Assignment 2 : Programming in C

Data and File Structures Laboratory

Deadline : 12 August 2016

Posted on : 06 August 2016

Clarification by 10 August 2016

Programming Environment

Login to the virtual machine, where CS16XX is your roll number

`ssh mtc16XX@192.168.64.35`	if you use *vi* or *emacs*
`ssh -X mtc16XX@192.168.64.35`	if you use *gedit*

Set up the basic programming environment for Assignment 2

`cd dfslab`	go to the directory for DFS Lab
`mkdir -p assign2`	create directory for Assignment 2
`cd assign2`	go to the directory for Assignment 2

Create the solutions for Assignment 2 (e.g., in *gedit*)

`gedit cs16XX-assign2-progY.c`	Y = problem number

Programming Environment

First few lines of *every* assignment program

```
/*-------------------------------------
Name :
Roll :
Date :
Desc :
Acks :
-------------------------------------*/
```

Compiling and running your program

```
gcc -g -Wall -o progY cs16XX-assign2-progY.c
./progY
```

Problem 1

Write a program that converts units of several entities, as follows.

Temperature	`temp`	Centigrade and Fahrenheit
Time	`time`	Seconds, Minutes and Hours
Energy	`energy`	Joule, Gramcalorie and BTU
Length	`length`	Metre, Yard and Foot
Distance	`distance`	Kilometre, Mile and Nauticalmile
Mass	`mass`	Kilogram, Pound and Ounce

```
$ ./convert temp 25.5 Centigrade to Fahrenheit
25.5 Centigrade = 77.9 Fahrenheit
$ ./convert distance 5.23 Kilometre to Nauticalmile
5.23 Kilometre = 2.823974 Nauticalmile
```

Problem 2

Write a program that displays the hex dump of a file as shown in the example. The value of each byte should be displayed as a pair of hexadecimal numbers. The name of the file and the number of bytes displayed per line should be taken as command line arguments. If not specified, the default number of bytes displayed per line is 16.

```
$ ./hexdump -b 16 filename.c
20 2A 20 68 65 78 5F 63 68 61 72 28 63 68 61 72     * hex_char(char
20 2A 70 6F 73 69 74 69 6F 6E 2C 20 63 68 61 72     *position, char
20 63 29 0A 20 20 20 7B 0A 20 20 20 73 70 72 69     c).   {.   spri
6E 74 66 28 70 6F 73 69 74 69 6F 6E 2C 20 22 25    ntf(position, "%
30 32 58 20 22 2C 20 63 29 3B 20 0A 0A 09 09 09    02X ", c); .....
```

Problem 3

Write a C program that takes as command-line inputs a string and the names of multiple files (number of files not fixed), and outputs the locations of the search string in each of the input files, if it is found at all. The location of the string may be the line numbers.

```
$ ./searchstring pdslab firstfile.txt secondfile.txt thirdfile.txt
firstfile.txt:5
firstfile.txt:23
thirdfile.txt:7
$ ./searchstring pdslab secondfile.txt
String pdslab not found
```

Bonus Problem

Rishi and Sourav are playing a game – picking some coins out of a pile – in turn. Each time a player is allowed to pick **1 or 2 or 4 coins**, and the player that gets the last coin of the pile is the winner. Given the number of coins and the order of players (command-line), write a program to calculate the winner of the game, and calculate how many different strategies there are for that player to win the game.

```
$ ./coingame 1 sourav rishi
sourav 1
$ ./coingame 2 sourav rishi
sourav 1
$ ./coingame 3 sourav rishi
rishi 2
```

```
$ ./coingame 10 rishi sourav
rishi 22
$ ./coingame 25 rishi sourav
rishi 3344
$ ./coingame 30 rishi sourav
sourav 18272
```

Submission Procedure

Login to the server, and go to your directory for Assignment 2

```
ssh mtc16XX@192.168.64.35        your home on the server
cd dfslab/assign2/               directory for Assignment 2
```

Create the target directory for Assignment 2 submission

```
mkdir /user1/perm/pdslab/cs16XX/assign2
```

Copy all solution files for Assignment 2 from `dfslab/assign2/` to the target directory `/user1/perm/pdslab/cs16XX/assign2/`

Verify that your solutions for Assignment 2 are indeed submitted

```
ls -lsa /user1/perm/pdslab/cs16XX/assign2/
```