2-10 Data Structures

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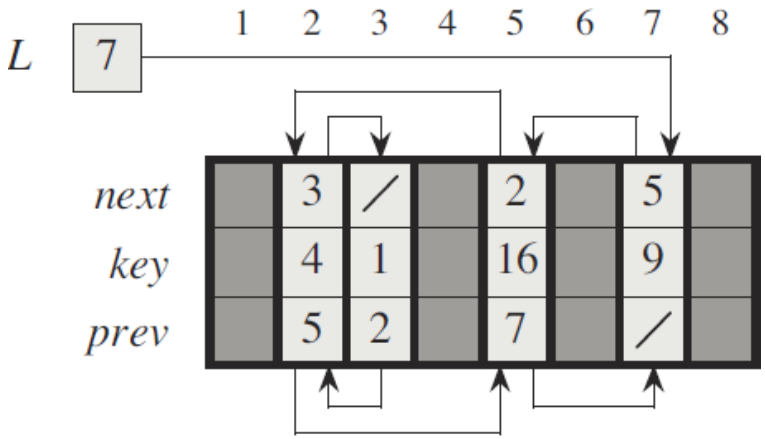
Compactation (Problem 10.3-4)

Keep all elements of a doubly linked list compact in storage, using the first n index locations in the multiple-array representation.

ALLOCATE-OBJECT() FREE-OBJECT(x)



1	2	3	4	5	6	7	8
1	1	1	1	0	0	0	0

LIST-INSERT(L, x) LIST-DELETE(L, x)

ALLOCATE-OBJECT() LIST-INSERT(L, x)

Table: $L = 1$

Λ					
x					
Λ					

Table: $L = 2$

Λ	1				
x	y				
1	Λ				

Table: $L = 4$

Λ	1	2	3		
x	y	s	t		
2	3	4	Λ		

$x \leftarrow free$ $free \leftarrow free + 1$ Return x

LIST-DELETE(L, x) FREE-OBJECT(x)

LIST-DELETE$(L, 2)$

Table: $L = 4$

Λ	1	2	3		
x	y	s	t		
2	3	4	Λ		

Table: $L = 3$

Λ	1	2			
x	s	t			
2	3	Λ			

Moving the elements (not pointers) after x forward

$O(n)$

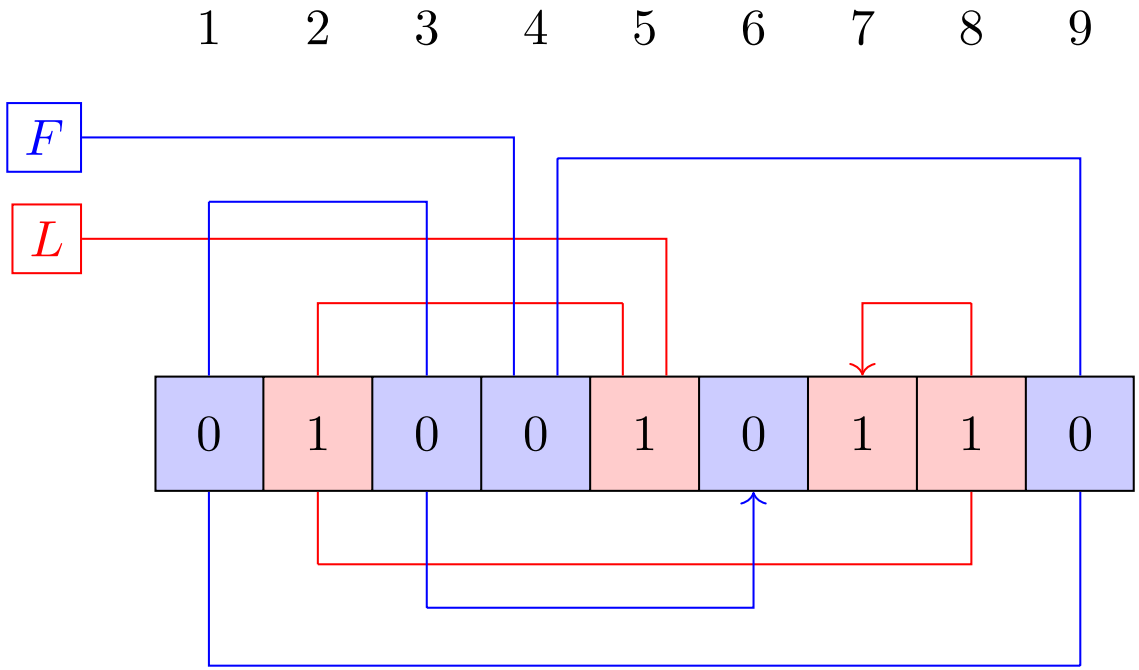
Compactify-List (Problem 10.3-5)

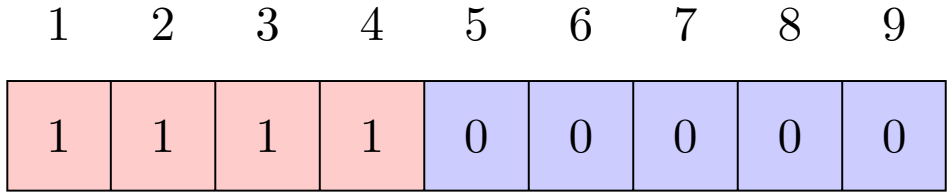
Compactify-List(L, F)

$$L: \text{ doubly linked list}, \quad |L| = n$$

$$F: \text{doubly linked free list}, \quad |F| = m - n$$

$$\Theta(n)$$

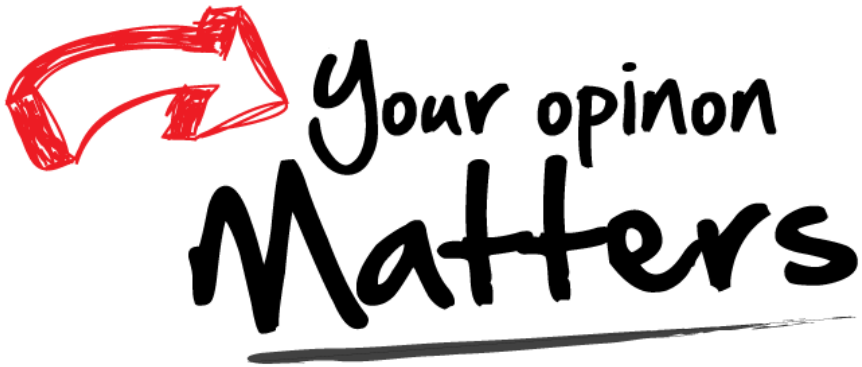




Swap $(0, 1)$ pairs following (F, L)

Swap only when $L > n \wedge F \leq n$


Thank
You!



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