

$$\begin{array}{c}
 \begin{array}{c}
 \text{Tree structure:} \\
 \begin{array}{c}
 \text{Level 0: } n \\
 \text{Level 1: } \frac{n}{2} \quad \frac{n}{2} \\
 \text{Level 2: } \frac{n}{2^2} \quad \frac{n}{2^2} \quad \frac{n}{2^2} \quad \frac{n}{2^2} \\
 \vdots \\
 \text{Level } k: \frac{n}{2^k} \quad \frac{n}{2^k} \quad \dots \quad \frac{n}{2^k} \quad \frac{n}{2^k}
 \end{array}
 \end{array}
 \end{array}
 =
 \begin{array}{c}
 O_0(n) \\
 + \\
 O_1(n) \\
 + \\
 O_2(n) \\
 + \\
 \vdots \\
 + \\
 O_{k=\log_2 n}(n)
 \end{array}
 =
 \begin{array}{c}
 O\left(\sum_{i=0}^k 2^i \cdot \frac{n}{2^i}\right) = O\left(\sum_{i=0}^k n\right) = O(k \cdot n) \Leftrightarrow O(n \cdot \log_2 n)
 \end{array}$$