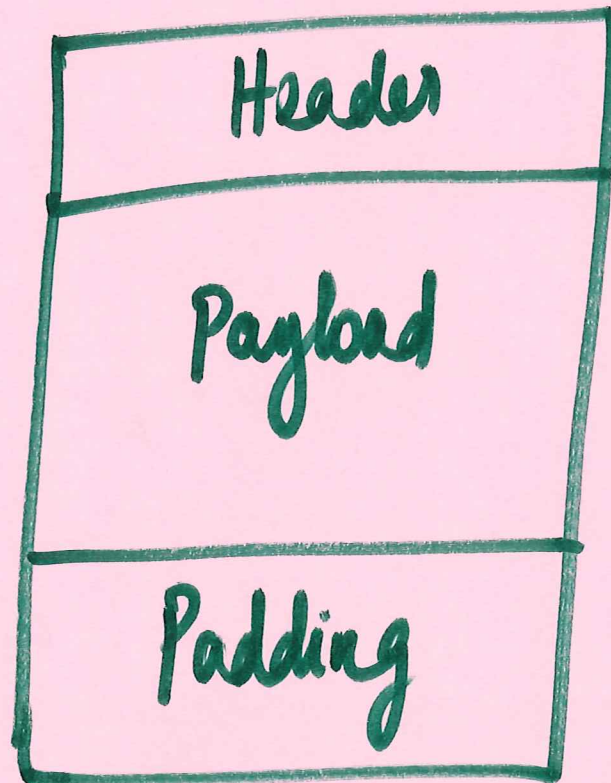


Lecture - 33

Heap block

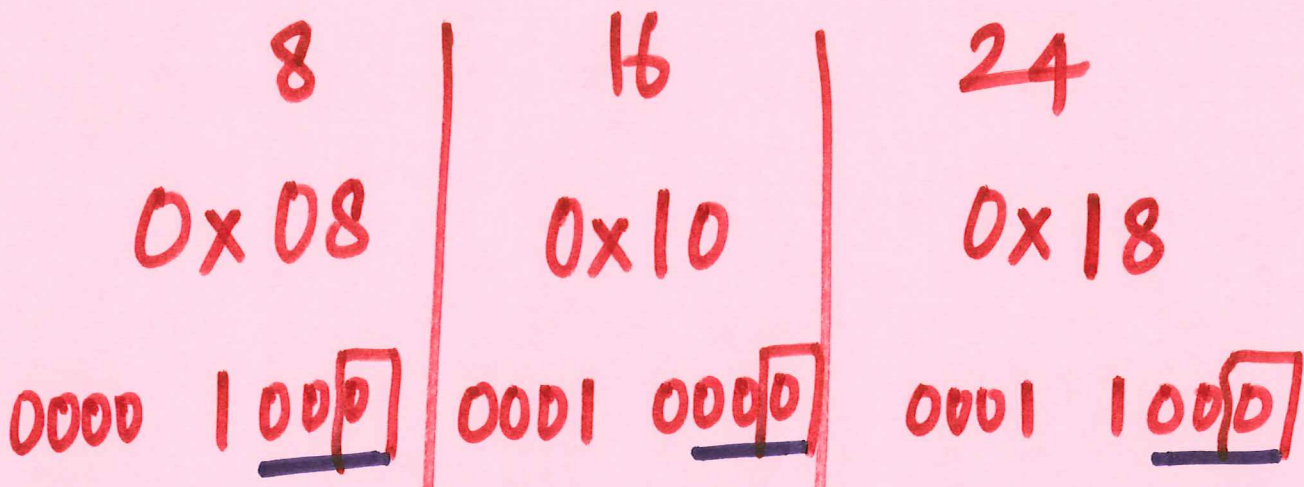


double - word aligned.

min block size = 8 bytes

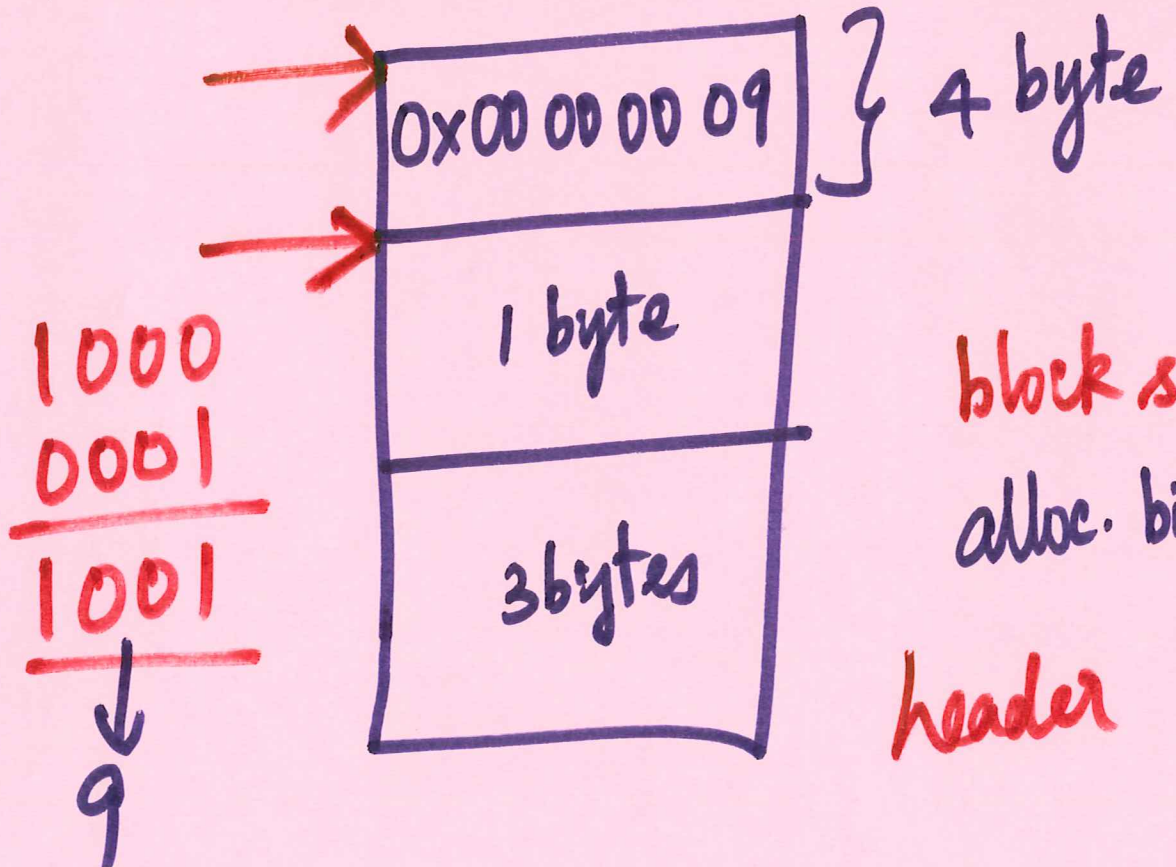
Sample block sizes

8, 16, 24.



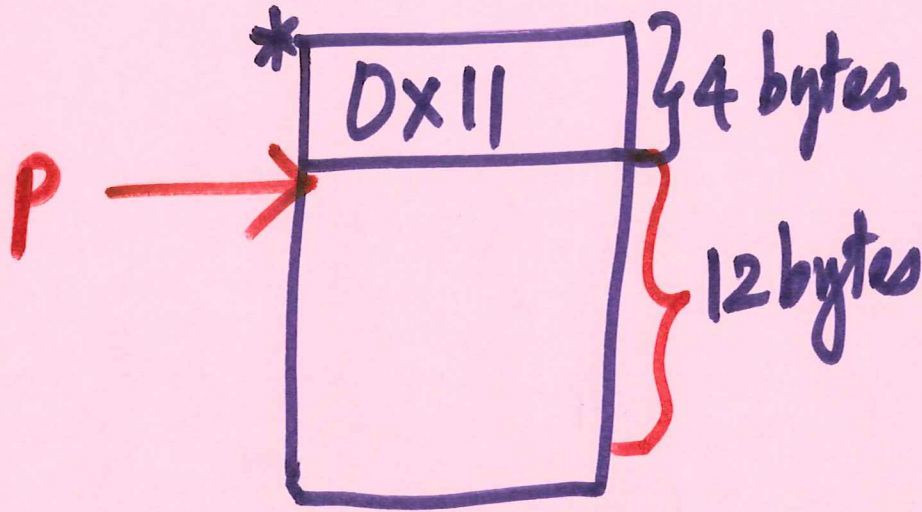
Least sig. bit → allocated bit
 1 → allocated
 0 → free.

malloc(1)



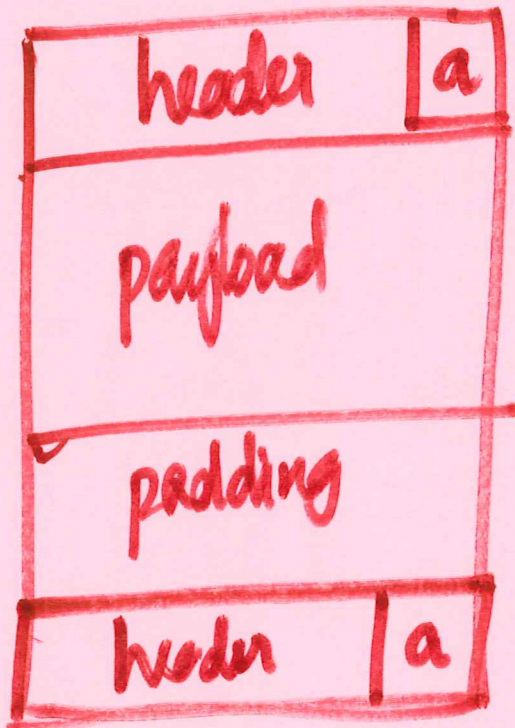
block size = 0x08
 alloc. bit = 0x01
header = 0x09

allocated block of size 16.

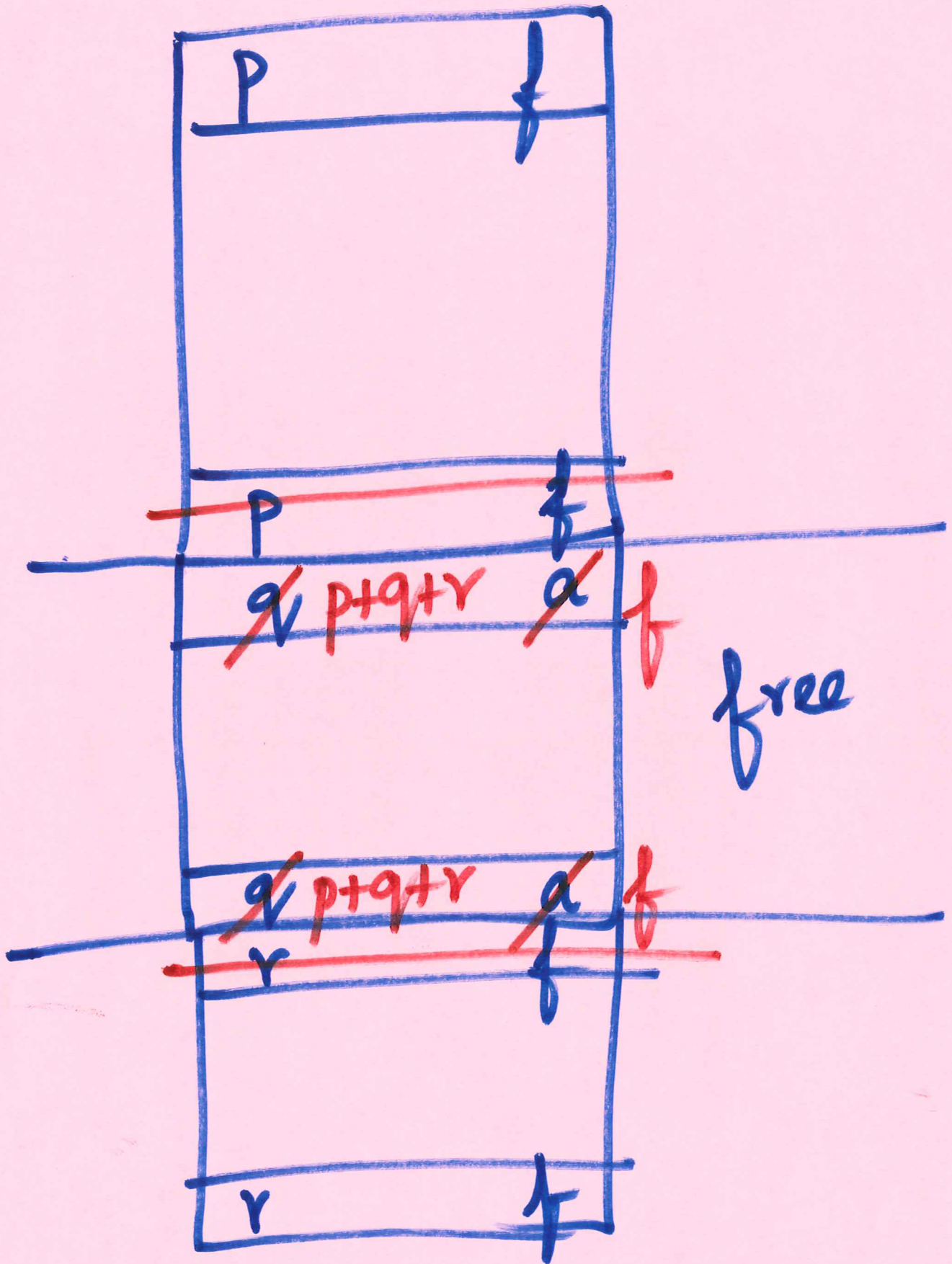


0x10
0x01

0x11

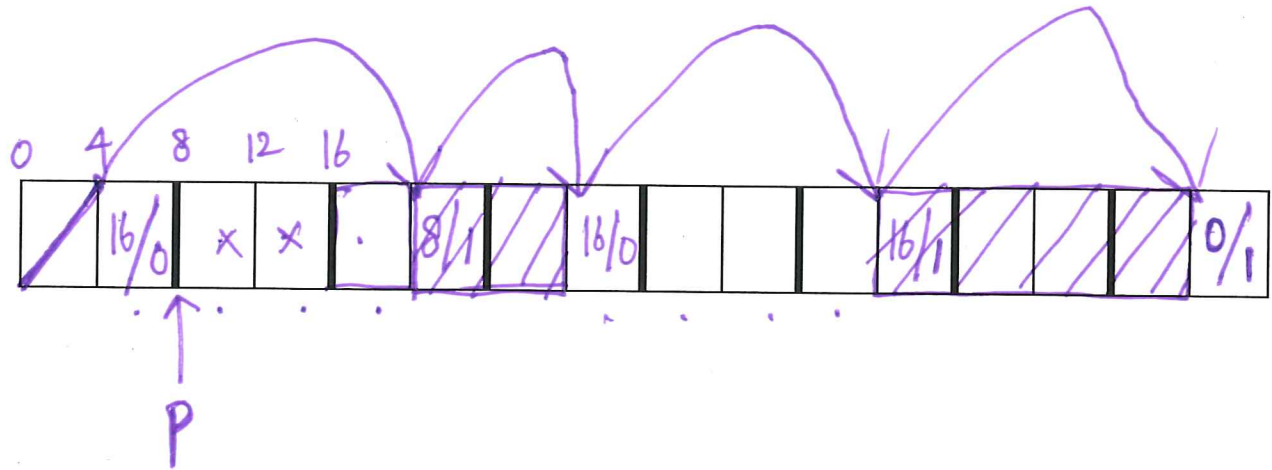


footer.

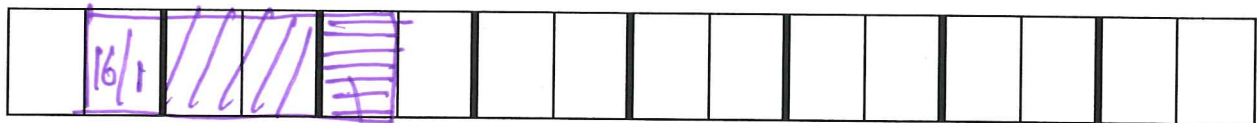


$p+q+r$	$ \frac{1}{2}$
$p+q+r$	$ \frac{1}{2}$

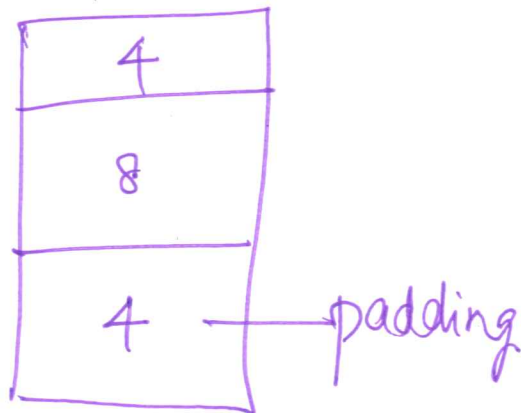
Implicit free list.



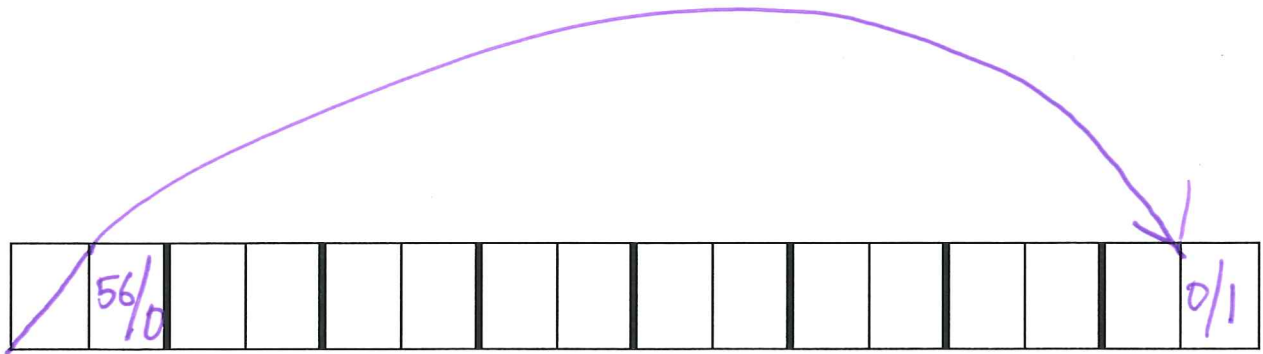
malloc(8)



4 bytes



Initial structure of heap.



$$\begin{array}{r} 14 \\ 4 \\ \hline 56 \end{array}$$



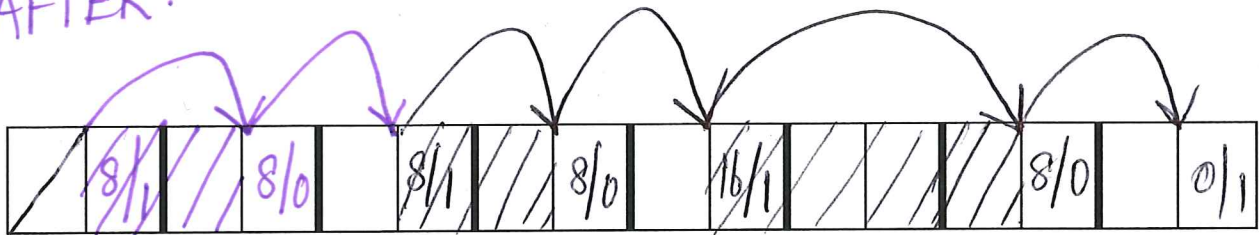
First Fit

BEFORE:



1. malloc(4) - successful
2. malloc(8) - fails.

AFTER:

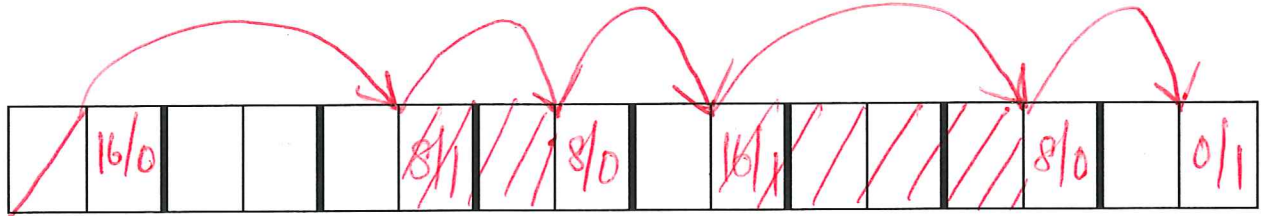


malloc(4)
allocated
here.



Best Fit

BEFORE:



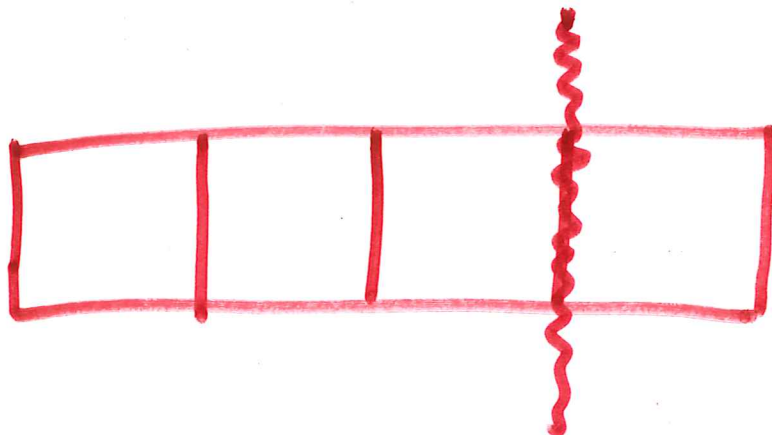
- 1. malloc (4)
 - 2. malloc (8)
- } both allocations succeed!

AFTER:

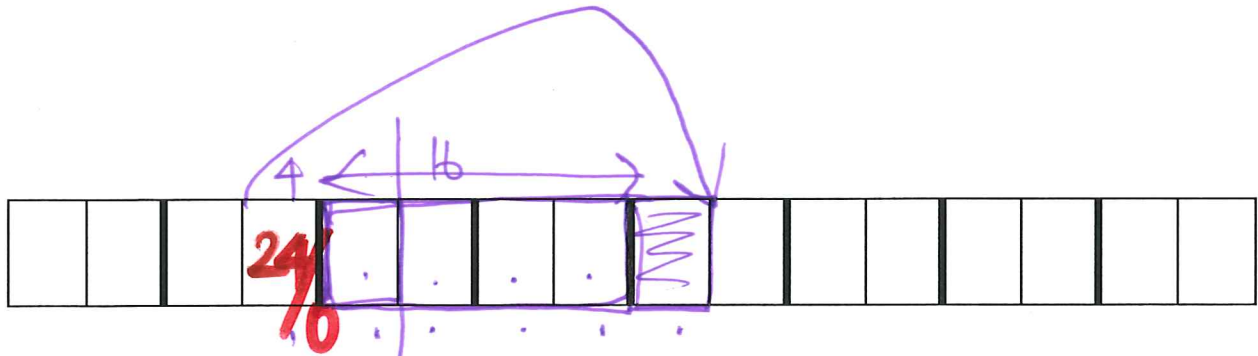


malloc(8)
allocated here.

malloc(4)
allocated here.



Splitting



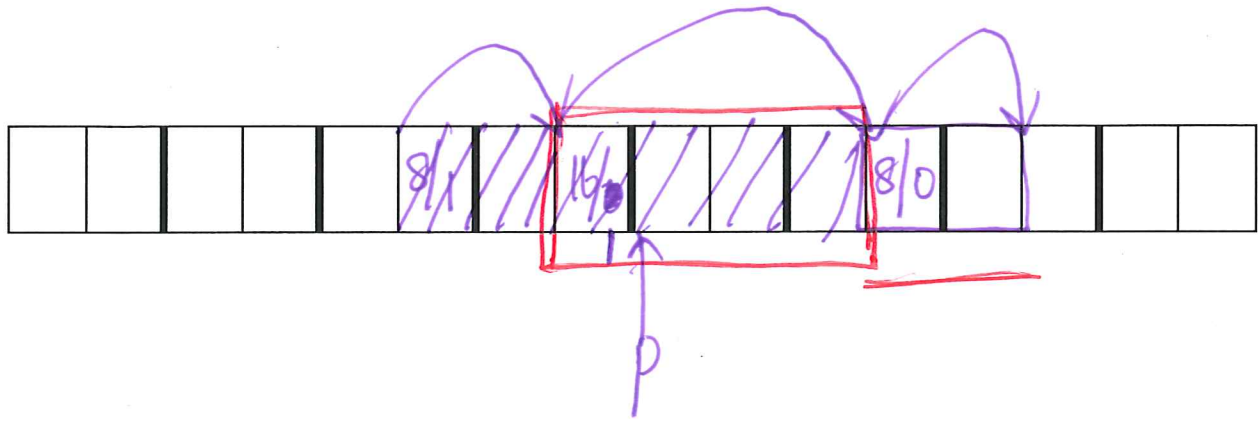
malloc(4) → split

8 }
12 } → split
~~16~~

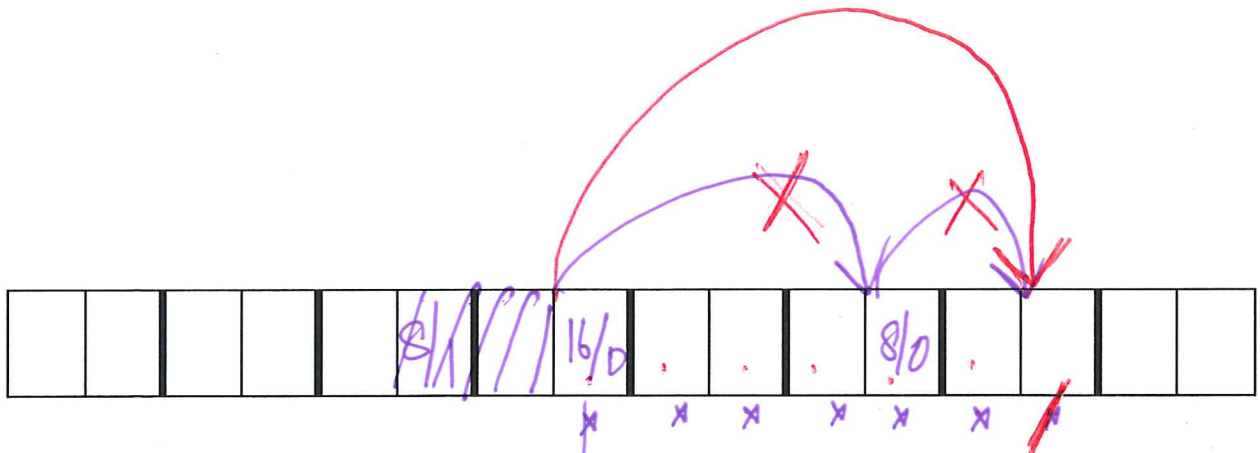
16, 20 → NO split.



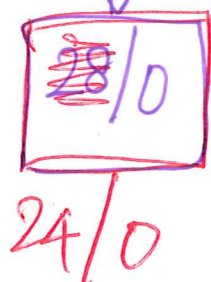
Coalescing free blocks



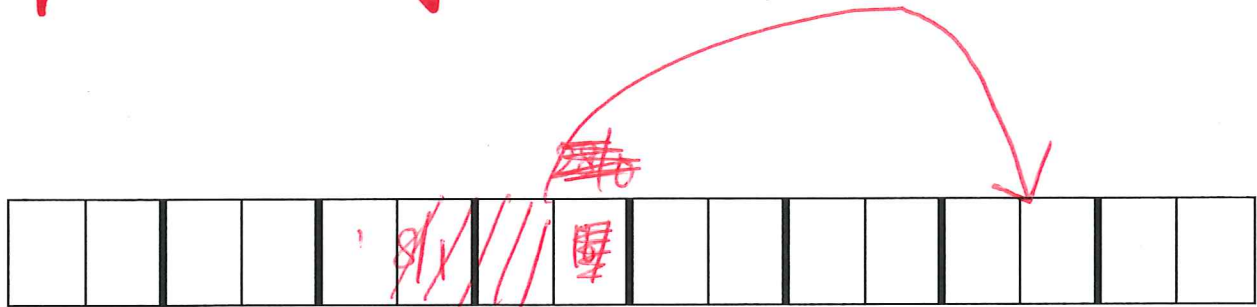
free(p);



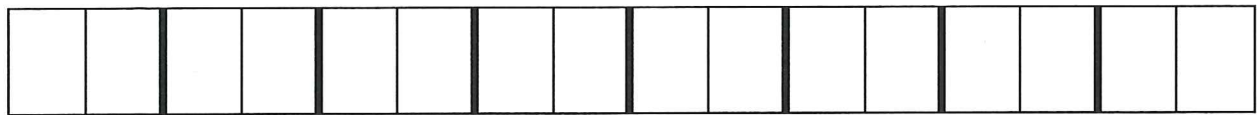
False fragmentation.



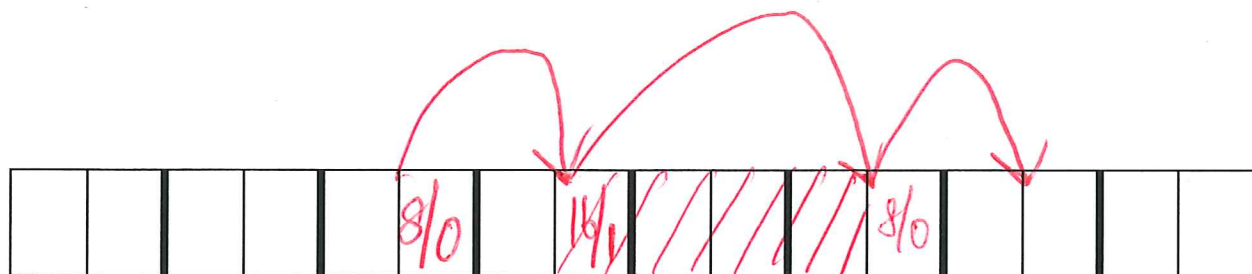
After coalescing



24/0 } 1 free block



Coalescing - next and prev block is free.



P

free(p)

