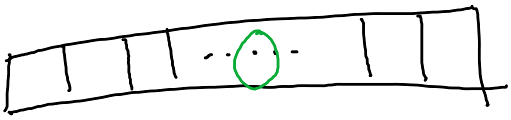
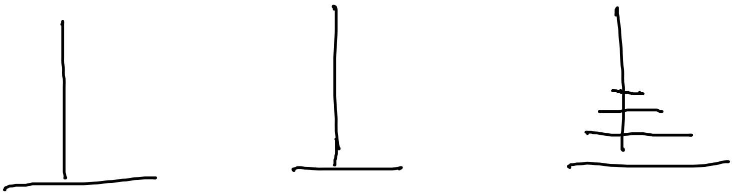
Özyineleme Seans 2

10 Mart 2022 Perşembe 13:46





$$T(n) = 2T(n-1)+1 \quad , \quad T(1) = 1$$

$$= 2\cdot\left(2T(n-2)+1\right)+1 \qquad T(n-1) = \underbrace{2\cdot T(n-2)+1}$$

$$= 4T(n-2)+2+1 \qquad T(n-2) = 2T(n-3)+1$$

$$= 4\left(2T(n-3)+1\right)+2+1$$

$$= 8T(n-3)+4+2+1$$

$$= 2^i\cdot T(n-i) + \underbrace{1+2+\dots 2^{i-1}}$$

$$\sum_{k=0}^{i-1} 2^k = 2^i - 1$$

$$= 2^i\cdot T(\underbrace{n-i}_{1}) + 2^i - 1 \quad , \quad n-i = 1 \quad , \quad i = n-1$$

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

$$2^n - 1 \in \Theta(2^n)$$

·BinRec

$$T(n) = T\left(\frac{n}{2}\right) + 1 \quad , \quad T(1) = 0$$

$$= T\left(\frac{n}{4}\right) + 1 + 1 \qquad\qquad T\left(\frac{n}{2}\right) = T\left(\frac{n}{4}\right) + 1$$

$$= T\left(\frac{n}{8}\right) + 1 + 1 + 1 \qquad\qquad T\left(\frac{n}{4}\right) = T\left(\frac{n}{8}\right) + 1$$

$$= T\left(\frac{n}{2^i}\right) + i$$

$$T(n) = T(1) + \log_2 n$$

$$T(n) = \log_2 n \in \Theta(\log n)$$

$$\frac{n}{2^i} = 1 \quad , \quad 2^i = n$$

$$\log_2 2^i = \log_2 n$$

$$i \cdot \underbrace{\cancel{\log_2 2}}_{1} = \log_2 n$$

$$i = \log_2 n$$

$$T(n) = 2T(\sqrt{n}) + 1 \quad , \quad T(2) = 0$$

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

$$= 2\left(2T\left(n^{\frac{1}{4}}\right) + 1\right) + 1 \qquad\qquad = 2T\left(n^{\frac{1}{4}}\right) + 1$$

$$= 4T\left(n^{\frac{1}{4}}\right) + 2 + 1$$

$$= 4\left(2T\left(n^{\frac{1}{8}}\right) + 1\right) + 2 + 1 \qquad\qquad T\left(n^{\frac{1}{4}}\right) = 2T\left(n^{\frac{1}{8}}\right) + 1$$

$$= 8T\left(n^{\frac{1}{8}}\right) + 4 + 2 + 1$$

$$\sqrt{n^{\frac{1}{2^i}}} = 2$$

$$= 2^i T\left(n^{\frac{1}{2^i}}\right) + \underbrace{2^0 + 2^1 + \cdots + 2^{i-1}}_{2^i - 1}$$

$$= 2^i \cdot T\left(n^{\frac{1}{2^i}}\right) + 2^i - 1$$

$$= \cancel{\log_2 n \cdot T(2)} + \log_2 n - 1$$

$$T(n) = \log_2 n - 1 \in \Theta(\log n)$$

$$\log_n n^{\frac{1}{2^i}} = \log_n 2$$

$$\frac{1}{2^i} = \log_n 2$$

$$2^i = \frac{1}{\log_n 2}$$

$$2^i = \log_2 n$$

$$\log_2 2^i = \log_2 \log_2 n$$

$$i = \log_2 \log_2 n$$