20.26. LOG LOG N COMPLEXITY

EXAMPLE

$c = 0, k = 0$

$for(i = 1; i \leq n ; i = i * 2)\{$

$\qquad c = c + 1;$

$\}$

$for(j = 1; j \leq c; j = j * 2)\{$

$\qquad k = k + 1;$

$\}$

ANSWER

$Note: c = c + 1\ will\ execute\ logn\ times, we\ may\ say:$

$\lfloor logn \rfloor + 1 , now\ j\ loop\ will\ execute\ \log\ of\ \lfloor logn \rfloor + 1\ i.e.$

$which\ generates\ log(log(n))\ for\ the\ 2nd\ loop. Hence:$

Time Complexity for the 2nd Loop:

$for(j = 1; j \leq c; j = j * 2)\{$

$\qquad k = k + 1;$

$\}$

$is: O\left(log(log(n))\right)$

Note: $c = c + 1$ *holds the value that obtained in* $log(n)$ *iteration*

i.e. if n is 5 *, c will hold* 3 *and* $2nd$ *for loop will run upto* $log(3)$ *times.*

1 *time. And both loops are interdependent on each other.*

Hence it is $log\big(log(n)\big)$ *as* $c = log(n)$.

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