



Vidyavardhini's College of Engineering and Technology

Department of Artificial Intelligence & Data Science

Experiment No. 8
Implement Restoring algorithm using c-programming
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Aim: To implement Restoring division algorithm using c-programming.

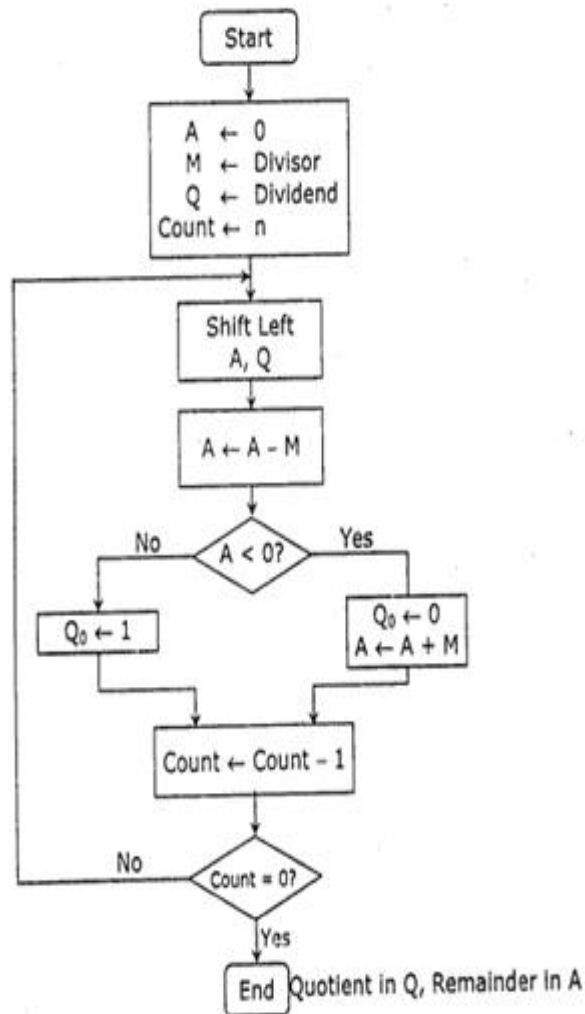
Objective -

1. To understand the working of Restoring division algorithm.
2. To understand how to implement Restoring division algorithm using c-programming.

Theory:

- 1) The divisor is placed in M register, the dividend placed in Q register.
- 2) At every step, the A and Q registers together are shifted to the left by 1-bit
- 3) M is subtracted from A to determine whether A divides the partial remainder. If it does, then Q0 set to 1-bit. Otherwise, Q0 gets a 0 bit and M must be added back to A to restore the previous value.
- 4) The count is then decremented and the process continues for n steps. At the end, the quotient is in the Q register and the remainder is in the A register.

Flowchart



Perform $8 \div 3$ by restoring division technique.

	A Register	Q Register	
Initially	0 0 0 0 0	1 0 0 0	First Cycle
Shift	0 0 0 0 1	0 0 0 □	
Subtract M	<u>1 1 1 0 1</u>		
Set Q₀	① 1 1 1 0		
Restore(A+M)	<u>0 0 0 1 1</u>	0 0 0 ①	Second Cycle
Shift	0 0 0 1 0	0 0 ① □	
Subtract M	<u>1 1 1 0 1</u>		
Set Q₀	① 1 1 1 1		
Restore(A+M)	<u>0 0 0 1 1</u>	0 0 ① ①	Third Cycle
Shift	0 0 1 0 0	0 ① ① □	
Subtract M	<u>1 1 1 0 1</u>		
Set Q₀	① 0 0 0 1		
Shift	0 0 0 1 0	0 ① ① ①	Fourth Cycle
Subtract M	<u>1 1 1 0 1</u>	① ① ① □	
Set Q₀	① 1 1 1 1		
Restore(A+M)	<u>0 0 0 1 1</u>	① ① ① ①	
	0 0 0 1 0	① ① ① ①	
	Remainder	Quotient	

Program-

```

#include<stdlib.h>
#include<stdio.h>
int acum[100]={0} ;
void add(int acum[],int b[],int n);
int q[100],b[100];
int main()
{
    int x,y;
    printf("Enter the Number :");
    scanf("%d%d",&x,&y);
    int i=0;
    while(x>0 || y>0)
    {
        if(x>0)
        {
            q[i]=x%2;
            x=x/2;
        }
    }
}
  
```

```

else
{
q[i]=0;
}
if(y>0)
{
b[i]=y%2;
y=y/2;
}
else
{
b[i]=0;
}
i++;
}

int n=i;
int bc[50];
printf("\n");
for(i=0;i<n;i++)
{
if(b[i]==0)
{
bc[i]=1;
}
else
{
bc[i]=0;
}
}
bc[n]=1;
for(i=0;i<=n;i++)
{
if(bc[i]==0)
{
bc[i]=1;
i=n+2;
}
else
{
bc[i]=0;
}
}
int l;
b[n]=0;
int k=n;
int n1=n+n-1;
int j,mi=n-1;
for(i=n;i!=0;i--)
{
for(j=n;j>0;j--)

```

```

{
    acum[j]=acum[j-1];

}
acum[0]=q[n-1];
for(j=n-1;j>0;j--)
{
    q[j]=q[j-1];
}

add(acum,bc,n+1);
if(acum[n]==1)
{
    q[0]=0;
    add(acum,b,n+1);
}
else
{
    q[0]=1;
}
}
printf("\nQuoient  :");

for( l=n-1;l>=0;l--)
{
    printf("%d",q[l]);

}
printf("\nRemainder : ");
for( l=n;l>=0;l--)
{
    printf("%d",acum[l]);
}
return 0;
}
void add(int acum[],int bo[],int n)
{
    int i=0,temp=0,sum=0;
    for(i=0;i<n;i++)
    {
        sum=0;
        sum=acum[i]+bo[i]+temp;
        if(sum==0)
        {
            acum[i]=0;
            temp=0;
        }
        else if (sum==2)
        {
            acum[i]=0;
            temp=1;

```

```
}  
else if(sum==1)  
{  
    acum[i]=1;  
    temp=0;  
}  
else if(sum==3)  
{  
    acum[i]=1;  
    temp=1;  
}  
}  
}
```

Output –

Input:

15 7

Output:

Enter the Number :

Quoient: 0010

Remainder: 00001

Conclusion –

In this experiment, we learned about the division algorithm in computer architecture which is the Restoring Algorithm.