



A.Y. 2022-2023

Subject: Process Organization and Architecture

SAP ID: 60004220253 – Devansh Mehta

Experiment No: 01

Aim: To implement Booth's Algorithm for signed and unsigned integer multiplication.

Code and Output:

Booth's Algorithm:

```
def twosComplement(num):
    onesComp=""
    for i in num:
        if i == "0":
            onesComp += "1"
        else:
            onesComp += "0"

    return bin(int(onesComp,2) + int("1",2)).replace('0b','')

num1 = int(input('Enter number: '))
num2 = int(input('Enter 2nd number: '))

binNum1 = bin(abs(num1)).replace("0b","")
binNum2 = bin(abs(num2)).replace("0b","")

if len(binNum1) >= len(binNum2):
    maxlen = len(binNum1)
else:
    maxlen = len(binNum2)

maxlen +=1

binNum1 = binNum1.zfill(maxlen)
binNum2 = binNum2.zfill(maxlen)
if num2 < 0:
    binNum2 = twosComplement(binNum2)
if num1 < 0:
    binNum1 = twosComplement(binNum1)

binCompNum1 = twosComplement(binNum1)
binCompNum1 = binCompNum1.zfill(maxlen)
print('Number 1 binary:',binNum1)
print('Number 2 binary:',binNum2)
print('Number 1 complement:',binCompNum1)

count = maxlen
```



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```
m = binNum1
minusb = binCompNum1
q = binNum2
q1 = '0'
a = "0"
a = a.zfill(maxlen)
rightshift=""
while count > 0:
    if q1 == '1' and q[maxlen-1] == '0':
        a = bin(int(a,2) + int(m,2)).replace('0b','')
        if(len(a) > maxlen):
            a = a[1:]
        a = a.zfill(maxlen)

    elif q1=='0' and q[maxlen-1] == '1':
        a = bin(int(a,2) + int(minusb,2)).replace('0b','')
        if(len(a) > maxlen):
            a = a[1:]
        a = a.zfill(maxlen)

    merged = a+q+q1
    rightshift = merged[0]
    for i in range(len(merged)-1):
        rightshift += merged[i]

    a = rightshift[:maxlen]
    q = rightshift[maxlen:maxlen*2]
    q1 = rightshift[-1]
    count -=1

ans = a+q
minus = False
if ans[0] == '1':
    ans = twosComplement(ans)
    minus = True
print(ans)
if minus:
    print(int(ans,2) * -1)
else:
    print(int(ans,2))
```

```
Enter number: -7
Enter 2nd number: 13
Number 1 binary: 11001
Number 2 binary: 01101
Number 1 complement: 00111
1011011
-91
```