Data Structure Assignment [1]

Programming homework

Compressor of hex digits

Developing a compressor for data files containing Hex digits.

In this question, assume there is an input file, say A, in which all characters are 'Hex' digits (0-F). Let S(x) denote the file size of file x. For simplicity, we assume S(A) is an even number. Because a byte contains two nibbles[+] (aka half-byte), it is reasonable to compress file A as a new file, say B, whose file size is just half of file A (i.e., S(B) = S(A)/2). However, it becomes impossible to print out the contents of file B due to the incompatibility with the definition of ASCII. To solve it, you need to adopt another famous encoding scheme, named BASE64*, to transform the unprintable file B to another printable file, say C. The penalty of performing BASE64 transformation is the increased file size. In other word, we have S(C)=S(B)*4/3. As a result, the overall compression ratio would be 2/3, instead of 1/2.

Input:
A file containing Hex digits.

Output:
A file containing BSAE64 digits which is compressed from input file.

Note:
You are requested to support options** in tool compressor.
Use getopt(), optarg, optopt, … (<stdarg.h>) to accomplish it.

Usage :
./compressor –i input.txt –o output.txt

Refernece:

+Nibble	http://en.wikipedia.org/wiki/Nibble
*BASE64	http://en.wikipedia.org/wiki/Base64
	https://www.base64decode.org/

**Getopt http://en.wikipedia.org/wiki/Getopt

Input

```
21232A30393C3F405B5E606F7E
2123
```

Output

```
ISMqMDk8P0BbXmBvfg==
ISM=
```

Execution

```
./compressor -i input.txt -o output.txt
```

General information:

- Deadline: 2020/09/24 12:00.
- Submit your programming assignment to Moodle system.
- Submitted file format: student-ID_Name.zip, e.g. F12345678_王曉明.zip
- Submitted directory structure:

```
| -- F12345678_王曉明
    | -- F12345678_王曉明.pdf
    | -- code
        | -- xxxxx.c
        | -- xxxxx.c
```

- Your submitted file must contain **Source Code** & **Readme file** (Program description)
- Late homework will not be accepted
- There is a “zero tolerance” for plagiarism. You will receive a score of zero if you get caught plagiarizing.

Course Provisions

1. Program execution environment : Windows、Linux
2. Programming language : C (standard: C11) (**Languages other than C are not accepted**)
3. Submitted programming homework must include **source code** in .c data type, and **readme document** in .pdf data type. You are required to address the **(1) result screenshot, (2) program architecture, (3) program functions and (4) how you design your program** in readme file. Do not just write the pseudo code or even just copy and paste your code!
4. **There is a "zero tolerance" for plagiarism. You will receive a score of zero if you get caught plagiarizing.**
5. Please submit your programing homework to moodle.
6. Late homework is not accepted.
7. Programming homework grade is divided into two parts: 80% for the code and 20% for the readme file. **Partial points will still be awarded if the output results of your program are partly correct**. The remaining grading standards are decided by the TAs.
8. **Please name the filename of your submitted compressed file (e.g. F12345678_王曉明.zip) after your student ID number. 20 points will be deducted otherwise.**

TA time of the course:

Mon. 15:00 - 17:00

Wed. 11:00 – 12:00

Lab location: CSIE Bldg. Room 65302

If you have any question, please make an appointment in advance.

You can also mail us about your questions.

TA e-mail: ta_@dblab.csie.ncku.edu.tw