2 marks]

(d) How does a design class diagram differ from a domain model class diagram? [2 marks]

(e) Consider a situation where an employee works in an IT company as an Analyst, Programmer or Software Tester. [6 marks]

- i. *Modify the diagram below to allow an employee to change their job role.*
- ii. *Modify your diagram in (i) to allow an employee to work in different roles at the same time within a company.*



(f) Give a brief description of each of the following terms as used in relation to class diagrams. How is each modelled? Use an example to illustrate your answer. [6 marks]

- i. *Class scoped attribute.*
- ii. *Navigability.*
- iii. *Self association.*

Q3

(a) Explain the meaning of an **Association** class. [2 marks]

(b) Add association classes to the following many to many associations.
Show the attributes that might be found in these association classes.

[6 marks]

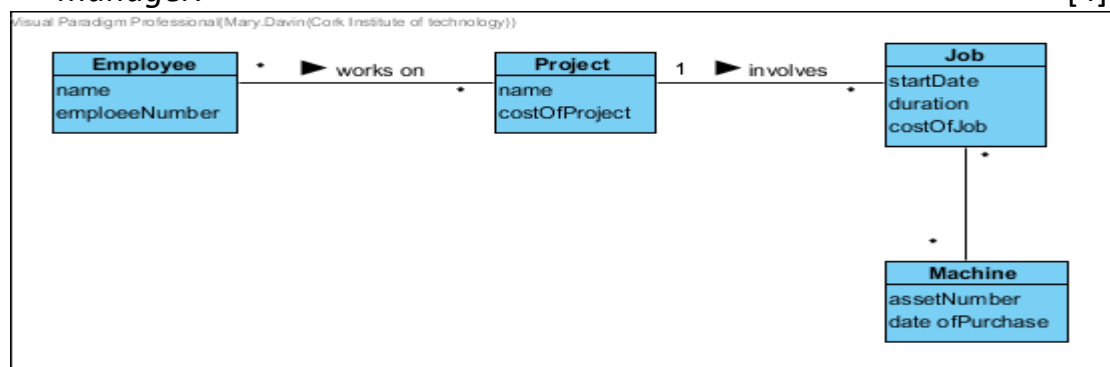


(c) Draw a class diagram to model the following information. [9]

*A property management company manages a number of different apartment blocks located in different cities. Each apartment block has many apartments of different sizes and number of bedrooms. The apartment block has many floors. Each apartment is located on a single floor. Apartments may or not be occupied at different times. If the apartment is occupied, the details of all tenants needs to be recorded. The details include name, contact number, and email address. One tenant will be designated the primary tenant. **Identify one derived attribute in your diagram.***

(d) The following diagram is used to illustrate people carrying out jobs on projects using different machines. Amend the diagram so that it shows the following information,

- The time a machine is used on a job. [4]
- The employee who manages a project, assuming there is only one manager. [4]



Q4

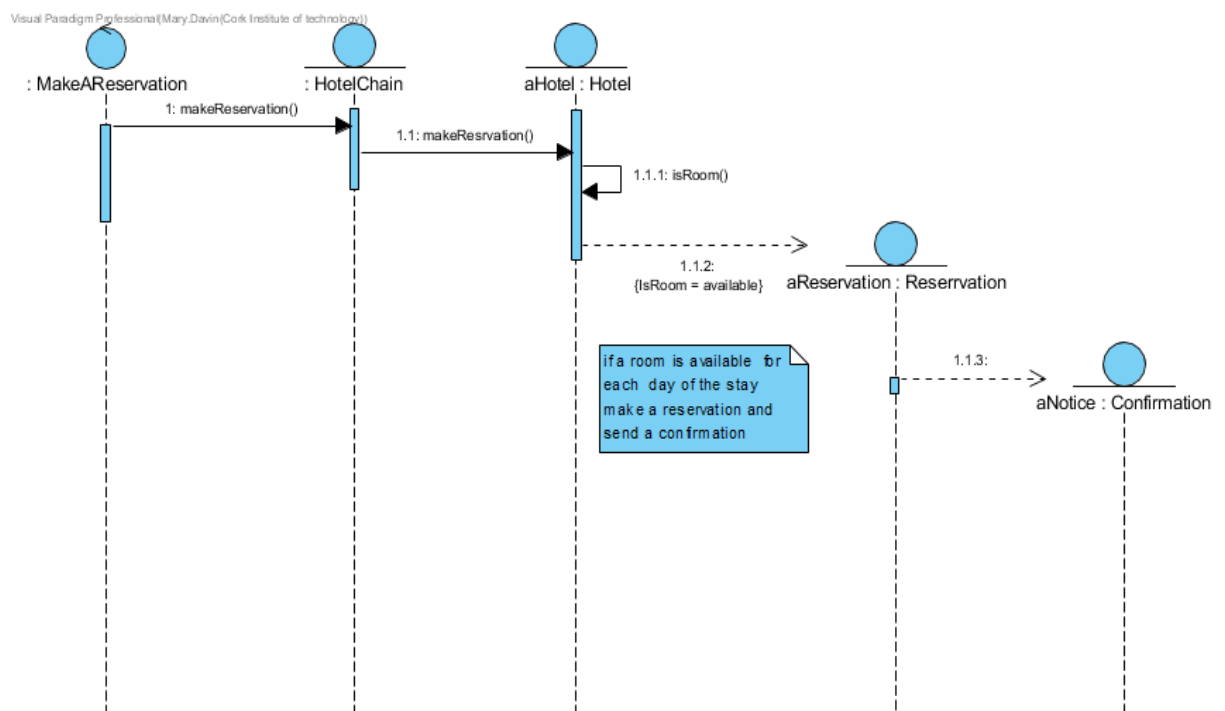
(a) Differentiate between the following types of objects.

Entity, Control and Boundary

[3 marks]

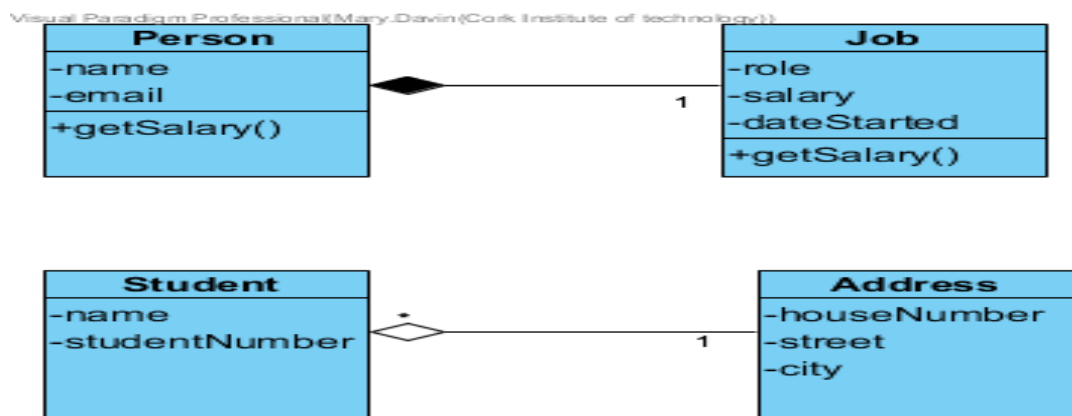
(b) Draw a class diagram that would support the following sequence diagram.

[8 marks]



(c) Differentiate between the relationships as used in the following diagram.

[4 marks]



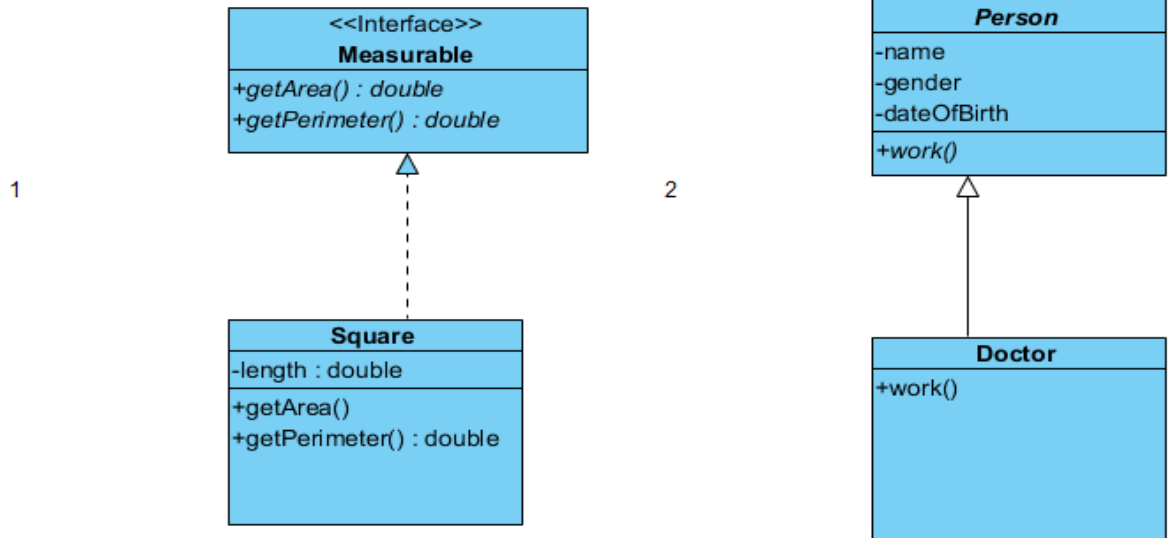
(d) What is the advantage of using interfaces over abstract classes?

[2 marks]

(e) Explain the meaning of the relationships as used in the following two models.

[6 marks]

Visual Paradigm Professional (Mary Davin (Cork Institute of Technology))



(f) When should you favour composition over inheritance as a means of reusing code?

[2 marks]

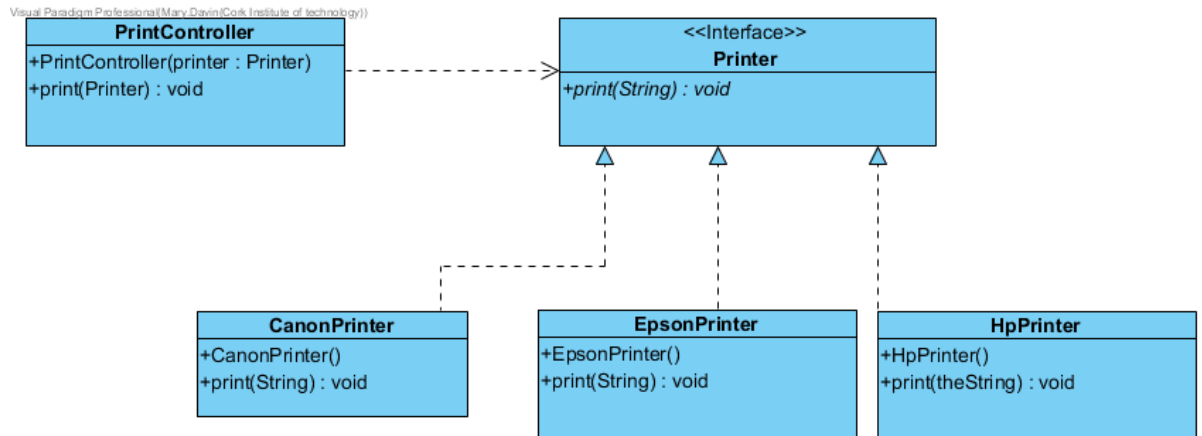
Q5

(a) Use the model below to explain each of the following

[8 marks]

i. **Delegation pattern**

ii. **Open Closed Design Principle (OCP)**



- (b) When designing an object-oriented model, which of the following situations is ideal? Explain why you choose this answer.

[6 marks]

- A.** *High cohesion, high coupling*
- B.** *High cohesion, low coupling*
- C.** *Low cohesion, low coupling*
- D.** *Low cohesion, high coupling*

- (c) What is meant by the principle of least knowledge otherwise known as the law of Demeter?

[6 marks]

- (d) Explain the meaning of the Interface segregation principle using the following interface. Assume there are different types of athletes such as swimmers and cyclists and runners.

[5 marks]

