

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

17 KiB, 8 KiB, 10 KiB, 21 KiB, 12 KiB, 13 KiB

it receives these requests

11 KiB, 9 KiB, 7 KiB, 16 KiB

~~Best fit~~

~~AND~~

best fit

KiB 17 KiB 8 KiB 10 KiB 21 KiB 12 KiB 13 KiB

11

X

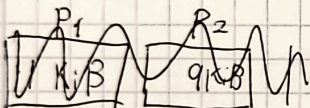
9

X

7

X

16 X



a) Best fit

11 KiB  $\rightarrow$  P<sub>1</sub> ✓

P<sub>4</sub>  $\rightarrow$  17 KiB  $\rightarrow$  1 KiB

9 KiB  $\rightarrow$  P<sub>2</sub> ✓

P<sub>3</sub>  $\rightarrow$  8 KiB  $\rightarrow$  1 KiB

7 KiB  $\rightarrow$  P<sub>3</sub> ✓

P<sub>2</sub>  $\rightarrow$  10 KiB  $\rightarrow$  1 KiB

16 KiB  $\rightarrow$  P<sub>4</sub> ✓

21 KiB

P<sub>1</sub>  $\rightarrow$  12 KiB  $\rightarrow$  1 KiB

13 KiB

b) Worst fit

11 KiB  $\rightarrow$  P<sub>1</sub> ✓

P<sub>2</sub>  $\rightarrow$  17 KiB  $\rightarrow$  8 KiB

9 KiB  $\rightarrow$  P<sub>2</sub> ✓

8 KiB

7 KiB  $\rightarrow$  P<sub>3</sub> ✓

10 KiB

16 KiB  $\rightarrow$  P<sub>4</sub> X

P<sub>1</sub>  $\rightarrow$  21 KiB  $\rightarrow$  10 KiB

12 KiB

P<sub>3</sub>  $\rightarrow$  13 KiB  $\rightarrow$  6 KiB

it goes into starvation since P<sub>4</sub> cant be completed

BRUNNEN



c) First-fit

11 KiB  $\rightarrow P_1 \checkmark$

9 KiB  $\rightarrow P_2 \checkmark$

7 KiB  $\rightarrow P_3 \checkmark$

16 KiB  $\rightarrow P_4 \checkmark$

$P_1 \rightarrow$

$P_2 \rightarrow$

$P_4 \rightarrow$

17 KiB
8 KiB
10 KiB
21 KiB
12 KiB
13 KiB

$\rightarrow$

$P_3 \rightarrow$

$\rightarrow$

$\rightarrow$

<del>6 KiB</del>
8 KiB
1 KiB
5 KiB
12 KiB
13 KiB

$\rightarrow$

6 KiB
<del>1 KiB</del>
1 KiB
5 KiB
12 KiB
13 KiB

f) next-fit

11 KiB  $\rightarrow P_1 \checkmark$

9 KiB  $\rightarrow P_2 \checkmark$

7 KiB  $\rightarrow P_3 \checkmark$

16 KiB  $\rightarrow P_4 \times$

$P_1 \rightarrow$

$P_2 \rightarrow$

$P_3 \rightarrow$

17 KiB
8 KiB
10 KiB
21 KiB
12 KiB
13 KiB

$\rightarrow$

$\rightarrow$

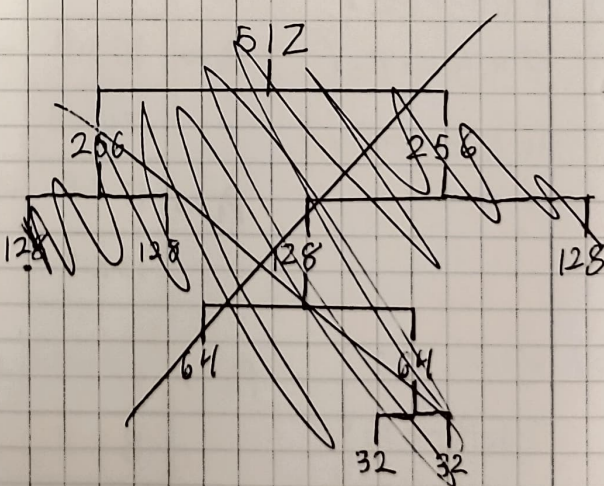
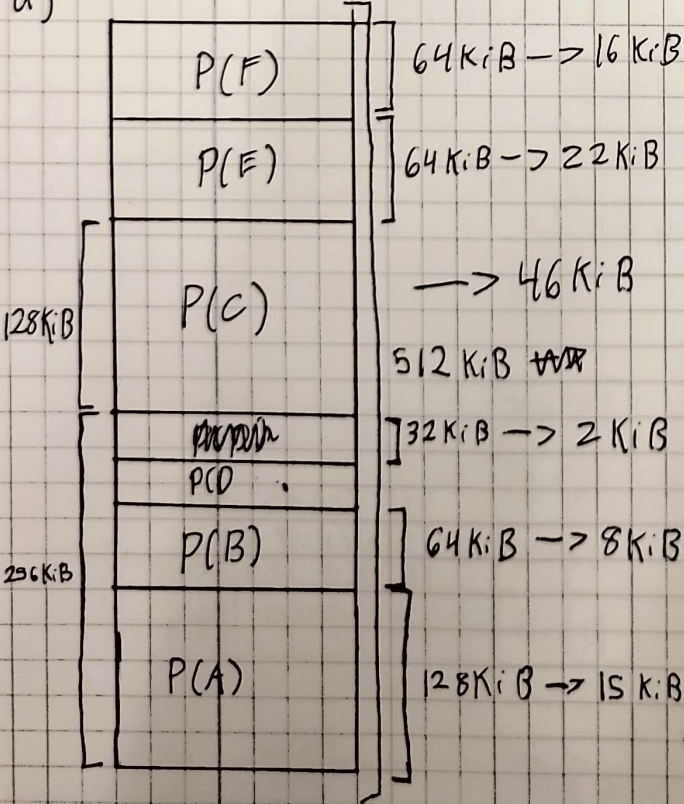
$\rightarrow$

6 KiB
8 KiB
1 KiB
14 KiB
12 KiB
13 KiB

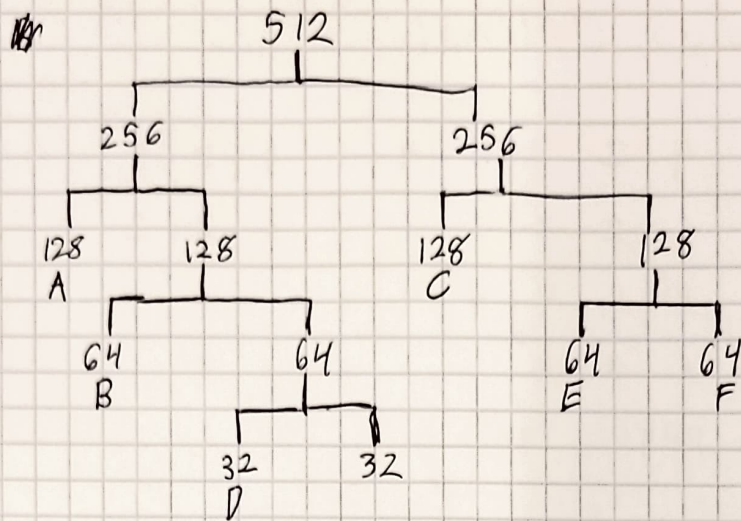
starvation  
does not  
complete

Ex. 2) buddy system

a)







b) 1A

internal fragmentation

$$15 + 8 + 2 + 46 + 22 + 16 = 109$$

c) it could not since the space it wants it cannot get and the space it could use breaks buddy system rules

### 7.3) Page replacement algorithms

a) FIFO

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	2	2	4	4	4	3	3	1
frame 1		4	4	3	3	3	1	1	2	2
	*	*	*	*	*		*	*	*	*

9 page faults

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	1	3	3	3	3	3	3	3
frame 1		4	4	4	4	4	1	1	1	1
frame 2			2	2	2	2	2	2	2	2
	*	*	*	*			*			

5 page faults



## b) Belady's Optimal

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	2	3	3	3	3	3	2	2
frame 1		4	4	4	4	4	1	1	1	1
	*	*	*	*			*		*	

6 page faults

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	1	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>	<del>1</del>
frame 1		4	4	4	4	4	<del>4</del>	<del>4</del>	<del>2</del>	<del>2</del>
frame 2			2	<del>3</del>	<del>3</del>	<del>3</del>	<del>3</del>	<del>3</del>	<del>2</del>	<del>3</del>
	<del>*</del>	<del>*</del>	<del>*</del>	<del>*</del>			*		*	

5 page faults

## c) LRU

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	2	2	4	4	4	3	3	1
frame 1		4	4	<del>3</del>	3	3	1	1	2	2
	*	*	*	*	*		*	*	*	*

9 page faults

ref string	1	4	2	3	4	4	1	3	2	1
frame 0	1	1	1	3	3	3	3	3	3	3
frame 1		4	4	4	4	4	4	4	2	2
frame 2			2	2	2	2	1	1	1	1
	*	*	*	*			*		*	

6 page faults