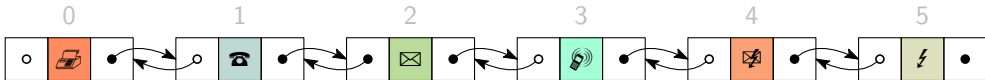
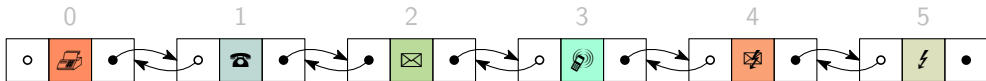




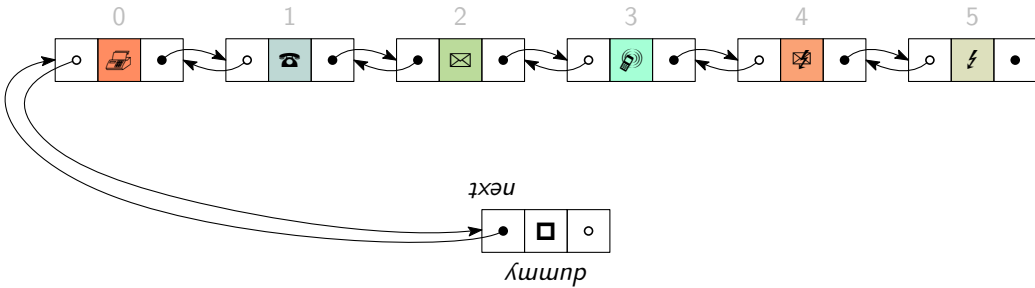
prev x next

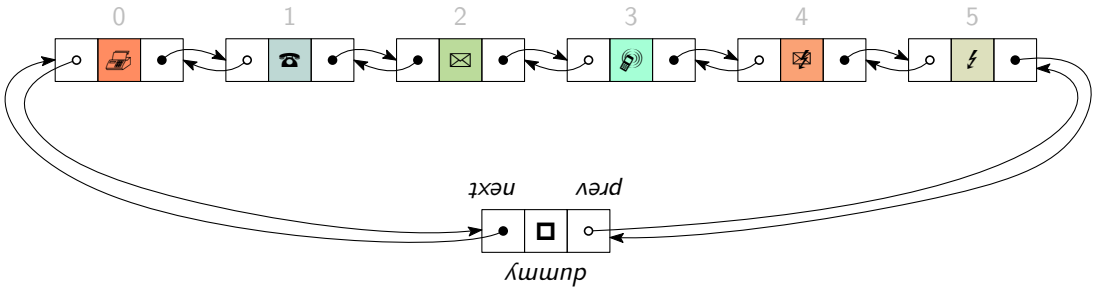


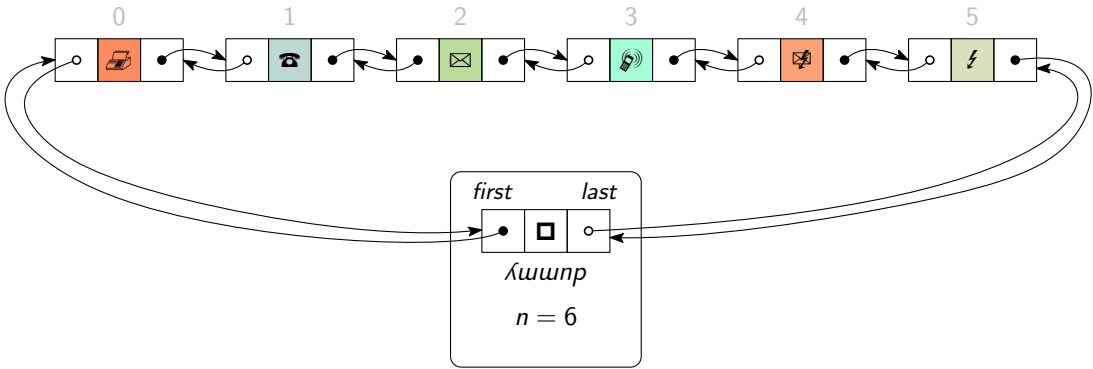




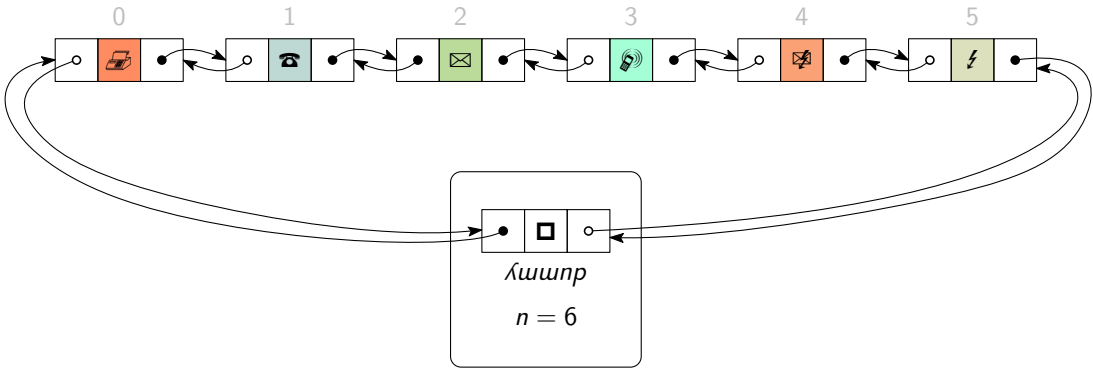
$\lambda\omega\omega\eta\rho$





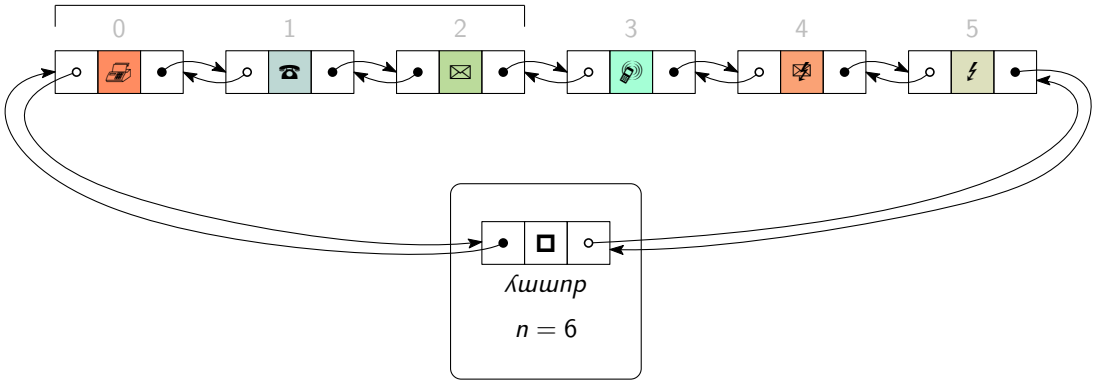


getNode(2)



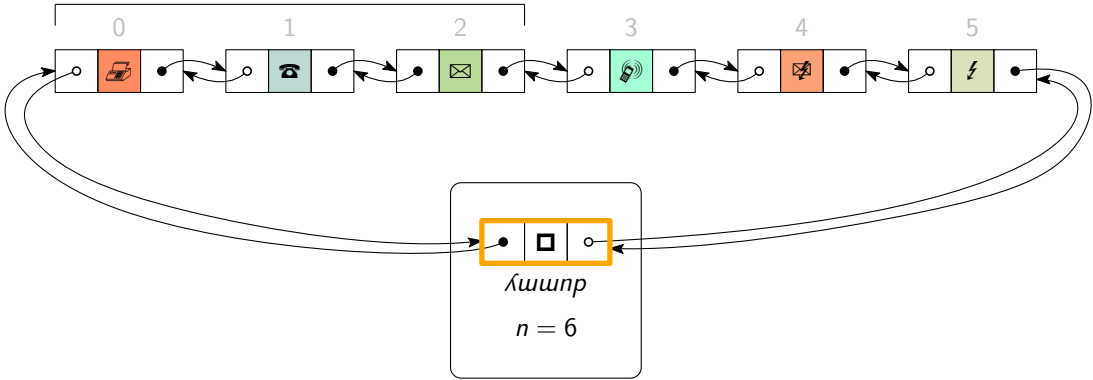
getNode(2)

$$2 < n/2$$



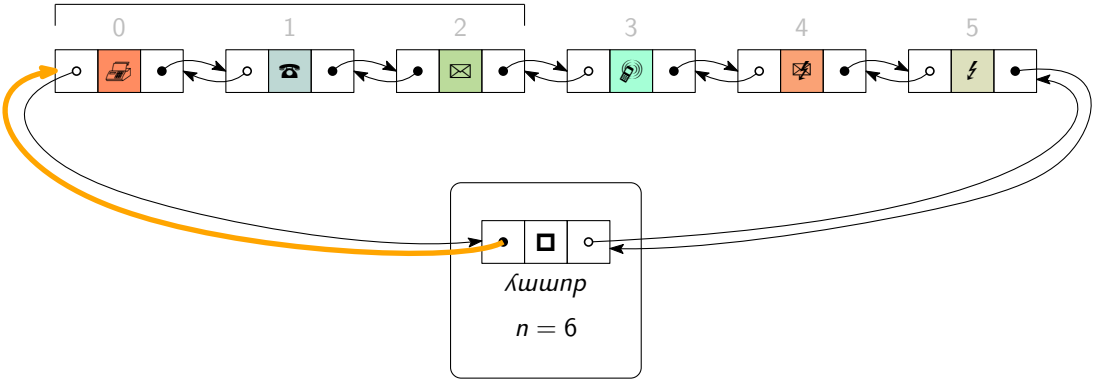
getNode(2)

$2 < n/2$



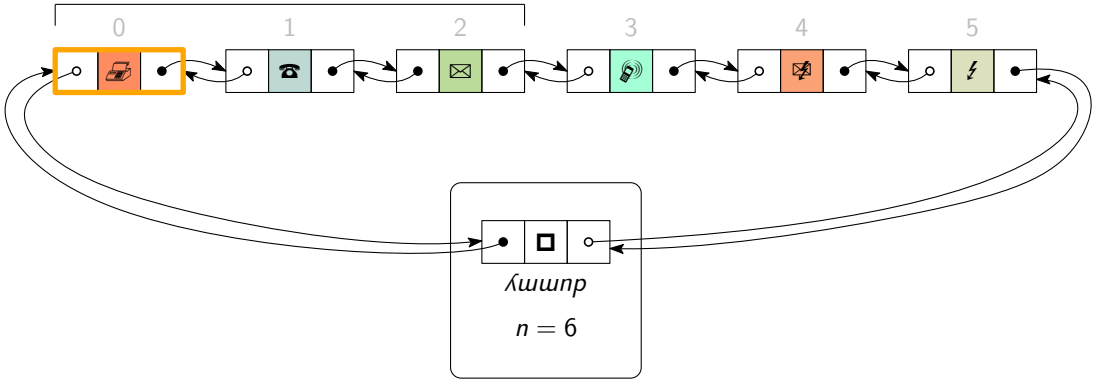
getNode(2)

$$2 < n/2$$



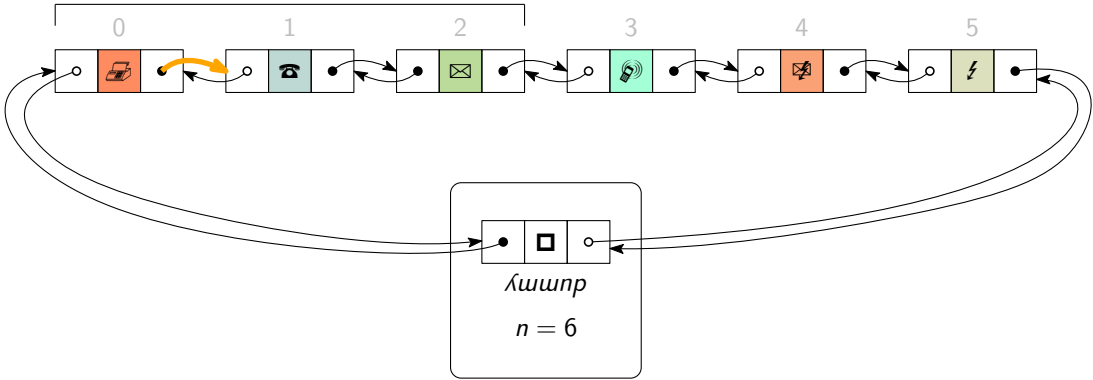
getNode(2)

$$2 < n/2$$



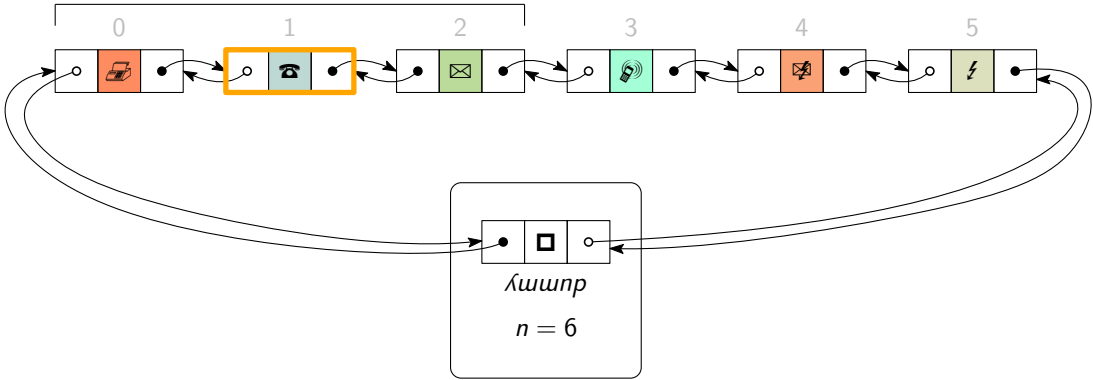
getNode(2)

$2 < n/2$



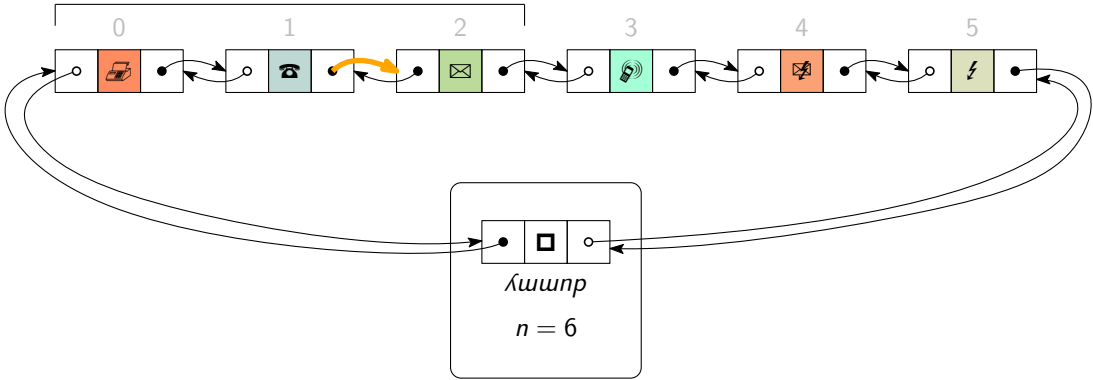
getNode(2)

$2 < n/2$



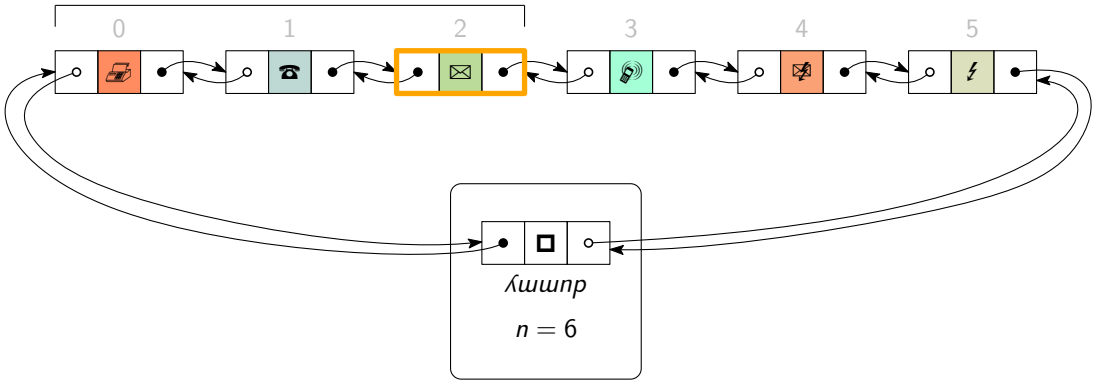
getNode(2)

$2 < n/2$



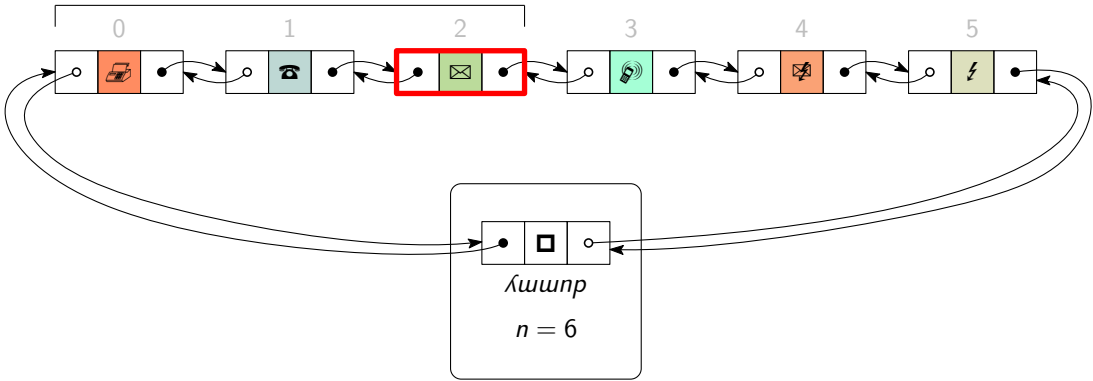
getNode(2)

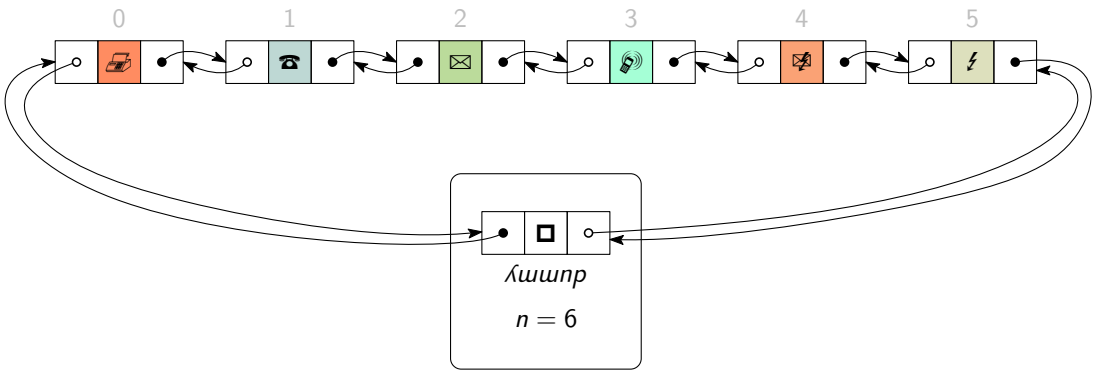
$$2 < n/2$$



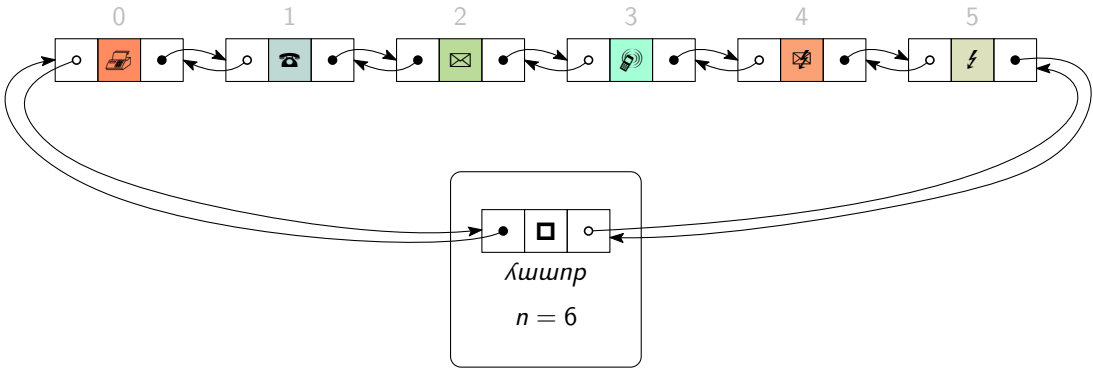
getNode(2)

$$2 < n/2$$



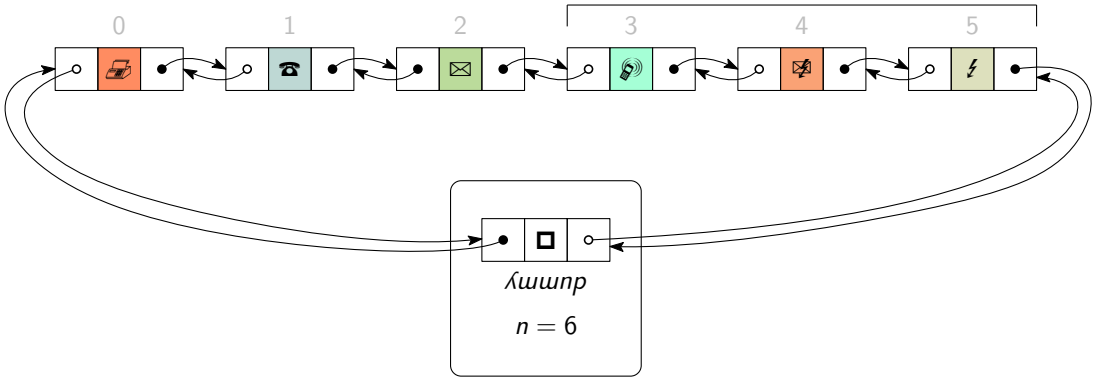


getNode(4)



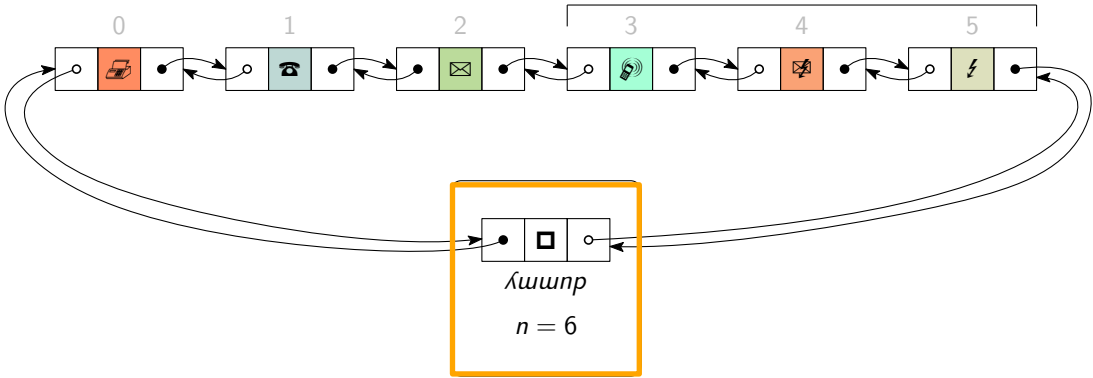
getNode(4)

$$4 \geq n/2$$



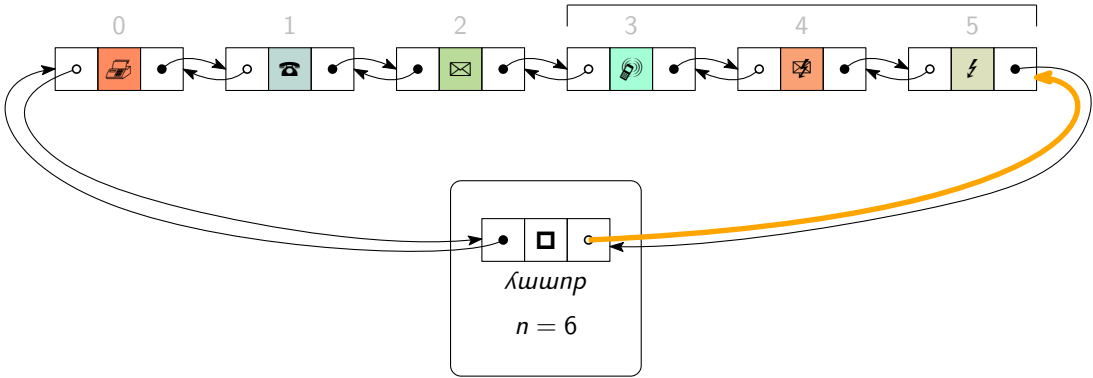
getNode(4)

$$4 \geq n/2$$



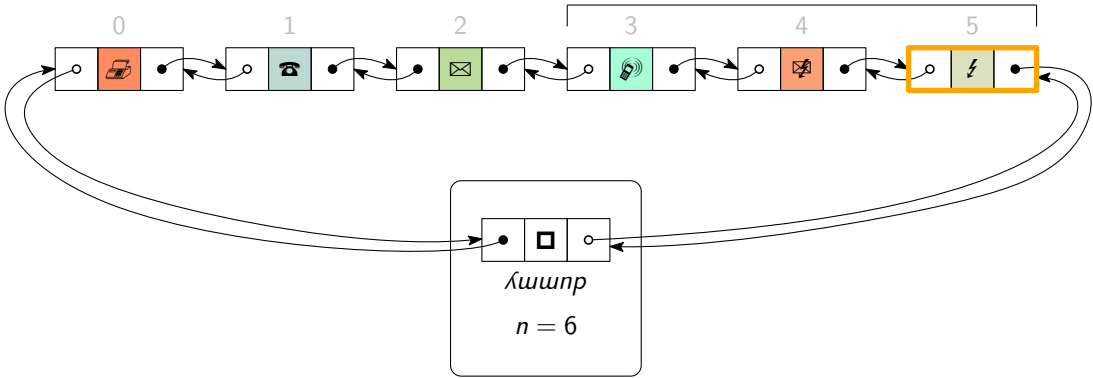
getNode(4)

$$4 \geq n/2$$



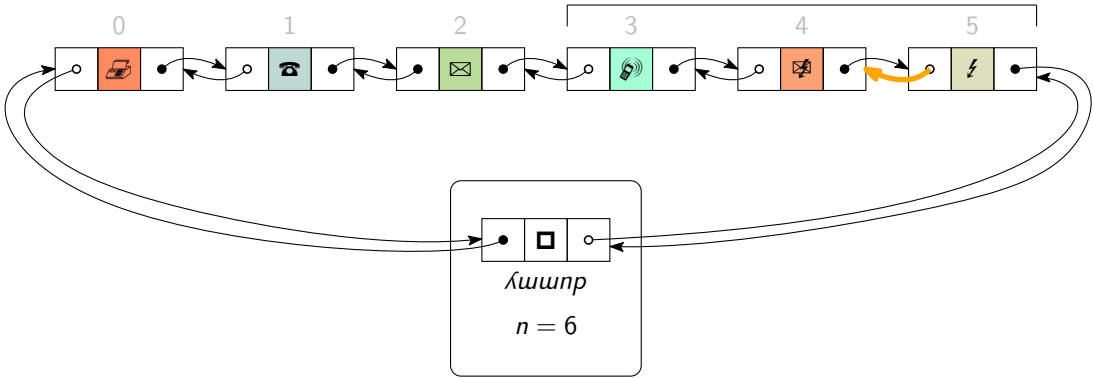
getNode(4)

$$4 \geq n/2$$



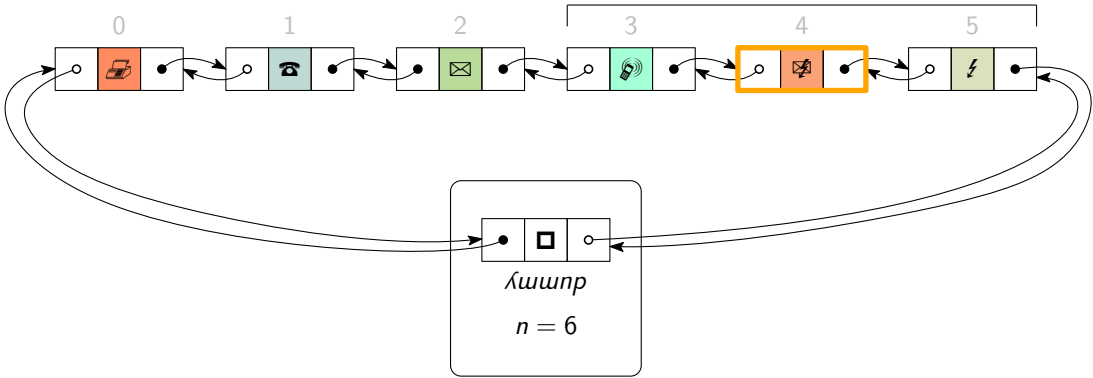
getNode(4)

$$4 \geq n/2$$



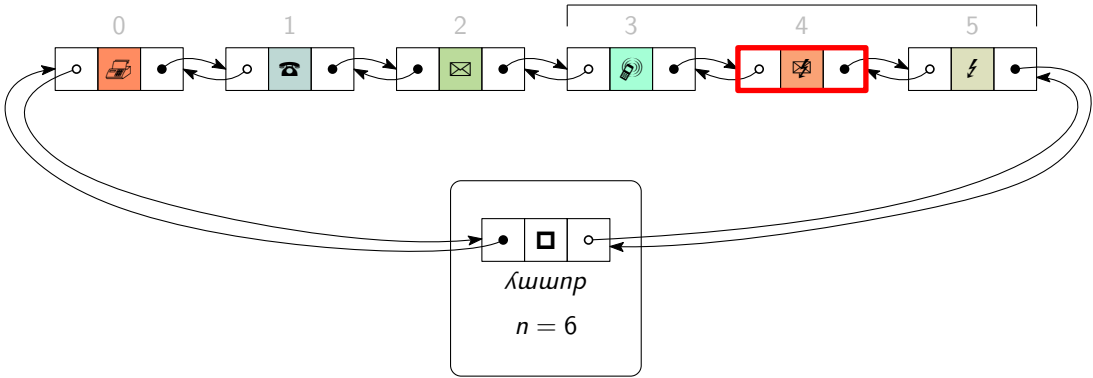
getNode(4)

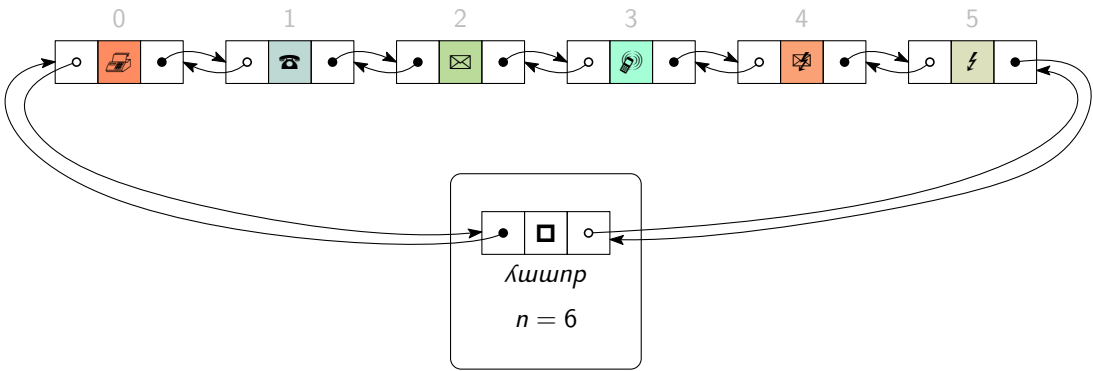
$$4 \geq n/2$$



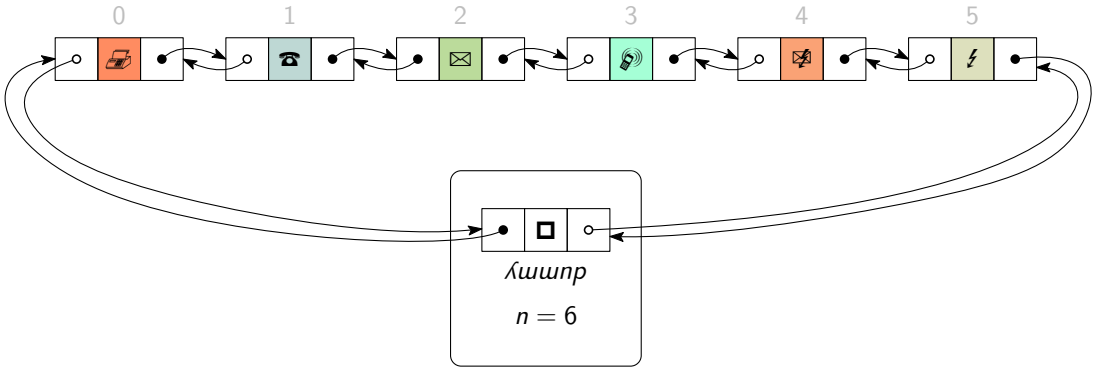
getNode(4)

$$4 \geq n/2$$



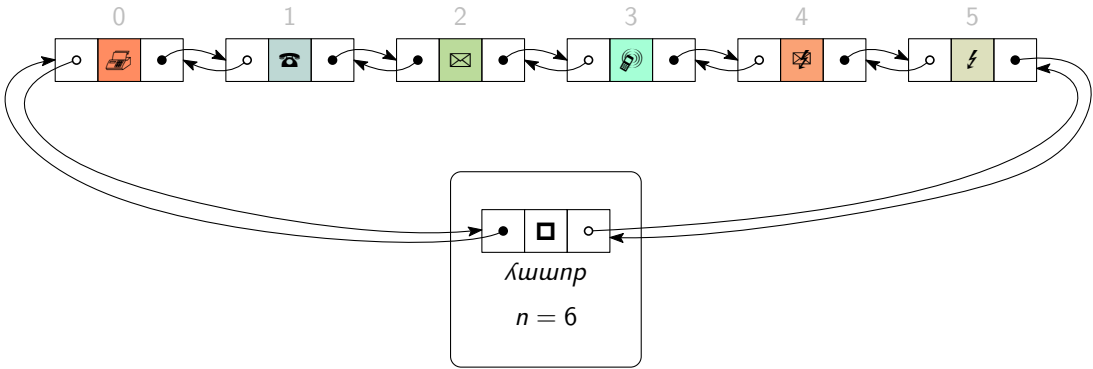


getNode(i)



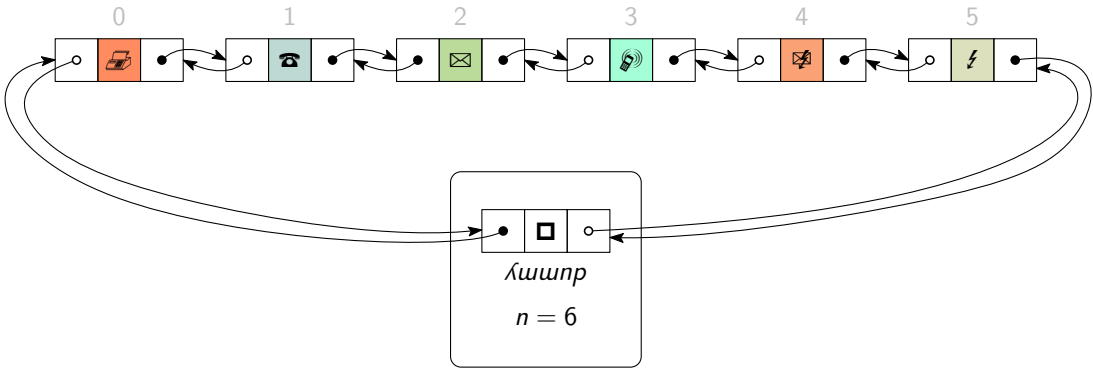
getNode(i)

$\min\{i + 1, n - i\}$



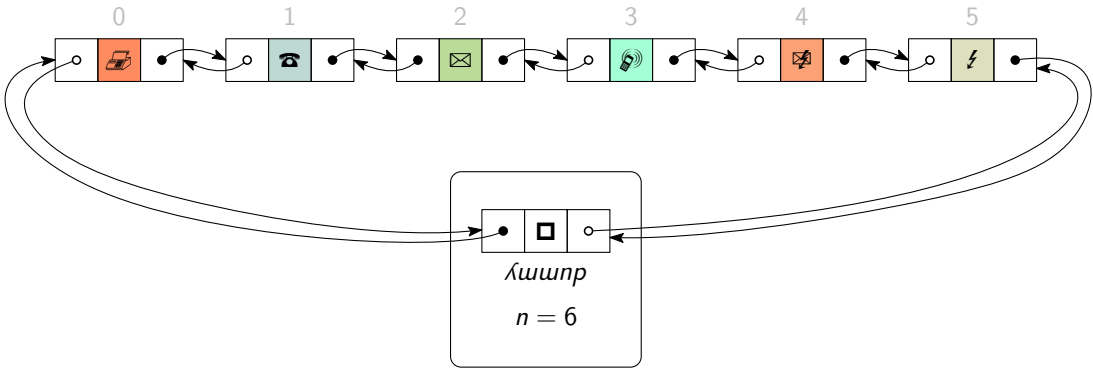
getNode(i)

$O(1 + \min\{i, n - i\})$



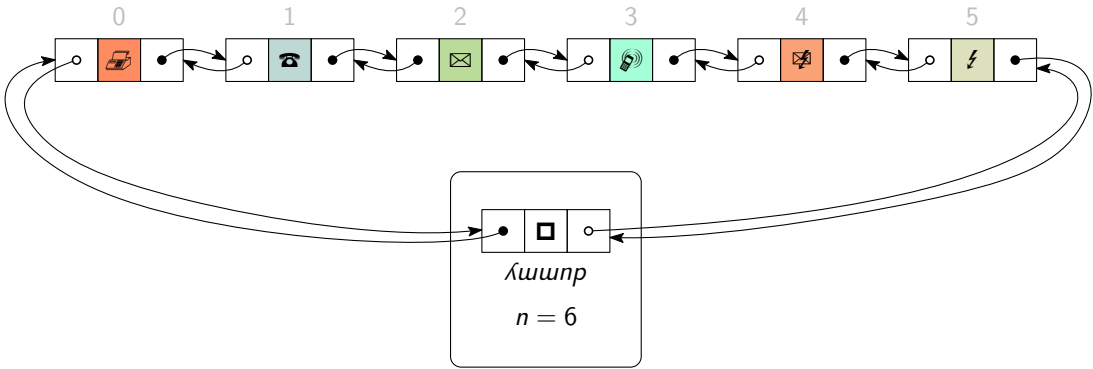
getNode(i)

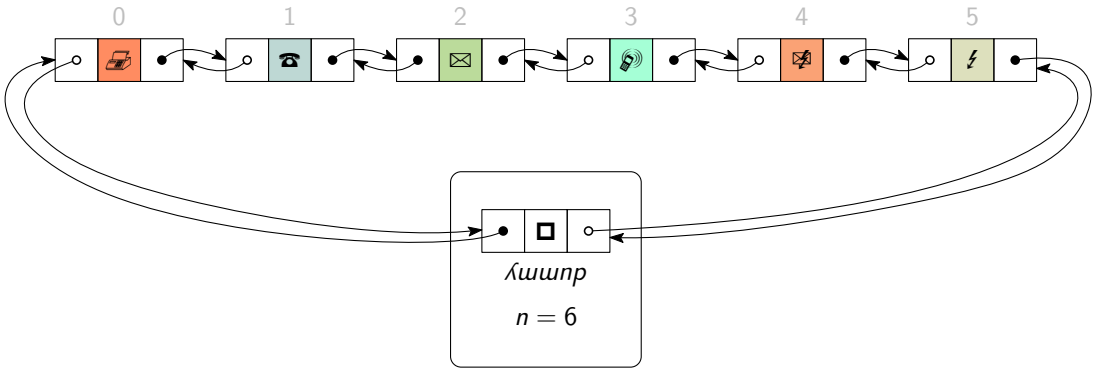
$O(1 + \min\{i, n - i\})$



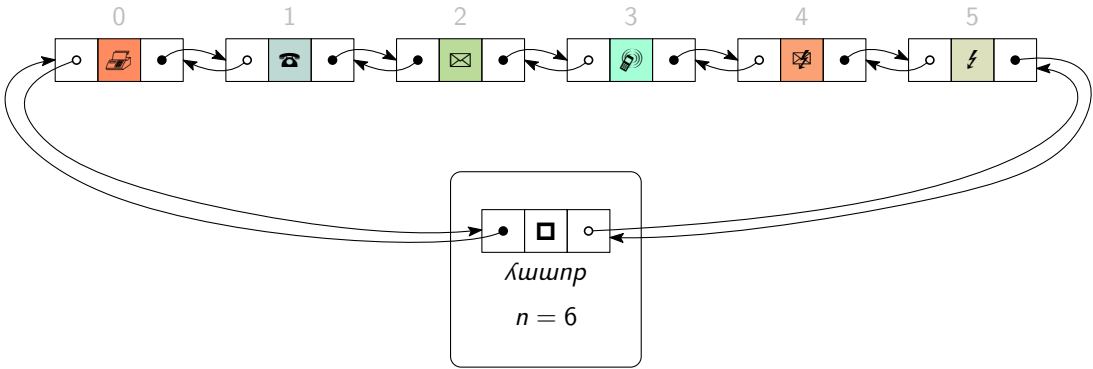
getNode(i)

$O(1 + \min\{i, n - i\})$





```
get(i)
  u ← getNode(i)
  return u.x
```

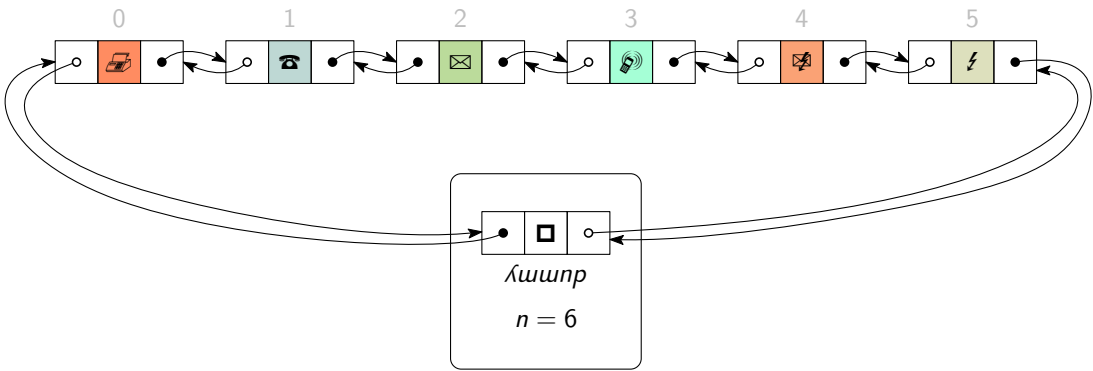


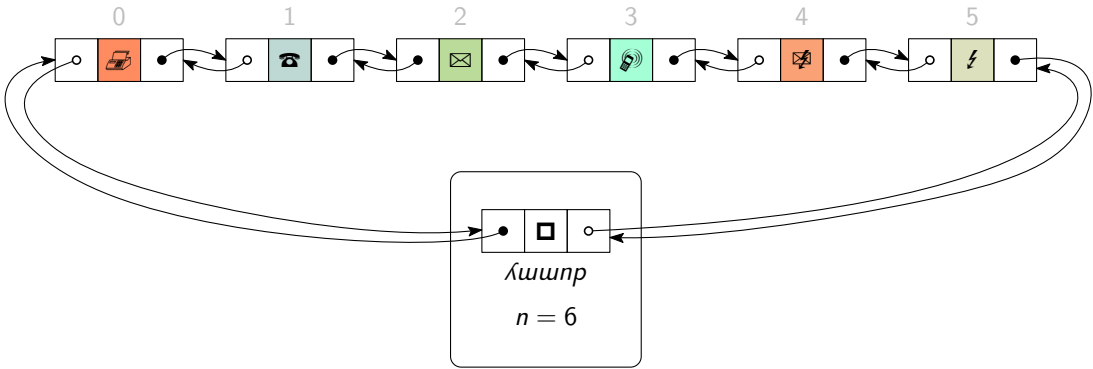
```

get(i)
  u ← getNode(i)
  return u.x

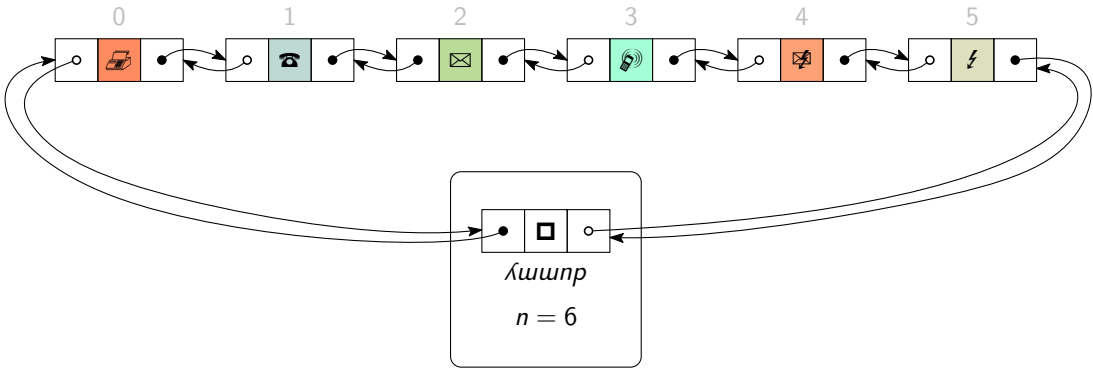
```

$$O(1 + \min\{i, n - 1\})$$



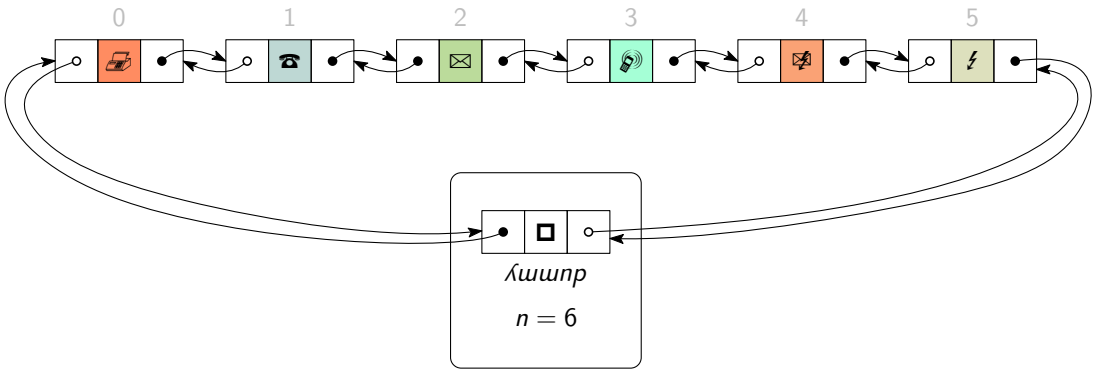


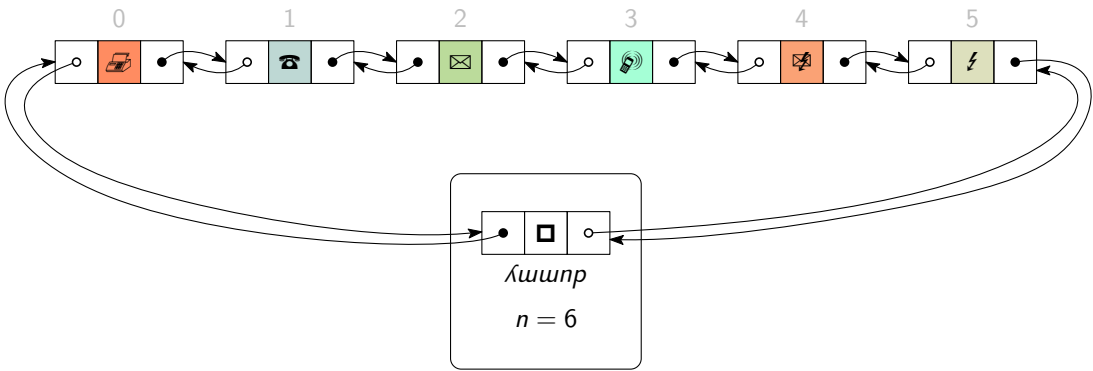
```
set( $i, x$ )  
   $u \leftarrow \text{getNode}(i)$   
  return  $u.x \leftarrow x$ 
```




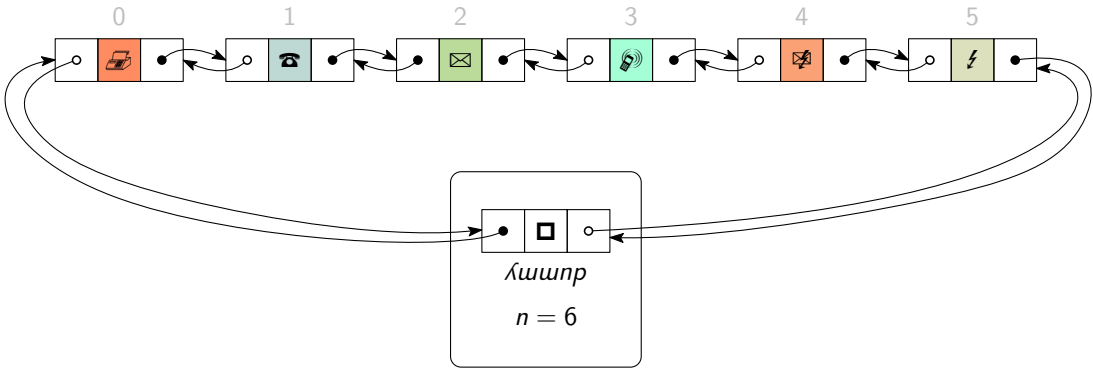
```
set( $i, x$ )  
   $u \leftarrow \text{getNode}(i)$   
  return  $u.x \leftarrow x$ 
```


$$O(1 + \min\{i, n - 1\})$$



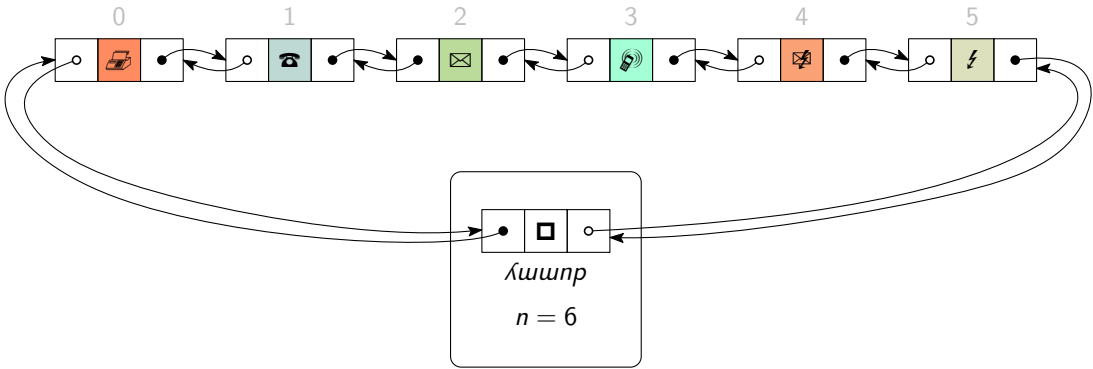



add(4, )



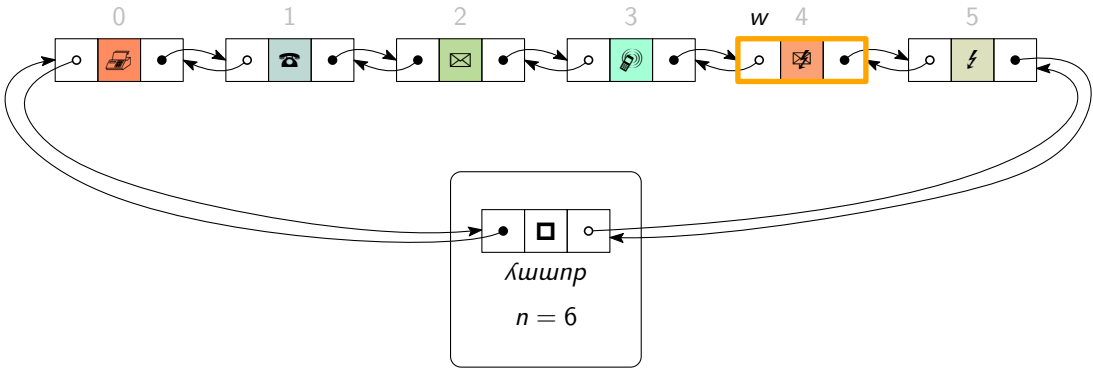
add(4, )


u

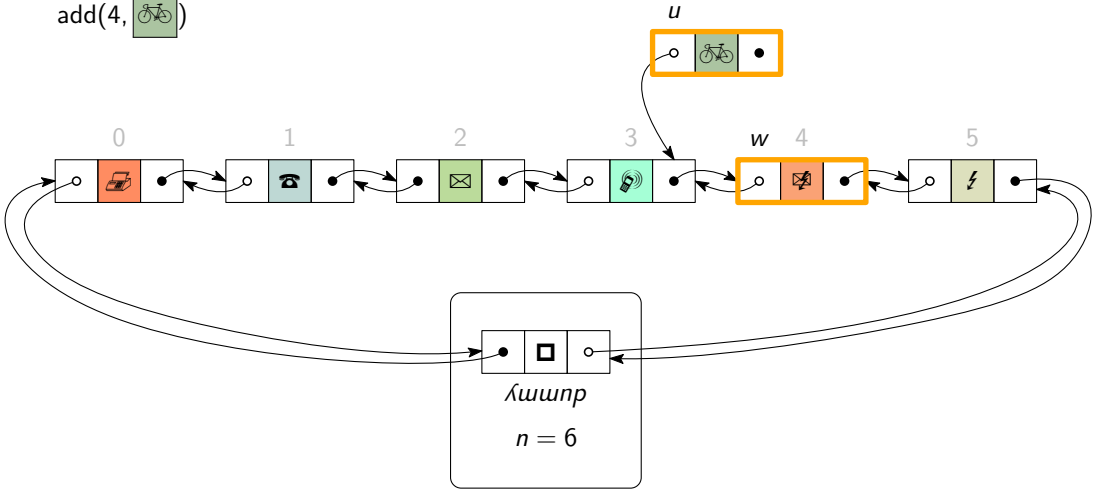



add(4, )

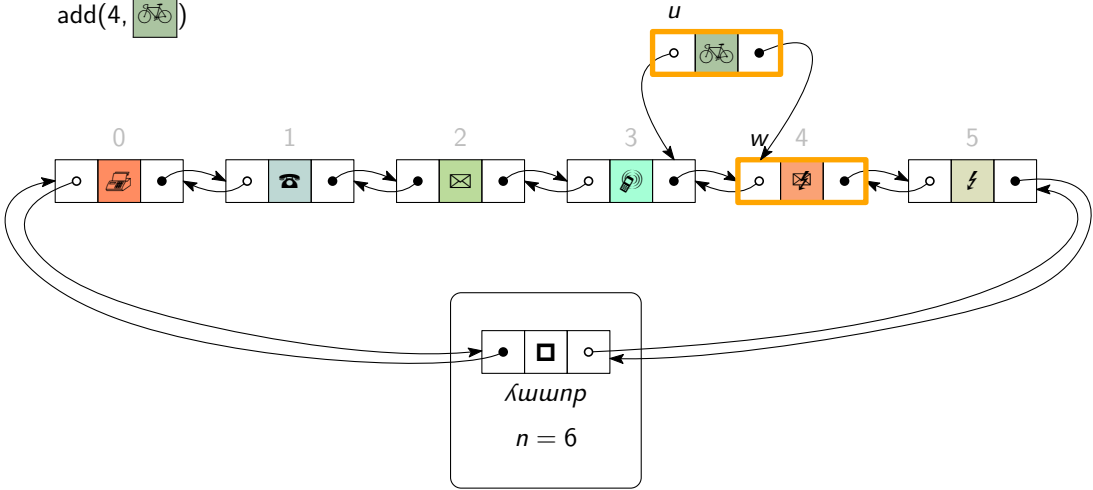
u




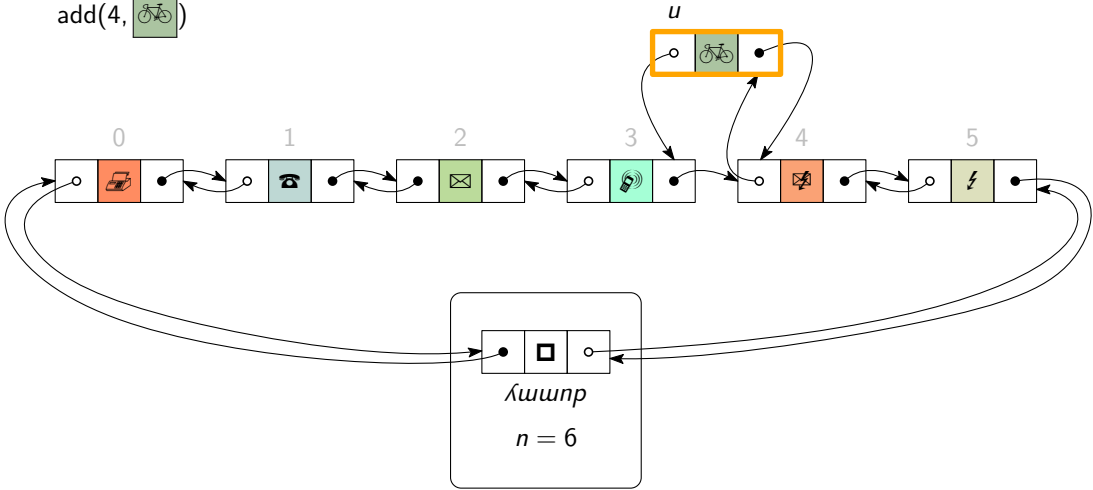
add(4, )




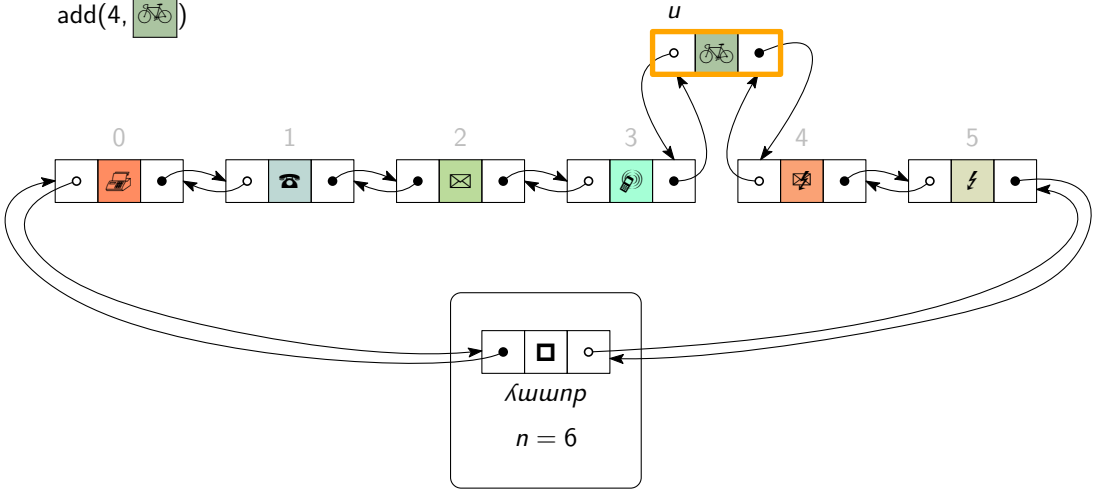
add(4, )




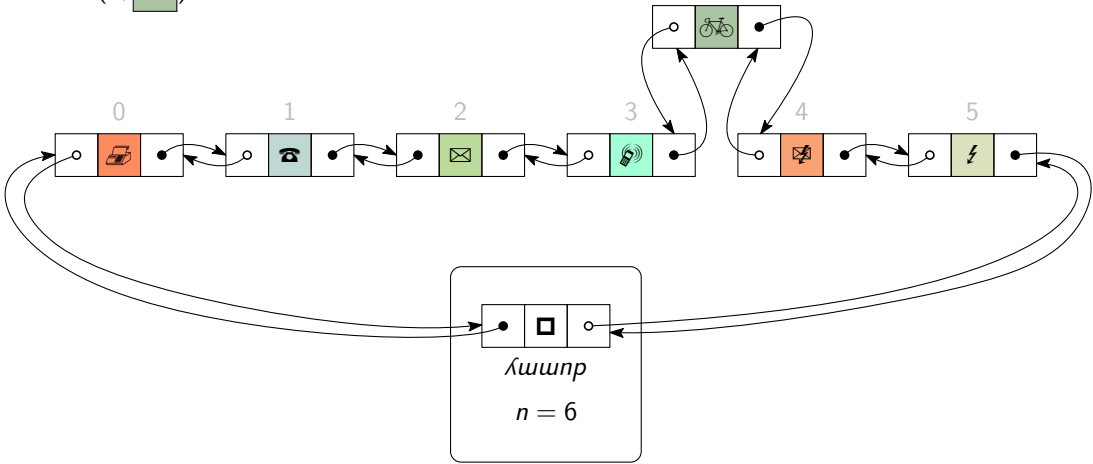
add(4, )




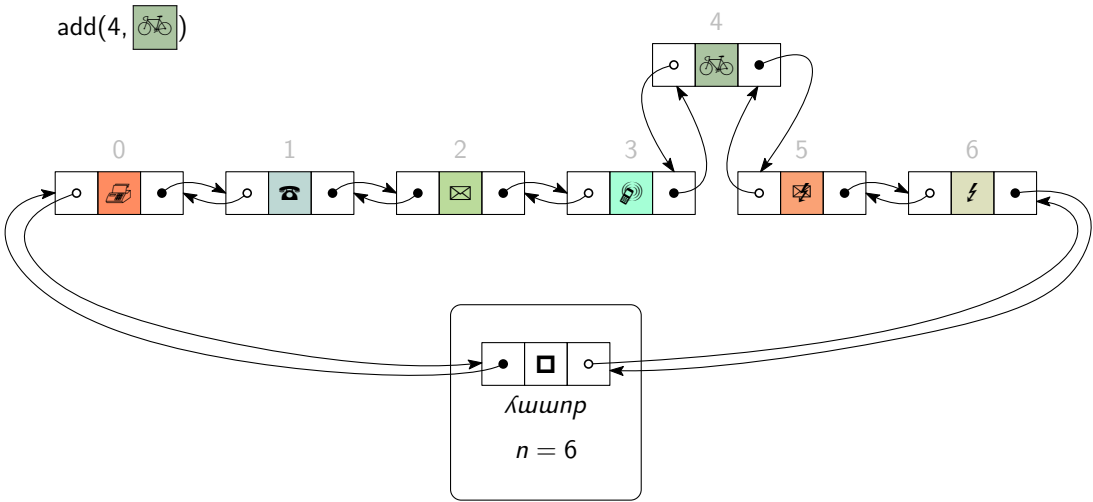
add(4, )



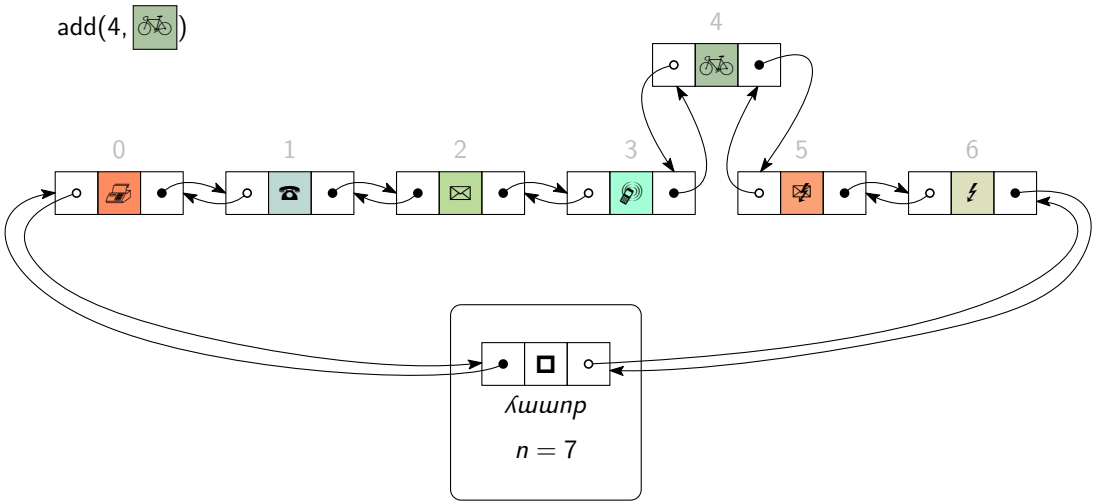
add(4, )

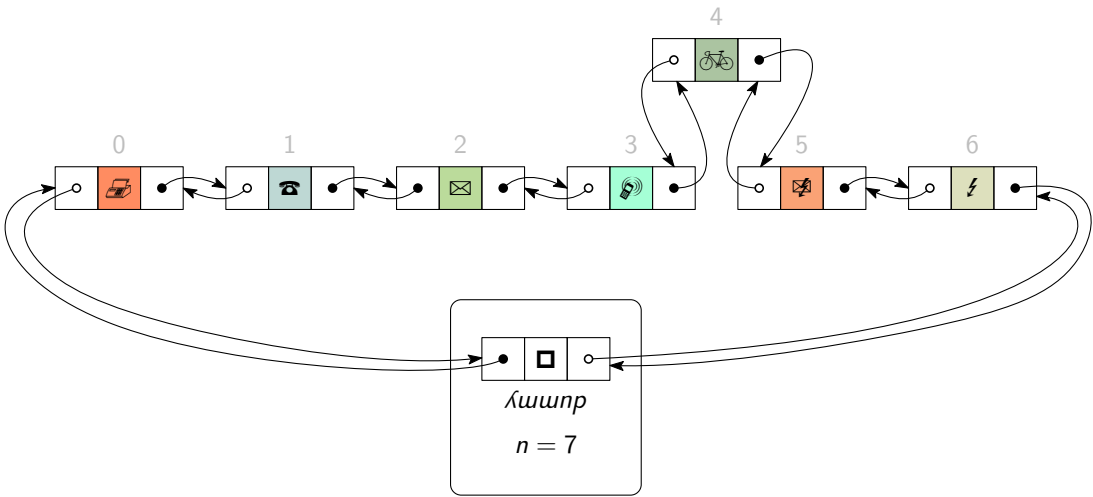


add(4, )

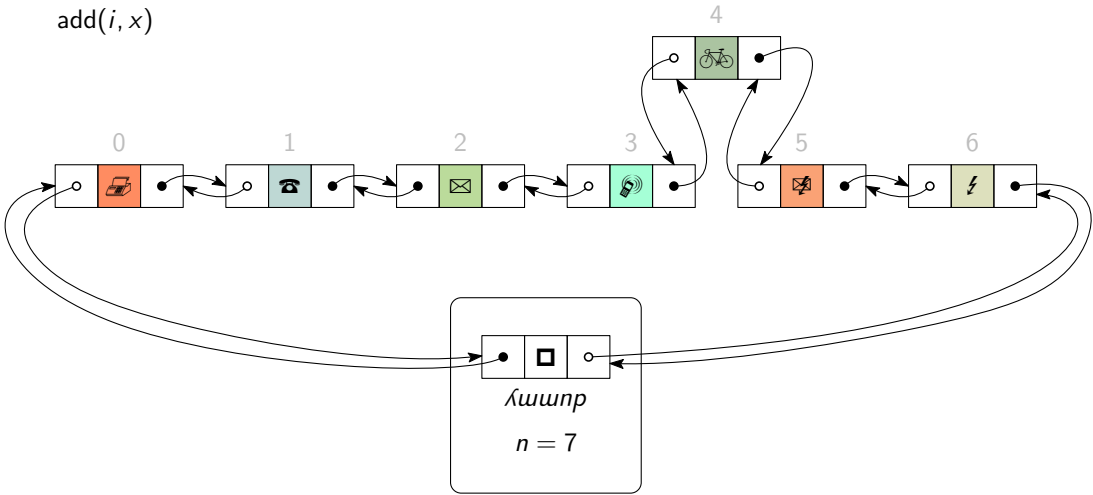


add(4, )

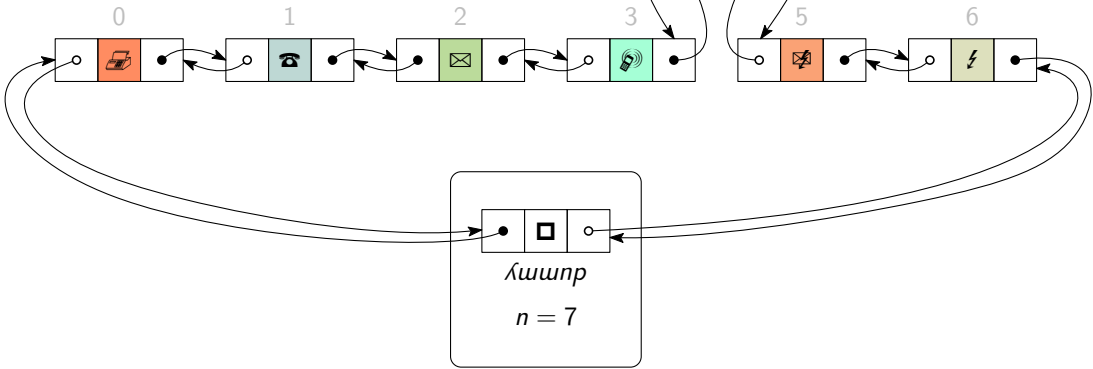


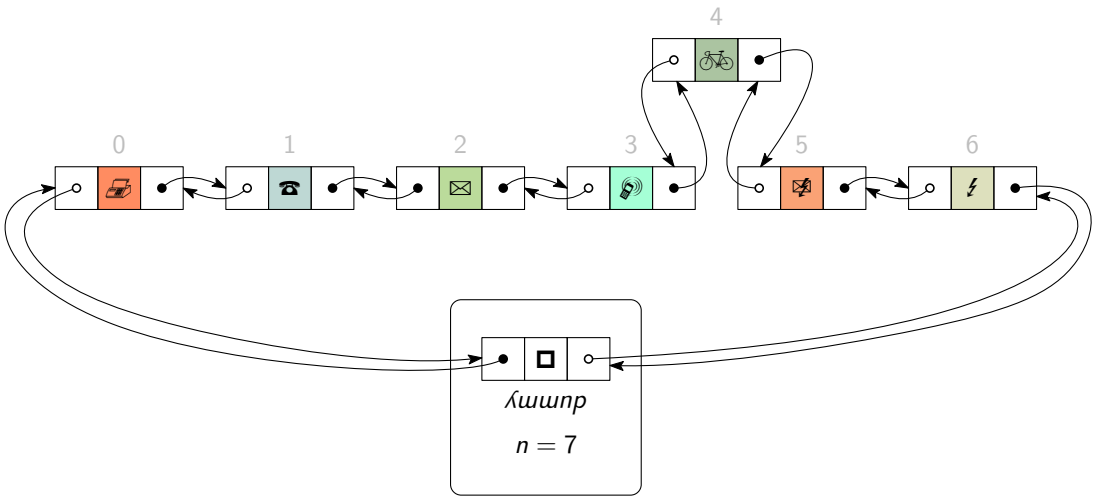


$\text{add}(i, x)$

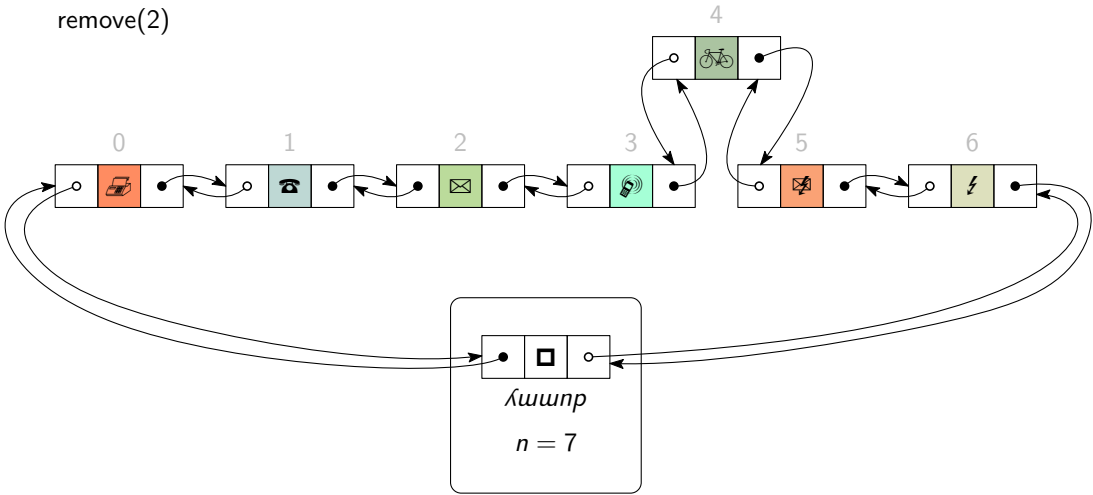


$\text{add}(i, x)$ $O(1 + \min\{i, n - i\})$

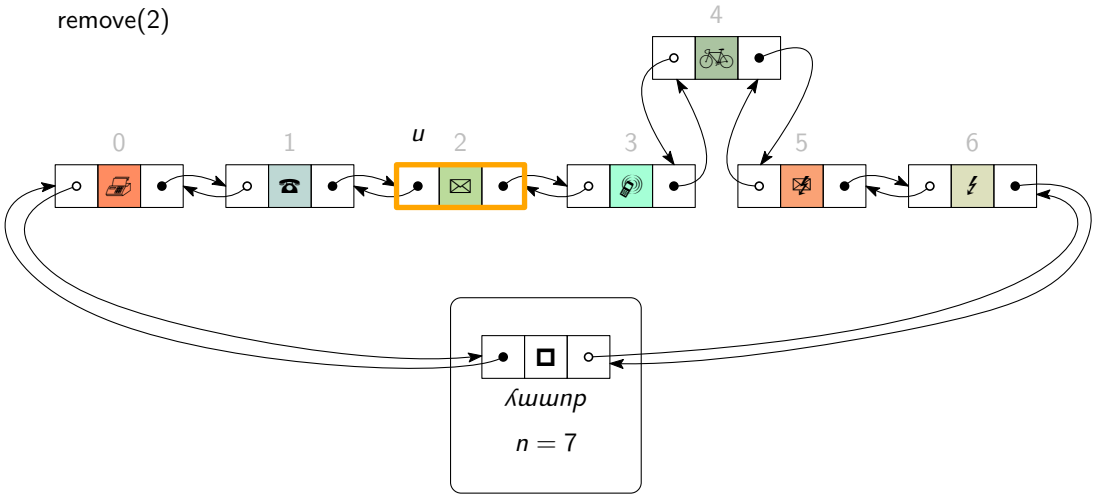




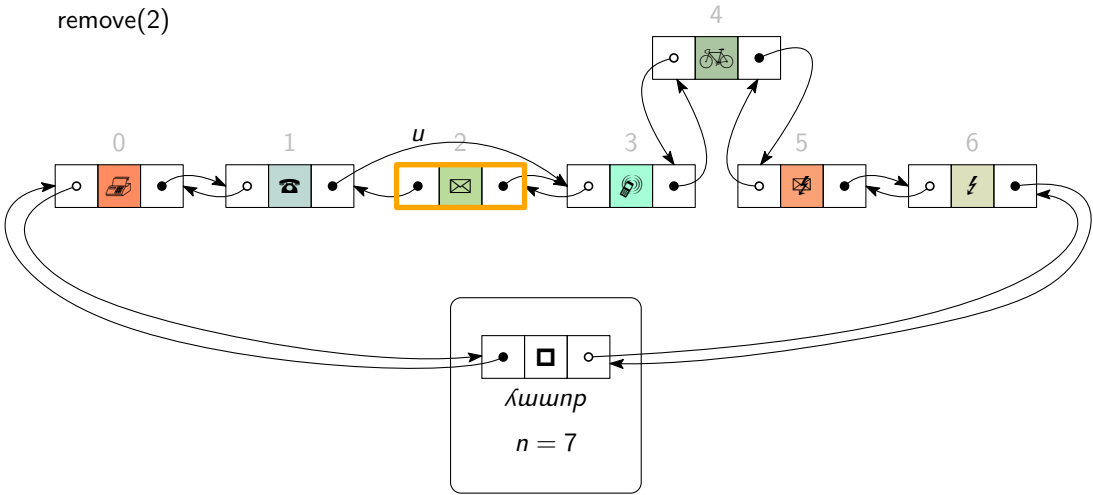
remove(2)



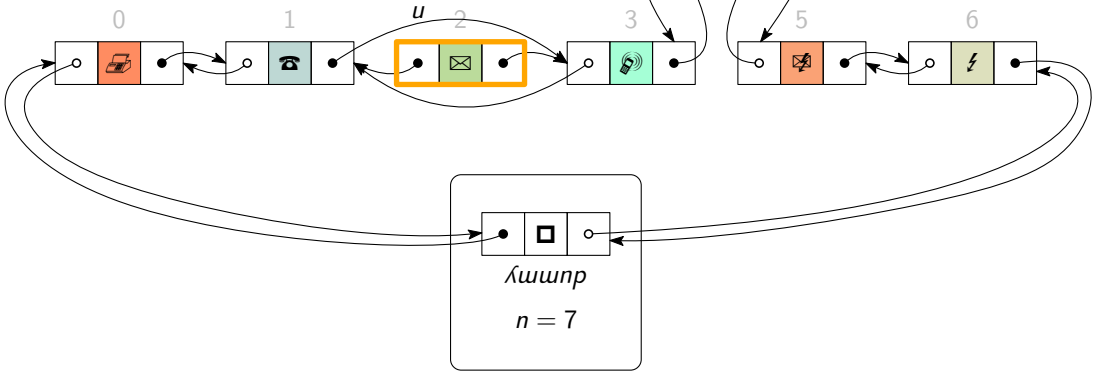
remove(2)



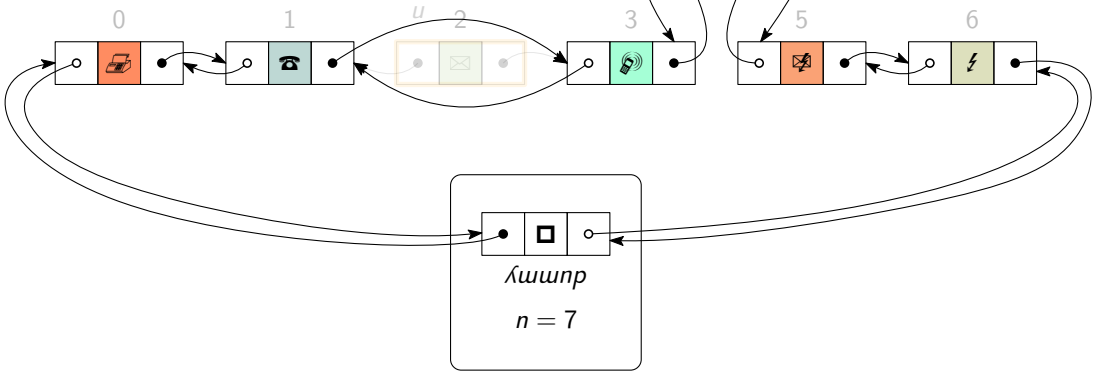
remove(2)



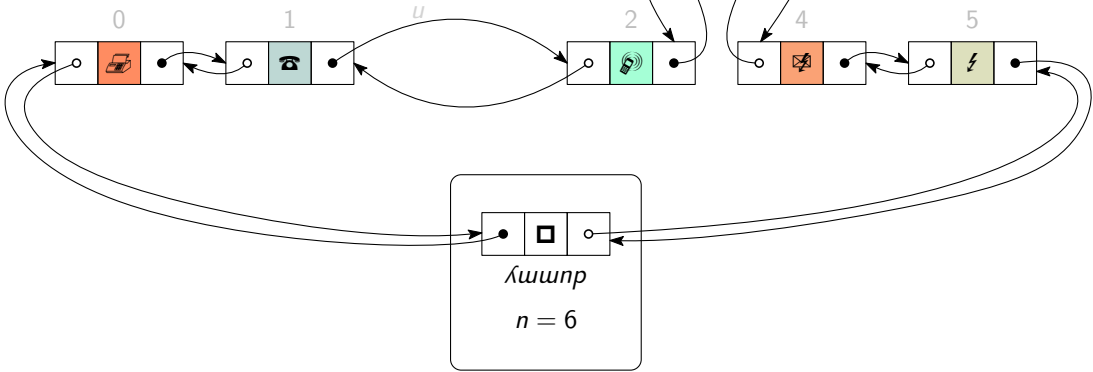
remove(2)

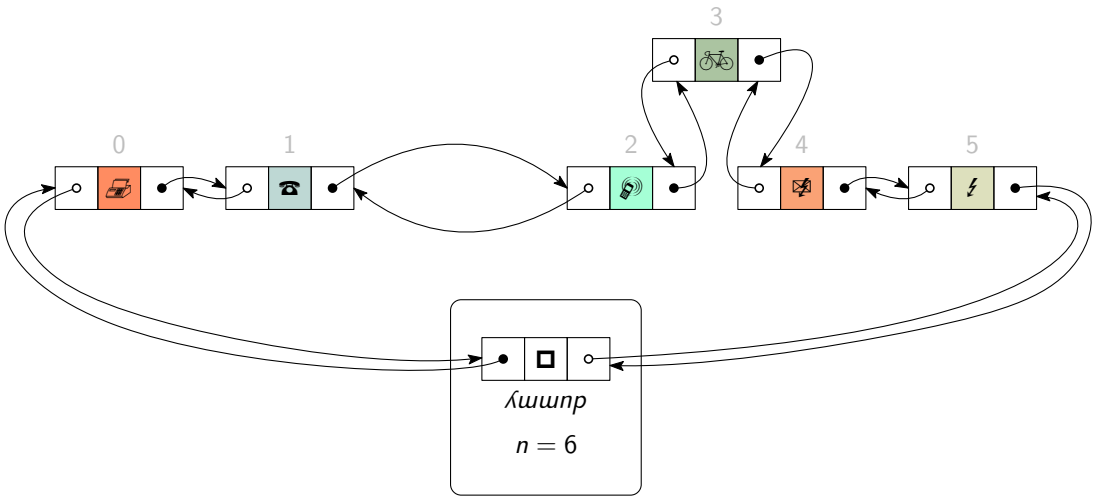


remove(2)

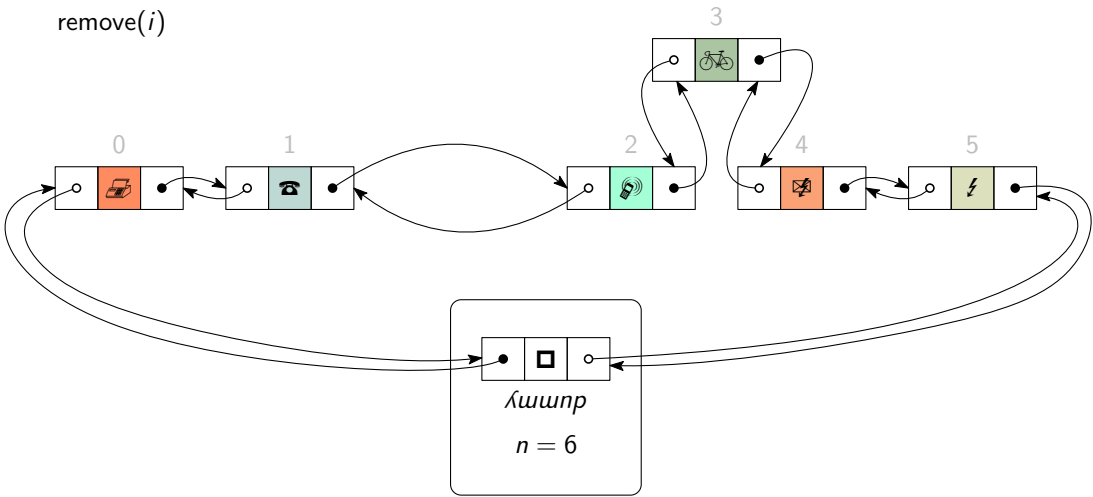


remove(2)





remove(i)



remove(i) $O(1 + \min\{i, n - i\})$

