Substitution Approach $\Rightarrow$

$$T(n) = \begin{cases} 1 & \text{if } n = 1 \\ 2T(n/2) + n & \text{if } n > 1. \end{cases}$$

$$T(n) = 2T(n/2) + n.$$

$$= 2\left[2T(n/4) + n/2\right] + n.$$

$$T(n/2) = 2T(n/4) + n/2$$

$$= 2\left[2T(n/4) + n/2\right] + n.$$

$$= 4T(n/4) + n + n$$

$$= 4T(n/4) + 2n,$$

$$= 2^2 T(n/2^2) + 2n,$$

$2^k = n.$

$\therefore k = \log_2 n.$

$$\vdots$$

$$= 2^k T(n/2^k) + kn.$$

$$= n + T(1) + \log_2 n \cdot n)$$

$$= n + 1 + \log_2 n \cdot n,$$

$$= n + n \cdot \log n.$$

$$\Rightarrow \underline{O(n \log n)}$$