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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Date of Performance:

Date of Submission:

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:

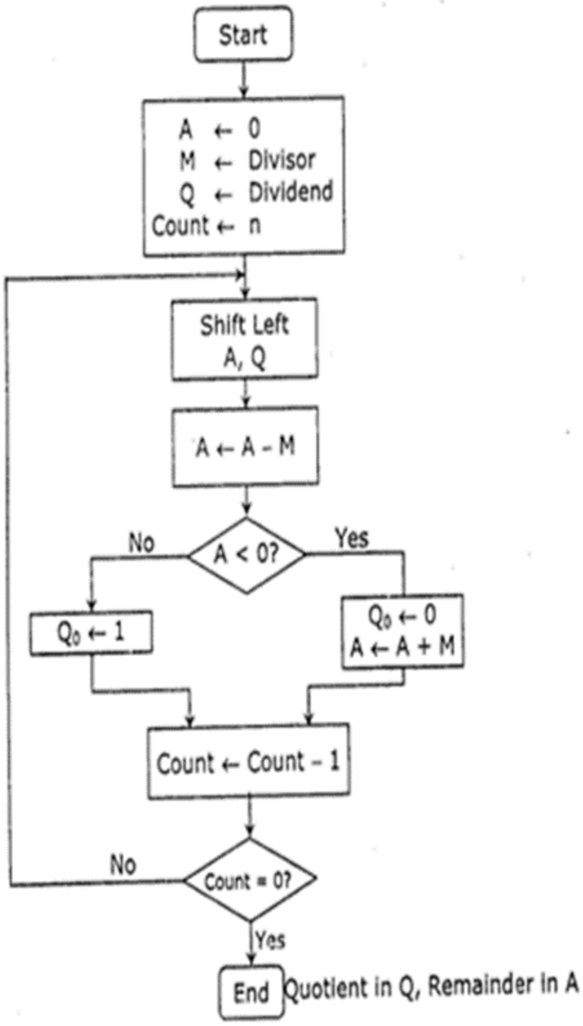
1) The divisor is placed in M register, the dividend placed in Q register.

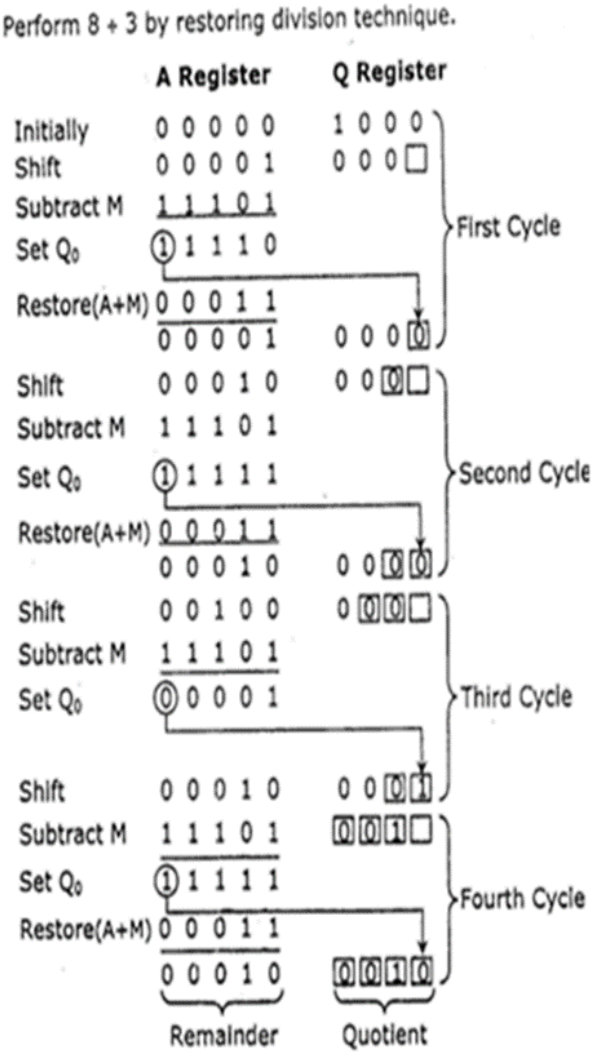
2) At every step, the A and Q registers together are shifted to the left by 1-bit

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 ÷ 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	1 1 1 0 1		
Set Q_0	① 1 1 1 0		
Restore(A+M)	0 0 0 1 1		
	0 0 0 0 1	0 0 0 0	
Shift	0 0 0 1 0	0 0 0 □	Second Cycle
Subtract M	1 1 1 0 1		
Set Q_0	① 1 1 1 1		
Restore(A+M)	0 0 0 1 1		
	0 0 0 1 0	0 0 0 0	
Shift	0 0 1 0 0	0 0 0 □	Third Cycle
Subtract M	1 1 1 0 1		
Set Q_0	⓪ 0 0 0 1		
Shift	0 0 0 1 0	0 0 0 1	
Subtract M	1 1 1 0 1	0 0 1 □	Fourth Cycle
Set Q_0	① 1 1 1 1		
Restore(A+M)	0 0 0 1 1		
	0 0 0 1 0	0 0 1 0	
	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.