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/*-------------------------------------------------------------
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Course Code: CSCI291
Purpose of the Program: Functions performed with a battery
Question Number: 1
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/*The program runs in Quincy and Dev-C++ 5.11*/

/*-------------------------------------------------------------*/

/*file headers*/
#include<stdbool.h> /*using bool data type*/
#include<stdio.h> /*using statements for input and output*/

/*for defining battery as a structure*/
typedef struct {
      float voltage;
      float max_energy;
      float cur_energy;
      } battery_t;

/*function prototypes*/
bool power_device (battery_t* bat_power, float time_req, float
current_dev);
float max_time (battery_t* bat_duration, float current_maxt);
float recharge (battery_t* bat_recharge);

/*main function*/
int main ()

{

/*declaring variables and their data types*/
battery_t battery, bat_power, bat_duration, bat_recharge;
int option;

bool powered; /*variable for storing the 1st function */
float current_dev, time_req;

float duration; /*variable for storing the 2nd function*/
float current_maxt;

float recharged; /*variable for storing the 3rd function*/


/*asking user to input details of the battery that is being used*/
printf("Enter the following details of the battery: \n");

      printf("Enter the Voltage = "); /*for inputting voltage*/
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      scanf("%f", &battery.voltage);   /*input type and variable where
it would be stored*/

      printf("Enter the Maximum Energy = ");/*for inputting maximum
energy*/
      scanf("%f", &battery.max_energy); /*input type and variable where
it would be stored*/

      printf("Enter the Current Energy = "); /*for inputting current
energy*/
      scanf("%f", &battery.cur_energy); /*input type and variable where
it would be stored*/



/*displaying functions that can be performed and asking the user to
choose the option*/
printf("Choose what function number you want to perform with the
battery: \n");
printf("1. Can the battery power a device for a certain time? \n");
printf("2. How long can the batttery power a device? \n");
printf("3. Recharge the battery \n");
scanf("%d", &option); /*for inputting the chosen option*/

/*using switch statement to select options*/
switch (option)

{
case 1: /*for providing power to a device */

      {
      printf("Enter the current of the electrical device = ");
      scanf("%f", &current_dev);

      printf("Enter the time (in seconds) the device has to be powered
by battery = ");
      scanf("%f", &time_req);

      powered = power_device(&battery, time_req, current_dev);
/*function call for 1st function*/

            if (powered==1)
            {
            printf("The device is powered. \n" );
            }
            else
            printf("The battery can't power the device for so long.
\n");

      break;
      }
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case 2: /*for finding the maximum time the battery can provide power*/

      {
      printf("Enter the current of the electrical device = ");
      scanf("%f", &current_maxt);

      duration = max_time (&battery, current_maxt); /*function call for
2nd function*/

      printf("The battery can provide power for %f seconds. \n" ,
duration);
      break;
      }

case 3: /*for recharging the battery to its maximum energy level*/

      {
      recharged = recharge (&battery); /*function call for 3rd
function*/
      printf(" The battery is recharged back to its original %f
energy", recharged);
      break;
      }

default: /*action if wrong option is selected*/
      printf("Wrong Option Selected");
}

return (0); /*end of main function*/
}

/*-------------------------------------------------------------------
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/*function definitions*/


/*for power device function*/
bool power_device (battery_t* bat_level, float time_req, float
current_dev)
{

float device_level; /*variable used to store the required energy to
provide to the device*/

device_level = bat_level->voltage*current_dev*time_req; /*using
formula w=vit*/

printf("Power required for device is %f \n", device_level );
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if (device_level<bat_level->cur_energy) /*comparing required energy
with current energy*/
{
     bat_level->cur_energy=bat_level->cur_energy-device_level; /*the
updated energy level after powering the device*/

     printf("The remaining energy of battery after powering the device
is %f \n", bat_level->cur_energy);

     return 1; /*if current energy was more than the required energy
for the device*/
}

else
     return 0; /*if current energy was less than the required energy
for the device*/
}



/*for maximum time function*/
float max_time (battery_t* bat_duration, float current_maxt)
{
float time_operate; /*variable used to store the maximum time the
battery can provide energy to a device*/

time_operate = bat_duration->cur_energy/(current_maxt*bat_duration-
>voltage); /*using the formula w=pt where p=vi, and is solved for t*/

     return time_operate;

}



/*for recharging function*/
float recharge (battery_t* bat_recharge)
{
     /*equating the current battery energy to be the same as the
maximum energy */
     return bat_recharge->cur_energy = bat_recharge->max_energy;

}

/*-------------------------------------------------------------------
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/*end of the c program*/
```