

multiplying factor ← This is to cancel elements  
 1st term  $2^0 T(n) = 2 \times T(\frac{n}{2}) + \log(n)$   
 2nd term  $2^1 \times T(\frac{n}{2}) = 2 \times [2 \times T(\frac{n}{4}) + \log(\frac{n}{2})]$   
 3rd term  $2^2 \times T(\frac{n}{4}) = 4 \times [2 \times T(\frac{n}{8}) + \log(\frac{n}{4})]$   
 ...  
 nth term  $n \times T(2) = n \times [2(T(1)) + \log 2]$

$$\begin{aligned}
 T(n) &= n \times 2 T(1) + \log n \\
 &+ 2 \log \frac{n}{2} + 4 \log \frac{n}{4} + \dots \\
 &\quad n \times \log 2
 \end{aligned}$$

$$O((\log_2 n)^2)$$

$$\begin{aligned}
 \rightarrow T(n) &= n + O[(\log_2 n)^2] \\
 &= O(n)
 \end{aligned}$$

