Lecture 2: AI Agents & Environment Properties

Question: Classify the following environments and provide examples:

a) Chess game (Fully Observable)(Deterministic)(Sequential)(Static)(Discrete)(Multi-agent)

b) Self-driving car navigation (Partially Observable)(Stochastic)(Sequential)(Dynamic)(Continuous)(Multi-agent)

c) Email spam filter (Fully Observable)(Stochastic)(Episodic)(Static)(Discrete)(Single-agent)

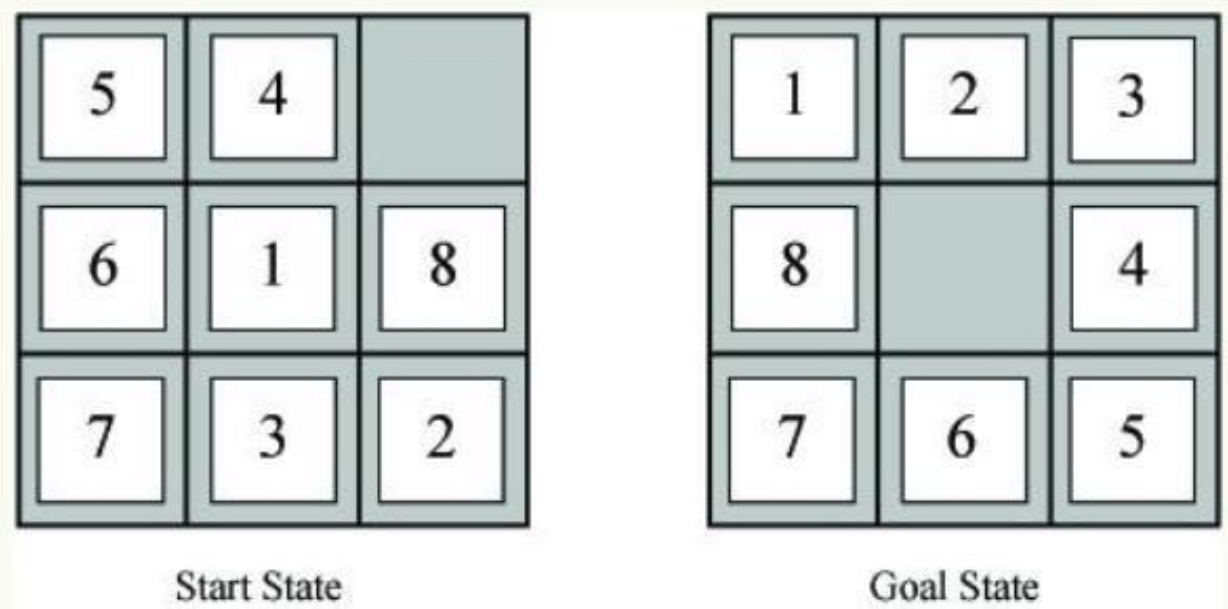
d) Crossword puzzle (Fully Observable)(Deterministic)(Sequential)(Static)(Discrete)(Single-agent)

Question: Match each agent type with its appropriate example:

1. Simple Reflex Agent => Vacuum Cleaner
2. Model-Based Reflex Agent => Self-Driving Car
3. Goal-Based Agent => Google Maps
4. Utility-Based Agent => Uber AI
5. Learning Agent => AI Chess Player

Lecture 3: Solving Problems by Searching Algorithm

Problem 1:



Question: For the Eight Puzzle problem, define:

a) States => Tile (square) locations

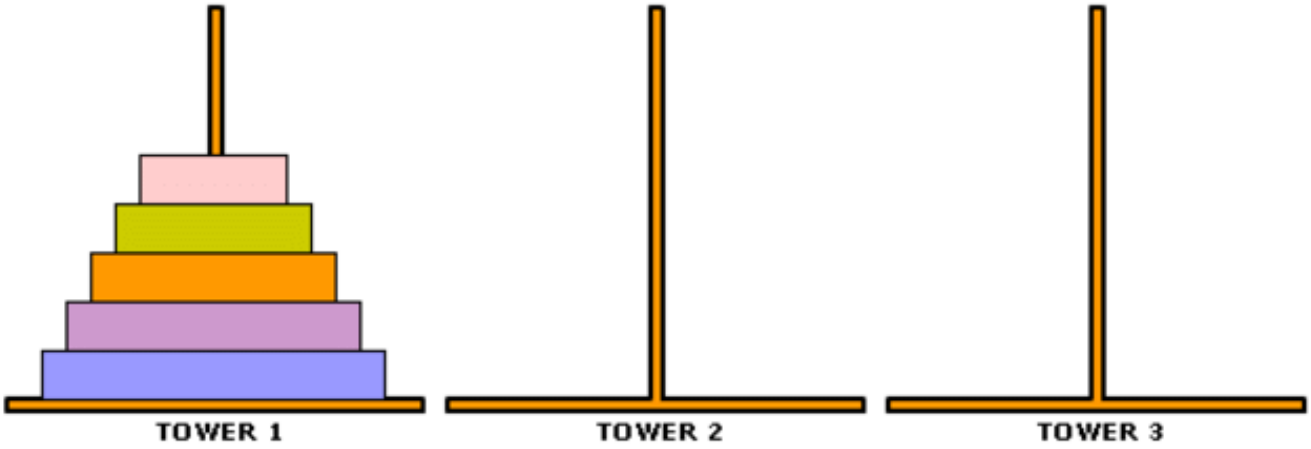
b) Initial state => One specific tile configuration

c) Operators => Move blank tile left, right, up, or down

d) Goal => Tiles are numbered from one to eight around the square

e) Path cost => Cost of 1 per move

Problem 7:

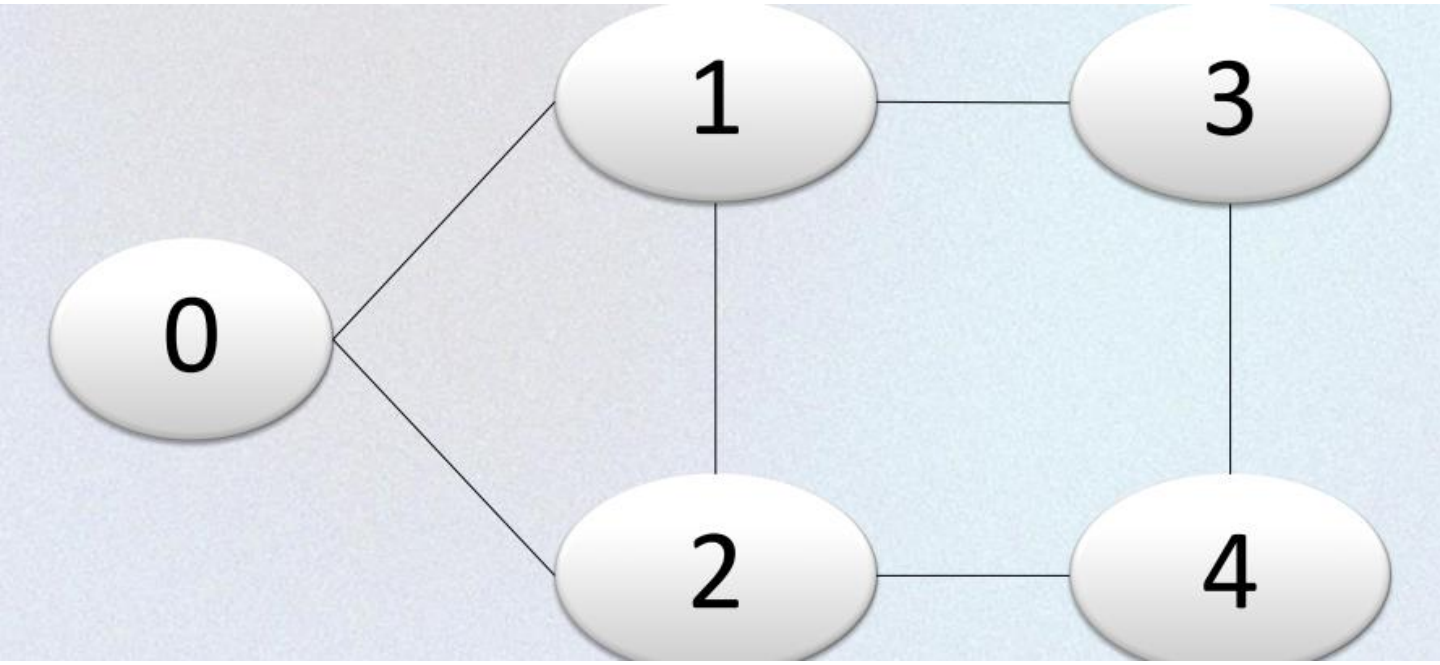


Question: For the Towers of Hanoi problem with n disks, what is the minimum number of moves required? Calculate for 1, 2, 3, and 4 disks.

Answer: Formula: $2^n - 1$

- 1 disk → 1 move
- 2 disks → 3 moves
- 3 disks → 7 moves
- 4 disks → 15 moves

Breadth-First Search (BFS)

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[  0,      1,      2,      3,      4 ]
[[1,2], [0,2,3], [0,1,4], [1,4], [2,3]]
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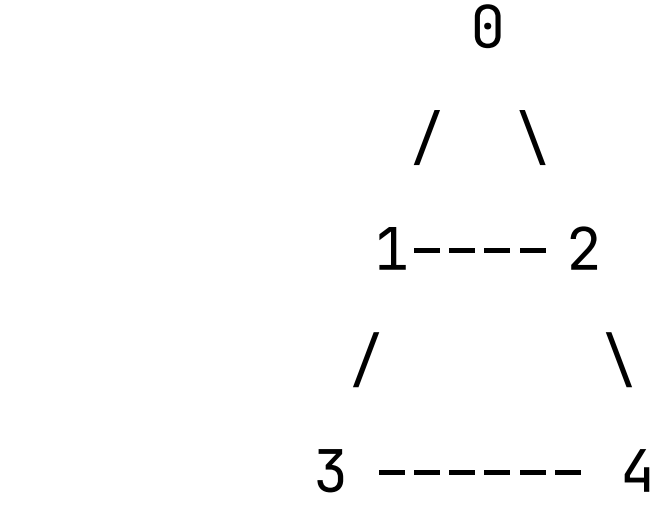


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[ 0, 1, 2, 3, 4]
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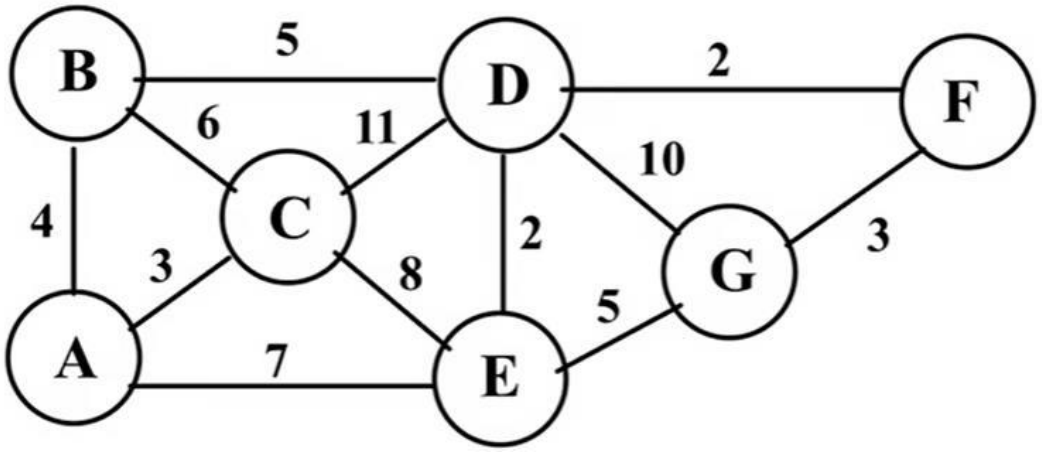
Greedy Best-First

Find shortest path from **A** node to **F** node. Note that the heurestic value h(n) equal to (node level)x2.



node(n)	h(n)
n(A) = 7+3+4=14	h(A) = 28
n(B) = 15	h(B) = 30
n(C) = 28	h(c) = 56
n(D) = 30	h(D) = 60
n(E) = 22	h(E) = 44
n(F) = 5	h(F) = 10
n(G) = 18	h(E) = 36

Final Path: A → B → C → E → G → F