



TETRIS SIMULATION

COURSE WORK #03

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PROBLEM STATEMENT

You simulate a Tetris game with horizontal line blocks only. Each block falls until all cells below are clear or it reaches the bottom of the tube. You need to find the row of the last fallen block. The height of each block is 1. The beginning and the end of each block are denoted by two numbers. The fulfilled rows are not eliminated.

Input. The first string contains two numbers: block count N ($1 \leq N \leq 10^5$) and width of the tube K ($10 \leq K \leq 10^5$) divided by spaces. The second string contains an N pair of numbers divided by spaces. Each pair describes the block's left and right ends ($0 \leq x_0, x_1 < K$).

Output. A single number — the row of the last block.

THE PROBLEM SOLVING

Example: **N**=6 **K**=10

Input

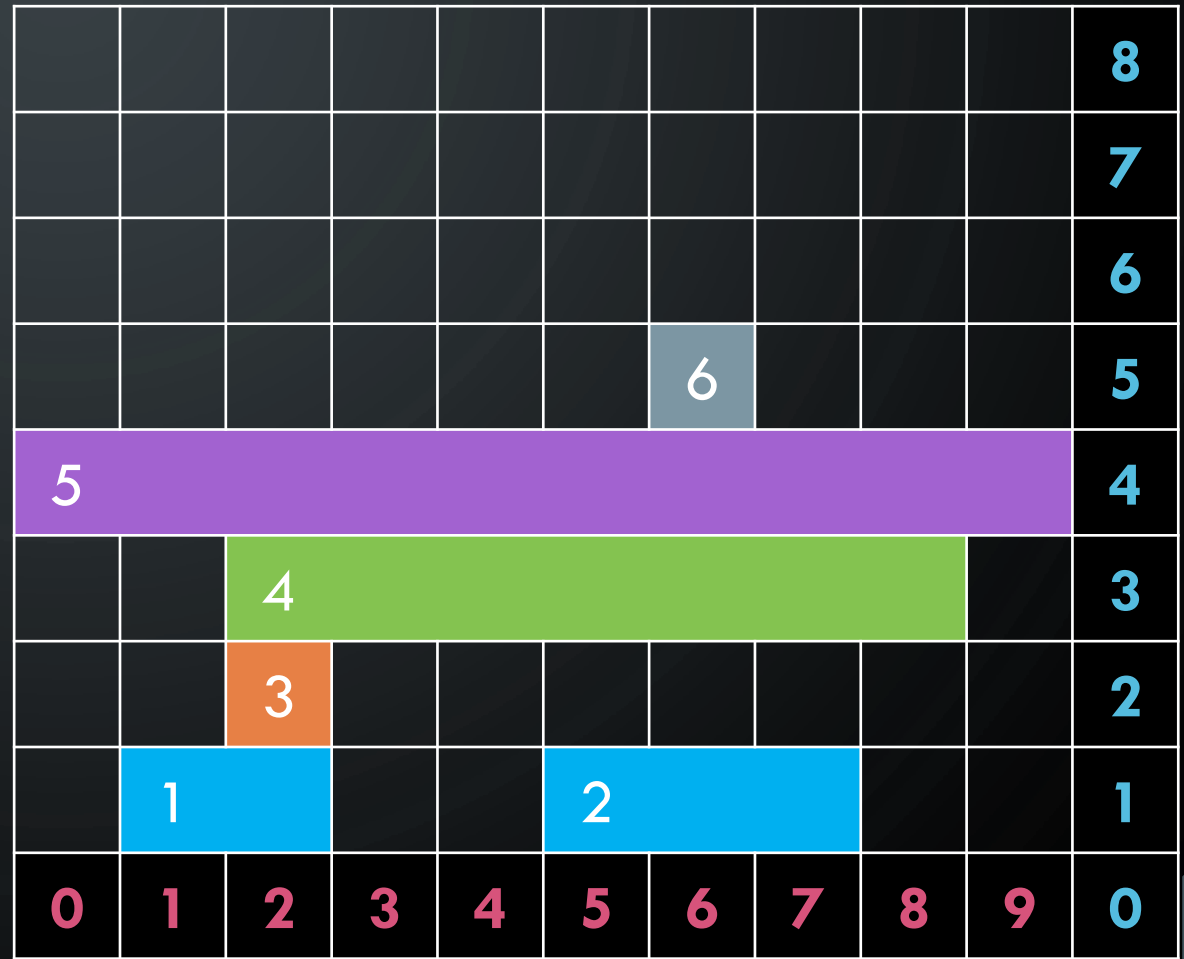
6 **10**

1 2 5 7 2 2 2 8 0 9 6 6

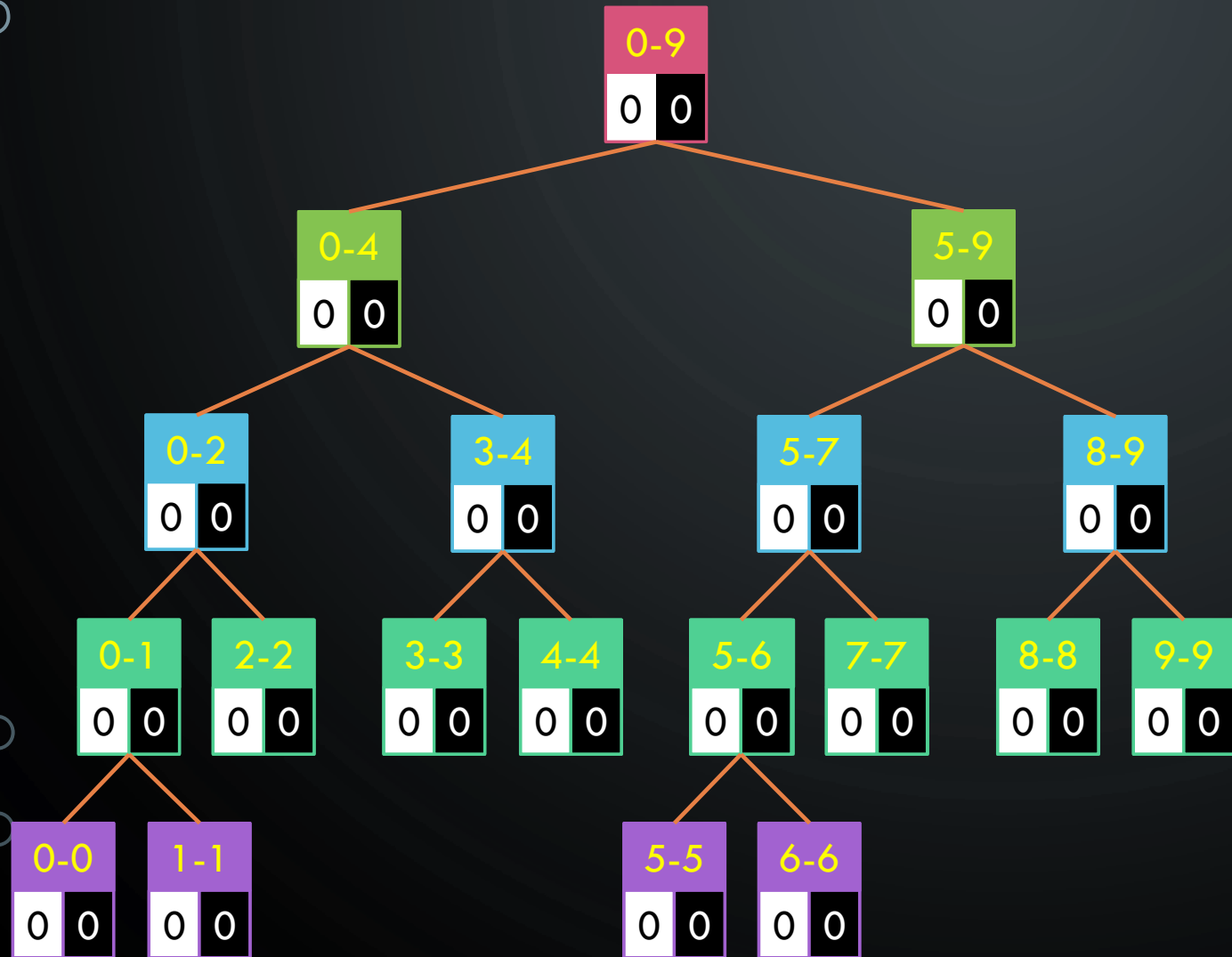
Output

5

To solve this problem we will use the 'Segment Tree' data structure.



THE PROBLEM SOLVING - START

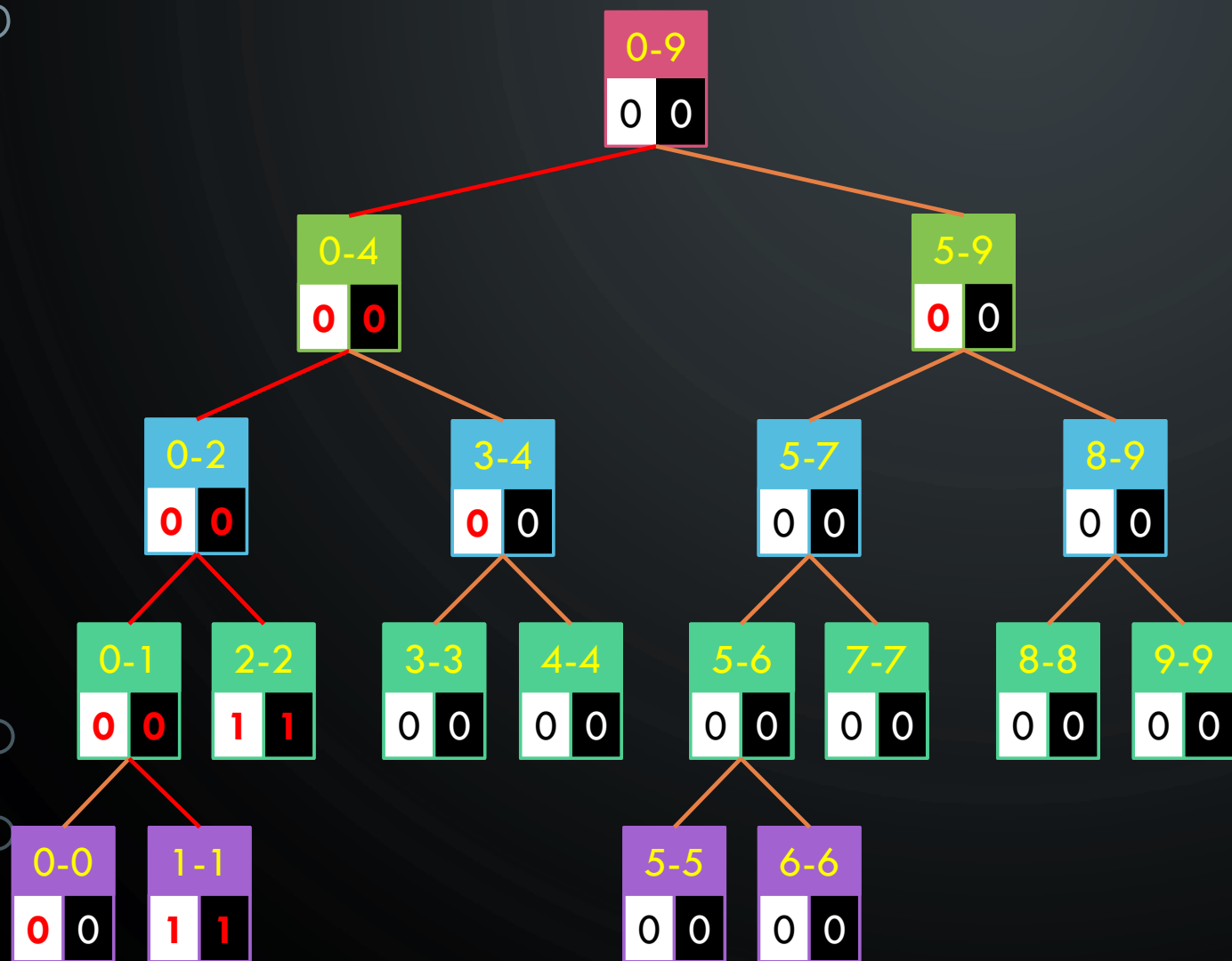


										8
										7
										6
										5
										4
										3
										2
										1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #1 DOWN

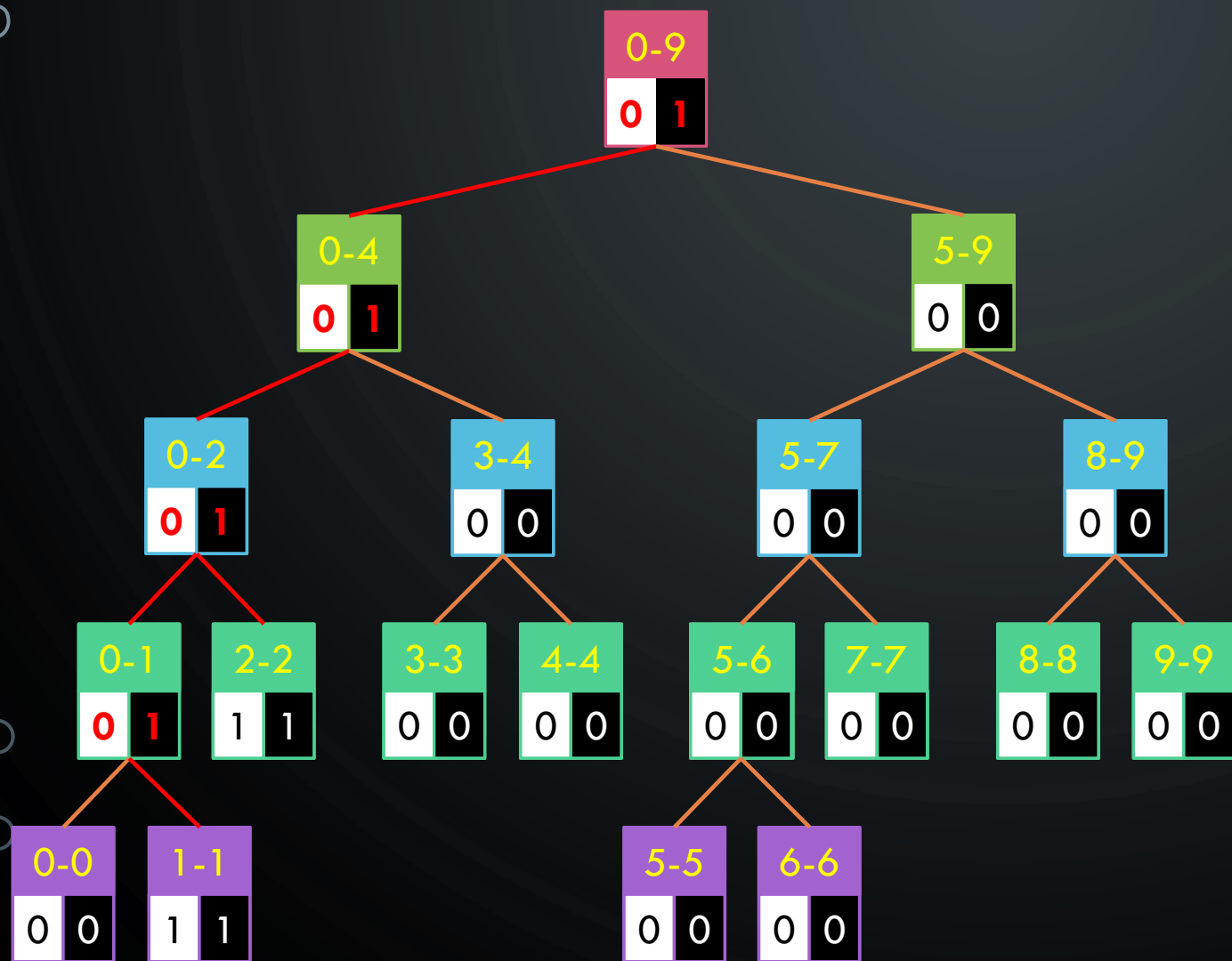
The diagram illustrates a search tree for the 8-puzzle problem, starting from the root node (0-9) and branching down to leaf nodes. The tree shows the sequence of moves (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) and the resulting states. The root node is (0-9) with state (0, 0). The first level branches into (0-4) and (5-9). The second level branches into (0-2), (3-4), (5-7), and (8-9). The third level branches into (0-1), (2-2), (3-3), (4-4), (5-6), (7-7), (8-8), and (9-9). The fourth level branches into (0-0), (1-1), (5-5), and (6-6). The final state (0-0) is reached at the bottom left.

										8
										7
										6
										5
										4
										3
										2
	1									1
0	1	2	3	4	5	6	7	8	9	0



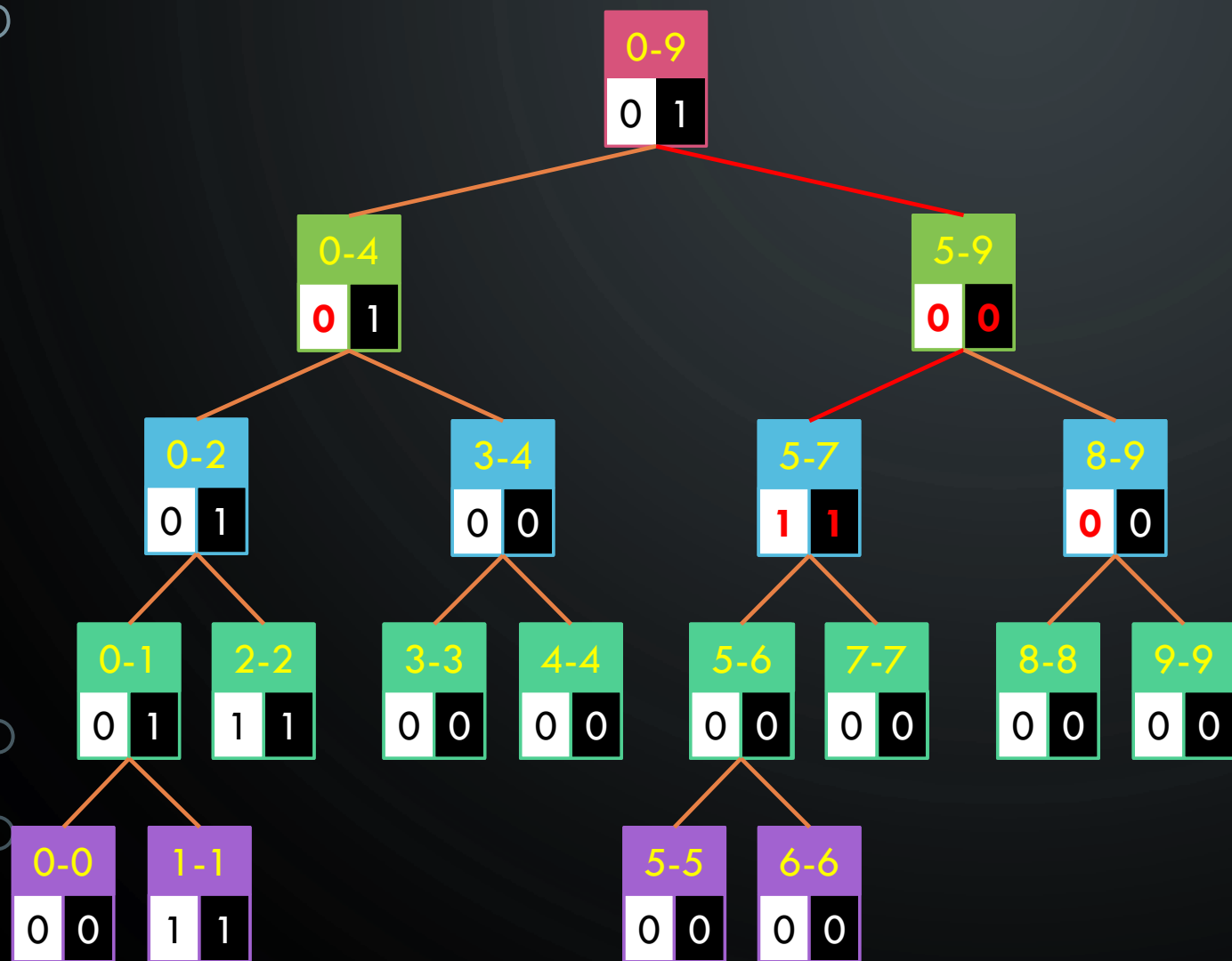
										8
										7
										6
										5
										4
										3
										2
	1									1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #1 UP



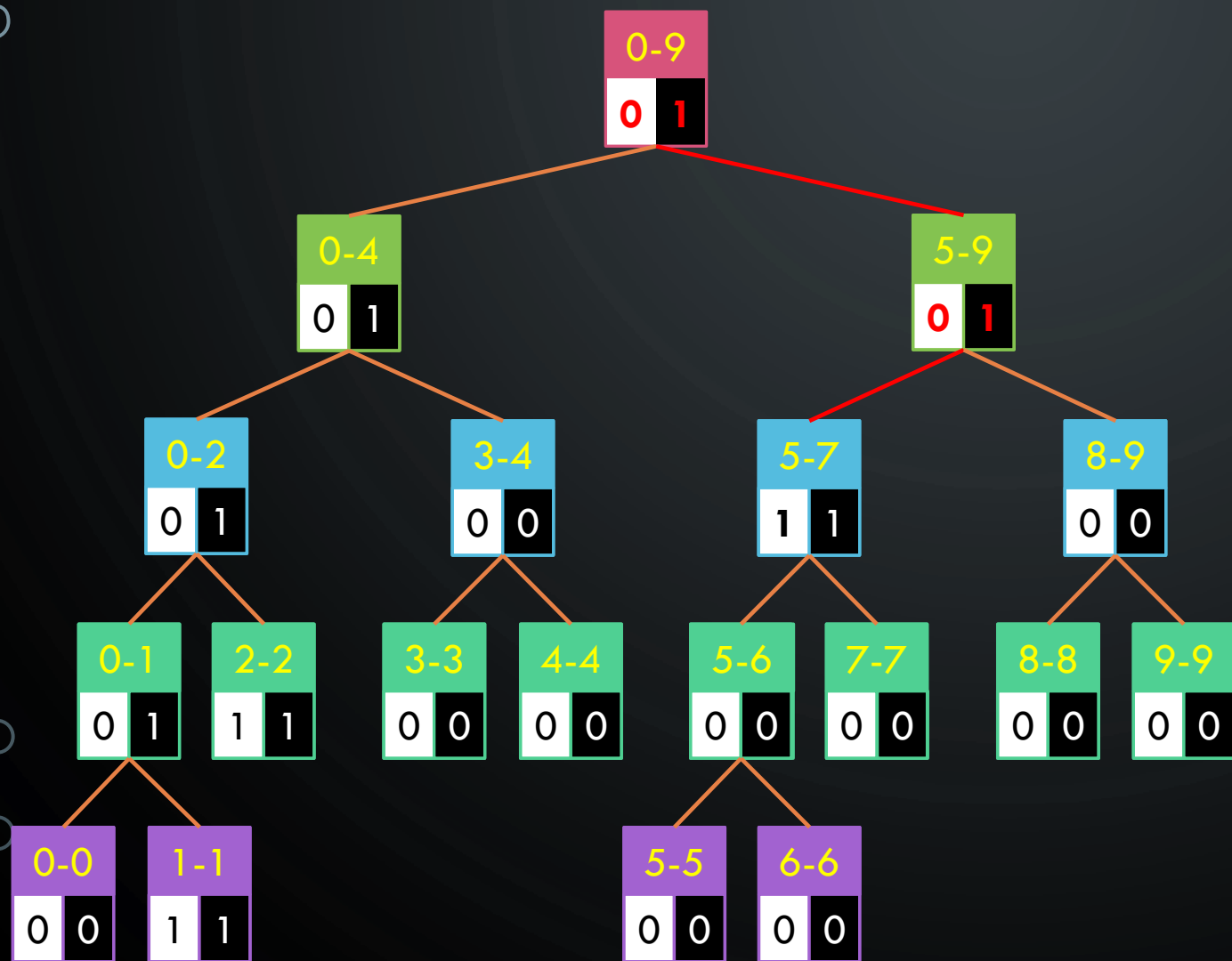
										8
										7
										6
										5
										4
										3
										2
	1									1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #2 DOWN



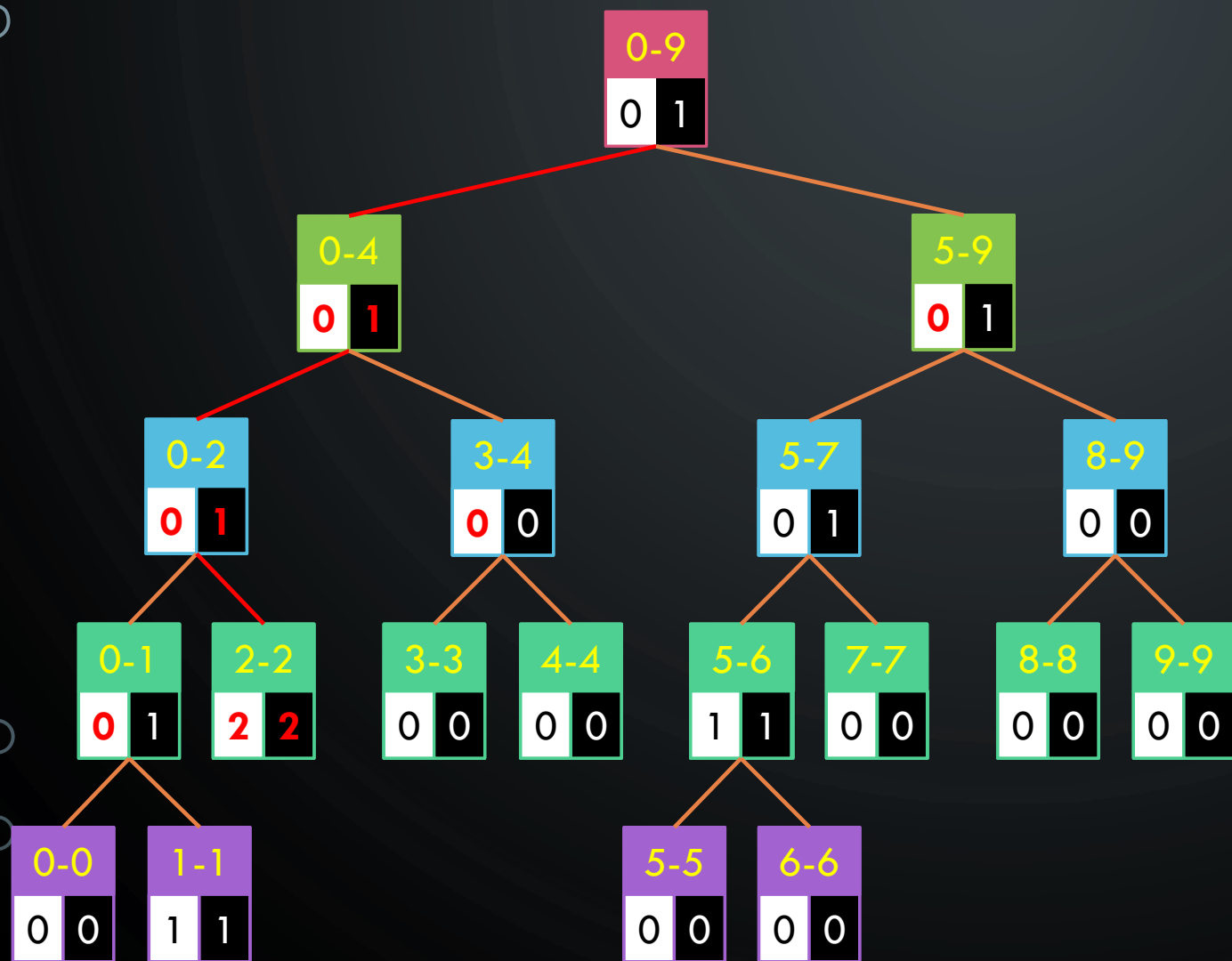
										8
										7
										6
										5
										4
										3
										2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #2 UP



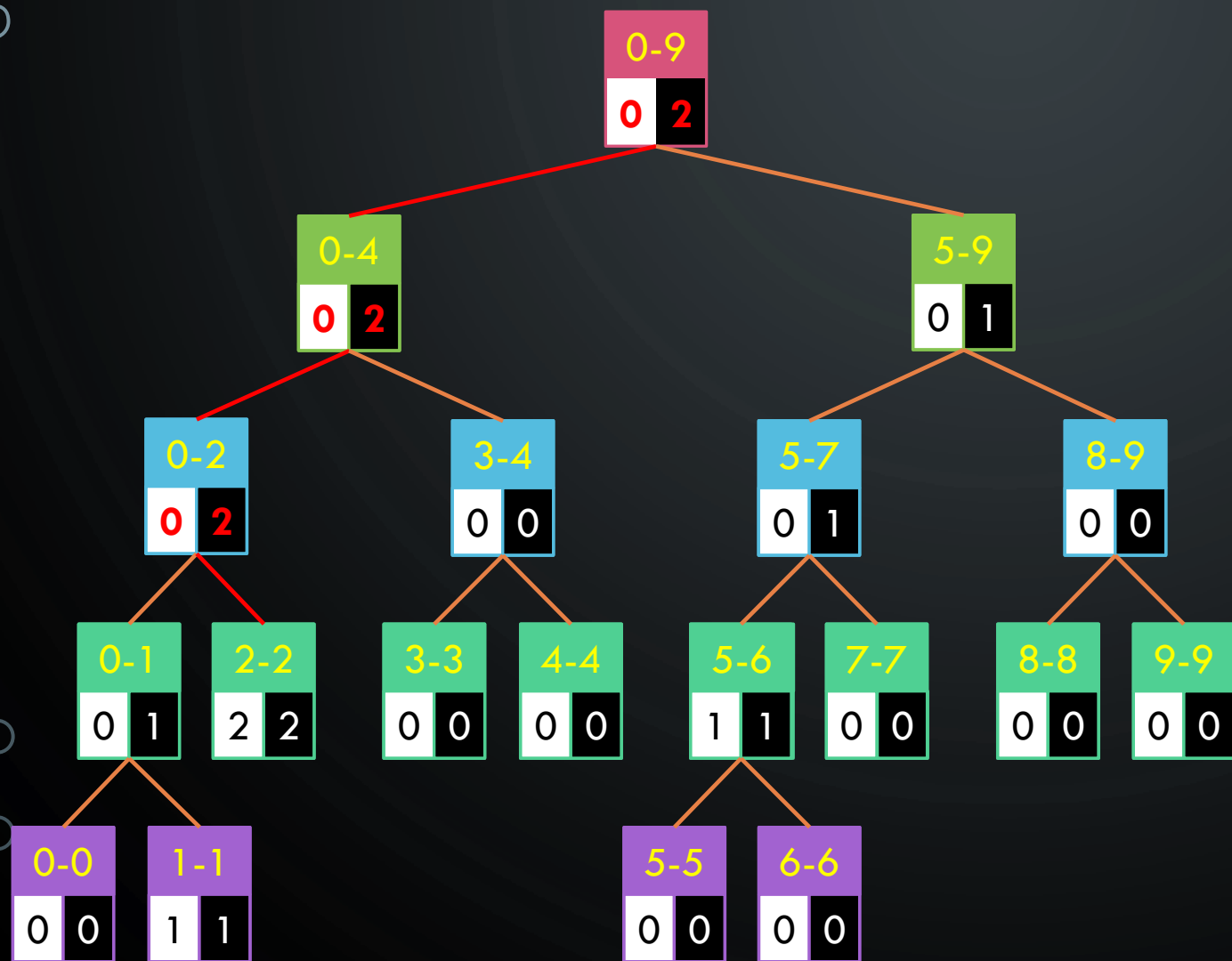
										8
										7
										6
										5
										4
										3
										2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #3 DOWN



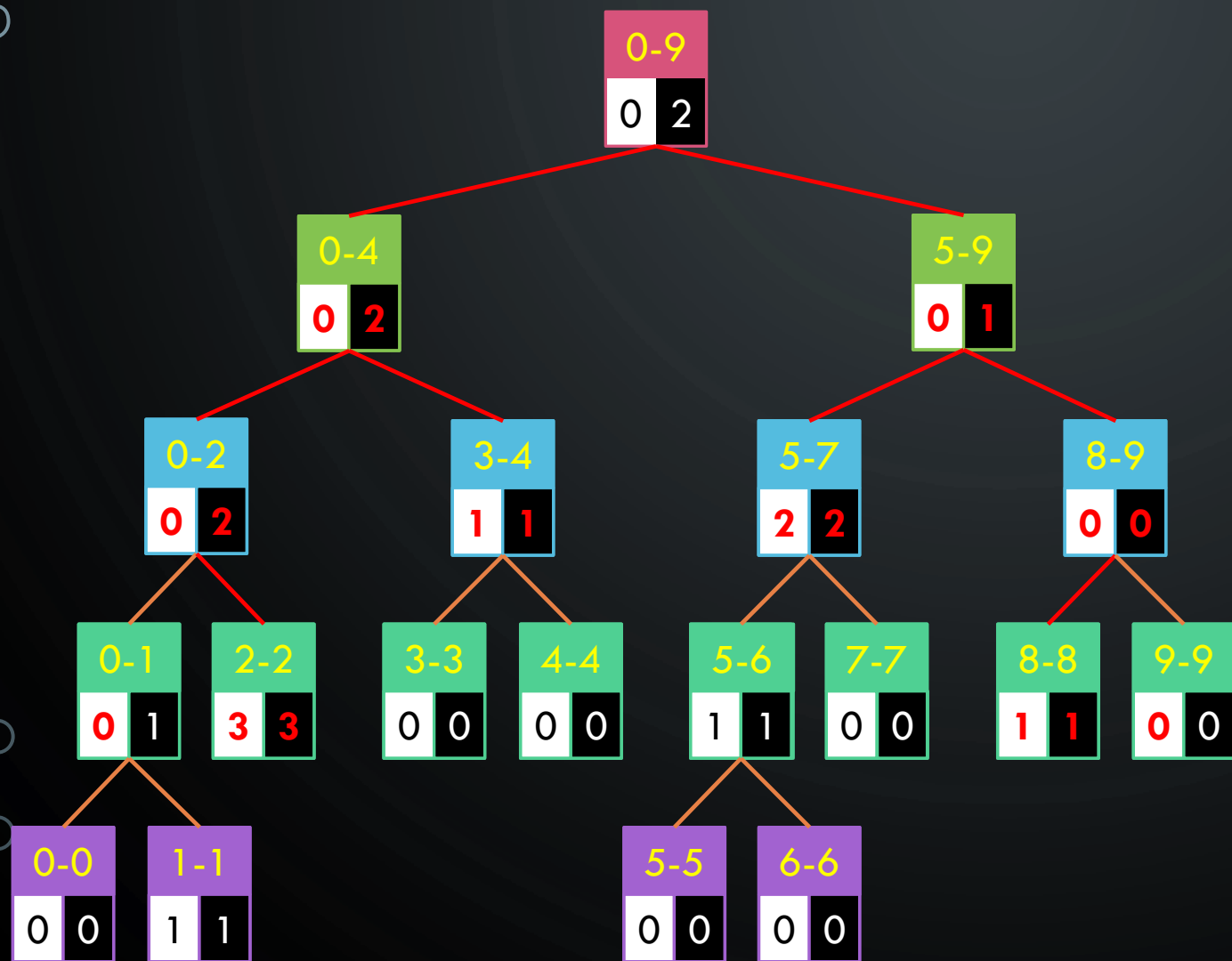
										8
										7
										6
										5
										4
										3
										2
		3								1
	1				2					0
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #3 UP



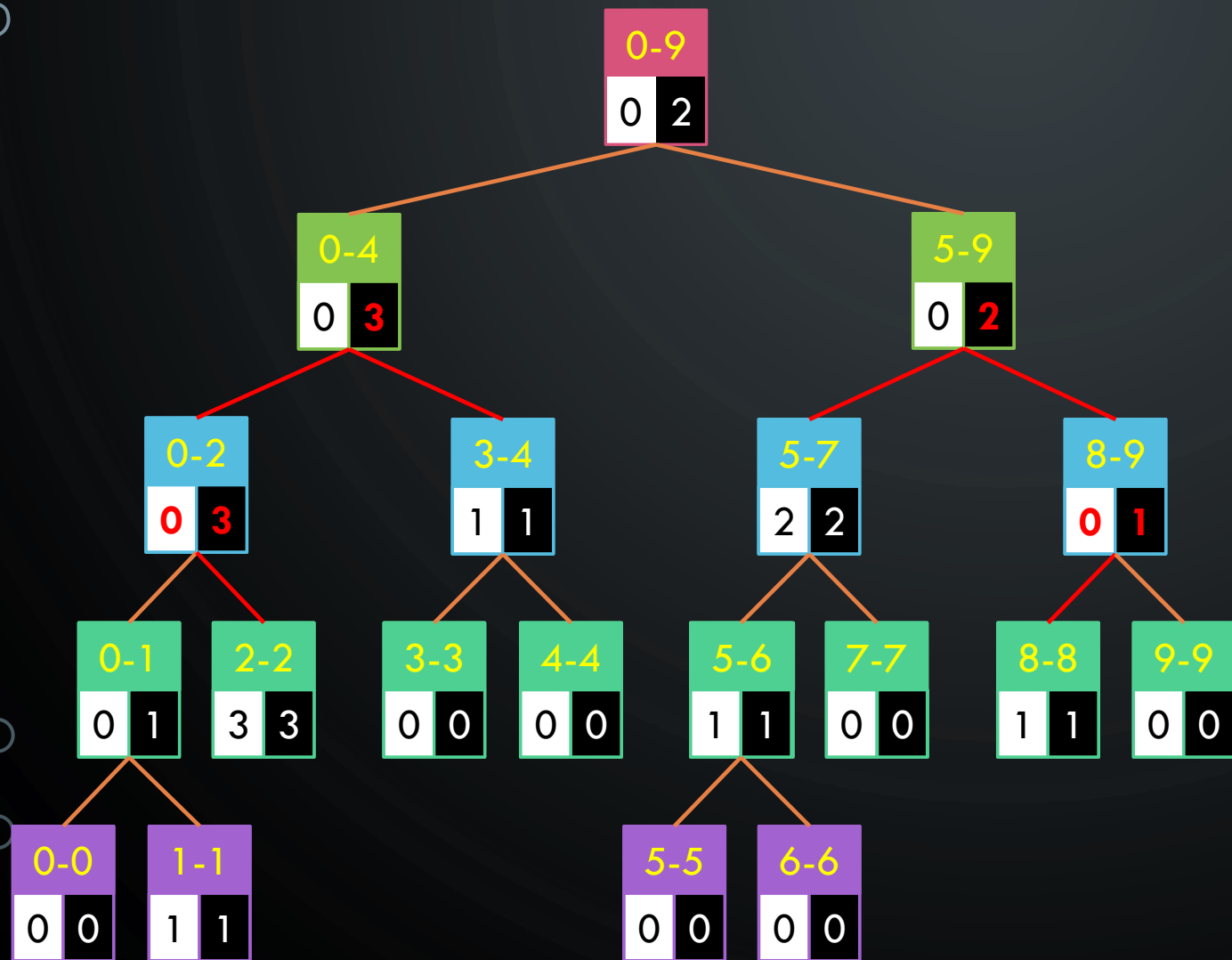
										8
										7
										6
										5
										4
										3
										2
		3								1
	1				2					0
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 DOWN #1



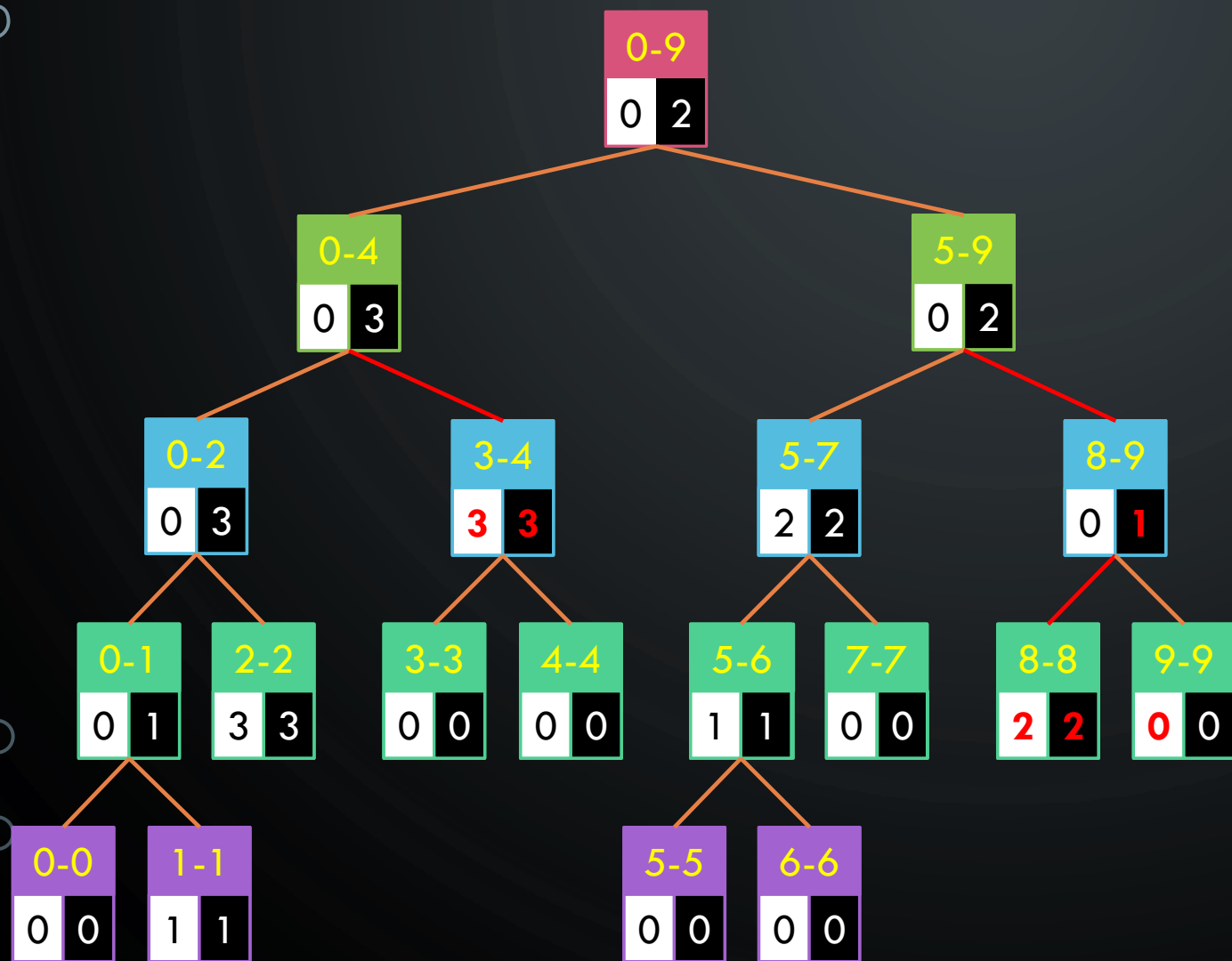
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 UP #1



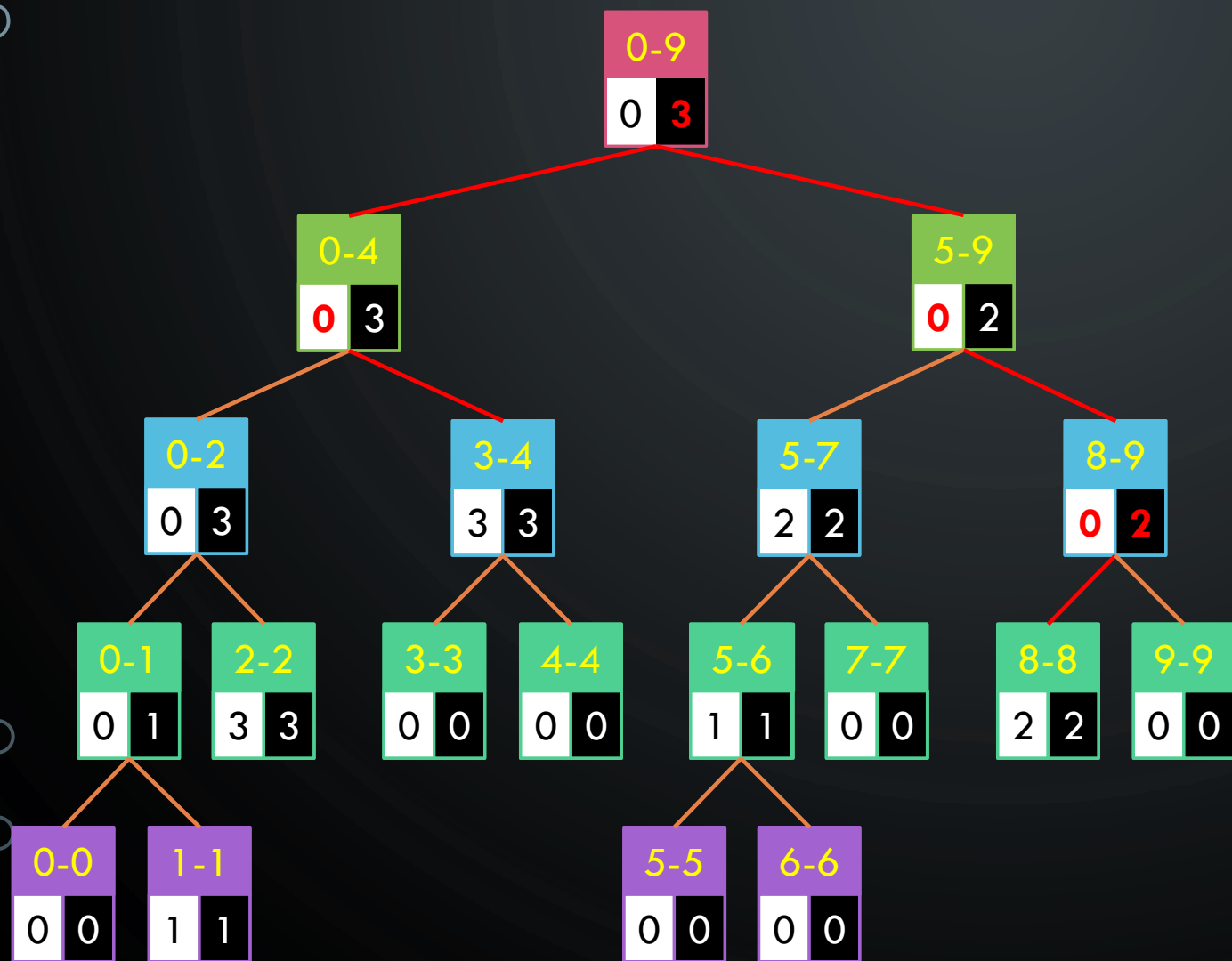
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 DOWN #2



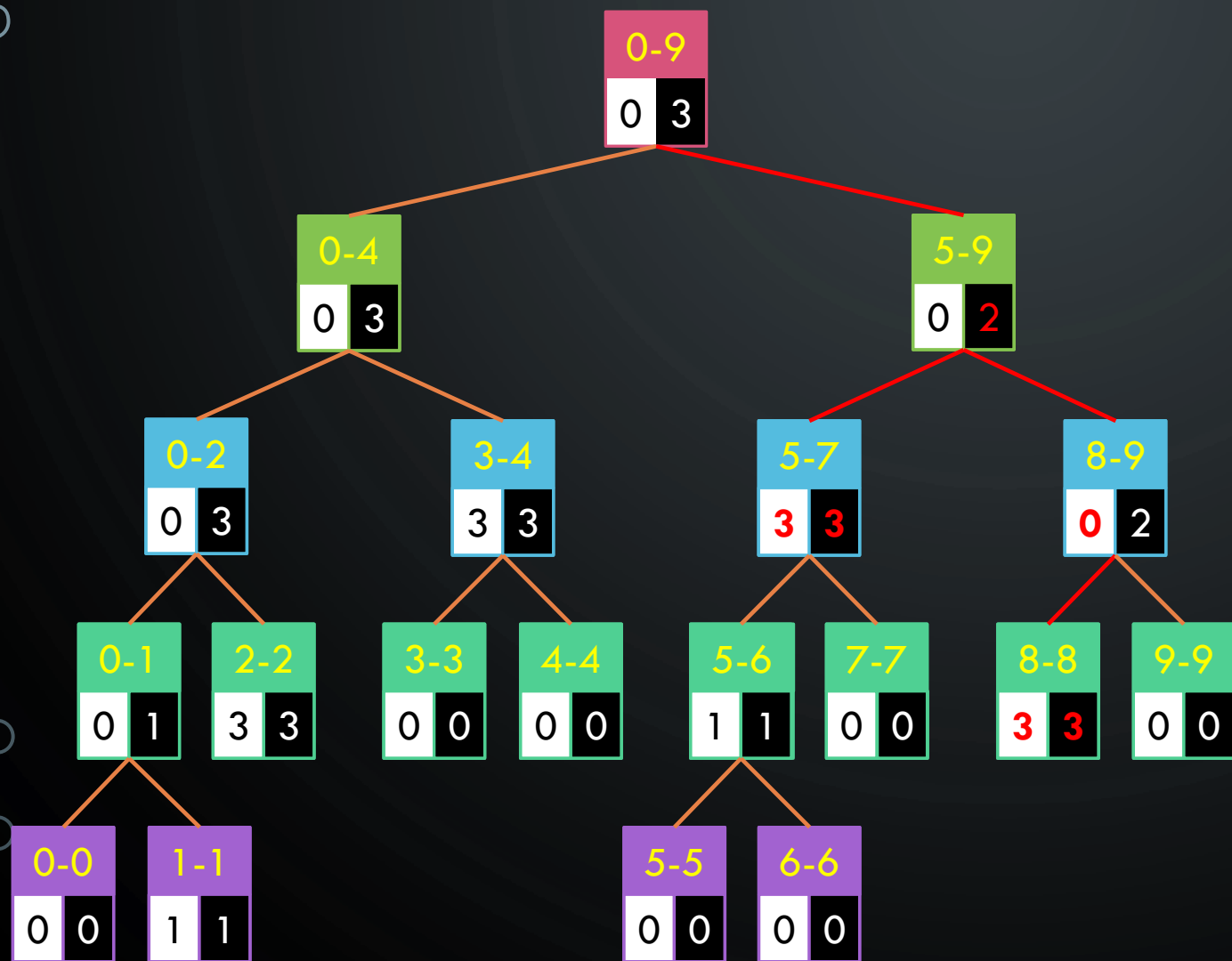
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 UP #2



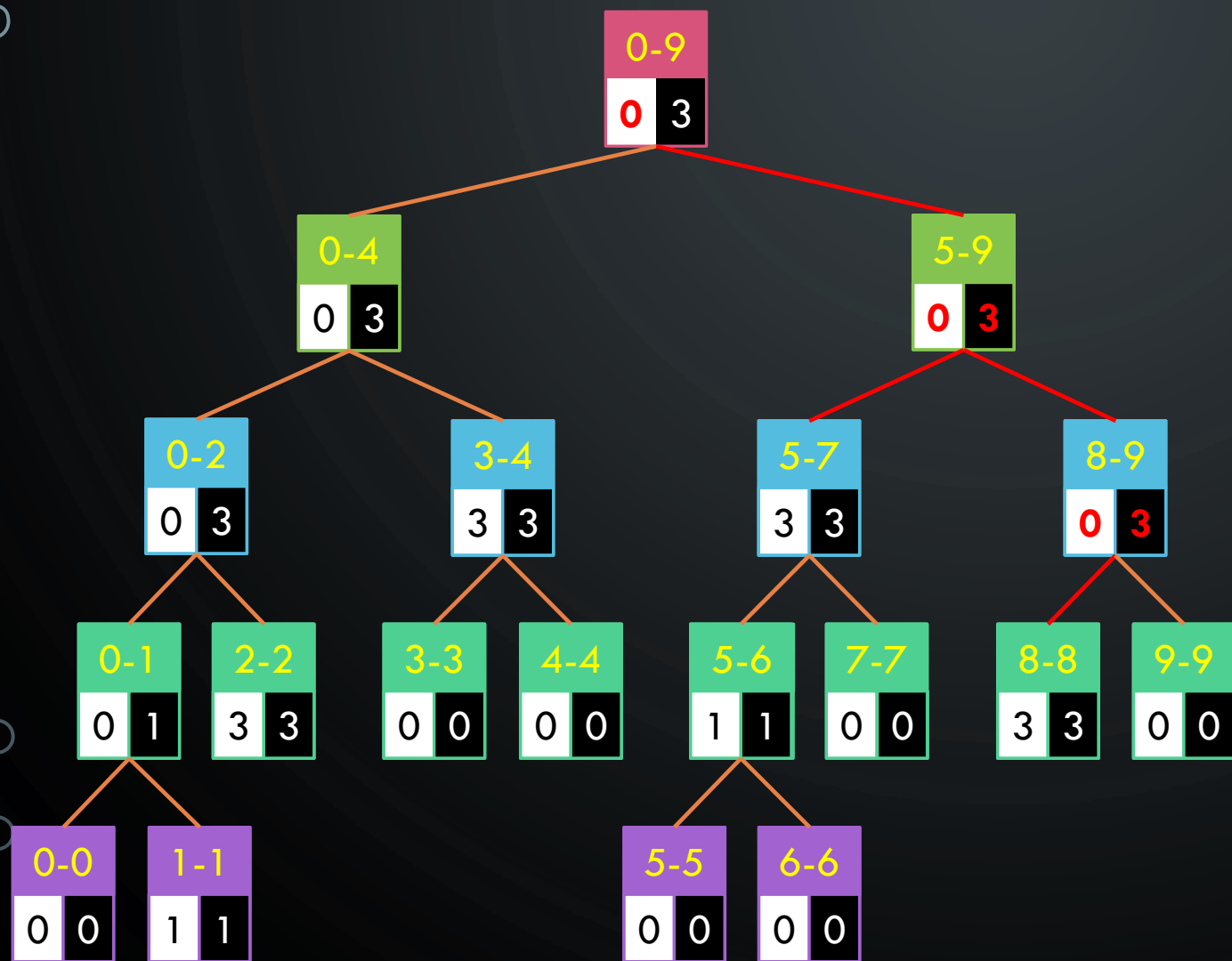
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 DOWN #3



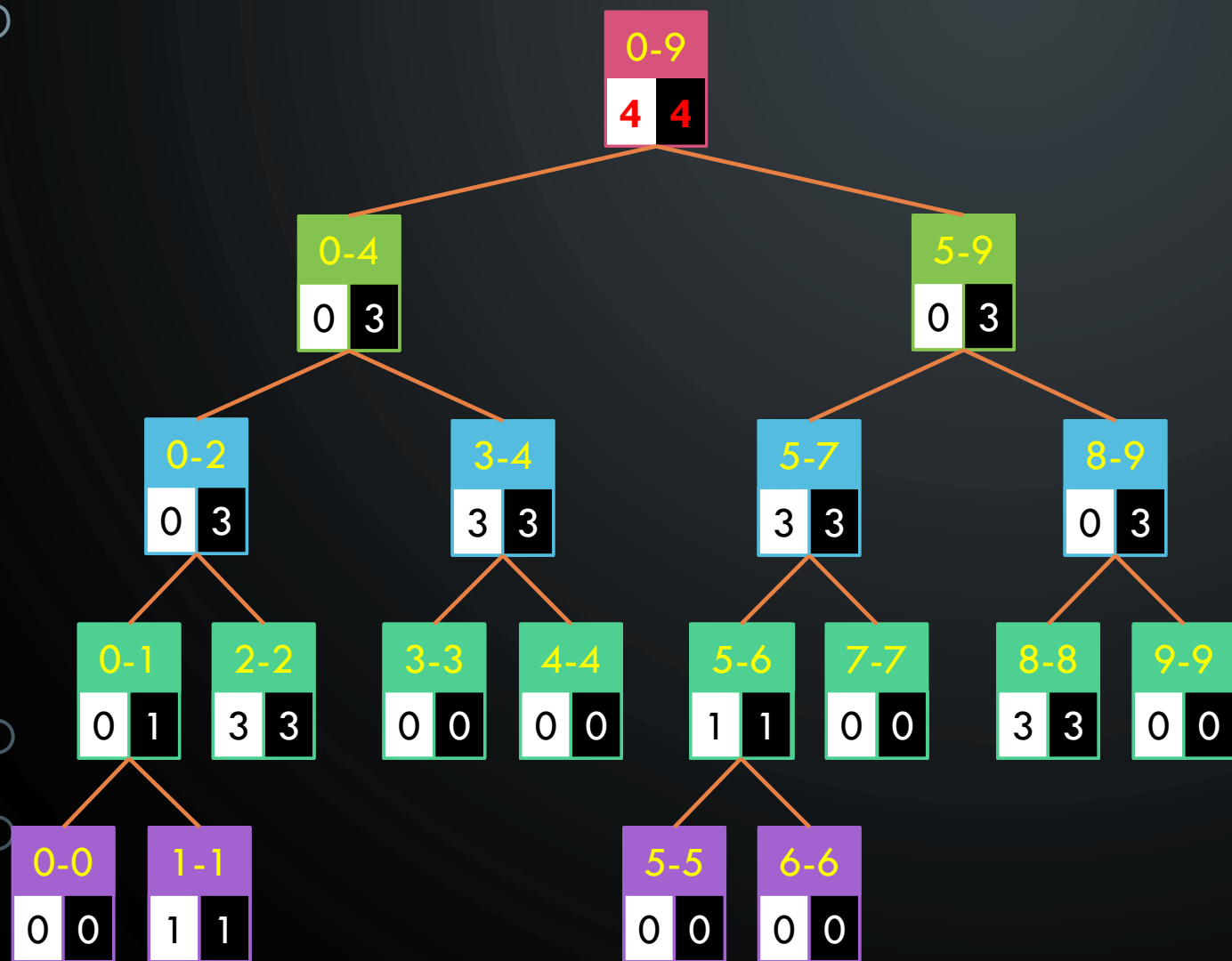
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #4 UP #3



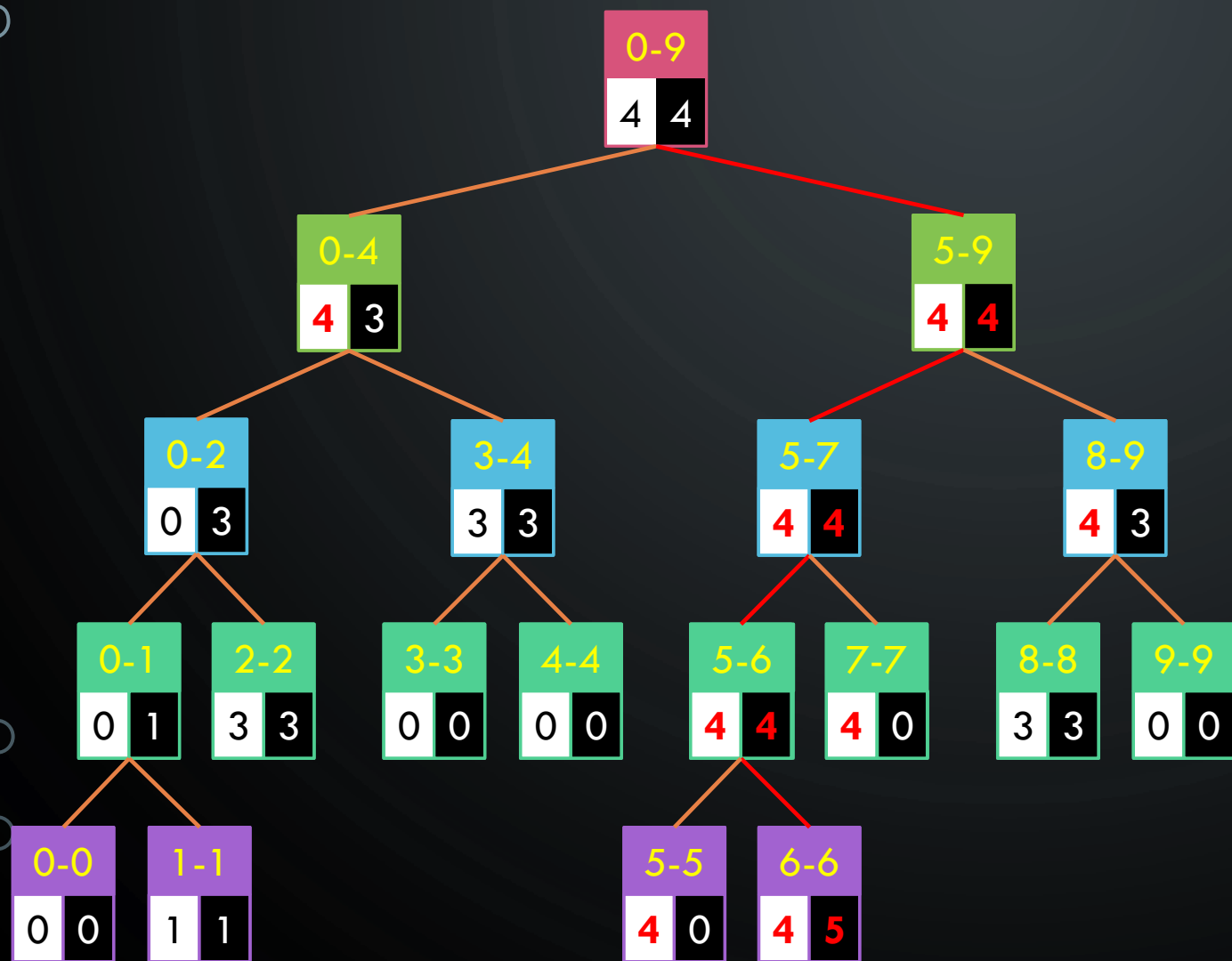
										8
										7
										6
										5
										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #5



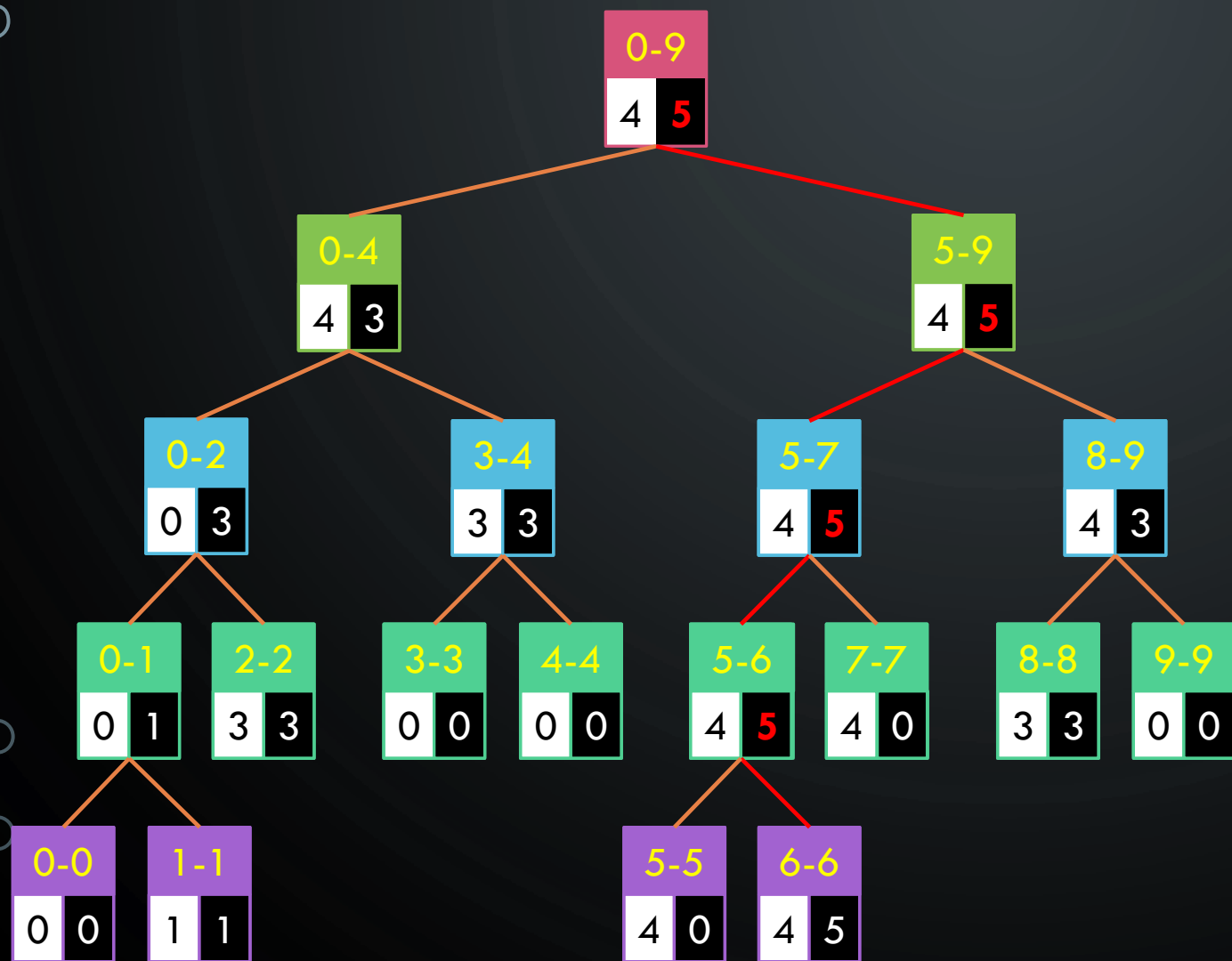
										8
										7
										6
										5
5										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #6 DOWN



										8
										7
										6
						6				5
5										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0

THE PROBLEM SOLVING – BLOCK #6 UP

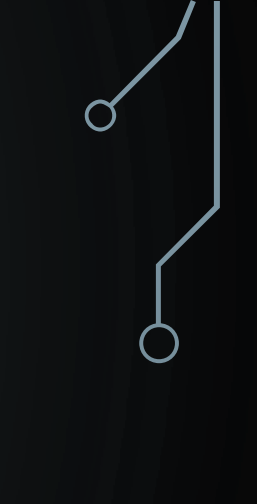


										8
										7
										6
						6				5
5										4
		4								3
		3								2
	1				2					1
0	1	2	3	4	5	6	7	8	9	0



THE PROBLEM SOLVING

The algorithm to solve this problem.

1. Create a structure for the block.
 2. Construct a segment tree for the current tube width.
 3. Update the status of each block in the tree according to the input block.
 4. After the last block is processed the root of the tree contains the answer.
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The image features a dark gray background with a subtle pattern of concentric circles. In the four corners, there are white, stylized circuit board traces with small circles at the end of the lines, resembling electronic components or data paths.

**THANK
YOU!**