

STRUTTURA DI CLARKE PER LA SELECT

Data

$b \in \{2\}$

	0	1	2	3	4	5	6
b	0	1	1	0	1	0	1

p	$rank_b(p)$
0	0
1	0
2	1
3	2
4	2
5	3
6	3
7	4

k	$select_b(k)$
0	1
1	2
2	4
3	6
4	7

I° LIVELLO

Memorizzazione solo le select
per valori multipli di
 $\log n \log \log n$

OCCUPAZ. MEMORIA

$$\frac{n}{\log n \log \log n} \log n = \frac{n}{\log \log n} = O(n)$$

$P_0, P_1, P_2, P_3, \dots$

P_i è la posizione dell' i -esimo $\log \log n$ -esimo

$$P_{i+1} - P_i \approx \log n \log \log n$$

$$30 - 8 = 220$$

$$\sum_{i=7}^{30} \log n \log \log n = 210$$

$$\geq 1620$$

$$1570$$

II° LIVELLO

Dipende da $r_i = P_{i+1} - P_i$
 $r_i \approx \log n \log \log n$

IRA "SPARSO"
 $r_i \approx (\log n \log \log n)^2$
 Tabella della select viene memorizzata esplicitamente (come differenza da P_i)

OCCUPAZ. MEMORIA

$$\frac{(\log n \log \log n) \log r_i}{(\log n \log \log n)^2} = \log r_i \approx$$

$$\sum_{i=1}^m \frac{\pi_i \log \pi_i}{\log n} \leq \sum_{i=1}^m \frac{\pi_i}{\log n}$$

II B

"DENSE"

(**)

$\log n \log \log n \leq \pi_i < (\log n \log \log n)^2$
 le posizioni
 Memorizzo
 multiple di
 $\log \pi_i \log \log n$

OCUPAZ. MEMORIA

$$\frac{\log n \log \log n}{\log \pi_i \log \log n} \log \pi_i \leq \log n \leq \frac{\pi_i}{\log \log n}$$

COMPLETESSIMAMENTE

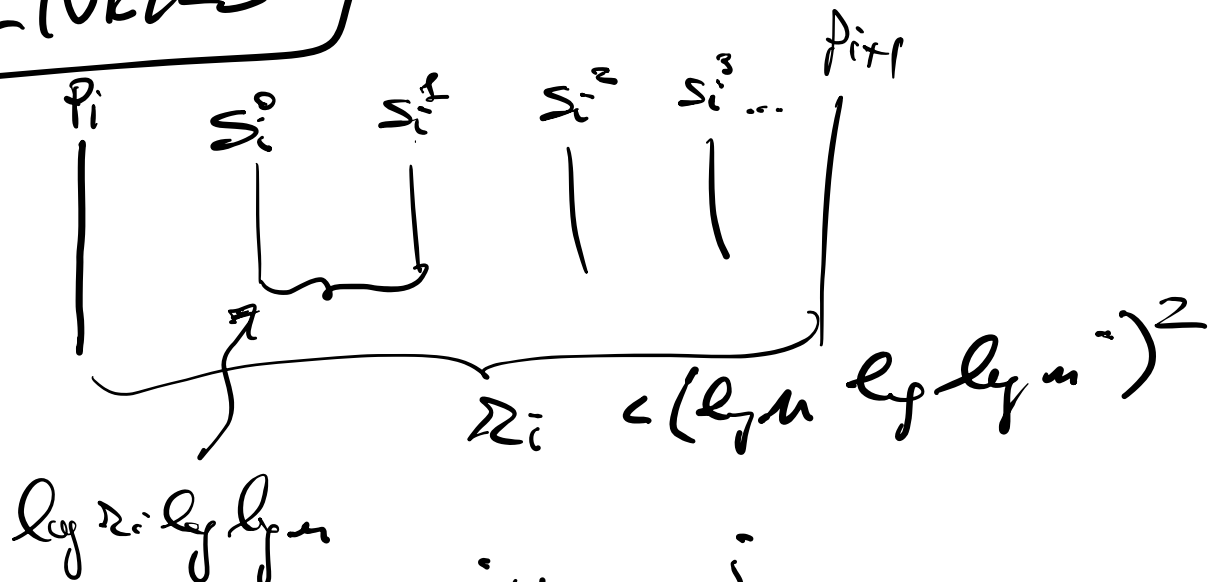
$$\leq \frac{\pi_0}{\log \log n} + \frac{\pi_1}{\log \log n} + \dots =$$

$$= \frac{p_1 - p_0}{\log \log n} + \frac{p_2 - p_1}{\log \log n} + \dots =$$

$$= \frac{P_n - P_0}{\log \log n} \leq \frac{M}{\log \log n}$$

$$= O(n)$$

III LIVELLO (per il caso II B)



$$t_i^j = s_i^{j+1} - s_i^j$$

$$t_i^j \geq \log r_i \log \log n$$

III A

"SPARSO"

$$t_i^j \geq \log t_i^j \log r_i (\log \log n)^2$$

Memorizzo la tabella.

occupaz. memoria

$$(\log r_i \log \log n) \log t_i^j =$$

$$= \frac{\log t_i^j \log r_i (\log \log n)}{\log \log n} =$$

$$= \frac{t_i^j}{\log \log n}$$

III B

"DENSE"

$$t_i^j < \log t_i^j \log r_i (\log \log n)^2$$

Four-Russians trick

$$\log t_i^j \leq \log r_i \leq$$

$$\leq \log (\log n \log \log n)^2 =$$

$$= 2 \log (\log n \log \log n) =$$

$$= 2 \log \log n + 2 \log \log \log n$$

$$\leq 4 \log \log n$$

$$t_i^j < \log t_i^j \log r_i (\log \log n)^2$$

$$\leq 4 \log \log n \cdot 4 \log \log n$$

$$\leq 16 (\log \log n)^2$$

$$\leq \underbrace{2^{t_i}}_{\text{n° TAB}} \underbrace{t_i}_{\text{n° RIGHE}} \underbrace{\log t_i}_{\substack{\text{BIT PER} \\ \text{RIGA}}} \leq$$

$$\leq 2^{16 (\log \log n)^4} \cdot 16 (\log \log n)^4 \cdot \log (16 (\log \log n)^4)$$

$$= (16 (\log \log n)^4)^2 = o(n)$$