

OS 2022 Problem Sheet #7

Problem 7.1: *positioning algorithms*

(1+1+1+1 = 4 points)

A system using segmentation has free blocks of the following sizes:

12 KiB, 5 KiB, 19 KiB, 13 KiB, 7 KiB, 8 KiB, 16 KiB

The blocks are ordered as shown above and the last memory allocation took place right before the first block. The system receives the following sequence of memory requests (in the order shown below):

14 KiB, 9 KiB, 7 KiB, 10 KiB

If a free block is allocated that is bigger than the request, then a new small block is left over and positioned at the same place where the bigger block was positioned in the list of free blocks.

a) Show how the list of free blocks changes after each allocation using the best-fit algorithm.

12 KiB, 5 KiB, 19 KiB, 13 KiB, 7 KiB, 8 KiB, 16 KiB
14 KiB:
9 KiB:
7 KiB:
10 KiB:

b) Show how the list of free blocks changes after each allocation using the worst-fit algorithm.

12 KiB, 5 KiB, 19 KiB, 13 KiB, 7 KiB, 8 KiB, 16 KiB
14 KiB:
9 KiB:
7 KiB:
10 KiB:

c) Show how the list of free blocks changes after each allocation using the first-fit algorithm.

12 KiB, 5 KiB, 19 KiB, 13 KiB, 7 KiB, 8 KiB, 16 KiB
14 KiB:
9 KiB:
7 KiB:
10 KiB:

d) Show how the list of free blocks changes after each allocation using the next-fit algorithm.

12 KiB, 5 KiB, 19 KiB, 13 KiB, 7 KiB, 8 KiB, 16 KiB
14 KiB:
9 KiB:
7 KiB:
10 KiB:

Show how the pages are mapped to three frames using the Least Recently Used (LRU) page replacement algorithm.

reference string	1	2	3	4	1	1	4	2	1	2
frame 0										
frame 1										
frame 2										

Hint: Do not move pages between frames except when necessary.