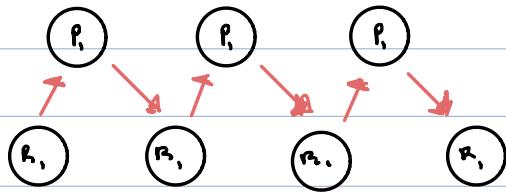


HW 3 #5

(a) 3 process
4 resources



(b) N processes
M resources

$$\sum_{i=1}^N \text{Max need} < M + N$$

For a deadlock to happen \Rightarrow All resources must be in use

- Each process needs 1 more atleast (N)

HW 2 Problem 7

LSPN

$$S = D - t - C$$

slack = 0
(Must run now)

(a)

Any process must execute immediately

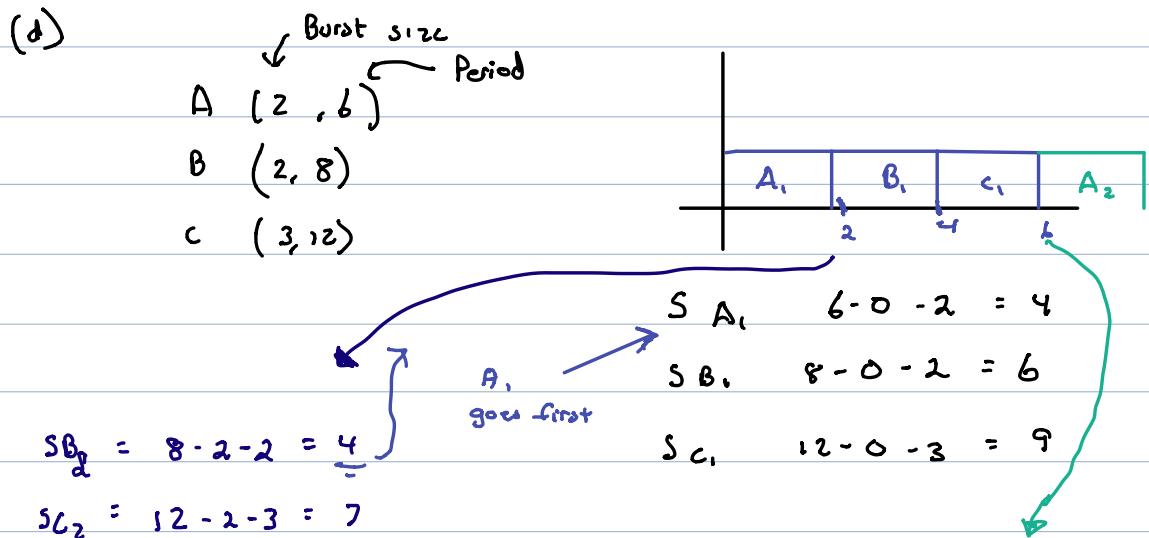
(b) - slack

\rightarrow If already missed deadline

(c) How long

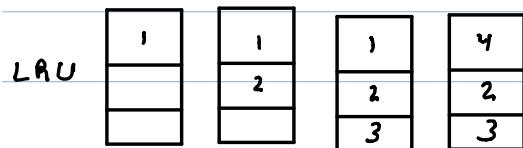
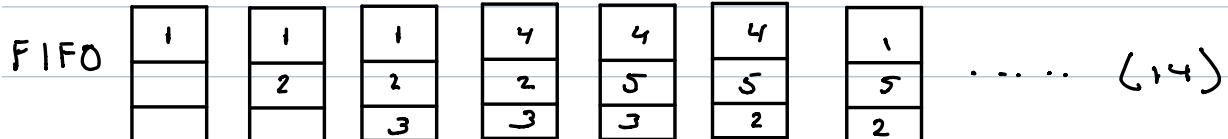
\hookleftarrow

(d)



Homework 4 Problem 3

1 2 3 4 5 2 1 3 3 2 3 4 5 1 2 3 5



Can you have preemptive version of HRRN

$$R_i = \frac{w + s}{s}$$

2		3
1		1

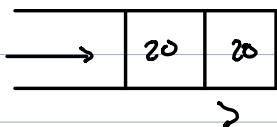
i.e. \downarrow Higher priority

$$\frac{\Delta+2}{2} \quad \frac{\Delta+3}{3}$$

HRRN, no b/c its getting the ratios calculated contingously

①

N-step Scan



CS4328 Review Questions

20	20	20	20	20
>				

- 1- A burst of 100 I/O requests is submitted at time 0 to a 20-step SCAN algorithm. If it takes 50 msec to do a single SCAN, what is the maximum time to finish those requests?

$$S \cdot SD = 250 \text{ msec}$$

- 2- Suppose you have a disk composed of 25 tracks and the head is currently on track 10. Give a sequence of requests to different tracks showing that SSTF is not optimal.

(Give example) Shortest seek time first

- 3- Santa's life consists of waiting for requests from a child and fulfilling them; when a request is made (for a particular gift), Santa goes and brings the gift and then waits for the next request. The child waits for Santa's availability, submits a request and waits for the gift. Once a gift is fulfilled, the child may ask for another gift. Write a pseudo code that would synchronize the operations of Santa and the child.

- 4- State a significant fact about each of the following items:

- a) Priority inversion - High priority process waiting for a resource
- b) Thrashing -
- c) Race conditions - out come depends on order of execution
- d) Priority inheritance -
- e) External fragmentation -
- f) Belady's anomaly -
- g) Worst-fit memory allocation -
- h) Medium-term scheduling -
- i) Internal fragmentation -

- 5- Consider a system consisting of four processes and a single resource with m units. The current state of the maximum claim and allocation matrices are:

Maximum claim

P1	3
P2	2
P3	9
P4	7

Allocation

P1	1
P2	1
P3	3
P4	2

What is the minimum m that would result in a safe state?

$$\text{Page size} = \text{Process size}$$

6- Consider the following page table for a process with 1024 page size:

0
1
2
3
4
5

Logical

Virtual Page number	Valid bit	Frame Number
0	1	4
1	1	7
2	0	-
3	1	2
4	0	-
5	1	0

c) $\frac{1052}{1024}$

b) $\frac{2221}{1024}$

c) $\frac{5499}{1024}$

What physical address, if any, would each of the following virtual addresses correspond to?

a) $1052 \rightarrow 1052 = 1024 + 28$

b) $2221 \rightarrow 2221 = 2 \cdot 1024 + 173$

c) $5499 \rightarrow 5499 = 5 \cdot 1024 + 379$

Frame 7 = 7196

Page fault

Frame 0 - 1024 + 379 ~ 379

7- A 1-MByte block of memory is allocated using buddy system. Show the results for the following requests: Request for A 70; Request for B 35; Request for C 80; Return A; Request for D 60; Return B; Return D; Return C.

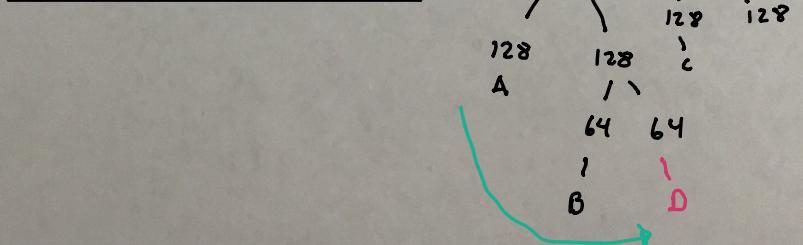
A

R: 70

A	128	256	512
---	-----	-----	-----

A	B	64	256	512
---	---	----	-----	-----

A	B	D	128	512
---	---	---	-----	-----



3) Santa :

```
while(1) {  
    signal(santa);  
    wait(request);  
    get gift();  
    signal(gift)
```

};

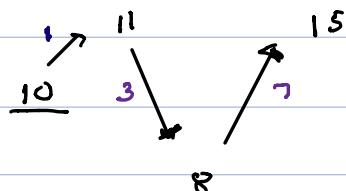
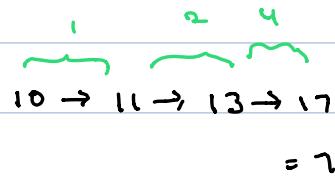
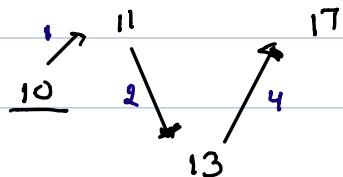
child :

```
while(1) {  
    wait(santa);  
    signal(request);  
    wait(gift);  
    play();
```

};

2)

$\emptyset \rightarrow 199$



$$10 \rightarrow 11 \rightarrow 13 \rightarrow 8 \rightarrow 15 = 9$$

Final Review

#5.)	Allocation	Max claim	(Max+Min)	Need
P ₁	1	3	2	
P ₂	1	3	1	
P ₃	3	9	6	
P ₄	2	7	5	

7

Assume m=8 available = 1 (8-7)

P₂ available = 2

P₁ avail = 3

can't go anymore

Now assume m=9 avail = 2 (9-7)

P₂ avail = 3

P₁ avail = 4

X

m=10 avail = 3 (10-7)

P₂ a=4

P₁ a=5

P₄ a=7

P₃ safe sequence

6 questions

- CPU util (Draw our time)
- Draw books → [More details]

Readings / concepts

LRU

Page replacement

Choosing victims

• Page replacement

• choosing victims

• Page fault