9/01/20

Assignment

ADA

(1) Master's Theorem

If $f(n)$ and $\Theta(n^d)$ are $f(n) = c^k n^d$ where $d \geq 0$

recurrence $T(n) = aT(n/b) + F(n)$ then,

$$T(n) = \begin{cases} \Theta(n^d) & \text{if } a < b^d \\ \Theta(n^d \log n) & \text{if } a = b^d \\ \Theta(n^{\log_b a}) & \text{if } a > b^d \end{cases}$$

$T(n) = 8T(n/2) + 1000n^2$

$T(n) = aT(n/b) + f(n)$

$a = 8, \quad b = 2 \qquad f(n) = cn^d$

$= 1000n^2$

$c = 1000, \quad d = 2$

Since $a > b^d$

i.e $8 > 2^2$

masked theorem case (3) is fulfilled

$T(n) = \Theta(n^{\log_b a})$

$= \Theta(n^{\log_2 8})$

$$\boxed{T(n) = \Theta(n^3)}$$

(2) $T(n) = 2T(n/2) + n^2$

$a = 2, \quad b = 2, \quad c = 1, \quad d = 2$

Since $a < b^d$

$2 < 2^2$

Case (1) $T(n) = \Theta(n^d)$

$T(n) = \Theta(n^2)$

3) $T(n) = 2T(n/2) + 10n$

$a = 2, \quad b = 2, \quad c = 10, d = 1$

Since $a = b^d$

$2 = 2^1$

case (2)

i.e $T(n) = \Theta(n^d \log n)$

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

Scanned by CamScanner