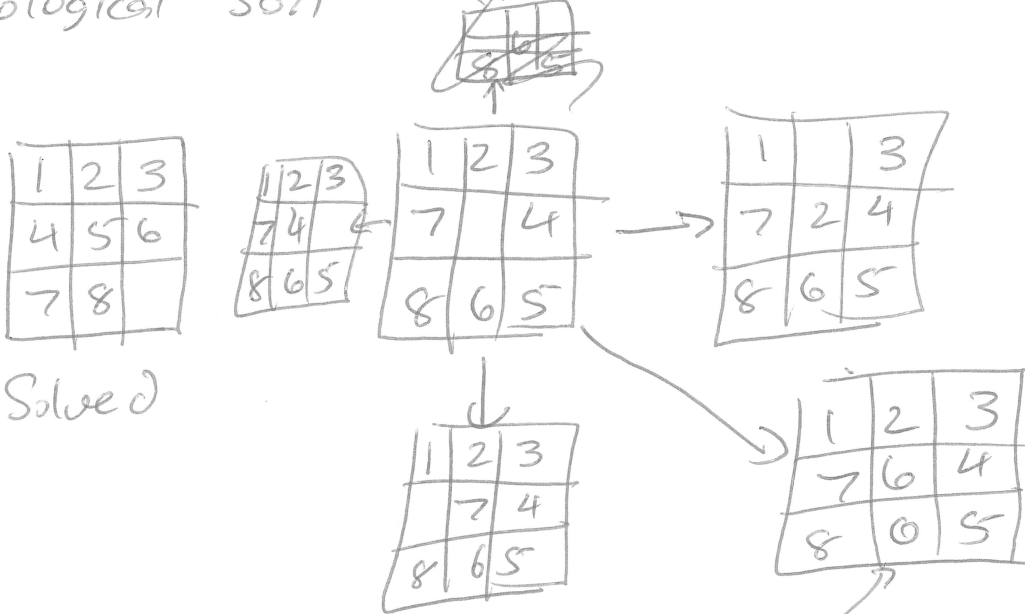


# COP3503 2/27/2024

- ① BFS Application: 8-Puzzle
- ② Topological Sort (Directed Unweighted)



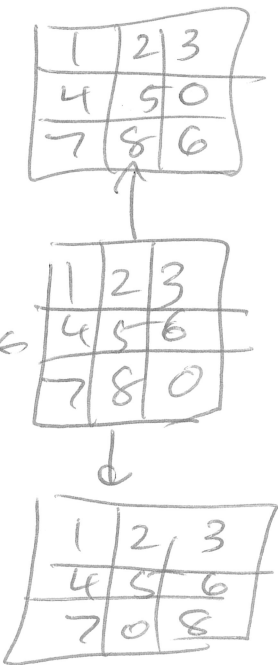
Board num 9 digit

HashMap

123704865 → 0  
103724865 → 1

123456780 → 0  
123456708 → 1  
123450786 → 1

Run BFS \*  
from here



Run 1 BFS from end board. Store all answers Answer all queries from HashMap

Perm Rents

- 0 012
- 1 021
- 2 102
- ~~3~~ 201
- 3 201
- 4 201
- 5 210

3!

2! start w/o

rents left  
 $\frac{3}{2!} = 1 \rightarrow (\text{openslot} - 1)!$

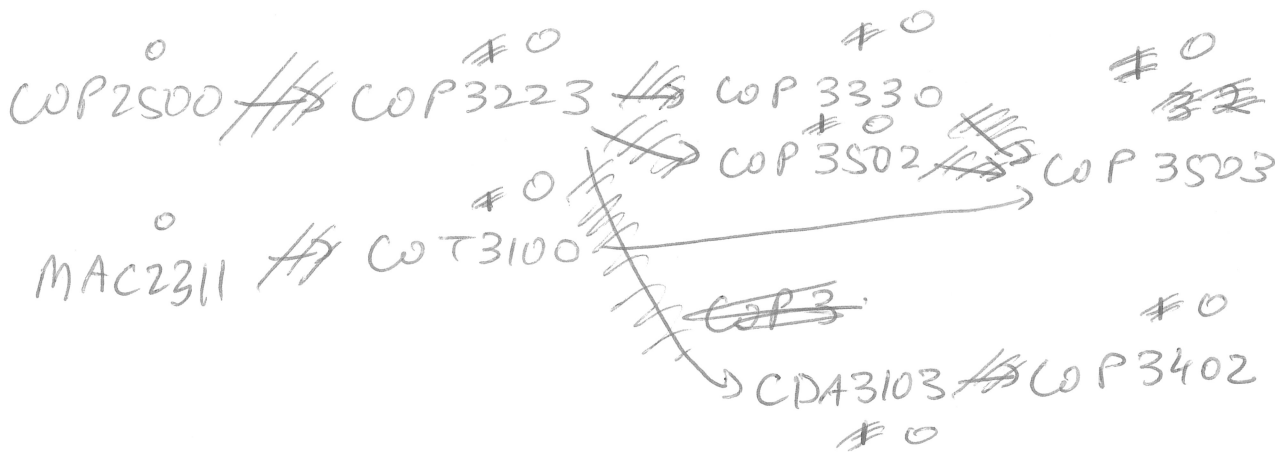
$3 - 2 = 1$

1<sup>st</sup> rented item  $\begin{matrix} \text{02} \\ 20 \end{matrix}$

$\frac{1}{1!} = 1$

1, 2, 0

# Topological Sort



- WOP2500
- MAC2311
- COT3100
- WOP3223
- WOP3502
- CDAB3103
- WOP3402
- WOP3330
- WOP3503

for each vertex main its current "in-degree"  
 place each item w/in degree 0 into a queue (q).

while (q.size() > 0) {

    class cur = q.poll();

    ans.add(cur); // add this to the classlist

    for (class next = ~~cur~~ g[cur]) {

        indegree[next]--;

        if (indegree[next] == 0)

            q.offer(next);

    }

}

// if ans has all classes this is a  
 valid topological sort. If not, it's impossible!