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Report: hw6\_1 + hw6\_2

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Description: 利用integer pointer(hw6\_1)和union(hw6\_2)來進行

1. Float to binary number

2. Binary number to float

3. Binary number to double

三者的運算.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*hw6\_1 Code:

#include <stdio.h>

#include <stdlib.h>

#include <math.h>

int main(){

unsigned cher;

int i,j,k,m,n;

float f;

unsigned mask = 1<<31 ;

/////////////////////////////////////////////////////////

printf("Input the float number:"); //Float to binary number

scanf("%f",&f);

cher =\*(unsigned\*)&f;

for (i=0;i<32;i++)

{

putchar(mask & cher? '1' : '0' );

cher <<=1;

}

/////////////////////////////////////////////////////////

printf("\n"); // Binary number to float

printf("Input binary number to convert float number:");

printf("\n");

int a[32] = {0};

char c[32];

int x,y;

scanf("%s",&c);

for (i=0;i<32;i++)

a[i] = c[i] - '0';

y=1;x=0;

for (i=8;i>=1;i--) // Exponent

{

if (a[i] == 1)

x = x+y;

y=y\*2;

}

float rx,ry;

int e;

e=0;

ry=0.5;

for (i=9;i<=31;i++) //Mantissa

{

if (a[i] == 1)

rx = ry + rx;

ry=ry\*0.5;

}

e = x - 127;

m=0;n=0;j=0;

float ans = 1;

while (e>=0 & j==0) //Mantissa

{

ans = ans\*2;

n++;

if (n==e)

j=1;

}

while (e<0 & j==0) //Mantissa

{

ans = ans\*0.5;

n--;

if (n==e)

j=1;

}

float final = (1 + rx) \* ans;

if (a[0]==1) //Sign bit

final = final \*-1;

printf("%f",final);

/////////////////////////////////////////////////////////

printf("\n"); //Binary number to double

printf("Input binary number to convert double number:");

printf("\n");

int la[64] = {0};

char lc[64];

long long int lx,ly;

scanf("%s",&lc);

for (i=0;i<64;i++)

la[i] = lc[i] - '0';

ly=1;lx=0;

for (i=11;i>=1;i--) // Exponent

{

if (la[i] == 1)

lx = lx+ly;

ly=ly\*2;

}

double lrx,lry;

long long int le;

le=0;

lry=0.5;

for (i=12;i<=63;i++) //Mantissa

{

if (la[i] == 1)

lrx = lry + lrx;

lry=lry\*0.5;

}

le = lx - 1023;

m=0;n=0;j=0;

double lans = 1;

while (e>=0 & j==0) //Mantissa

{

lans = lans\*2;

n++;

if (n==le)

j=1;

}

while (e<0 & j==0) //Mantissa

{

lans = lans\*0.5;

n--;

if (n==le)

j=1;

}

double lfinal = (1 + lrx) \* lans;

if (la[0]==1) //Sign bit

lfinal = lfinal \*-1;

printf("%lf\n",lfinal);

return 0 ;

}

Compilation:

gcc hw6\_1.c -o hw6\_1

Execution:

./hw6\_1

Input:

1. Float

2. Binary

3. Binary 64-bit

Output:

Input the float number:

(1. binary number)

Input binary number to convert float number:

(2. float)

Input binary number to convert double number:

(3. double)

error massage:

在char的轉換及次方運算有出現錯誤,解決後沒有問題.

hw6\_2 Code:

#include <stdio.h>

#include <stdlib.h>

#include <math.h>

union array{

char c[32];

char lc[64];

};

int main(){

unsigned cher;

int i,j,k,m,n;

float f;

unsigned mask = 1<<31 ;

union array ar;

/////////////////////////////////////////////////////////

printf("Input the float number:"); //Float to binary number

scanf("%f",&f);

cher =\*(unsigned\*)&f;

for (i=0;i<32;i++)

{

putchar(mask & cher? '1' : '0' );

cher <<=1;

}

/////////////////////////////////////////////////////////

printf("\n"); // Binary number to float

printf("Input binary number to convert float number:");

printf("\n");

int a[32] = {0};

int x,y;

scanf("%s",&ar.c);

for (i=0;i<32;i++)

a[i] = ar.c[i] - '0';

y=1;x=0;

for (i=8;i>=1;i--) // Exponent

{

if (a[i] == 1)

x = x+y;

y=y\*2;

}

float rx,ry;

int e;

e=0;

ry=0.5;

for (i=9;i<=31;i++) //Mantissa

{

if (a[i] == 1)

rx = ry + rx;

ry=ry\*0.5;

}

e = x - 127;

m=0;n=0;j=0;

float ans = 1;

while (e>=0 & j==0) //Mantissa

{

ans = ans\*2;

n++;

if (n==e)

j=1;

}

while (e<0 & j==0) //Mantissa

{

ans = ans\*0.5;

n--;

if (n==e)

j=1;

}

float final = (1 + rx) \* ans;

if (a[0]==1) //Sign bit

final = final \*-1;

printf("%f",final);

/////////////////////////////////////////////////////////

printf("\n"); //Binary number to double

printf("Input binary number to convert double number:");

printf("\n");

int la[64] = {0};

long long int lx,ly;

scanf("%s",&ar.lc);

for (i=0;i<64;i++)

la[i] = ar.lc[i] - '0';

ly=1;lx=0;

for (i=11;i>=1;i--) // Exponent

{

if (la[i] == 1)

lx = lx+ly;

ly=ly\*2;

}

double lrx,lry;

long long int le;

le=0;

lry=0.5;

for (i=12;i<=63;i++) //Mantissa

{

if (la[i] == 1)

lrx = lry + lrx;

lry=lry\*0.5;

}

le = lx - 1023;

m=0;n=0;j=0;

double lans = 1;

while (e>=0 & j==0) //Mantissa

{

lans = lans\*2;

n++;

if (n==le)

j=1;

}

while (e<0 & j==0) //Mantissa

{

lans = lans\*0.5;

n--;

if (n==le)

j=1;

}

double lfinal = (1 + lrx) \* lans;

if (la[0]==1) //Sign bit

lfinal = lfinal \*-1;

printf("%lf\n",lfinal);

return 0 ;

}

Compilation:

gcc hw6\_2.c -o hw6\_2

Execution:

./hw6\_2

Input:

1. Float

2. Binary

3. Binary 64-bit

Output:

Input the float number:

(1. binary number)

Input binary number to convert float number:

(2. float)

Input binary number to convert double number:

(3. double)

error massage:

進行32-BIT到64-BIT修改時忘記把127改成1023,導致錯誤一直出現,修改後無問題.

2.

(1)

#include <stdio.h>

#include <float.h>

int main()

{

float a,b;

a=FLT\_MIN;

b=1.175494350822287507968736537222245677818665556772087521508751706278417259454727172851560500000000000000000000000000000000e-38f;

if(a==b)

printf("Yes");

else

printf("No");

return 0;

}

答案為YES,可知1.175494350822287507968736537222245677818665556772087521508751706278417259454727172851560500000000000000000000000000000000e-38f 為最小的floating point number.

(2)

00000000000000000000000000000000

(3)

因為程序沒有給予要精確到哪個位置(精確度),所以得此結果.