Pow(x,n)

Problem Statement Suggest Edi

You are given two numbers *'x'*(it's a float), and *'n'*(it's a integer).

Your task is to calculate 'x' raised to power 'n', and return it.

The expected time complexity is *'O(logn)'*, and the expected space complexity is *'O(1)'*, where 'n' is the power to which the number should be raised.

Pow(x,n)

x = 2

n = 2

$2^2 = 4 = 2 \times 2 = 4$

Brute force Approach:

x^n

$3^2 = 3 \times 3$

1 2

x = 3

i = 1 < 2

x = 3 * 3

x = 9

i = 1 → 2

x = 3 * x

x = 3 * 3

T.C.: O(N)

S.C.: O(1)

Optimal Approach:

$3^9 = 3 \times (3)^8$ (n-1)

$3^9 = 3 \times 3^8 = 3 \times 9^4 = 3 \times 81^2 = 3 \times 6561 = 19683$

3^9 → 19683

$3 \times (3)^8$ → decipt ✓

$3^8 = 3^{4+4} = 3^4 \times 3^4 = (3 \times 3)^4$

$3^8 = (3 \times 3)^1 = 9^4$

$9^4 = (9 \times 9)^2 = (81)^2 = (81 \times 81)^1 = (6561^1)$

$6561 \times (6561)^0 =$

$(6561)^0$ → (1)

Pattern : Given Input x = val $= x^n$

n = pow (raised)

Assume n = positive

x^n =

n → even = $(x * x)^{n/2}$

x = x * x

n = n/2,

odd →

ans = ans * x

n = n - 1

If the value of n is - negative:

n = -n

x^{-n} = $\frac{1}{x^n}$ → nikal rhahun

n = -n

nn = n

if(n<0) = $\frac{1}{x^n}$ = $\frac{1}{ans}$

else return ans.