# **Non Restoring Division Algorithm**

#include <math.h>

#include <stdio.h>

//NON RESTORING DIVISION

int main()

{

int a[50],a1[50],b[50],d=0,i,j;

int n1,n2, c, k1,k2,n,k,quo=0,rem=0;

printf("Enter the number of bits\n");

scanf("%d",&n);

printf("Enter the divisor and dividend\n");

scanf("%d %d", &n1,&n2);

for (c = n-1; c >= 0; c--)//converting the 2 nos to binary

{

k1 = n1 >> c;

if (k1 & 1)

a[n-1-c]=1;// M

else

a[n-1-c]=0;

k2 = n2 >> c;

if (k2 & 1)

b[2\*n-1-c]=1;// Q

else

b[2\*n-1-c]=0;

}

for(i=0;i<n;i++)//making complement

{

if(a[i]==0)

a1[i]=1;

else

a1[i]=0;

}

a1[n-1]+=1;//twos complement ie -M

if(a1[n-1]==2)

{

for(i=n-1;i>0;i--)

{

if(a1[i]==2)

{

a1[i-1]+=1;

a1[i]=0;

}

}

}

if(a1[0]==2)

a1[0]=0;

for( i=0;i<n;i++)// putting A in the same array as Q

{

b[i]=0;

}

printf("A\tQ\tPROCESS\n");

for(i=0;i<2\*n;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}

printf("\n");

for(k=0;k<n;k++)//n iterations

{

for(j=0;j<2\*n-1;j++)//left shift

{

b[j]=b[j+1];

}

for(i=0;i<2\*n -1;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}printf("\_");

printf("\tLEFT SHIFT\n");

if(b[0]==0)

{

for(i=n-1;i>=0;i--)//A=A-M

{

b[i]+=a1[i];

if(i!=0)

{

if(b[i]==2)

{

b[i-1]+=1;

b[i]=0;

}

if(b[i]==3)

{

b[i-1]+=1;

b[i]=1;

}

// printf("%d",b[i]);

}

}

if(b[0]==2)

b[0]=0;

if(b[0]==3)

b[0]=1;

for(i=0;i<2\*n -1;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}printf("\_");

printf("\tA-M\n");

}

else

{

for(j=n-1;j>=0;j--)//A=A+M

{

b[j]+=a[j];

if(j!=0)

{

if(b[j]==2)

{

b[j-1]+=1;

b[j]=0;

}

if(b[j]==3)

{

b[j-1]+=1;

b[j]=1;

}

}

if(b[0]==2)

b[0]=0;

if(b[0]==3)

b[0]=1;

}

for(i=0;i<2\*n -1;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}printf("\_");

printf("\tA+M\n");

}

if(b[0]==0)//A==0?

{

b[2\*n-1]=1;

for(i=0;i<2\*n ;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}

printf("\tQ0=1\n");

}

if(b[0]==1)//A==1?

{

b[2\*n-1]=0;

for(i=0;i<2\*n ;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}

printf("\tQ0=0\n");

}

}

if(b[0]==1)

{

for(j=n-1;j>=0;j--)//A=A+M

{

b[j]+=a[j];

if(j!=0)

{

if(b[j]==2)

{

b[j-1]+=1;

b[j]=0;

}

if(b[j]==3)

{

b[j-1]+=1;

b[j]=1;

}

}

if(b[0]==2)

b[0]=0;

if(b[0]==3)

b[0]=1;

}

for(i=0;i<2\*n;i++)

{

if(i==n)

printf("\t");

printf("%d",b[i]);

}

printf("\tA+M\n");

}

printf("\n");

for(i=n;i<2\*n;i++)

{

quo+= b[i]\*pow(2,2\*n-1-i);

}

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

{

rem+= b[i]\*pow(2,n-1-i);

}

printf("The quotient of the two nos is %d\nThe remainder is %d",quo,rem);

printf("\n");

return 0;

}

Output:

