Aula P04

Resumo

$f(n) = O(g(n))$ ← Majorante

big oh

$f(n) > g(n)$

$f(n) = \Theta(g(n))$ ← Acompanhante

big theta

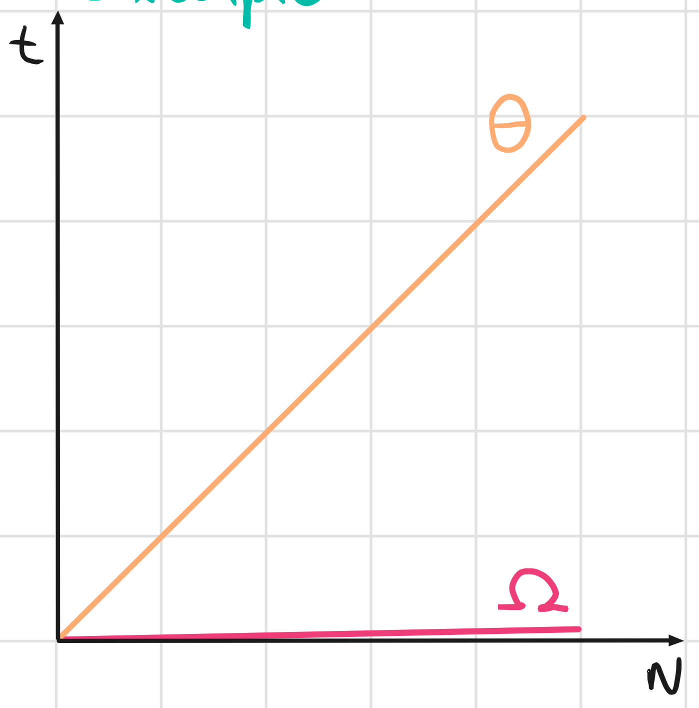
$f(n) = g(n)$

$f(n) = \Omega(g(n))$ ← Minorante

big omega

$f(n) < g(n)$

Exemplo




```
isprime = 1;

for (i = 2; i < N/2; i++)
    if (N % i == 0) {
        isprime = 0;
        break; }
```

Tem Θ, quando tem de percorrer de 2 até N/2 (n ímpar).
Tem Ω, quando N é par e por isso o loop termina em 2.

Exercício 1

$r_1(n) = \sum_{n=1}^{N} 1$
$= n$

$t_1(n) = r_1(n)$
$= \Theta(n)$

$r_2(n) = \sum_{i=1}^{n} \left(\sum_{j=1}^{i} 1 \right)$
$= \sum_{i=1}^{n} i$
$= \frac{n(n+1)}{2}$

$t_2(n) = r_2(n)$
$= \Theta(n^2)$

$r_3(n) = \sum_{i=1}^{n} \left(\sum_{j=1}^{n} 1 \right)$
$= \sum_{i=1}^{n} n$
$= n \cdot \sum_{i=1}^{n} 1$
$= n^2$

$t_3(n) = r_3(n)$
$= \Theta(n^2)$

$r_4(n) = \sum_{i=1}^{n} i$
$= \frac{n(n+1)}{2}$

$t_4(n) = r_4(n)$
$= \Theta(n)$

$r_5(n) = \sum_{i=1}^{n} \left(\sum_{j=i}^{n} 1 \right)$
$= \sum_{i=1}^{n} (n-i+1)$
$= \sum_{i=1}^{n} (n+1) - \sum_{i=1}^{n} i$
$= n.(n+1) - \frac{n(n+1)}{2}$
$= \frac{n(n+1)}{2}$

$t_5(n) = r_5(n)$
$= \Theta(n^2)$

$r_6(n) = \sum_{i=1}^{n} \left(\sum_{j=1}^{i} 1 \right)$
$= \sum_{i=1}^{n} \left(\frac{i(i+1)}{2} \right)$
$= \frac{1}{2} \left(\sum_{i=1}^{n} i^2 + \sum_{i=1}^{n} i \right)$
$= \frac{1}{2} \left(\frac{n(n+1)(n+2)}{6} + \frac{n(n+1)}{2} \right)$
$= \frac{1}{2} \left(\frac{n(n+1)(2n+4)}{6} \right)$
$= \frac{n(n+1)(n+2)}{6}$

$t_6(n) = t_2(n)$
$= \Theta(n^2)$

Notas

A complexidade vê-se com o número de loops ou de somatórios, dependendo da situação.