COMP2100 Workshop Week 3

1. struct and bit fields
    a. Write the declaration of a data structure that represents time: hour, minute, second, millisecond, and am/pm indicator. Use the smallest ordinary data type possible for each field. Initialise an instance of your structure to 11:31:53.924 am.

    b. Rewrite your time data structure using bit fields to make it as small as possible. How many bits does your structure use?

2. Nested structs

    a. Define `Student` structure to store the following.

        Student number
        Student name // *use a reasonable size, e.g., 50 characters*
        The number of units currently enrolled
        Gross point average (GPA) // see *MQ 7-Point Scale GPA calculation*

        i. Statically initialise with the following:

            Student number: 12345678
            Student name: John Citizen
            The number of units enrolled: 2
            GPA: 5.5

        ii. Print these values to `stdout` as below.
            `12345678, John Citizen, 2, 5.50`

    b. Expand `Student` structure by adding a nested struct (i.e., `Unit`) to store details, as below, of two (2) units.

        Unit code
        Unit name
        Total marks

        i. Statically initialise `Student` structure with the following:
            Student number: 12345678
            Student name: John Citizen
            The number of units enrolled: 2
            GPA: 5.5
            Unit code: COMP2100
            Unit title: Systems Programming
            Total marks: 72
            Unit code: COMP3100
            Unit title: Distributed Systems
            Total marks: 78

ii. Print these values to `stdout` as below.

```
12345678, John Citizen, 2, 5.50
COMP2100, Systems Programming, 72
COMP3100, Distributed Systems, 78
```

c. Expand `Unit` structure by using a nested struct (i.e., `Assessment`) to store marks for three assessment items per unit as below.

Assignment 1
Assignment 2
Final exam

i. Statically initialise Student structure with the following:

Student number: 12345678
Student name: John Citizen
The number of units enrolled: 2
GPA: 5.5
Unit code: COMP2100
Unit title: Systems Programming
Total marks: 72
Assignment 1: 20
Assignment 2: 23
Final exam: 29
Unit code: COMP3100
Unit title: Distributed Systems
Total marks: 78
Assignment 1: 17
Assignment 2: 25
Final exam: 36

ii. Print these values to `stdout` as below.

```
12345678, John Citizen, 2, 5.50
COMP2100, Systems Programming, 72, Assignment 1: 20, Assignment 2: 23, Final exam: 29
COMP3100, Distributed Systems, 78, Assignment 1: 17, Assignment 2: 25, Final exam: 36
```

3. C File I/O
   a. Read a text file specified as the first command line argument and write the contents to another file specified as the second command line argument (i.e., cp)
   b. Can you do this using input redirection for the first argument and output redirection for the second argument, respectively (as if the input file is fed in stdin and the output is made to stdout)?