$\underline{\text{Cost}}$

Access i^{th} element $= i$

Swap i with $i+1/-1 = O(1)$

Accessing in Ascending cost

$1+2+3 \; --- \; n$

$\frac{n(n+1)}{2}$ + cost of swaps

$$\frac{n(n+1)}{2} + 0+1+2+3 -- n-1$$

$$\frac{n^2+n}{2} + (n-1) + c$$

$$\frac{n^2+n+2n-2}{2}$$

$$\frac{\frac{(n+2)^2}{2} - \frac{1}{2}}{n} \quad \frac{(n+2)^2 - 2}{2} \Rightarrow \frac{\cancel{n}\left(\frac{n+1+2/n}{\quad}\right)}{\cancel{n}}$$

$\approx \Omega(n)$

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

2^0 2^1 2^2 2^3

$\log(n) \rightarrow$ # of powers of 2

$n - \log n \rightarrow$ # $O(1)$

$2^0 + 2^1 + 2^n + \cdots + 2^{\log n}$

$$\sum_{k=0}^{\log n} 2^k = 2^{\log n + 1} - 1$$

$(2 \cdot \log n - 1) + (n - \log n) \cdot 1$

$= 2n - 1 + n - \log n$

$3n - 1 - \log n$

$= O(3n) = \cancel{O(3)}$

n

$$4^0 + 4^1 + 4^2 \cdots 4^{\log_4 n}$$

$$(n - \log_4 n)$$