Athlone Institute of Technology

The Faculty of Engineering & Informatics

Semester 1 Examinations 2017

December Session

Bachelor of Science in Software Design (Game/Cloud Development)

Year 3

Software Development

External Examiner(s): Dr. Stephen Davy
Mr. Jerh O Connor

Internal Examiner(s): Dr. Enda Fallon

Instructions to candidates:
Read all questions carefully.
All questions carry equal marks.
Answer **Three** out of **Four** questions.

Time Allowed: 2 Hours

No. of pages including cover sheet: 4

Q.1. (a) The following table stores the details of the fastest Irish men's 100M athletics records of all time. The details include the race time, wind speed in meters per second, athlete name, the date the record was set, the lane the record was set in and the race location. Assuming that a class called RecordDetails **already exists** which encapsulates the data for records including all necessary set and get methods.

Write a Main class which uses a collection to create and store the objects below.

(6 Marks)

Once the necessary objects have been created:

- Calculate the average time taken by the 5 athletes to complete the 100M
- Search the collection to find the names of athletes who set record times in Dublin
- Search the collection to find the date on which Christian Robinson set his 100M record.
- Search the collection and print out the names of athletes who set their records when the wind speed was greater than 1.0 m/sec.
- In athletics lanes 3 and 4 are considered optimal for record setting. Search the collection and print out the names of athletes who set their records from either lane 3 or lane 4.
- Search the collection and print out the athlete name and time for any record which was set more than 30 years ago.

Position	Time	Wind Speed m/sec	Athlete	Date Record Set	Lane	Location
1	10.30	0.7	Marcus Lawler	28 Feb 95	1	Regensburg
2	10.56	1.4	Jason Smyth	4 Jul 87	3	Newham
3	10.62	1.7	Eanna Madden	25 Feb 94	2	Dublin
4	10.64	1.7	Christian Robinson	16 Aug 96	3	Dublin
5	10.66	1.7	Stephen Gaffney	10 Jul 93	4	Dublin

(6 Marks)

(b) Outline the updates required to the RecordDetails and the Main class in part (a) in order to

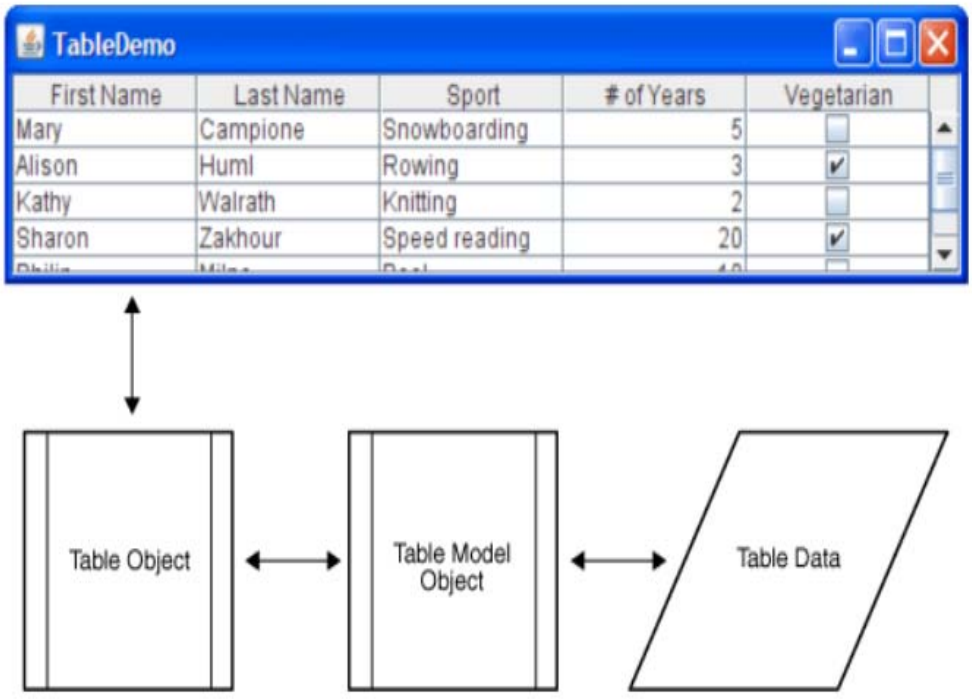
1. Serialize the objects to a file called “records.ser”
2. Deserialize the contents of “records.ser”

(8 Marks)
[20 Marks]

Q.2. (a) “When choosing a programming language for high performance environments, Java has performance limitations”. With regard to this statement, discuss with the aid of a diagram, the implications of Javas compilation process on system performance. As part of your discussion explain how Javas platform independence can influence performance.

(8 Marks)

(b) “Every table object uses a *table model object* to manage the actual table data.” Using the following diagram and relevant sections of code explain how a table model object can be used to manage the data displayed in a table.



(12 Marks)
[20 Marks]

Q.3. (a) "A collections framework is a unified architecture for representing and manipulating collections." With reference to the Java Collections Framework (JCF) explain the need for a "unified architecture". Your explanation should outline why the JCF was introduced. What are the major elements of the JCF?

(7 Marks)

(b) With reference to the JCF, explain using relevant sections of code the term iterator. In your explanation include (a) the purpose of an iterator (b) how to access an iterator (c) types of iterator.

(7 Marks)

(c) Outline using short sections of relevant code the operation of the list interface in the JCF. What is the purpose of the interface? What is the package hierarchy of the interface? What differentiates the List interface from other JCF features such as maps?

(6 Marks)
[20 Marks]

Q.4. (a) Briefly explain the term "Design pattern". In your explanation include a description of (a) what a design pattern is (b) how design patterns evolved (c) name the elements of a design pattern.

(5 Marks)

(b) "An Abstract class is a conceptual class which cannot be instantiated"

Explain this statement using a diagram and code examples. In your explanation describe (a) the purpose of abstract classes (b) why abstract classes cannot be instantiated though they can be subclassed (c) when an abstract class should be used in preference to an interface.

(6 Marks)

(c) Explain using **a diagram and short sections of relevant code** the purpose of and interaction between, the following elements of an RMI system; Client, Server and RMI Registry. In your explanation outline the sequence of steps which are required to make a standard Plain Old Java Object (POJO) RMI enabled.

(9 Marks)
[20 Marks]