# Recursion

0:00 - 1:15 - Intro
Zoom Etiquette
Lattice Paths - Recursive Tree
Powerset - Helper Method Recursion

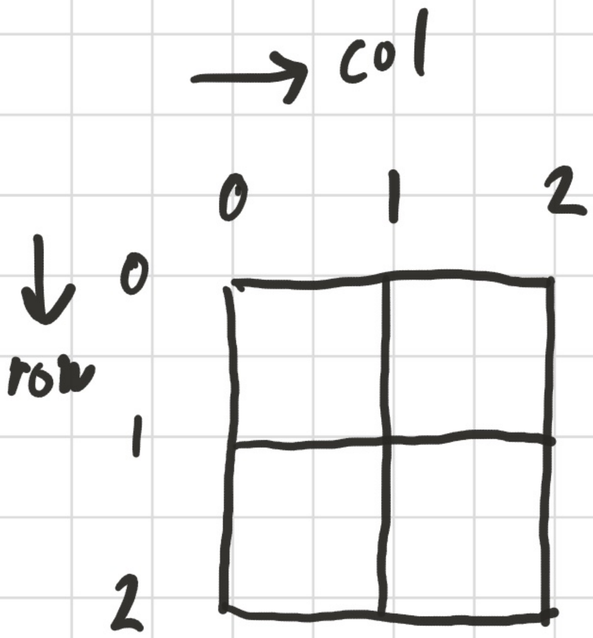
1:15 - 1:25 - Break

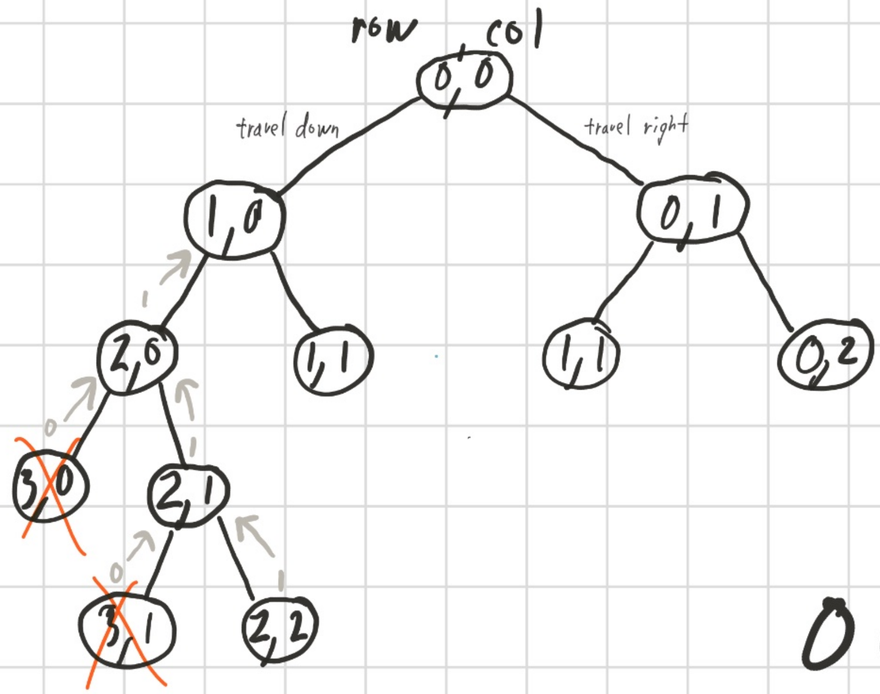
1:25 - 1:30 - Whiteboarding Intro

1:30 - 3:00 - Whiteboarding Cycles

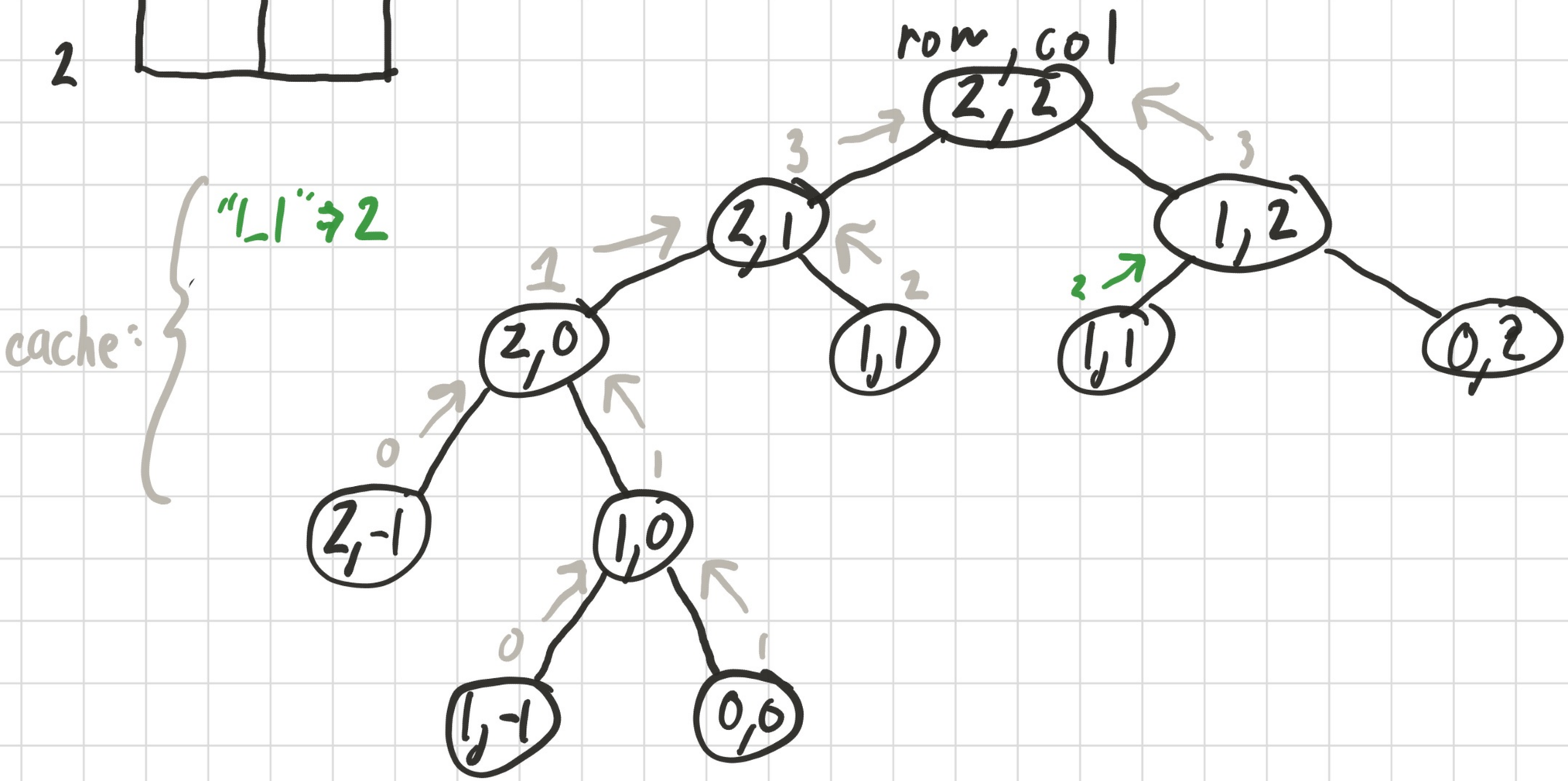
# Lattice Paths

- Recursive tree

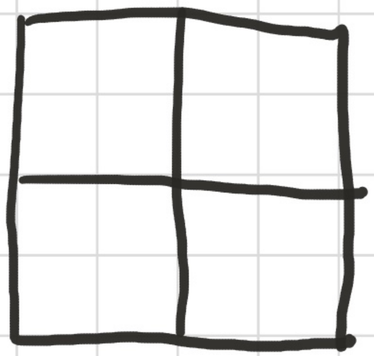



$O(2^{(M+N)})$



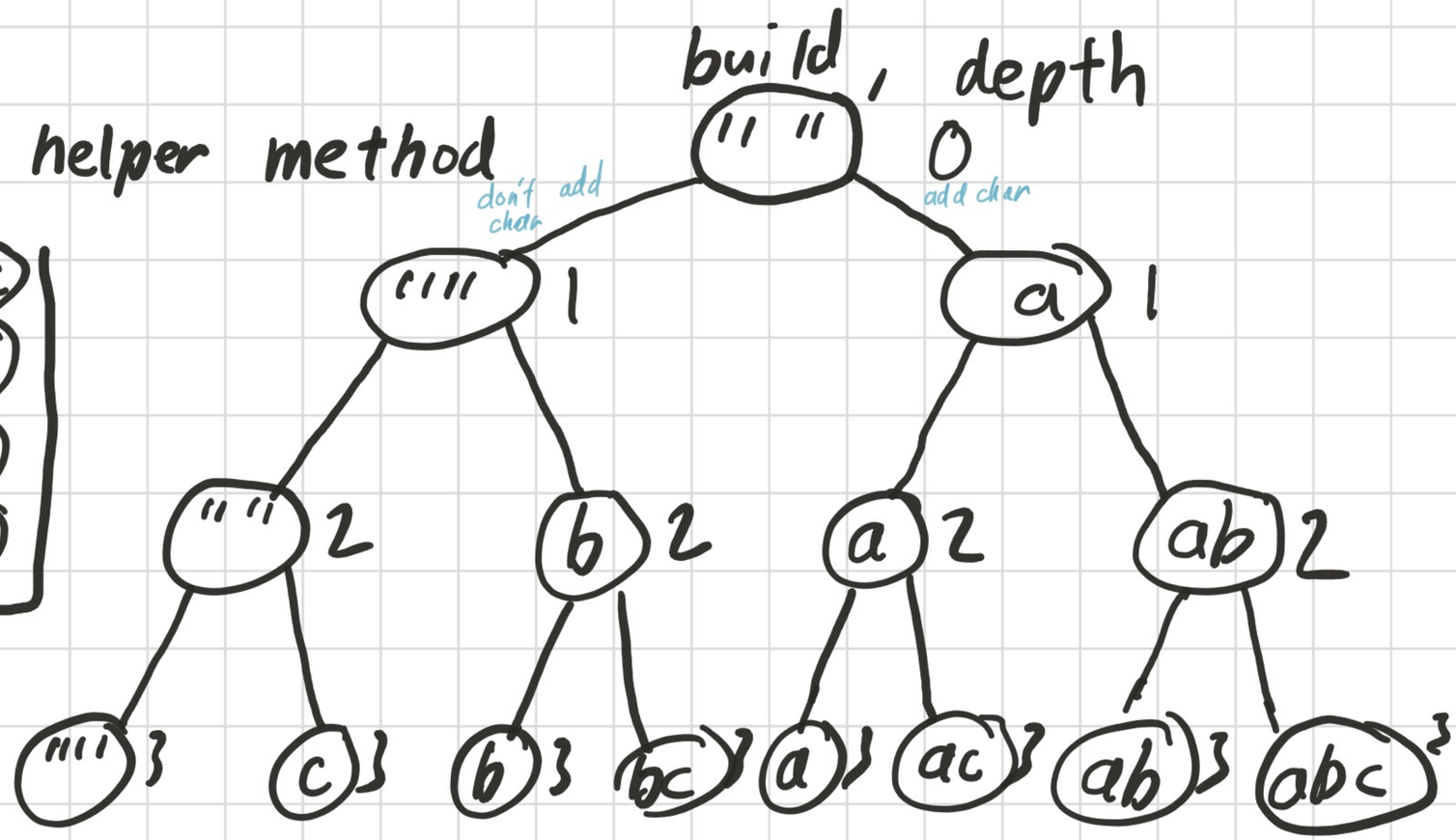
NxN lattice



lattice Paths (n)

# Helper Method Recursion

1) State variables
2) Return state variables
3) Instantiate and invoke helper method
4) Base Case(s)
5) Recursive Case(s)


"" → [ "" ]

"a" → [ "", a ]

"ab" → [ "", a, b, ab ]

"abc" → [ "", a, b, ab, c, ac, bc, abc ]

- each output used in following output

res = [ "", c, b ..... ]

time: $O(2^N)$
aux space: $O(2^N)$

N = input length