



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:

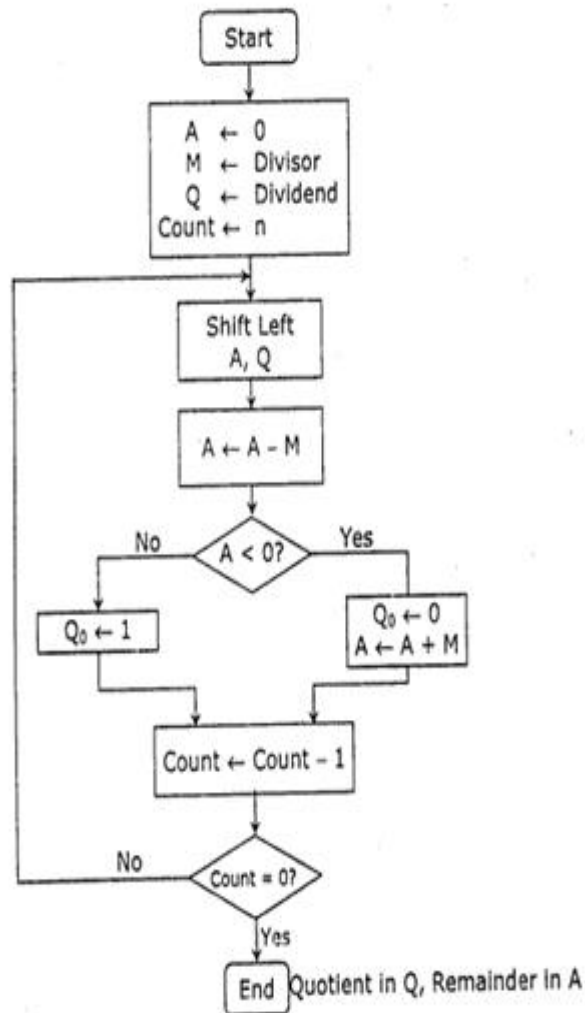
- 1) The divisor is placed in M register, the dividend placed in Q register.
- 2) At every step, the A and Q registers together are shifted to the left by 1-bit
- 3) M is subtracted from A to determine whether A divides the partial remainder. If it does, then Q0 set to 1-bit. Otherwise, Q0 gets a 0 bit 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.



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Flowchart



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

	A Register	Q Register	
Initially	0 0 0 0 0	1 0 0 0	
Shift	0 0 0 0 1	0 0 0 □	
Subtract M	1 1 1 0 1		
Set Q₀	① 1 1 1 0		First Cycle
Restore(A+M)	0 0 0 1 1		
	0 0 0 0 1	0 0 0 ①	
Shift	0 0 0 1 0	0 0 ① □	
Subtract M	1 1 1 0 1		
Set Q₀	① 1 1 1 1		Second Cycle
Restore(A+M)	0 0 0 1 1		
	0 0 0 1 0	0 0 ① ①	
Shift	0 0 1 0 0	0 ① ① □	
Subtract M	1 1 1 0 1		
Set Q₀	① 0 0 0 1		Third Cycle
Shift	0 0 0 1 0	0 0 ① ①	
Subtract M	1 1 1 0 1	① ① ① □	
Set Q₀	① 1 1 1 1		Fourth Cycle
Restore(A+M)	0 0 0 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)
        {

```



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```
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;
```



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```
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;
```



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```
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.