

Master Theorem Dividing Function Case 3

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

$$= aT(n/b) + n^k (\log n)^p$$

Case 3: $\log_a b < K$

Example $T(n) = 2T(n/2) + n^3 (\log n)^2$

$$\log_a b = \log_2 2 = 1; k=3; p=2$$

$$K > \log_a b \rightarrow p \geq 0$$

$$T(n) = \Theta(f(n)) = \Theta(n^3 (\log n)^2)$$

Thota

Case 3 A: If $p \geq 0$

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

Thota

Case 3 B: If $p < 0$

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

Big-O

exclude the log term from $f(n)$

Example: $T(n) = 2T(n/2) + n^3 (\log n)^{-1}$

$$\log_a b = \log_2 2 = 1;$$

$$k = 3$$

$$p = -1$$

$$K > \log_a b \neq p < 0$$

$$T(n) = \Theta(n^k \text{ part of } f(n))$$

Big-O

$$= \Theta(n^k)$$

$$= \underline{n^3}$$