Iterative Deepening A* Search Algorithm

- **Iterative deepening A* (IDA*)** is a graph traversal and path-finding method that can determine the shortest route in a weighted graph between a defined start node and any one of a group of goal nodes.
- It is a kind of **iterative deepening depth-first search** that adopts the **A* search algorithm's** idea of using a heuristic function to assess the remaining cost to reach the goal.

How IDA* algorithm work?

- **Step 1: Initialization**
  - Set the root node as the current node and find the f-score.
- **Step 2: Set threshold**
  - Set the cost limit as a threshold for a node i.e the maximum f-score allowed for that node for further explorations.
- **Step 3: Node Expansion**
  - Expand the current node to its children and find f-scores.

How IDA* algorithm work?

- **Step 4: Pruning**
  - If for any node the **f-score > threshold**, prune that node because it's considered too expensive for that node and store it in the visited node list.
- **Step 5: Return Path**
  - If the Goal node is found, then return the path from the start node Goal node.
- **Step 6: Update the Threshold**
  - If the Goal node is not found, then repeat from step 2 by changing the threshold with the minimum pruned value from the visited node list. And Continue it until you reach the goal node.

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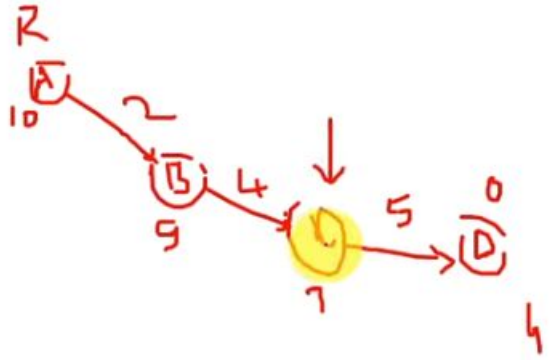
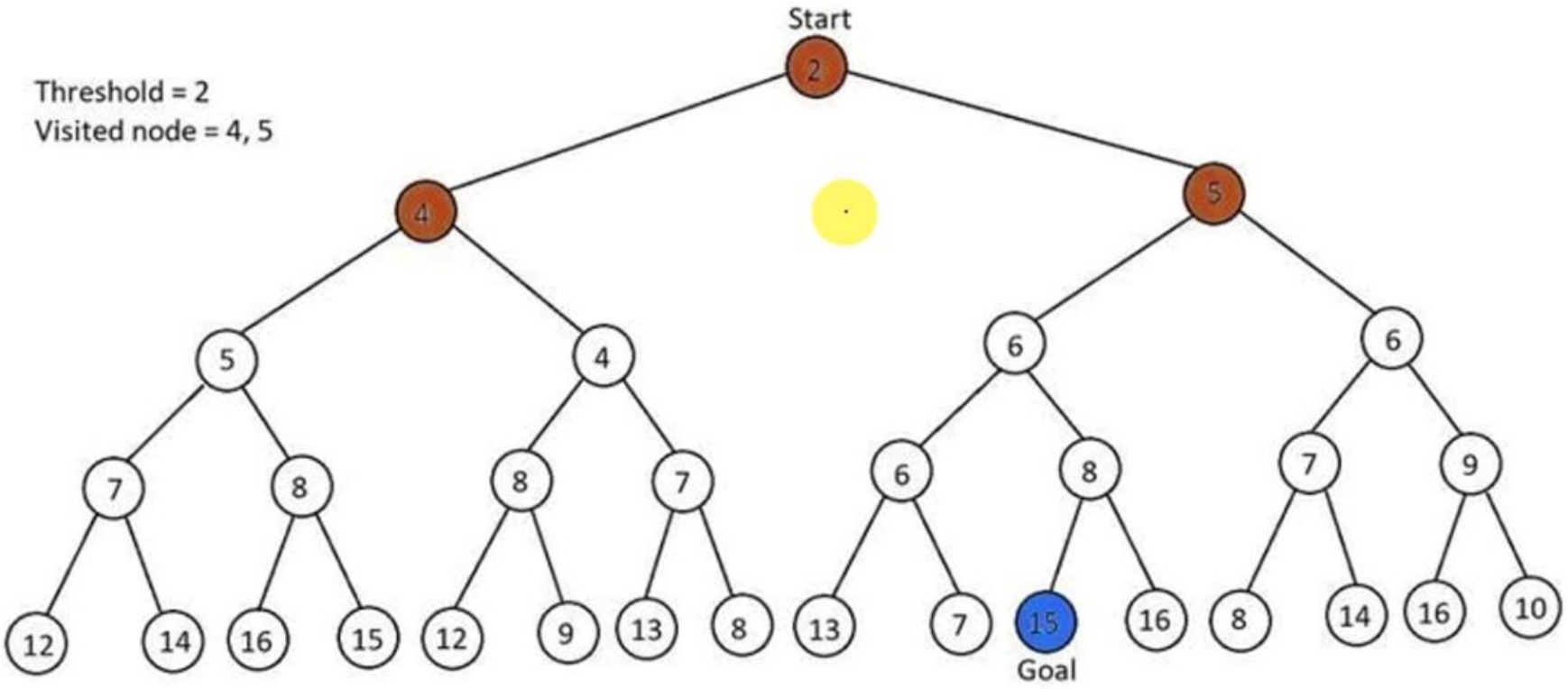
- **What is the f score?**
- In the A* and IDA* algorithm, F-score is a **heuristic function** that is used to estimate the cost of reaching the goal state from a given state. It is a combination of two other heuristic functions, **g(n)** and **h(n).**

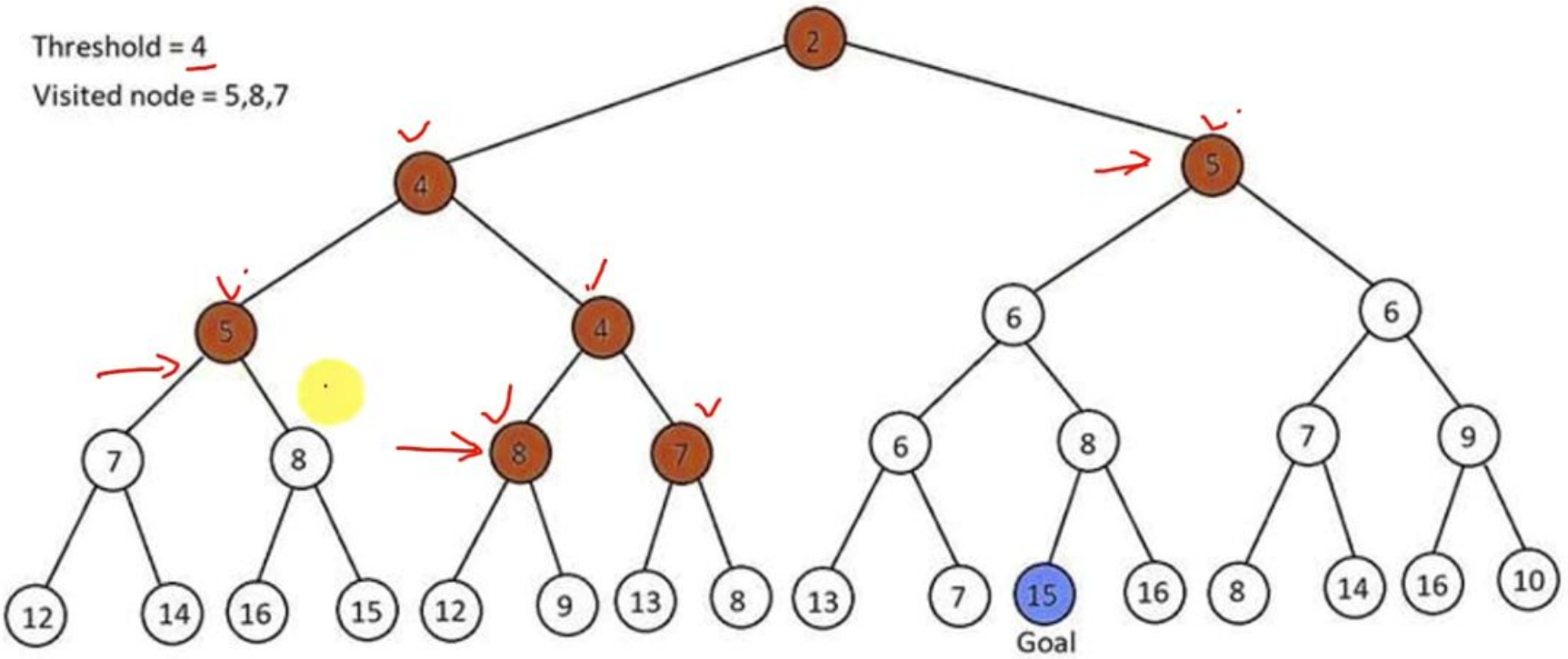
$$f(n) = g(n) + h(n)$$



How IDA* algorithm work?



Iterative Deepening A* Search Algorithm – Solved Example



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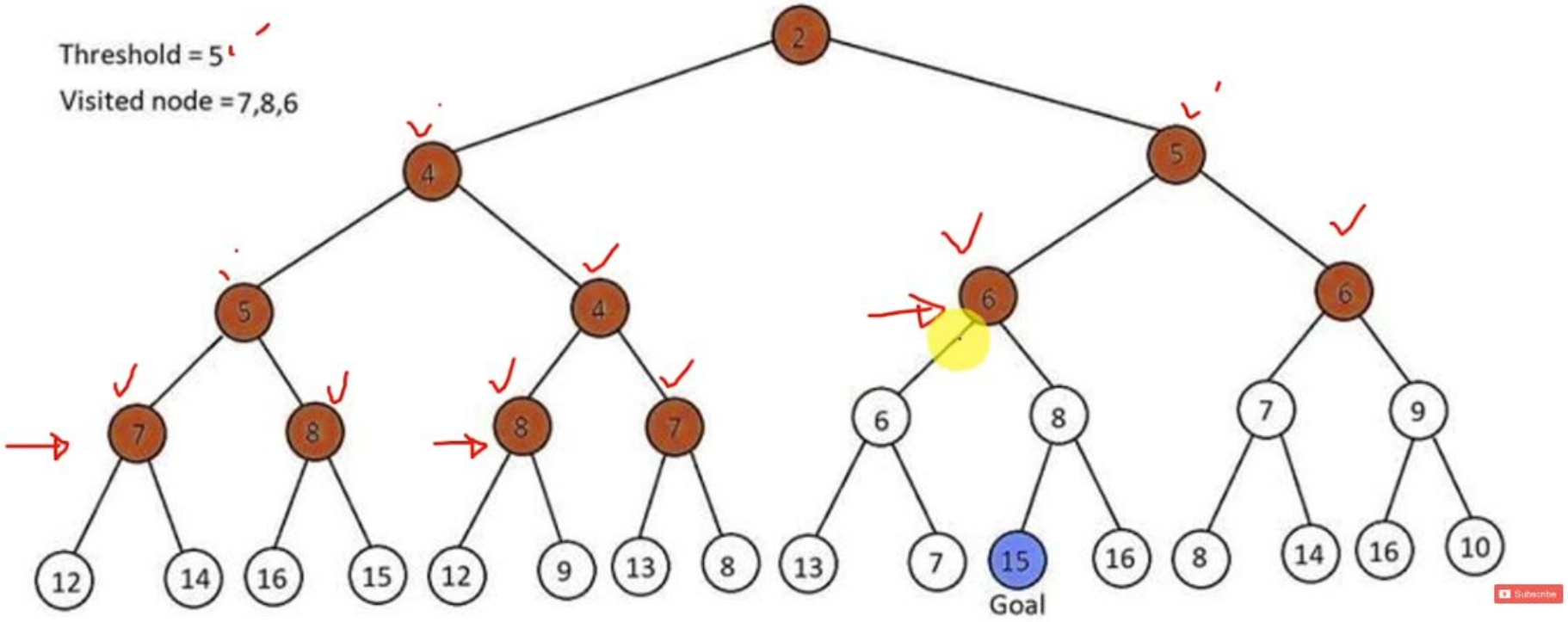

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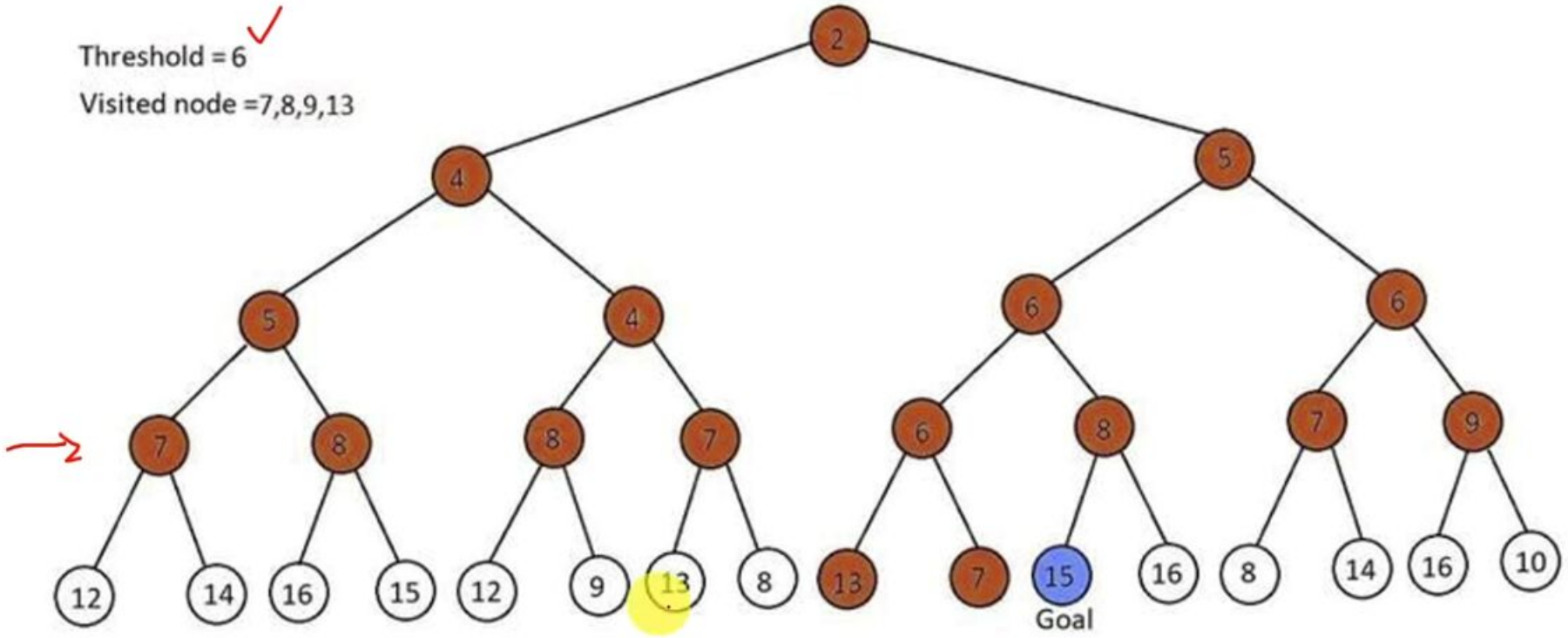

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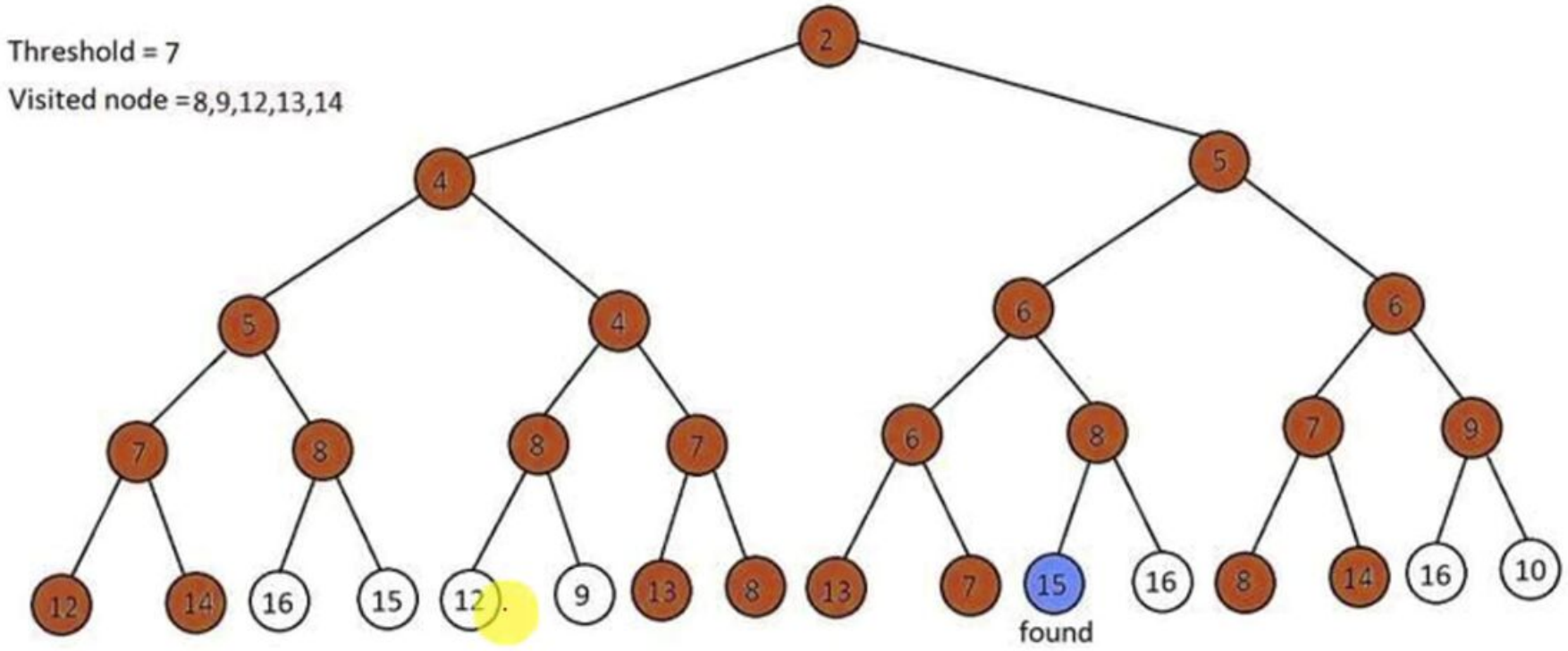

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