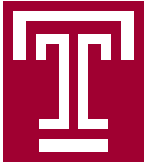


Booth's Algorithm

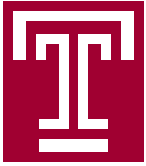
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Booth's Algorithm

An elegant approach to calculate the multiplication of the two signed numbers using add, subtract and shift operation.

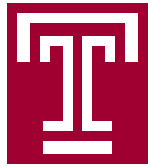
Reference: Computer Organization & Design
(The Hardware/Software Interface)
By – David A. Patterson & John L. Hennessy



Rules for the Algorithm :

- Product register should be $(2n+1)$ bits wide.
- Arithmetic operation depend on 2LSB's of product register.
 - 00 or 11- No operation.
 - 01– Add the multiplicand with nMSB's of product register.
 - 10- Sub the multiplicand with nMSB's of product register.
- Shift the product register right by 4 bit.
- If the $2n$ bit is 1, than $2n+1$ bit also be 1.
- Number of iterations depend on the size of the multiplier.

Assuming multiplicand and multiplier both are n-bit wide



Example :

Multiplier

0110

Multiplicand

0010

Product Register 0000 0110 0 No Operation

Shift Right by 1

0000 0011 0 Subtract

0010 0000 0

After Subtraction

1110 0011 0

Shift Right by 1

1111 0001 1 No operation

Shift Right by 1

1111 1000 1 Addition

0010 0000 0

After Addition and Shifting

0000 1100 0