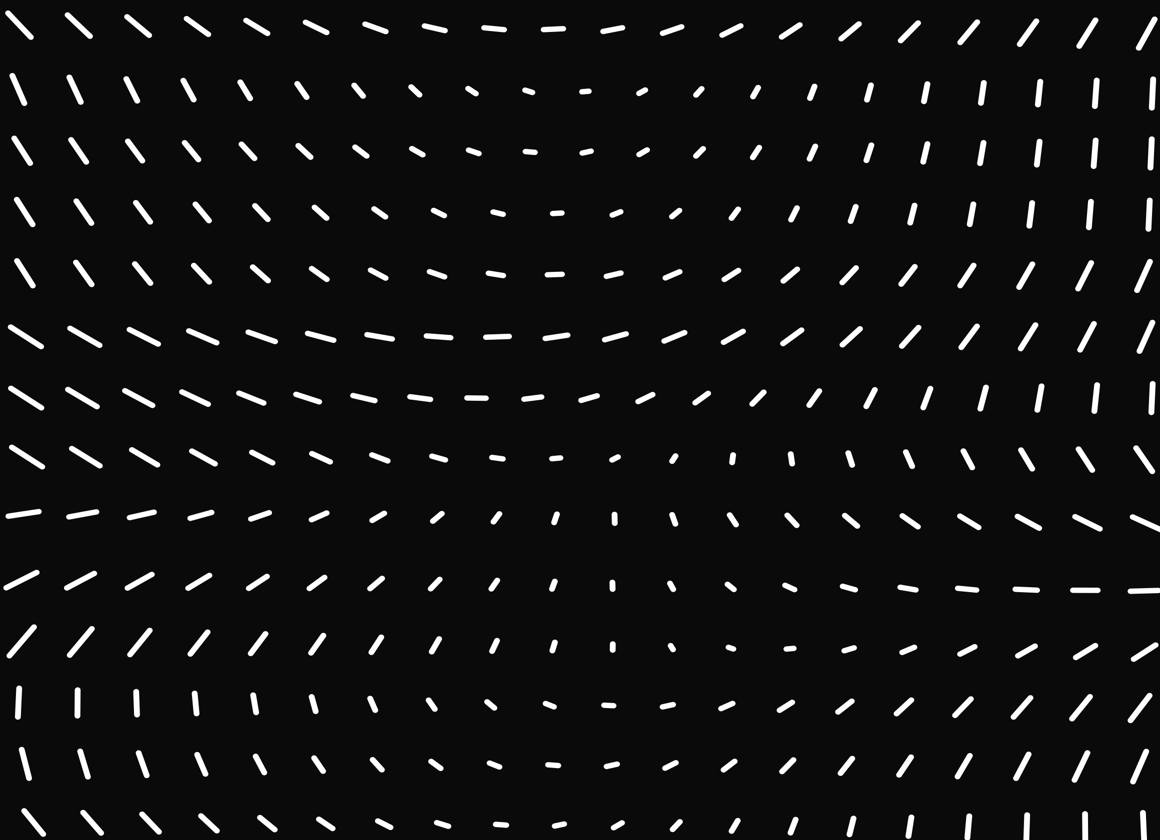


Lecture #2

- Two events if and only if the events do not causally affect each other

  e_2^4 & e_3^1 → concurrent

  If it is not causal, then it concurrent.

  If it is physically concurrent, then it is definitely concurrent.

- Logical Time Implementation details : 1) scalar time 2) Vector Time 3) Matrix Time

Partial ordering betn events

scalar logical time cannot have strong consistency.

Concurrency is not transitive.

Lecture #3

$$\underbrace{\begin{array}{c} i \\ j \end{array}\begin{bmatrix} k \\ <p \end{bmatrix} \qquad \begin{bmatrix} <k \\ p \end{bmatrix}}_{\text{concurrent}}$$

Lecture #4

i^{th} row is your vector in matrix clock

(j, i)

Home work: Q.1) why should we not take max along coloumn instead of rows?

Q.2) Can we check all if every one has recieved the broadcast using matrix clock?

If causal system, how do we mark Global state?

Lecture #6

Do we need both ME conditions in RA?

Do you play by the rules or quitely slip into CS as if nothing happened?

Is there disadvantage of breaking rules?

Raymond's Algorithm

Homework:

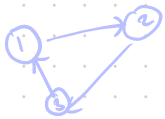
will the complexity of the Raymond's Algorithm become $O(n)$ from $O(\log_K n)$, will the K-ary tree ever become linear chain?

Lecture # 8

Lecture #9

1. Execution of TD algorithm should not indefinetly

Phantom deadlock - detecting deadlock that doesn't exist in DS



Lecture #10

Lecture #11

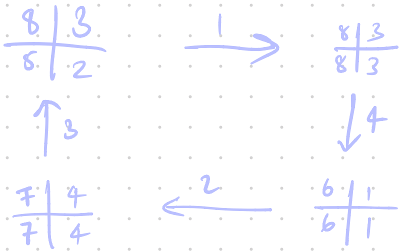
Block

Activate

Transmit

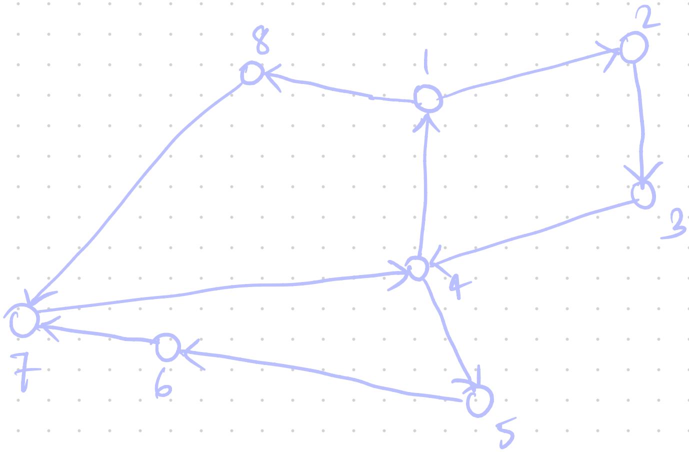
$(u < v)$ or $(u = v, p > q)$

Detect

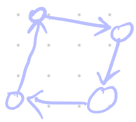


Is it always the last edge that detects that there is a deadlock in Mitchell-Merritt algorithm?

Lecture #12



Phantom deadlock detection
CMH



Lecture #13

Paper Discussion - Mid Semester

1. (a) Mitchell Merrit question
   (b) chandy lamport request queue question
   (c) will it remove deadlock if initiater aborting himself

   s → AND and OR

   (d) Global consistent

2. Termination detection

3. New 2Phase commit

4. Modify Matrix clock using singhal-kshemkalyani

all non-fail

Lecture # 14

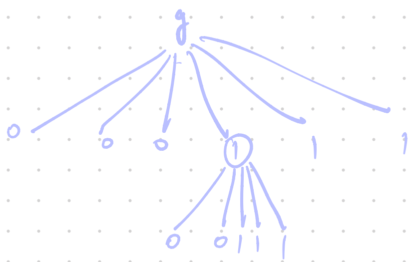
Given n, if $n \ngtr 3m+1$, then it is not possible to come up with the a solution to Byzantine problem.

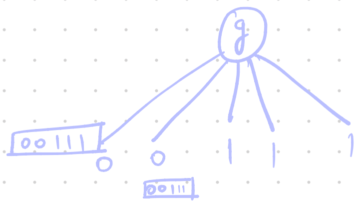
4, 1

Ho-Ramamoorthy

$N = 7, \quad t = 2$

$N = 7,$

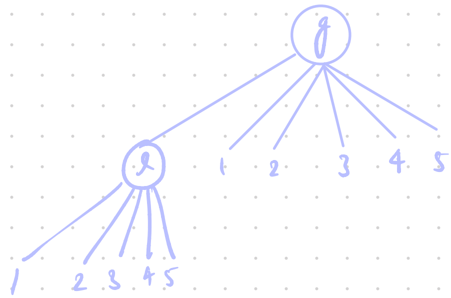




Slip test Question

Find pattern G is faulty or when it's not.

Lecture #15



Lecture #16

22/03/24

Slip Test

If all the non-malicious processes prefer v at the start of phase K, then all do at end of phase K.

Each of the non-malicious process recieves at least n-f preferences for v at the end of the first round of phase K.

Now, since $n > 4f$ it follows that $n-f > 3f = \frac{n}{2} + f$

$\therefore$ each of the non-malicious process still prefer V.

$\therefore$ This implies from phase K onwards, all non-mal. processes have the same preference.

$$n - f = \frac{n}{2} + \frac{n}{2} - f > \frac{n}{2} + 2f - f$$
$$= \frac{n}{2} + f$$

Lecture #17

Minimum Spanning Tree

Lecture #18

HW: At any level, sends at most one test not leading ....

HW: Take any MST run normal MST, & run this algo to get a clear idea

$n \to$?

Lecture # 19

Merkel Trees

Bitcoin uses Merkel Trees

HPI = (H(x), Pointer)

B L I

Watermarking of Link Prediction Task in Graph Neural Network using Backdoors