

	LL (w/size)	AL
get	$O(n)$	$O(1)$
getSize	$O(1)$	$O(1)$
insertFirst	$O(1)$	$O(n)$
insertLast	$O(n) / O(1)$ <small>lab tail ptr</small>	$O(n)$ amortized worst case $O(1)$
removeFirst	$O(1)$	$O(n)$
removeLast	$O(n)$	$O(1)$

## Amortized Time

If I perform a series of operations, how much did each operation cost me on average.

Size	Capacity	Adds	Copies		
0	4	1	0		
1	4	1	0		
2	4	1	0		+2 = 3
3	4	1	0		+2 = 3
4	4	1	4		+2 = 3
5	8	1	0	} 4	+2 = 3
6	8	1	0		+2 = 3
7	8	1	0		+2 = 3
8	8	1	0		+2 = 3
9	16	1	0	} 8	+2
10	16	1	0		+2
11	16	1	0		+2
12	16	1	0		+2
13	16	1	0		+2
14	16	1	0		+2
15	16	1	0		+2
16	16	1	0		+2

*Note: In the original image, a blue box highlights the first 4 rows of the 'Copies' column (rows 4-7) with a bracket labeled '4'. A blue arrow points from this box to the first row of the 'Copies' column (row 4). Another blue bracket highlights the last 8 rows of the 'Copies' column (rows 9-16) with a bracket labeled '8'.*

$n$  operations take  $3n$  work  
 avg. op takes 3 work  
 $O(1)$