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Min- Max algorithm

Min-Max algorithm

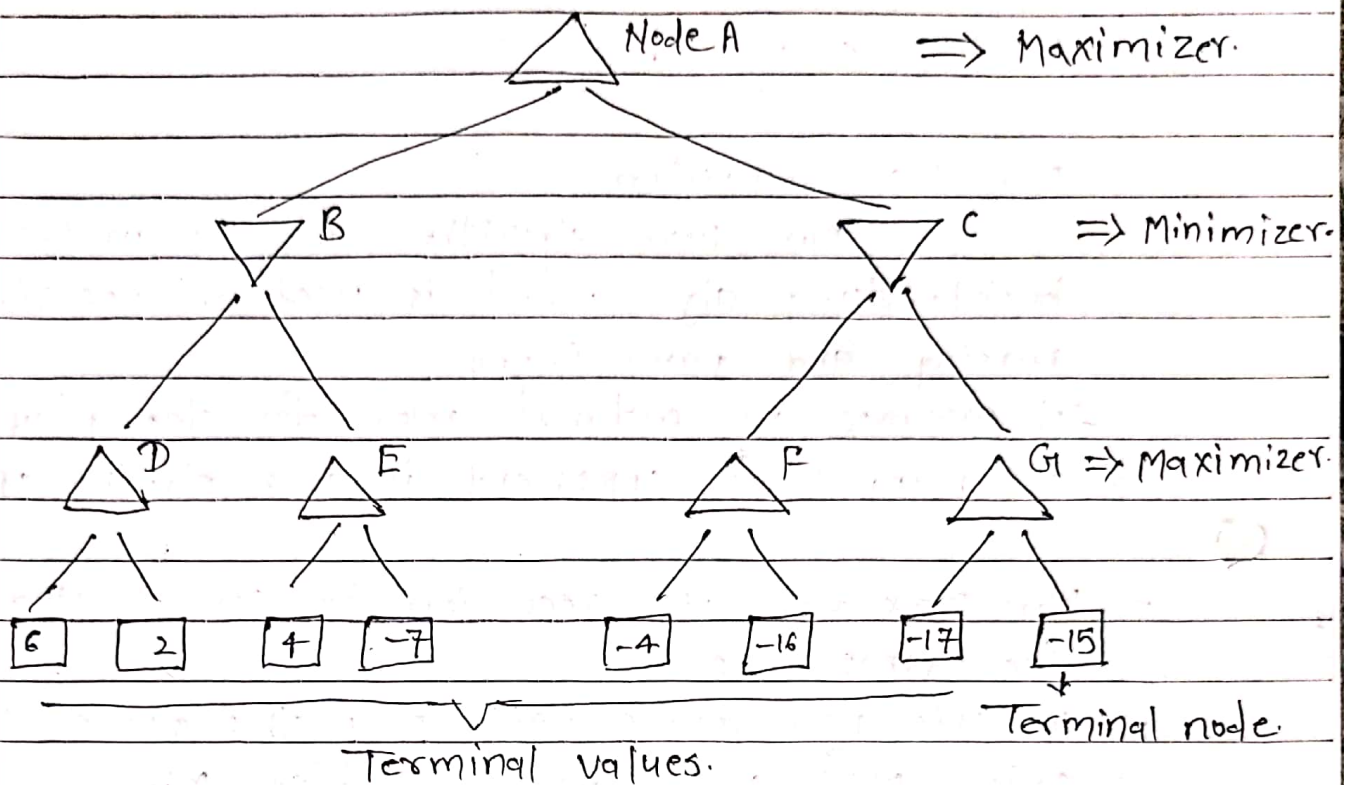Min - Max algorithm is a recursive or backtracking algo which is used in decision-making and game thory.
It provides on optimal move for the player assuming that opponent is also playing optimally.

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

- Step 1 :-
let's take A is initial state of a tree. Suppose maximizes takes first turn which has worst - case initial value : ~~initially~~ infinity and minimize will take next turn which has worst case initial value + infinity.

Node A ⟹ Maximizer.

B

C ⟹ Minimizer.

D   E   F   G ⟹ Maximizer.

| 6 | 2 | 4 | -7 | -4 | -16 | -17 | -15 |

Terminal node.

Terminal values.

Step 2 :
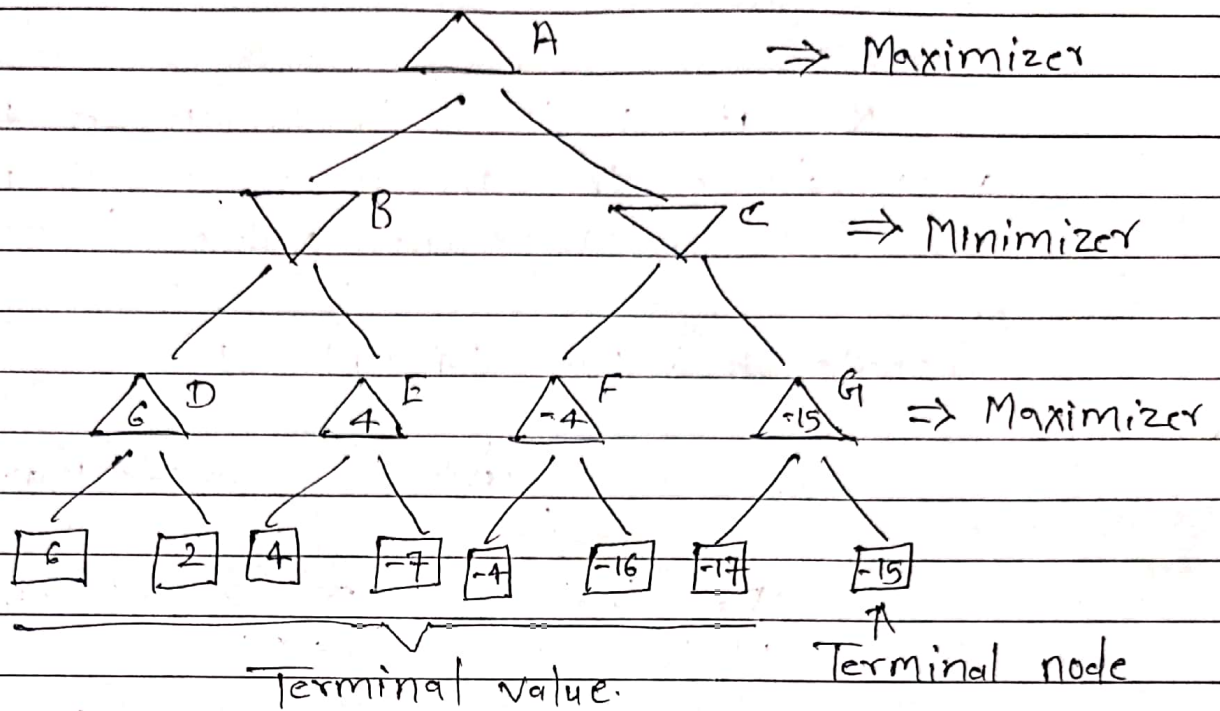
First we find the value for Maximizer, its initial value is $-\infty$, so we will compare each value in terminal state with initial value of Maximizes and determines the highest nodes value. It will find the Maximum among all.

For node D : Max $(6, -\infty)$ ⟹ Max $(6, 2) = 6$

For node E : Max $(4, -\infty)$ ⟹ Max $(4, -7) = 4$

For node F : Max $(-4, -\infty)$ ⟹ Max $(-4, 16) = -4$

For node G : Max $(-17, -\infty)$ ⟹ Max $(-17, -15) = -15$

A ⟹ Maximizer

B   C ⟹ Minimizer

D(6)   E(4)   F(-4)   G(-15) ⟹ Maximizer

[6] [2] [4] [-7] [-4] [-16] [-17] [-15]

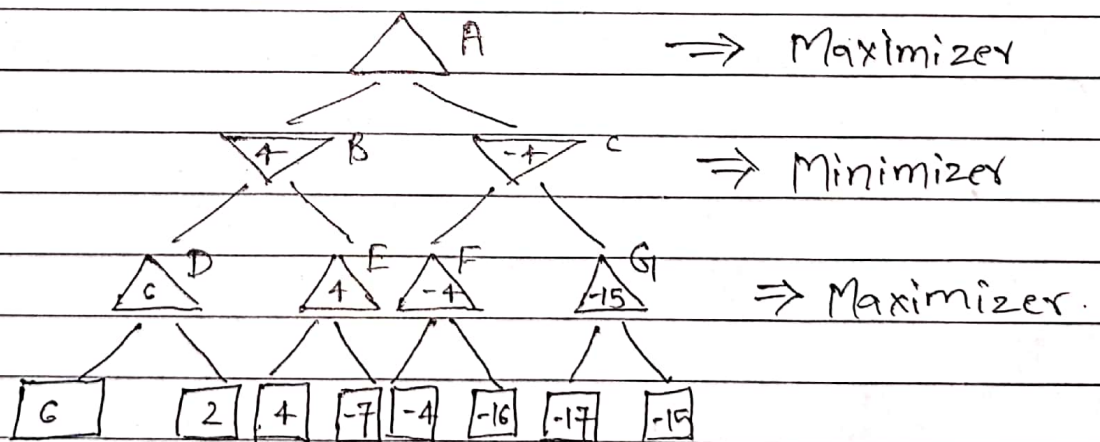Terminal value.   Terminal node

Step 3 :-

In the next step, it is a turn for minimize. So it will compare all nodes value with two & will find the 3rd layer node value.
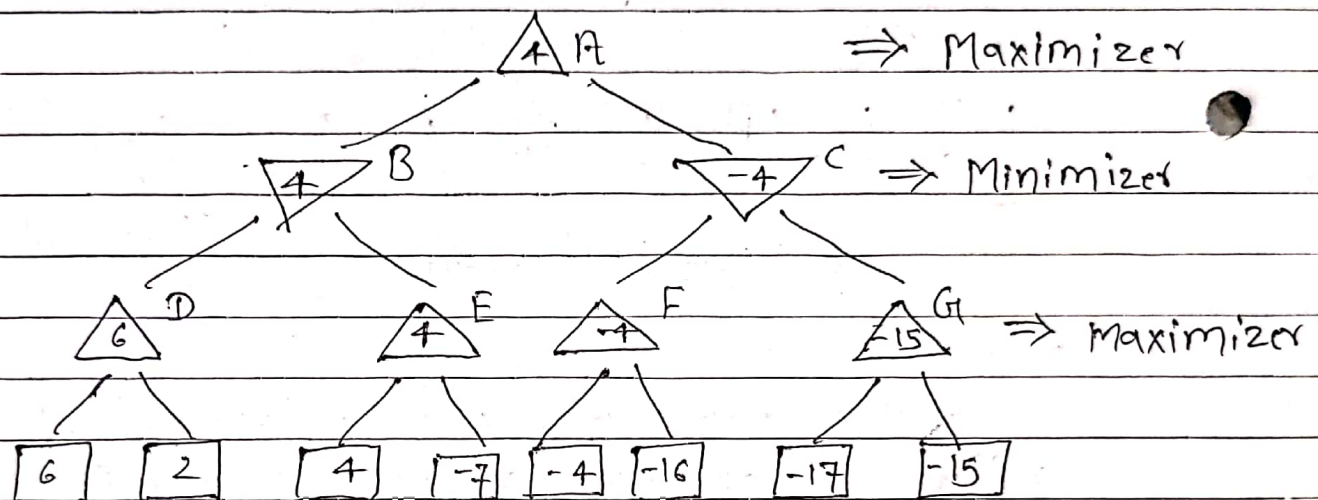
For node B   —   Min (6,4) = 4
For node C   —   Min (-4, -15) = -4

A ⟹ Maximizer

B(4)   C(-4) ⟹ Minimizer

D(c)   E(4)   F(-4)   G(-15) ⟹ Maximizer.

[6] [2] [4] [-7] [-4] [-16] [-17] [-15]

Step 4 :

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

For node A : Max (4, -4) = 4

Hence, it is the complete workflow of the minmax algorithm with two player game.