

NAME Evan Bonsighi

STUDENT-ID 907190445 (Armstrong 10)

17.5  
19

Q2  
OS  
Fall 18  
Time: 50 minutes

- 1- Define file directory and threshing (3 pts.)

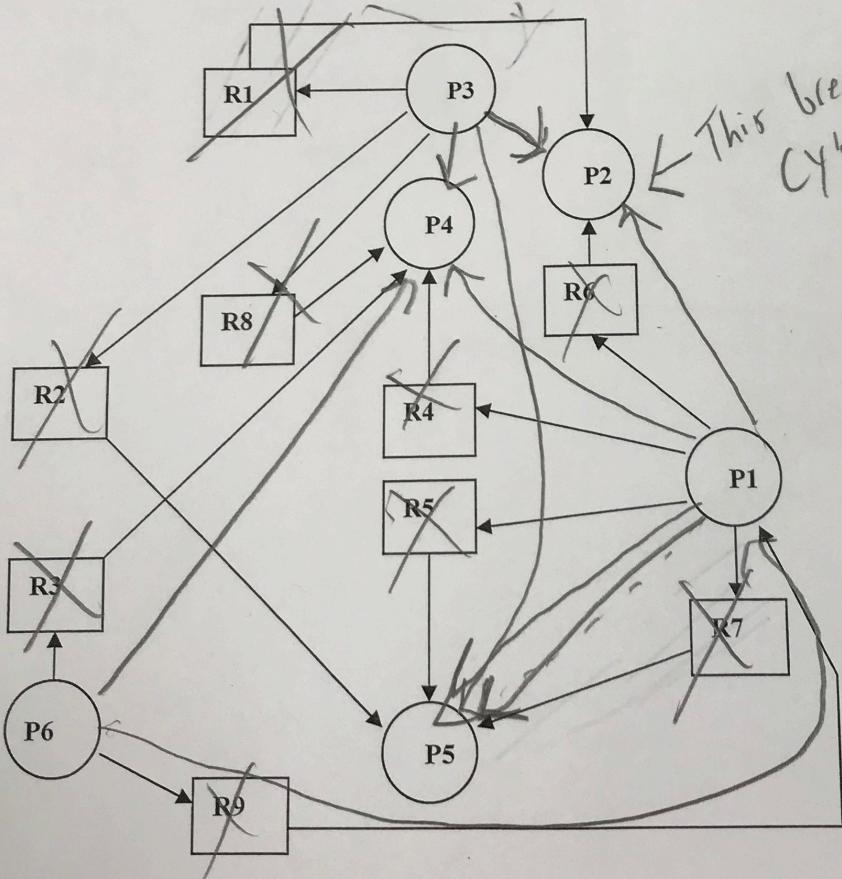
A file directory is a type of file, so it supports insertion, deletion, file attributes, manipulation, etc.  
It performs a "mapping function" onto files for which it contains.

+1.5

Threshing is scheduling for memory management systems. It optimizes something by assiging not too much or too little of something.

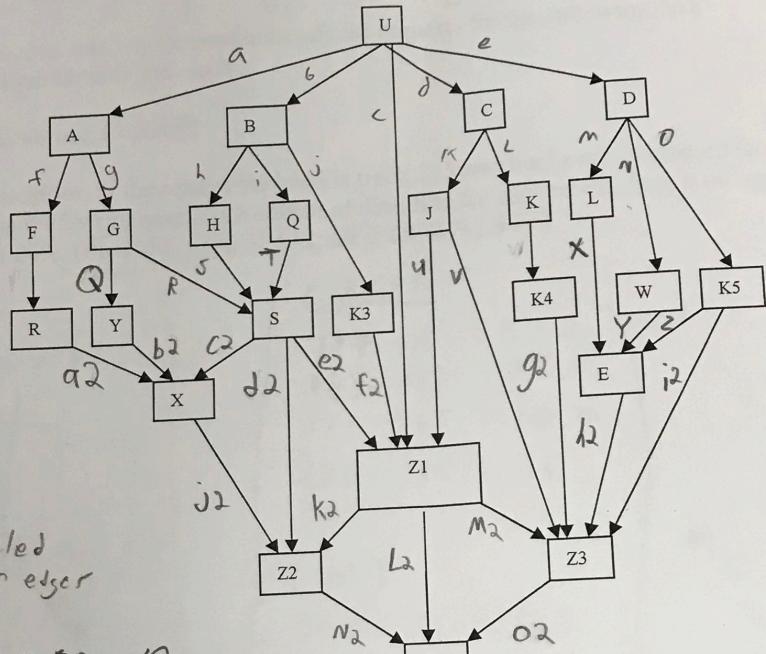
~~It definitely does something, but I'm not sure what that something is.~~

- 2- Show whether the following resource-allocation graph has a deadlock? (Assumption: every resource has only one instance) Show all of your work (5 pts.)



This breaks the cycle, so  
No Deadlock

3- Use semaphores to complete the parallel execution of the following precedence graph  
 (6 pts.).



$$a = b = d = e = \dots = N_2 = O_2 = \emptyset$$

Parbegin;

$P(U); V(a); V(b); V(j); V(e);$

$P(A); A; V(f); V(y);$

$P(f); F; R; V(a_2);$

$P(g); G; V(Q); V(R);$

$P(Q); Y; V(b_2);$

$P(b); B; V(h); V(i); V(j);$

$P(h); H; V(s); P(j); K3; V(f_2);$

$P(i); Q; V(T);$

$P(R); P(S); P(T); S; V(c_2); V(d_2); V(e_2);$

$P(a_2); P(b_2); P(c_2); X; V(j_2);$

$P(d); C; V(K); V(L);$

$P(K); J; V(u); V(v);$

$P(e_2); P(f_2); P(c); P(u); Z1; V(k_2); V(l_2); V(m_2);$

$P(j_2); P(d_2); P(k_2); Z2; V(n_2);$

$P(l); K; K4; V(g_2);$

$P(e); D; V(m); V(n); V(o);$

$P(m); L; V(x);$

$P(n); W; V(y);$

$P(o); K5; V(z); V(i_2);$

$P(x); P(y); P(z); E; V(h_2);$

$P(v); P(o_2); P(h_2); P(i_2); Z3; V(o_2);$

$P(n_2); P(l_2); P(o_2); Z4;$

Parend;

+6

[Cont.]

- 4- A disk queue is made of the I/O operation requests that acquire the following tracks:

72    147    85    96    175    165    200    94    73  
 $\downarrow L$      $\downarrow L$      $\downarrow$      $\downarrow$      $\downarrow L$      $\downarrow L$      $\downarrow L$      $\downarrow$      $\downarrow L$

Calculate the total head movement to satisfy all requests for the following disk scheduling algorithms (2 pts. each):

### C-SCAN and C-LOOK

The current position of the read/write head is track 115 and tracks are numbered from 0 to 249. If the read/write head has a choice of direction for movement, then it moves toward track 249. (PLEASE SHOW ALL OF YOUR WORK.)

#### C-SCAN:

$$\begin{aligned} |147-115| &= 32 \quad M_{S_1} \quad n=1 \\ 165-147 &= 18 \quad M_{S_2} \\ 175-165 &= 10 \\ 200-175 &= 25 \\ 249-200 &= 49 \\ 10-249 &= 249 \quad (\text{skip op}) \\ 172-0 &= 172 \\ 73-72 &= 1 \\ 85-73 &= 12 \\ 94-85 &= 9 \\ 96-94 &= 2 \quad M_{S_N} \quad n=N \end{aligned}$$

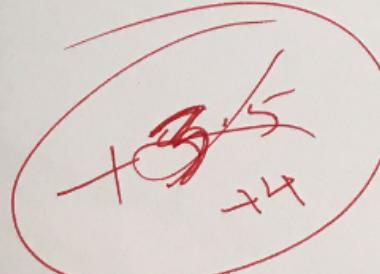
$$\text{Total Movement} = \sum_{n=1}^N M_S$$

please  
don't call me  
you cannot add

#### C-LOOK

$$\begin{aligned} 147-115 &= 32 \quad M_{L_1} \quad n=1 \\ 165-147 &= 18 \quad M_{L_2} \\ 175-165 &= 10 \quad M_{L_3} \\ 200-175 &= 25 \\ 249-200 &= 49 \\ (190K) & \\ 200-72 &= 128 \\ 73-72 &= 1 \\ 85-73 &= 12 \\ 94-85 &= 9 \\ 96-94 &= 2 \quad M_{L_N} \quad n=N \end{aligned}$$

$$\text{Total Movement} = \sum_{n=1}^N M_L$$



2  
6  
8

5 11  
4

5 11  
4

5- How many page faults do happen to accommodate the following memory references using MFU page replacement algorithm. Four pages are allocated to the process. (Show all of your work (6 pts.)

Reference String: 6, 9, 9, 10, 11, 12, 13, 14, 15

Page Ref.	Freq. Count	Page 1	Page 2	Page 3	Page 4	Page 5	Page 6	Page 7	Page 8	Page 9	Page 10	Page 11	Page 12	Page 13	Page 14	Page 15
3	1															
5	1															
8	1															
4	1															
3	2															
5	2															
2	3															
6	3															
8	3															
4	1															
2	3															
5	2															
2	2															
8	4															
4	1															
5	3															
2	3															
7	2															
4	1															
6	1															
2	3															
7	2															
4	1															
6	1															
2	1															
7	2															
4	1															
6	1															
2	1															
8	1															
4	1															

(x) 6

16 total page faults using MFU

Assumption: When highest-frequency (counters) are tied,  
 i.e. choose the topmost of the tie.  
~~x/y/z~~ choose + over y.