

C Programming II

2020 Spring

Homework 03

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Due: 2020.05.11 PM 11:59

Policies:

- Zero tolerance for late submission.
- You need to prepare a README file about how to make and run your program. Moreover, you need to provide your name and your student ID in the README file.
- For the writing assignment, I only accept pdf. MS. doc/docx format is not acceptable. Moreover, please use Chinese instead of English.
- Do not forget your Makefile. For your convenience, each assignment needs only one Makefile.
- The executable programs should be hw0301, hw0302
- You should pack your homework in one zip file. The file name should be StudentId_hw03.zip.

1 Football Analyzer (20 pts)

First of all, football is football, not soccer!! Football is my favorite sport game. Now, I want you to develop a program to get an overall statistics of some specific team. I will give you a season data of English Premier League. The data format is **csv**. You can open it with your preferred text editor. You can also use MS Office Excel or Libreoffice Calc to open the file. You can find the meaning of each field in **note.txt**. For your reference, in one game, the winner team can get 3 points and the loser gets nothing. As for the draw case, both team can get 1 point.

```
1 $ ./hw0301
2 Please enter the season data file: season-1718.csv
3 Please enter Team Name: Liverpool
4 Points:    75
5 Win:      21
```

```

6 Draw:      12
7 Lose:      5
8 Position:  4th
9 $ ./hw0301
10 Please enter the season data file: season-1718.csv
11 Please enter Team Name: Real Madrid
12 No such a team!

```

Note that TA may generate a fake season data for you. So do not hard code the statistics in your program.

2 Hex Viewer (20 pts)

In this class, I use `bless` as the hex viewer. `Bless` is a GUI hex viewer. Actually there is a linux command called **hexdump** to show the binary file. You can use **hexdump <file>** to see the output. Please implement a program to read a given file name and output the same thing like **hexdump**.

Format:

- Each row contains 16 bytes.
- Each row starts with the address in the file.

```

1 $ ./hw0302
2 Please enter the file: ntnu.jpg
3 00000000 d8ff e0ff 1000 464a 4649 0100 0100 5100
4 0000010 5100 0000 feff 1f00 454c 4441 5420 6365
5 0000020 6e68 6c6f 676f 6569 2073 6e49 2e63 5620
6 0000030 2e31 3130 ff00 00db 0084 0608 0706 0506
7 ...

```

3 Color Gradient (20 pts)

In computer graphics, a color gradient specifies a range of position-dependent colors, usually used to fill a region. Now I want you to write a program to generate a 1024×768 BMP file to show the color gradient, like figure 1.

```

1 $ ./hw0303
2 Please enter the file: output.bmp
3 Please enter (R,G,B) in the top left pixel: 0,0,0
4 Please enter (R,G,B) in the top right pixel: 255,0,0
5 Please enter (R,G,B) in the bottom left pixel: 0,255,0
6 Please enter (R,G,B) in the bottom right pixel: 0,0,255
7 Done

```

The colors of points are calculated using **linear interpolation**.



Figure 1: Color Gradient

4 Legend of the Galactic Heroes (40 pts)

After lots of midterm exams, now it is the time to enjoy your happy life. As your teacher, I also want you to be relaxed. So I ask you to play a MS Dos game. So you need to install a emulator, **dosbox**, first. Dosbox tutorial can be found at the link in the course page.

The game we want to play is called **Legend of the Galactic Heroes 4EX**. Legend of the Galactic Heroes is a series of science fiction novels written by Yoshiki Tanaka (田中芳樹). In humanity's distant future, two interstellar states –the monarchic Galactic Empire and the democratic Free Planets Alliance –are embroiled in a never-ending war. The story focuses on the exploits of rivals Reinhard von Lohengramm (萊因哈特馮羅嚴克拉姆) and Yang Wen-li (楊威利) as they rise to power and fame in the Galactic Empire (銀河帝國) and the Free Planets Alliance respectively (自由行星同盟). If you are interested in the story, you can read the novels. There is also an anime adaptation by Production I.G.

In **Legend of the Galactic Heroes 4EX**, you need to play an admiral, lead a fleet and beat the opposite side. Note that you are only an admiral and it is impossible for you to control other fleets. Your teacher is a bad PC game player and he cannot win the game. Now please help him to develop a game cheater. The cheater must allows the user to **modify some numbers in the save file**. The red blocks in figure 2, figure 3 are the numbers you need to modify. Note that you need to modify all roles. You need to design a good interface for the user.

銀河的歷史又翻過一頁...



Figure 2: 銀河英雄傳說 4ex：角色能力。

5 Bonus: Cheater v2 (5 pts)

Is there anything more you can do in your cheater? Write down and implement it.



Figure 3: 銀河英雄傳說 4ex：預算。



Figure 4: 銀河英雄傳說 4ex：星系資訊。