12 SDD Assessment Task 1 Specification

Part 1

Question 1

Read the following:

In the perpetual darkness more than two miles below the surface of the North Atlantic, a submersible sled slowly traced the alpine contours of the ocean bottom in the summer of 1985. Named the Argo after the ship in which the legendary Greek hero Jason sought the Golden Fleece, the 16-foot-long craft resembled a section of scaffolding flung on its side and stuffed with equipment, powerful lights, sonar and video cameras.

Far above, arrayed in front of a video screen in the control room of the U.S. Navy research vessel Knorr, members of a joint French-American scientific expedition watched images transmitted by the submersible as it was towed above a desolate landscape of canyons and mud slides. After 16 days of patient search, a scattering of metallic debris appeared on the screen followed by the unmistakable outline of a ship's boiler. A jubilant cry arose from the scientists. The ocean liner Titanic, sunk 73 years earlier with more than 1,500 of its 2,200 passengers on board, had finally been found

The quest for the remains of the Titanic in the crushing depths of the sea was a remarkable application of computer technology, as exotic in its means as in its venue. Not least of the keys to the successful outcome was the agility of modem computer programming.

Argo's ensemble of sonar, lights and cameras was orchestrated by an array of computers which were each programmed in a different computer language. The computer on the unmanned Argo itself was programmed in Forth, a concise but versatile procedural language originally designed to regulate movement of telescopes and also used to control devices and processes ranging from heart monitors to special-effects video cameras.

The computer on the Knorr was programmed in C, a powerful but rather cryptic language capable of precisely specifying computer operations. The telemetry system at either end of the finger thick co-ax cable connecting the vessels, which in effect enabled their computers to talk to each other, was programmed in a third, rudimentary tongue known as assembly language.

from 'Understanding Computers: Computer Languages', published by Time-Life, July 1990

a) Classify each of the languages used in terms of the computer language generation to which it belongs and justify your answers.
b) Why is assembly language described here as rudimentary (elementary or undeveloped) and in this case why would it be used?
c) Both Forth and C are imperative languages. Compare and contrast imperative and object-oriented languages.
d) Explain the use of three different languages in this scenario rather than a single all-purpose language.

Question 2

Consider the following sample of code

(line numbers have been included for reference)

```
1.    % Family  Tree
2.    father(Michael, Cathy).
3.    father(Michael, Sharon).
4.    father(Charles_gordon, Michael).
5.    father(Charles_gordon, Julie).
6.    father(Jim, Melody).
7.    father(Jim, Crystal).
8.    father(Elmo, Jim).
9.    father(Greg, Stephanie).
10.   father(Greg, Danielle).
11.   mother(Melody, Cathy).
12.   mother(Melody, Sharon).
13.   mother(Hazel, Michael).
14.   mother(Hazel, Julie).
15.   mother(Eleanor, Melody).
16.   mother(Eleanor, Crystal).
17.   mother(Crystal, Stephanie).
18.   mother(Crystal, Danielle).
19.   parent(X, Y) :- father (X, Y).
20.   parent(X, Y) :- mother (X, Y).
21.
22. go:- parent(X, Melody).
```

a) Describe all possible results from running the code on line 22.
b) The writer of the code wishes to improve it so that it includes a definition of a sibling. A sibling is simply someone who is either someone's brother or sister. Using the code given as examples of syntax, extend the program so that it includes this definition. Your answer should be as concise as possible.

Question 3

A school is developing a new administration program using Object Oriented Programming (OOP). It will need to store data about teachers, office staff and students. The data to be stored include date-of-birth, address and home phone number. In addition, extension phone number and pay details will be stored for teachers and office staff, and year level will be stored for students.

A class called Person is to be developed, describe an attribute and a method for this class, using examples.

Part 2

Question 4

Design and create a program of your choice using C++. The program needs to demonstrate use of the following:

- Classes
- Objects
- Attributes
- Methods
- Instantiation
- Variables and Control Structures

(Make use of internal documentation to assist with your demonstration)

Question 5

Explain and/or demonstrate how the following could be used in your program.

- Abstraction
- Inheritance
- Polymorphism
- Encapsulation

Question 6

Design and create a program of your choice using Prolog. The program needs to demonstrate use of the following:

- Variables
- Rules
- Facts
- Goals

(Make use of internal documentation to assist with your demonstration)

Question 7

Explain and/or demonstrate how the following could be used in your program.

- Heuristics
- Inference Engine
- Backward/Forward Chaining

Part 3

Question 8

Peer code review.

When: Monday 4 December 2017 in class.

You will be paired up twice to perform a code review. You will perform the role of a Project Manager and demonstrate Question 4 of your assessment task to a peer. Your peer will then document feedback regarding your task in the following specific areas:

- Identify any problems in the user interface;
- Suggest code optimisations and/or simplifications;
- Identify potential uncaught errors in the code;
- Suggest where more code comments were necessary;
- Identify areas that are well done and satisfy the marking criteria.

You will then reverse roles and your partner will perform the role of the Project Manager and you will document feedback regarding their code. You will then work with a different peer and repeat the process. Each session will be 15 minutes long.

Marks are based on the documented feedback provided to your peer, not on your code. It is highly recommended that you address areas raised about your code providing you the opportunity to improve your marks.