EC1003: 程式設計

Spring, 2018

Homework 5
Due: 23:55PM, June 19, 2017

1. (Prob. 10.14) (Reversing the order of an integer's bit) Write a program that reverses the order of the bits in an unsigned int value. The program should input the value from the user and call function reverseBits to print the bits in reverse order. Print the value in bits both before and after the bits are reversed to confirm that the bits are reversed properly.

2. (Outputting ASCII Values to a File) Write a program that gives an option to the user: either to print ASCII values of lowercase characters or to print ASCII values of uppercase characters. Write the results to the file "values.dat" so you may print the results later. The format for the results in the file should be as follows:

Character	ASCII value
A	65
B	66
C	67
.	
.	
.	
Z	90

3. (Prob. 12.7) (Inserting into an ordered list) write a program that inserts 10 random characters between a and z in order in a linked list. The program should print the characters of the list in uppercase.

4. Create a structure type to represent a battery. A battery_t variable's components will include the voltage, how much energy the battery is capable of storing, and how much energy it is currently storing (in joules). Define functions for input and output of batteries. Create a function called power_device that (a) takes the current of an electrical device (amps) and the time the device is to be powered by the battery (seconds) as input parameters and (b) takes a battery as an input/output parameter. The function first determines whether the battery's energy reserve is adequate to power the device for the prescribed time. If so, the function updates the battery's energy reserve by subtracting the energy consumed and then returns the value true (1). Otherwise it returns the value false (0) and leaves the energy reserve unchanged. Also define a function named max_time that takes a battery and the current of an electrical device as input parameters and returns the number of seconds the battery can operate the device before it is fully discharged. This function does not change any of the battery's component values. Write a function recharge that sets to the maximum capacity the battery's component representing present energy reserve. Use the following equations in your design:

$$p = vi \qquad p = \text{power in watts (W)}$$
$$v = \text{voltage in volts (V)}$$

$$w = pt \qquad i = \text{current in amps (A)}$$
$$w = \text{energy in joules (J)}$$
$$t = \text{time in seconds (s)}$$

For this simulation, neglect any loss of energy in the transfer from battery to device.

Create a main function that declares and initializes a variable to model a 12-V automobile battery with a maximum energy storage of 5×10^6 J. Use the battery to power a 4-A light for 15 minutes, and then find out how long the battery's remaining energy could power an 8-A device. After recharging the battery, recalculate how long it could operate an 8-A device.

Handin

1. Running results
2. Source code (You must add comments in your code.)