

TD2: - Suite -

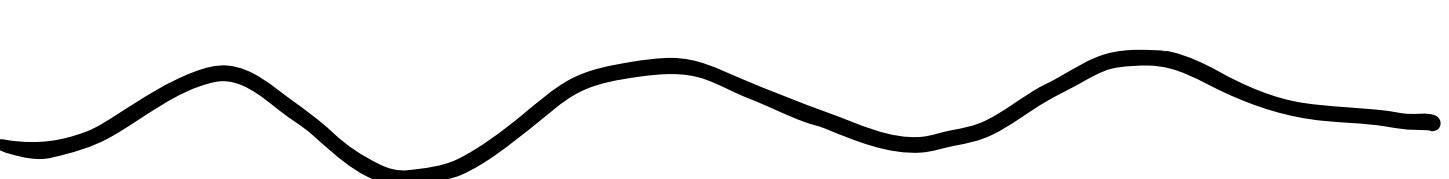
Recap Master Theorem:

$$f(n) = \begin{cases} a + \left(\frac{n}{b}\right) + f(n/b) & \text{if } n > 1 \\ \Theta(1) & \text{if } n = 1 \end{cases}$$

① $f(n) = O(n^{\log_b(a)-\epsilon})$; $T(n) = \Theta(n^{\log_b a})$

② $f(n) = \Theta(n^{\log_b a})$; $T(n) = \Theta(n^{\log_b a} \log n)$

③ $f(n) = \Omega(n^{\log_b(a)+\epsilon})$ et $af(n/b) \leq cf(n)$; $T(n) = \Theta(f(n))$



$$C(n) = 7C\left(\frac{n}{12}\right) + \log_2 n$$

$$a = 7$$

$$b = 12$$

$$\log_b(a) = \log_{12}(7) \approx 0.78$$

$$h(n) = \log_2 n = O(n^{0.78-\epsilon})?$$

$$\log_2 n = O(n^{1/2}) = O(\sqrt{n})$$

Donc, cas ① du MT, $C(n) = \Theta(n^{\log_{12}(7)})$

$$D(n) = 2D\left(\frac{n}{2}\right) + \frac{n}{\log_2 n}$$

$$a = 2$$

$$b = 2 \quad \log_b(n) = \log_2(2) = 1$$

Quel cas?

Est-ce qu'il existe $\epsilon > 0$ tq $\frac{n}{\log_2 n} \in \Theta(n^{1-\epsilon})$?

Test cas: 1. $h(n) \in \Theta(n)$? non

2. $\frac{n}{\log_2 n} \in \Theta(n)$? $\frac{\frac{n}{\log_2 n}}{n} = \frac{1}{\log_2 n}$ non

3. $h(n) \in \Omega(n^{1+\epsilon})$? non $= \frac{n}{\log_2 n} \leadsto$ retour cas 1

$$\frac{n}{\log_2 n} \in O(n^{1-\varepsilon})$$

$$\lim_{n \rightarrow \infty} \frac{\frac{n}{\log_2 n}}{n^{1-\varepsilon}} = \lim_{n \rightarrow \infty} \frac{n}{n^{1-\varepsilon} \log_2 n} = \lim_{n \rightarrow \infty} \frac{n^\varepsilon}{\log_2 n} = \infty$$

\Rightarrow \nexists d'application avec le Master Theorem

// NB: $F(n)$ $\hat{=}$ pour la D impossible appliquer MT.

$$E(n) = SE\left(\frac{n}{3}\right) + n^2$$

$$a = 5$$

$$b = 3$$

$$\log_b a = \log_3 5 = \frac{\ln 5}{\ln 3} \approx 1.46$$

$$f(n) = \Omega(n^{\log_3 5 + \varepsilon}) \quad 2 \text{ ori}$$

$$= n^2 \quad \boxed{\text{Cas 3}} \text{ Donc } E(n) = \Theta(n^2) \quad \varepsilon = 0$$