DUBLIN INSTITUTE OF TECHNOLOGY

DT228 BSc. (Honours) Degree in Computer Science

Year 4

SAMPLE PAPER

Systems Software [CMPU4051]

Two Hours

Answer question (1) and *any two* of questions (2), (3), (4)

Question (1) is worth **40** marks.
Questions (2), (3), (4) are worth **30** marks each

Question 1

1. a) Briefly describe how a C program can use system calls to perform low level system operations.

(5 marks)

1. b) Explain the specific tasks GDB can help with to identify bugs in a program.

(5 marks)

1. c) Gprof is a software profiler tool to measure the performance of an application. How can Gprof be used to identify areas of a program that require optimisation?

(5 marks)

1. d) Explain the purpose of the fork command.

(5 marks)

1. e) A session is linked to a Controlling Terminal. Explain why it is important for a daemon process to disconnect from its controlling terminal.

(5 marks)

1. f) Describe the main differences between named pipes and unnamed pipes.

(5 marks)

1. g) Describe the main operation of Canonical Mode terminal IO.

(5 marks)

1. h) How can the strtok() function be used to process user input if you are writing your own shell.

(5 marks)

Question 2

2. a) A process calls pipe then calls fork and creates an IPC channel from the child to the parent. Describe in detail how the child communicates with the parent process. Use a diagram to compliment your answer

(15 marks)

2. b) Create a C program to get a process to catch a signal interrupt (SIGINT) and to ignore the signal to allow the process to keep running. With this process running detail the steps that can be followed to kill this process in a terminal window?

(15 marks)

Question 3

3. a) Explain in detail the steps required to create a shell program using C.

(10 marks)

3. b) Write a program to create a basic shell program that will keep running until the user terminates the program. Describe in detail each aspect of the program.

(20 marks)

Question 4

4. a) Create a C program to demonstrate how threading can be offered using the pthread_create function.

(10 marks)

4. b) Create a makefile to represent the following:
Variables:
- **CC** to hold the compiler type
- **objects** to hold a list of the common objects
- **headers** to hold a list of the common headers

The final executable should be called areaProg.

The source files are areaOfRectangle.c, areaOfSquare.c, areaOfCircle and main.c. The header file areaOfRectangle.h is used by areaOfSquare.c

The makefile clean option should delete all executables in the project.

(20 marks)