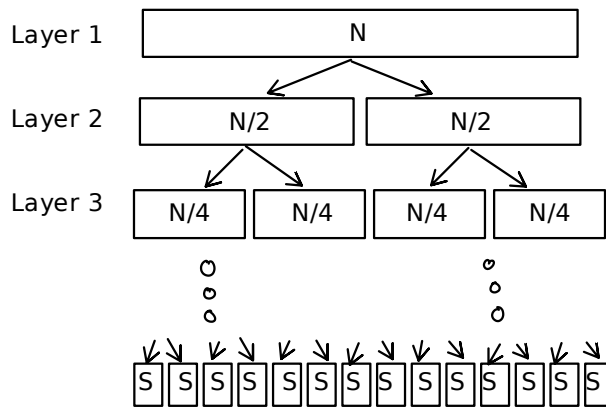


Theoretical Analysis



$$\# \text{Layers} = \log_2\left(\frac{n}{s}\right)$$

Each layer needs average n key comparison

Each block of S does insertion sort with average $\frac{s^2}{4}$ key comparison

$$T(n, s) = \begin{cases} 2T\left(\frac{n}{2}, s\right) + n & , n > s \\ \frac{n^2}{4} & , n \leq s \end{cases}$$

$$T(n, s) = \log_2\left(\frac{n}{s}\right) n + \frac{n}{s} \cdot \frac{s^2}{4}$$

$$T(n, s) = n \log_2\left(\frac{n}{s}\right) + \frac{n \cdot s}{4}$$

Finding optimal s

$$\frac{\partial T}{\partial s} = 0$$

$$-\frac{n}{\ln(2)} \frac{1}{s} + \frac{n}{4} = 0$$

$$\frac{n}{4} = \frac{n}{s \ln(2)}$$

$$s = \frac{4}{\ln(2)} \approx 5.77 \rightarrow s_{\text{best}} = 6$$