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class : BF- 17

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Subject : IS lab.

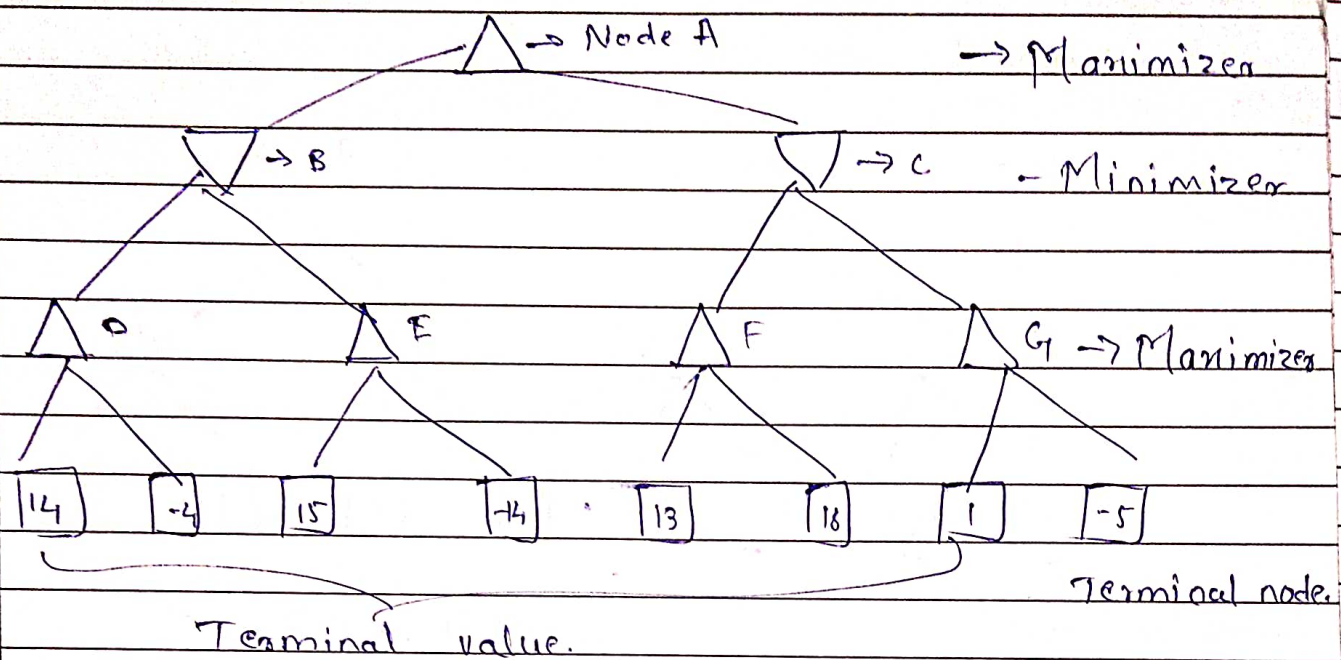DOP   DOA   marks   sign

Min-Max Algorithm:

Min-Max algorithm is a recursive or backtracking algorithm which is used in decision-making and game theory. It provides an optimal move for the player assuming that opponent is also playing optimally.

- Min Max algorithm uses recursion to search through game tree.
- In this algorithm two players play the game, one is called Max and other is called MIN.
- Min-Max algorithm is mostly used for game playing in AI.

Step 1:

Lets take A is the initial state of the tree. Suppose maximizer takes first turn (when or) which has worst-case initial value = -infinity, and minimizer will take next turn which has worst-case initial value = + infinity.

→ Node A   → Maximizer

→ B   → C   - Minimizer

D   E   F   G → Maximizer

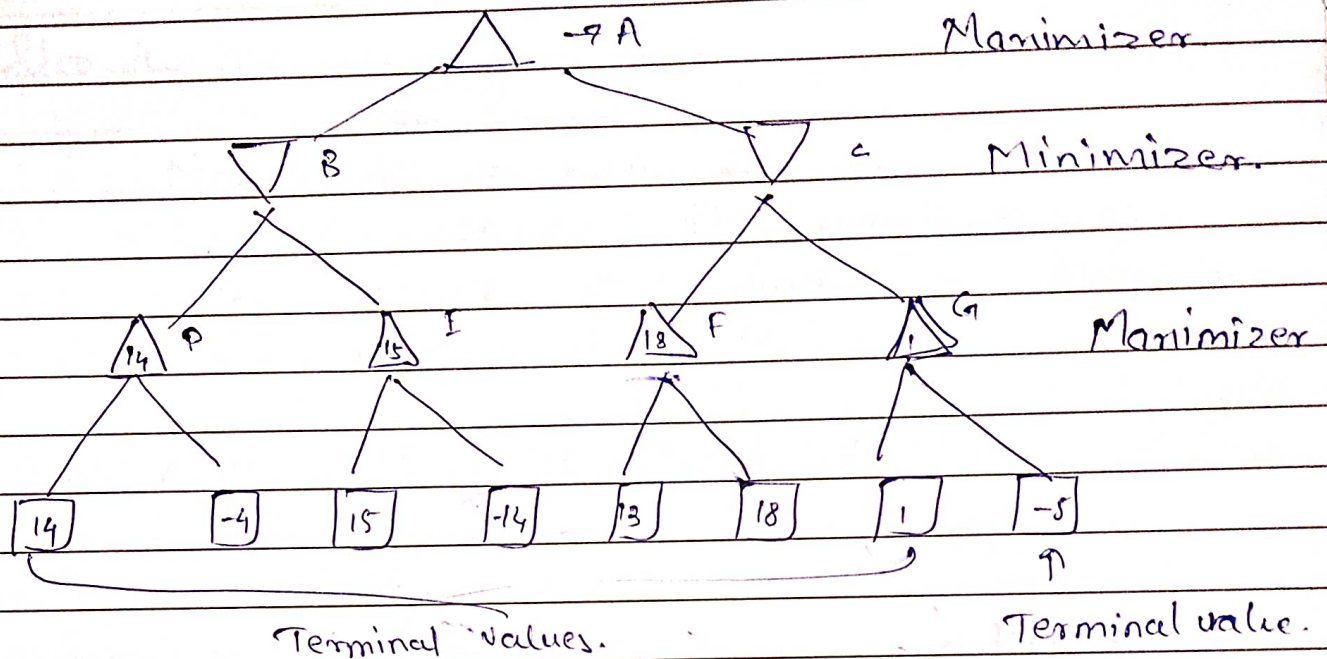| 14 | -4 | 15 | -14 | 13 | 18 | 1 | -5 |

Terminal node.

Terminal value.

Step 2:

first we find the utilities value for the maximizer, its initial value is $-\infty$, So we will compare each value in terminal State with initial value of maximizer and determines the higher nodes value. If will find the maximum among all.

for Node D: max(14, $-\infty$)   → max(14, -4) = 14

for Node E: max(14, $-\infty$)   → max(15, -14) = 15

for Node F: max(13, $-\infty$)   → max(13, 18) = 18

for Node G: max(1, $-\infty$)   → max(1, -5) = 1

-9 A — Maximizer

B — Minimizer

14 D   15 I   18 F   G — Maximizer

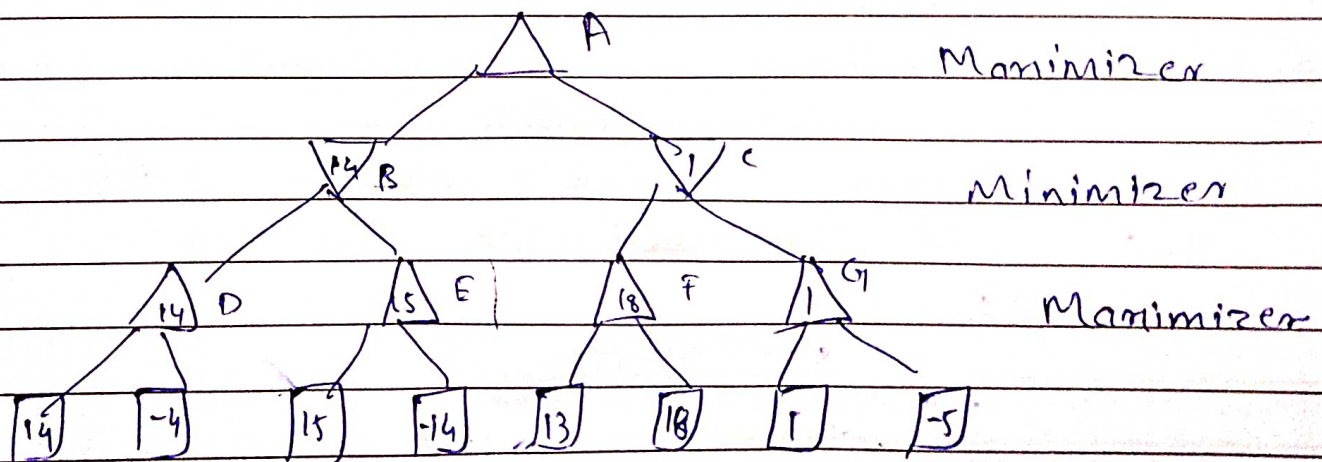| 14 | -4 | 15 | -14 | 13 | 18 | 1 | -5 |

Terminal values.   Terminal value.

step 3.

In the next step, it's a turn of minimize, so it will compare all node value with two, and will find the 3rd layer node value.
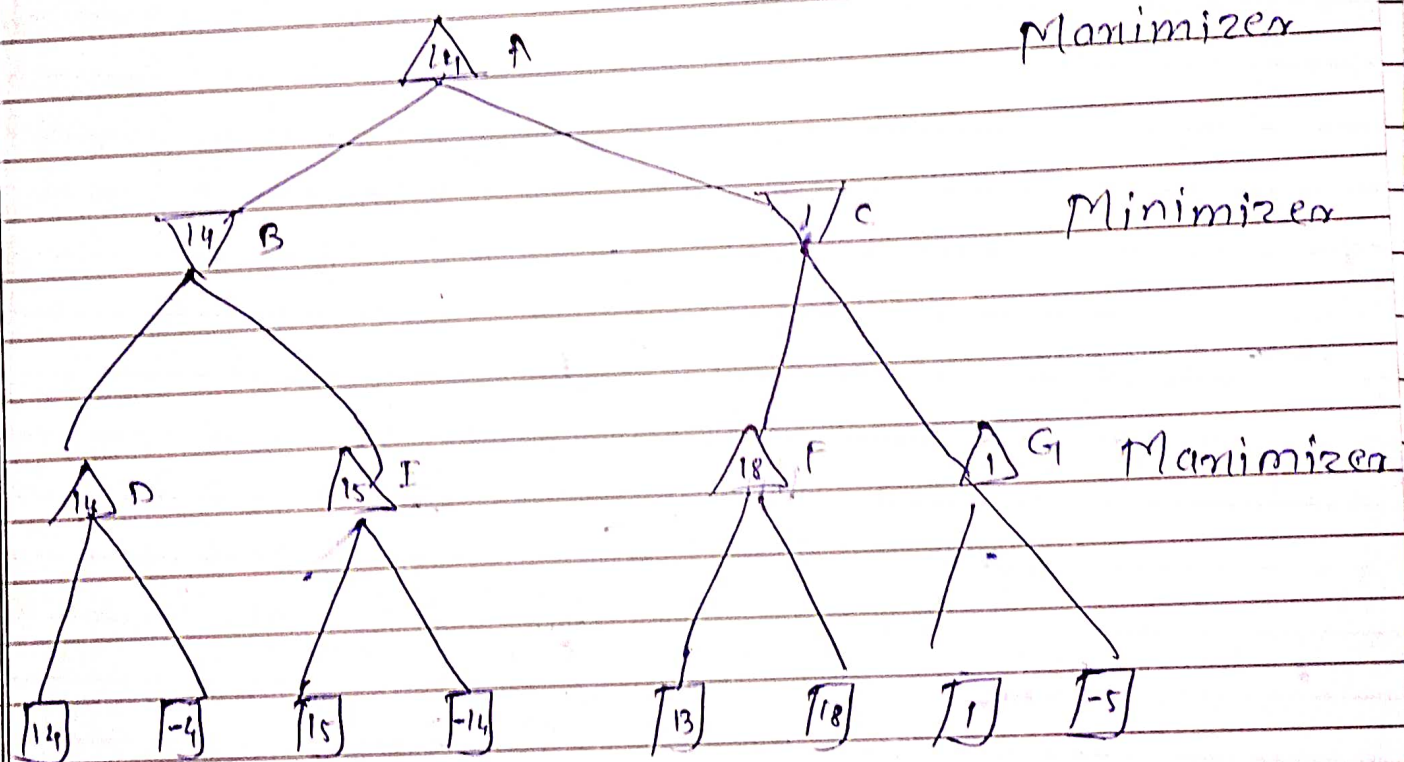
for node B — min (14, 15) = 14
for node C — min (18, 1) = 1

A — Maximizer

14 B   1 C — Minimizer

14 D   15 E   18 F   1 G — Maximizer
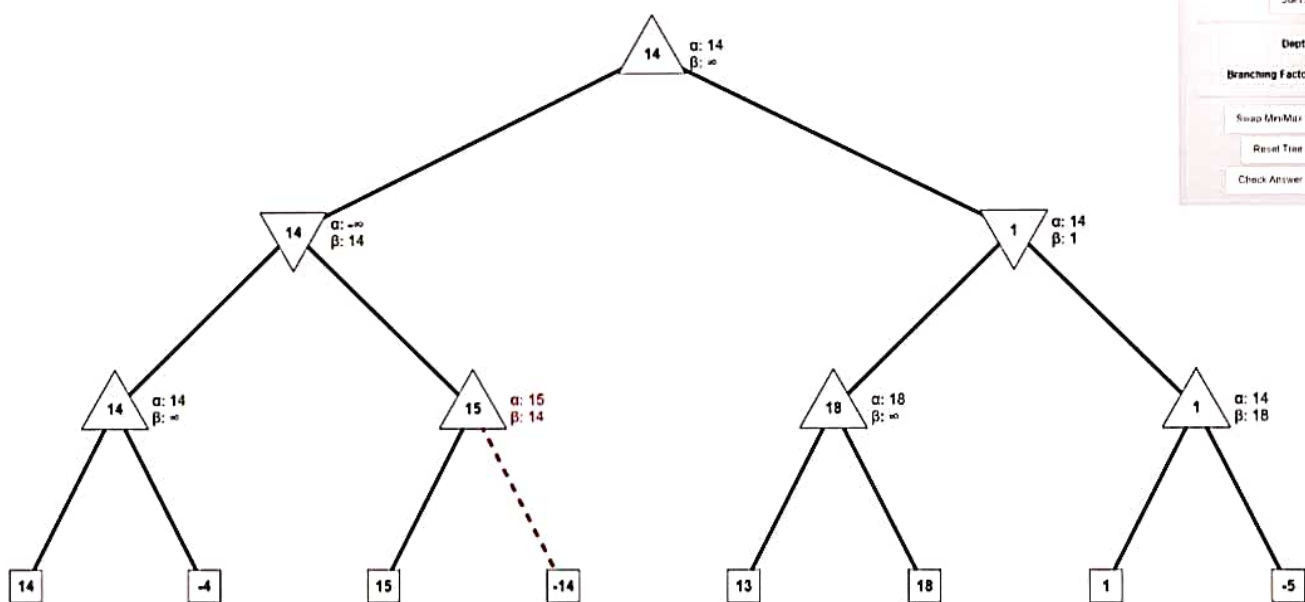
| 14 | -4 | 15 | -14 | 13 | 18 | 1 | -5 |

Step 4:

Now its a turn for maximizer, and
it will again choose the maximum of
all nodes values and find the maximum
value for the root node.

for node A : max $(14, -4) = 14$

Hence, it was the complete work flow of
the minmax algorithm with two player
game.

14   α: 14
      β: ∞

14   α: -∞
      β: 14

1   α: 14
      β: 1

14   α: 14
      β: ∞

15   α: 15
      β: 14

18   α: 18
      β: ∞

1   α: 14
      β: 18

14   -4   15   -14   13   18   1   -5