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Kelas B

No
Date

$$1) T(n) = 2 + 4 + 6 + 8 + 16 + \dots + 2^n$$

$$\text{Deret} = \frac{a(1^n - 1)}{(1 - 1)} = \frac{2(2^n - 1)}{2 - 1} = 2^{n+1} - 2$$

Notasi big O $\rightarrow O(2^n)$

$$T(n) \leq C \cdot 2^n \quad 2 - \frac{2}{2} \leq C$$

$$2^{n+1} - 2 \leq C \cdot 2^n \quad C \geq 1$$

$$2 - \frac{2}{2} \leq C$$

Misal $n=1$

Δ Big O $\rightarrow O(n^3)$ karena $O(n^3) = \Omega(n^3)$
maka $\Theta(n^3)$

4) Algoritma Penjumlahan 2 matriks

For $i \leftarrow 1$ to n do

For $j \leftarrow 1$ to n do

$M_{ij} \leftarrow a_{ij} + b_{ij}$

end for

end for

2) Buktikan bahwa p,q,r positif $T(n) = Pn^2 + Qn + R$

adalah $O(n^2), \Omega(n^2), \Theta(n^2)$

* Pembuktian Big O

* Pembuktian Big Ω ($\leq(n)$)

$$T(n) \leq C \cdot n^2$$

$$T(n) \geq C \cdot n^2$$

$$Pn^2 + Qn + R \leq C \cdot n^2 \quad Pn^2 + Qn + R \geq C \cdot n^2 \quad C \geq 1$$

$$\frac{Pn^2}{n^2} + \frac{Qn}{n^2} + \frac{R}{n^2} \leq C \cdot \frac{n^2}{n^2} \quad \text{misal } n=1 \quad p, q, r = 1 \quad \Theta(n^2) \text{ krn } O(n^2) = \Omega(n^2)$$

$$P + \frac{Q}{n} + \frac{R}{n^2} \leq C \quad P + \frac{Q}{n} + \frac{R}{n^2} \geq C$$

Misal $n=1$

$$1 + 1 + 1 \geq C$$

Misal $P=Q=R=1$

$$C \geq 3$$

$$1 + \frac{1}{1} + \frac{1}{1} \leq C$$

$$C \geq 3$$

5) Algoritma mencari bilir

For $i \leftarrow 1$ to n do

$$f(n) = n$$

$a_i \leftarrow b_i$

end for

* Big O krn $O(n^2)$ & $\Omega(n^2)$ terbukti sama

maka $\Theta(n^2)$ pun benar

$$O(n) \quad \Omega(n)$$

$$n \leq Cn \quad n \geq Cn$$

$$C \geq 1 \quad C \leq 1$$

$$\therefore O(n) = \Omega(n) \rightarrow \Theta(n)$$

3) temuan kompleksitas waktu

$W_1 \leftarrow W_2$ dan $W_2 \leftarrow W_1$ berulang sebanyak $n/2$

$$T(n) = n^3$$

Big O $\rightarrow O(n^3)$

Big $\Omega \rightarrow \Omega(n^3)$

$$n^3 \leq C \cdot n^3$$

$$n^3 \geq C \cdot n^3$$

$$C \geq 1$$

$$C \leq 1$$

6) a) operasi perbandingan

$$T(n) = (n-1) + (n-2) + (n-3) + \dots + 1$$

$$= \frac{n(n-1)}{2} = \frac{n^2 - n}{2}$$

b) mut pertukaran terdapat ketamen
 $n(n-1)/2$

c) Kompleksitas Waktu

• Best Case

Perbandingan $\rightarrow \frac{n(n-1)}{2}$ Kali

$$T(n) = \frac{n(n-1)}{2} = \frac{n^2 - n}{2}$$

• Worst Case

Perbandingan $\rightarrow \frac{n(n-1)}{2}$

Assignment $\rightarrow \frac{n(n-1)}{2}$

$$T_{\max}(n) = \frac{n(n-1)}{2} + \frac{3n(n-1)}{2} = \frac{4n(n-1)}{2}$$

$$= 2n^2 - 2n$$

$O(n^2)$

$\Omega(n^2)$

$$2n^2 - 2n \leq Cn^2 \quad \left| \frac{n^2 - n}{2} \right| > Cn^2$$

$$2 \cdot \frac{1}{2}n \leq Cn^2 \quad \left| \frac{1}{2} - \frac{1}{2n} \right| \geq C(n-1)$$

$$2 - 2 \leq C \quad \left| \frac{1}{2} - \frac{1}{2} \geq C \right|$$

$$C \geq 0$$

$$C \leq 0$$

$$\therefore O(n^2) = \Omega(n^2) \rightarrow \Theta(n^2)$$

B) Operasi Assignment

Mem Pz

$$b_n \leftarrow a_n \quad | \text{ kali}$$

$$b_n \leftarrow a_k + b_n + 1, \times \text{ kali}$$

$$T(n) = 1 + n$$

$O(n)$ untuk Pz

Algoritma P

Pertambahan = n kali

Pengurangan = n kali

$$T(n) = 2n$$

maka Pz lebih baik dari P

kecil dari P

7) a) Algoritma A $\rightarrow O(\log n)$

b) " B $\rightarrow O(\log n)$

c) " C $\rightarrow O(n^2)$

$$N=8$$

$$- A \rightarrow O(\log 8) = O(3 \log 2)$$

$$- B \rightarrow O(8 \log 8) = O(22 \log 2)$$

$$- C \rightarrow O(8^2) = O(64)$$

A tercepat dan O. 301