Data Structures & Algorithms – 1 (DSA 1)

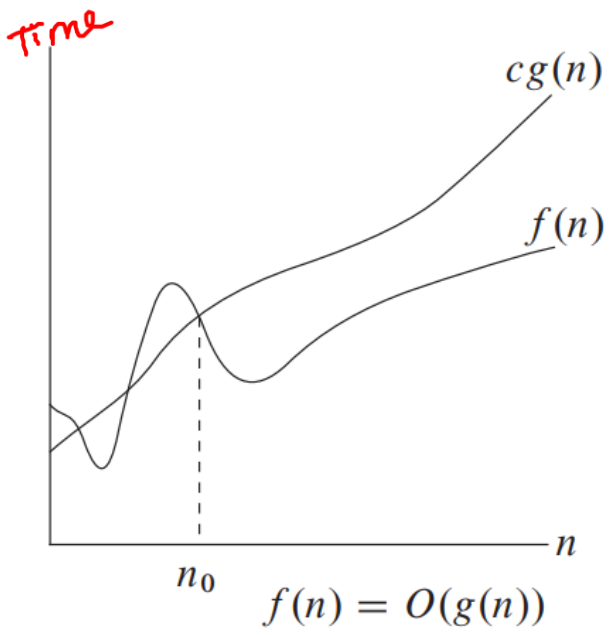
Topic: Asymptotic Notation (Part-2)

Some Examples of Asymptotic Notation

Learn With Mahfuz

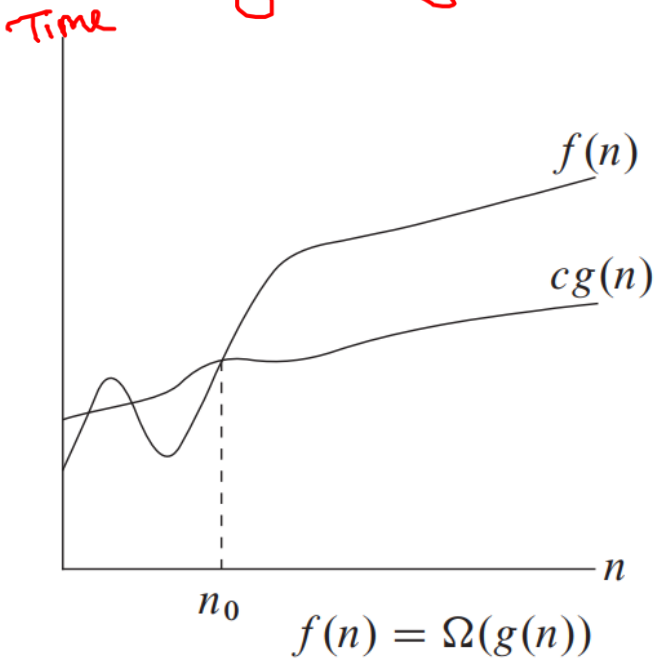
big-oh, big-omega, theta

Big-oh



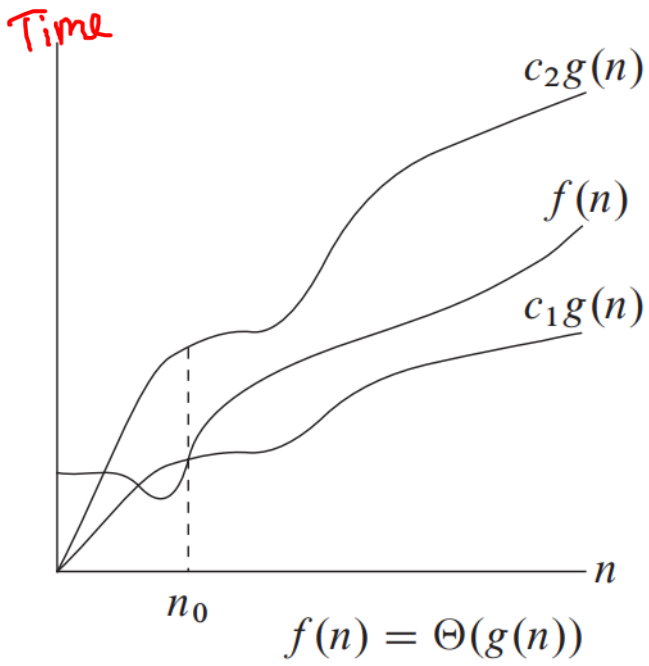
$f(n) \leq c \cdot g(n)$

Big-Omega



$f(n) \geq c \cdot g(n)$

Theta



$c_1 \cdot g(n) \leq f(n) \leq c_2 \cdot g(n)$

* $c, c_1, c_2, n_0 \rightarrow +ve$
$n \geq n_0$

O-notation (big-oh)

$f(n) = 3n^2 + n$

$O(n^2)$

$3n^2 + n \leq c \cdot g(n)$

$3n^2 + n \leq c \cdot n^2$

$3n^2 + n \leq 4 \cdot n^2$

$n \leq n^2$

$1 \leq n$

$f(n) = 3n + 2$

$= O(n)$

$3n + 2 \leq c \cdot g(n)$

$3n + 2n = 5n$

$3n + 2 \leq 5 \cdot n$

$2 \leq 2n$

$1 \leq n$

$c = 5$

$g(n) = n$

$n_0 = 1$

$n \geq 1$

Ω-notation (big-omega)

$f(n) = 3n^2 + n$

$f(n) = \Omega(n^2)$

$3n^2 + n \geq c \cdot g(n)$

$3n^2 + n \geq 3n^2$

$n \geq 0$

$g(n) = n^2$

$c = 3$

$n_0 = 0$

$n \geq 0$

$f(n) = 3n + 2$

$f(n) = \Omega(n)$

$3n + 2 \geq c \cdot g(n)$

$3n + 2 \geq 3 \cdot n$

$n \geq 0$

$n \geq 1$

Θ-notation (theta)

$f(n) = 3n^2 + n$

$f(n) = \Theta(n^2)$

$c_1 \cdot g(n) \leq 3n^2 + n \leq c_2 \cdot g(n)$

$3 \cdot n^2 \leq 3n^2 + n \leq 4 \cdot n^2$

$n \geq 1$

$f(n) = 3n + 2$

$f(n) = \Theta(n)$

$c_1 \cdot g(n) \leq 3n + 2 \leq c_2 \cdot g(n)$

$3n \leq 3n + 2 \leq 5 \cdot n$

$n \geq 1$

n_0

Click here to go to the **GitHub repository**

Learn With Mahfuz
Let's Code Together

Click here to see this video!

THANK YOU!

Learn With Mahfuz
Let's Code Together