Lab 2 C Programming Basics

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Objective

In this lab we are working on C programming. The objective is familiar with type casting, control flow and looping statements, variable size, shift operator and by using shift operator to perform bit masking. After finish this lab I am more familiar with C programming as well as the coding software eclipse.

Discussion

We have two tasks. In task one, creating a C program by using switch statement for options. In the first option, factorial of a number, there is a cap that allows no more than 20 to find its factorial because the limitation by length of unsigned short in 64 bits basis computer. After running the program I found that the number somehow compromised because we are running 32 bits computer.

Option 2 is to check weather a certain year is a leap year or not. We are using % operator to find remainder of the input year number, by mathematical way we will differentiate a leap year and a normal-length year.

In option 3, another form of if-else statement is used.

In option 4, type casting to convert from int to float.

Option 5 is exit a while loop.

In task 2, we are taking decimal number and displays its binary representation. There are two ways of doing this in our code, the first one is to use arithmetic operations, by mathematical way of doing this, we can use the remainder as we keep divide the input by two and that is the binary expression.

The second way of doing this task is to use bit masking. By Boolean logic “AND” we will find out if a certain number is 1 or 0. Because only 1 AND 1 gives result 1. Using bit shifting and loop statement also a way to complete this task.

Comments to this lab

This lab is quite informative about C programming, it gives me an idea of how to use type casting, control flow and looping statements, variable size, shift operator and by using shift operator to perform bit masking. By using these basic concept, more possibilities of function, tasks and project could be done.

Code

See appendix

include <stdio.h>  
#include <stdlib.h>  
  
int main(void) {  
    int in\_put, flag =1;  
    while(flag == 1){  
    printf("please enter function number you want to use\n 1: Factorial of a number\n 2:Leap year or not\n 3:Maximum\n 4:Division of two numbers\n 5:Exit");  
    fflush(stdout);  
    scanf("%d",&in\_put);  
    switch(in\_put)  
    {  
    case 1:  
    {  
unsigned short a;  
unsigned long b=1;  
int i;  
    printf("\nEnter your number smaller or equals to 20(64 bits)for factorial:");  
    fflush(stdout);  
    scanf("%u",&a);  
    while(a>20)  
    {    printf("\n number is too big please re-enter:\n");  
    fflush(stdout);  
        scanf("%u",&a);  
    }  
        for(i=1;i<=a;i++)  
        {  
            b\*=(unsigned long)i;  
        }  
        printf("\n the factorial of %u is %lu",a,b);  
        break;  
    }  
    case 2:{  
unsigned int year;  
printf("\n Please enter the year you want to see whether leap year or not:\n");  
fflush(stdout);  
    scanf("%u",&year);  
if (year%4 ==0)  
{  
    if (year %100 ==0)  
    {  
        if (year %400 ==0)  
        {  
        printf("\n The year of %u is a leap year\n",year);  
        fflush(stdout);  
        }  
        else  
        {  
        printf("\n The year of %u is not a leap year\n",year);  
        fflush(stdout);  
        }  
    }  
    else  
    {  
    printf("\n The year of %u is a leap year\n",year);  
    fflush(stdout);  
    }  
}  
else  
{  
 printf ("\n The year of %u is not a leap year\n",year);  
 fflush(stdout);  
}  
break;  
}  
    case 3:  
    {  
float num1,num2;  
printf("\n Please enter the first number:\n");  
fflush(stdout);  
scanf("%f",&num1);  
printf("\n Please enter the second number:\n");  
fflush(stdout);  
scanf("%f",&num2);  
(num1>num2)?printf("\n larger!"):printf("\n smaller!!");  
        break;  
    }  
    case 4:{  
int numb1,numb2;  
float output;  
printf("\n Please enter the first number:\n");  
fflush(stdout);  
scanf("%d",&numb1);  
printf("\n Please enter the second number:\n");  
fflush(stdout);  
scanf("%d",&numb2);  
output = (float)numb1/numb2;  
printf("out put is %f\n",output);  
        break;}  
    case 5:{  
        flag =0;  
        break;}  
    default:  
    {  
        printf("\nWARNING!!!!!Please enter number 1 to 5\n");  
        break;  
    }  
    }  
    }  
    return 0;  
}  
  
  
#include <stdio.h>  
#include <stdlib.h>  
#include <math.h>  
  
int main(void) {  
   int a[8],i=0,m,n;  
   unsigned short input;  
   printf("\nPlease select the mode you want for conversion 1: mathematical way 2: bit shifting way\n");  
    fflush(stdout);  
    scanf("%d",&n);  
switch(n)  
{case 1:{  
printf("\nYou are entering mathematical way, please key in the number you want to convert:");  
fflush(stdout);  
  
scanf("%hu",&input);  
  
while(input>1)  
{a[i++] = (unsigned short)input%2;  
input=input/2;  
}  
printf("Binary number is:");  
for(m=i-1;m>=0;m--)  
{  
    printf("\n%d",a[i]);  
 fflush(stdout);  
}  
break;  
}  
case 2:  
{  
int mask = 10000000;  
printf("\nYou are entering masking way, please key in the number you want to convert:");  
fflush(stdout);  
scanf("%hu",&input);  
while(mask>0)  
{  
if((input&mask) ==0)//bit masking to check if the number is 0 or not  
{printf("0");  
fflush(stdout);}  
else  
{printf("1");  
fflush(stdout);}  
mask = mask>>1;//shift operator to shift 10000000 to left by one bit  
}  
break;  
}  
default:  
break;  
}  
    return 0;  
}