Athlone Institute of Technology

School of Engineering

Semester 1 Examinations 2018

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 top goal scorers in the English Premier League for the 2017/2018 season. The details include the player name, premier league club, player nationality and the number of goals scored. Assuming that a class called PlayerDetails **already exists** which encapsulates the data for records including all necessary set and get methods.

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

(6 Marks)

Once the necessary objects have been created:

- Calculate the total goals scored by all the players
- The average number of goals scored by the top players
- The total number of goals scored by Manchester City players
- The average number of goals scored by players from England
- Delete the object for Roberto Firmino from the collection
- Mohamed Salah recently moved to Real Madrid. Find the relevant object in the collection and update the club details.

(6 Marks)

Player	Club	Nationality	Goals
Mohamed Salah	Liverpool	Egypt	32
Harry Kane	Tottenham Hotspur	England	30
Sergio Agüero	Manchester City	Argentina	21
Jamie Vardy	Leicester City	England	20
Raheem Sterling	Manchester City	England	18
Romelu Lukaku	Manchester United	Belgium	16
Roberto Firmino	Liverpool	Brazil	15

(b) Outline the updates required to the PlayerDetails 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]

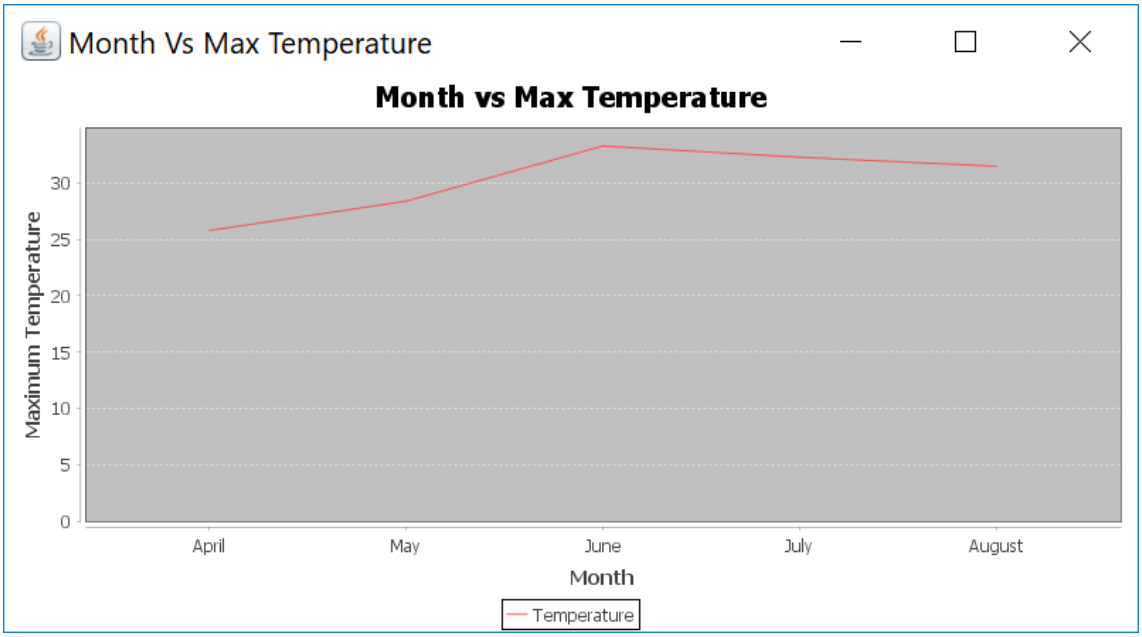
Q.2. (a) "The Raspberry Pi is a small computer the size of a credit card. It is slower than a modern laptop or desktop but is still a complete Linux computer and can provide all the expected abilities". With regard to this statement, discuss with the aid of a diagram, the implications of choosing Java or C++ as the programming language for the Raspberry Pi. As part of your discussion explain how Javas platform independence can influence performance.

(8 Marks)

(b) The following table outlines the highest monthly recorded temperatures in Ireland:

Decade	Temperature
April	25.8
May	28.4
June	33.3
July	32.3
August	31.5

Outline relevant sections of code required to chart the above data using a LineChart as illustrated below:



(12 Marks)
[20 Marks]

Q.3. (a) "Originally Java provided ad hoc classes such as Vector and Stack, although these classes were quite useful, they lacked a central, unifying theme." 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 terms Collection and Map. In your explanation include (a) an overview of the class hierarchy for each (b) how each stores data (c) mechanisms by which stored data can be accessed and manipulated.

(7 Marks)

(c) Using appropriate sections of code compare and contrast the operation of the Iterator and List Iterator in the JCF. In your explanation outline how each can be accessed and used to interact with JCF collections.

(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) "Abstract classes cannot be instantiated, but they can be subclassed."

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]