7 $T(n) = 2T\left(\frac{n}{2}\right) + \Theta\left(\frac{n}{\log(n)}\right) \qquad T(1) = \Theta(1)$

metodo iterativo

$$T(n) = 2\left[2T\left(\frac{n}{2^2}\right) + \Theta\left(\frac{n}{2\log\left(\frac{n}{2}\right)}\right)\right] + \Theta\left(\frac{n}{\log(n)}\right)$$

$$T(n) = 2^K T\left(\frac{n}{2^K}\right) + \sum_{i=0}^{K-1} 2^i \Theta\left(\frac{n}{2^i \log\left(\frac{n}{2^i}\right)}\right) \quad \text{FINO A} \quad K = \log(n)$$

$$T(n) = 2^{\log(n)}\Theta(1) + \sum_{i=0}^{\log(n)-1} 2^i \Theta\left(\frac{n}{2^i \log\left(\frac{n}{2^i}\right)}\right)$$

$$T(n) = \Theta(n) + \Theta(n)\sum_{i=0}^{\log(n)-1} \frac{2^i}{2^i \log\left(\frac{n}{2^i}\right)}$$

$$T(n) = \Theta(n) + \Theta(n)\sum_{i=0}^{\log(n)-1} \frac{1}{\log(n) - i}$$

* RICORDA $\displaystyle\sum_{i=0}^{n}(n-i) =$

$\displaystyle(n-0)+(n-1)+(n-2) = \sum_{J=1}^{n+1} J$

$$T(n) = \Theta(n) + \Theta(n)\sum_{J=1}^{\log(n)}\left(\frac{1}{J}\right)$$

$$T(n) = \Theta(n) + \Theta(n)\left[\log(\log(n))\right]$$

$$T(n) = \Theta(n \cdot \log(\log(n)))$$

$$\sum_{i=0}^{n}(n-i) = (n-0)+(n-1)\cdots+(n-n) = \sum_{J=0}^{n} i$$

metodo principale

$$n^{\log_b a} = n^{\log_2 2} = n$$

$$f(n) = \Theta\left(\frac{n}{\log(n)}\right)$$

$f(n) \qquad n^{\log_b a} \qquad \varepsilon = 0.1$

$$\Theta\left(\frac{n}{\log(n)}\right) = O(n^{1-\varepsilon})$$

È ASINTOTICAMENTE PIÙ GRANDE MA NON POLINOMIALMENTE.

metodo di sostituzione

$$\begin{cases} T(n) = 2T\left(\frac{n}{2}\right) + cn \\ T(1) = d \end{cases}$$

VOGLIO DIMOSTRARE $T(n) = O(n \log(\log(n)))$ QUINDI

$$T(n) \leq K \cdot n \log(\log(n))$$

CASO BASE

$T(1)$ NON VA, PROVIAMO $T(2)$

$$T(2) = 2T(1) + 2c = 2d + cn$$

$$2d + 2c \leq K2 \cdot 0$$

$$c \leq d$$

I. INDUTTIVA

$$\forall m < n \qquad T(m) \leq Km \log(\log(m))$$

P. IND.

$$2T\left(\frac{n}{2}\right) + cn \leq Kn \log(\log(n))$$

$$\cancel{2}\left[K\frac{n}{\cancel{2}} \log\left(\log\left(\frac{n}{2}\right)\right)\right] + cn \leq Kn \log(\log(n))$$

$$Kn\log\left(\log\left(\frac{n}{2}\right)\right) + Cn \leq Kn\log(\log(n))$$

$$Kn\log(\log(n) - 1) + Cn \leq Kn\log(\log(n))$$

$$K\log(\log(n)-1) + C \leq K\log(\log(n))$$