Master Theorem for Divide and Conquer

General Form of Recurrence Relation

$T(n) = \alpha T(\frac{b}{\beta}) + f(n)$

$\alpha \geq 1 \ \beta > 1 \ f(n) = \theta(n^k Log^p n)$

The Recurrence Equation provides all of these elements including:

- log_b^a
- k

Based on these two values of log_b^a and k there are 3 Cases:

Case 1: if $log_b^a > k$ then $\theta(n^{log_b^a})$

Case 2: if $log_b^a = k$ then:

- if $p > -1 \cong \theta(n^k log^{p+1} n)$
- if $p = -1 \cong \theta(n^k loglogn)$
- if $p < -1 \cong \theta(n^k)$

Case 3: if $log_b^a < k$ then:

- if $p \geq 0 \cong \theta(n^k log^p n)$
- if $p = -1 \cong \theta(n^k loglogn)$
- if $p < 0 \cong O(n^k)$