

Complexity Analysis

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1] Complexity Notations

$O(n)$: upper bound

$$\exists n^3 = O(n^3)$$

$\Omega(n)$: lower bound

$\Theta(n)$: tight bound

$o(n)$: proper upper bound

$$\exists n^3 \neq o(n^3)$$

2] Thm: $\log n! = \Theta(n \log n)$

3] Simplifying Rule :

- Let $f(n)$ and $g(n)$ be two functions from the set of natural numbers to the set of non-negative real numbers such that:

$$0 \leq L = \lim_{n \rightarrow \infty} \frac{f(n)}{g(n)} \leq \infty$$

Then

if $L < \infty$ then $f(n)$ is in $O(g(n))$

if $L > 0$ then $f(n)$ is in $\Omega(g(n))$

if $0 < L < \infty$ then $f(n)$ is in $\Theta(g(n))$

if $L = 0$ then $f(n)$ is in $o(g(n))$

