

Master Method Special Case

As a final comment, we introduce a “special case” of the master method that can come in handy. As we present this, we also note that the special case does not yield a theta bound while the full master method does.

Suppose we have a recurrence of the form $T(n) = a_1T(n/b_1) + a_2T(n/b_2) + \cdots + a_mT(n/b_m) + 1$.

Now suppose we define some $S = \sum_i (a_i/b_i)$. Then we have three cases as before:

1. If $S < 1$, then $T(n) = O(n)$.
2. If $S = 1$, then $T(n) = O(n \lg n)$
3. If $S > 1$, then $T(n) = O(n^{\lg \max_i a_i})$.

As a final note, the coefficient on the final function n must be 1 for the case to hold.