

Given:

$1 \rightarrow 2 \rightarrow \dots \rightarrow n$ , no size info

Result:

$1 \rightarrow n \rightarrow 2 \rightarrow n-1 \rightarrow 3 \rightarrow \dots$

If  $n$  is even,

E.x.

original 1, 2, 3, 4, 5, 6

1, 2, 3  
4, 5, 6

result 1, 6, 2, 5, 3, 4

$1 \rightarrow n \rightarrow 2 \rightarrow n-1 \rightarrow 3 \rightarrow \dots \rightarrow \frac{n}{2} \rightarrow \frac{n}{2}+1$

Else,

E.x.

Original 1, 2, 3, 4, 5, 6, 7

1, 2, 3, 4

5, 6, 7

Result 1, 7, 2, 6, 3, 5, 4

$1 \rightarrow n \rightarrow \dots \rightarrow n // 2 \rightarrow n // 2 + 2 \rightarrow n // 2 + 1$

General Procedure:

Suppose  $n$  is even

$1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow \dots \rightarrow n$

Process

1. Cut in half

①  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow \dots \rightarrow \lceil \frac{n}{2} \rceil$

②  $\lceil \frac{n}{2} \rceil + 1 \rightarrow \dots \rightarrow n$

2. Reverse List ②

3. Merge ① and ② into one list

Algorithm/Memory / complexity  
Naive 2-round iteration

$$\frac{O(n + \lceil \frac{n}{2} \rceil)}{\text{skip-list}} / O(1) \quad ??$$

$$O(\lceil \frac{n}{2} \rceil) / O(1)$$

$$O(n)$$