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## Min - Max Algorithm :

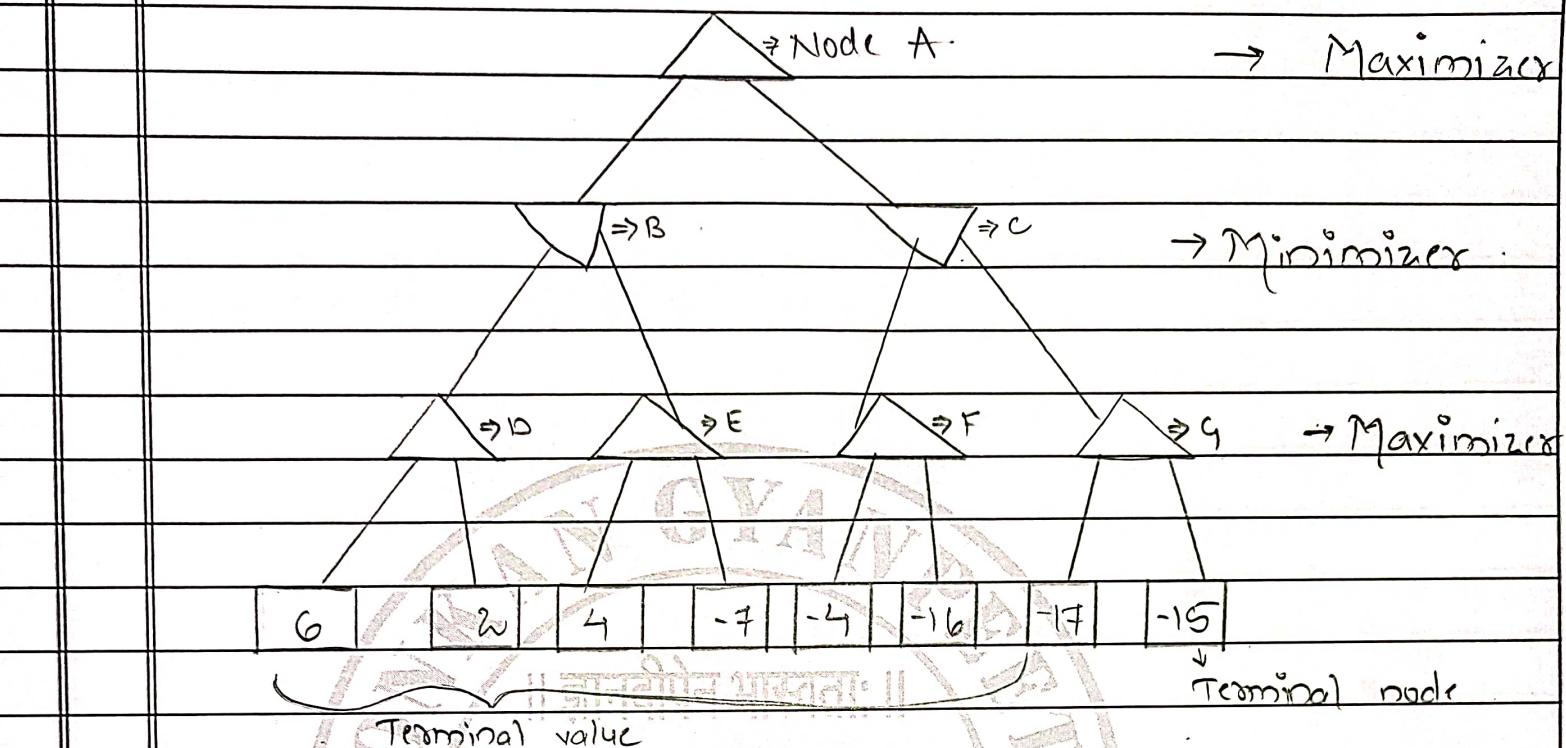
Min max algorithm :

Min-max algorithm is a recursive or backtracking algo which is used in decision-making and game theory. It provides an 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 :

Lets take A is the initial value =  
- infinity and mini

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



- Step 2 :

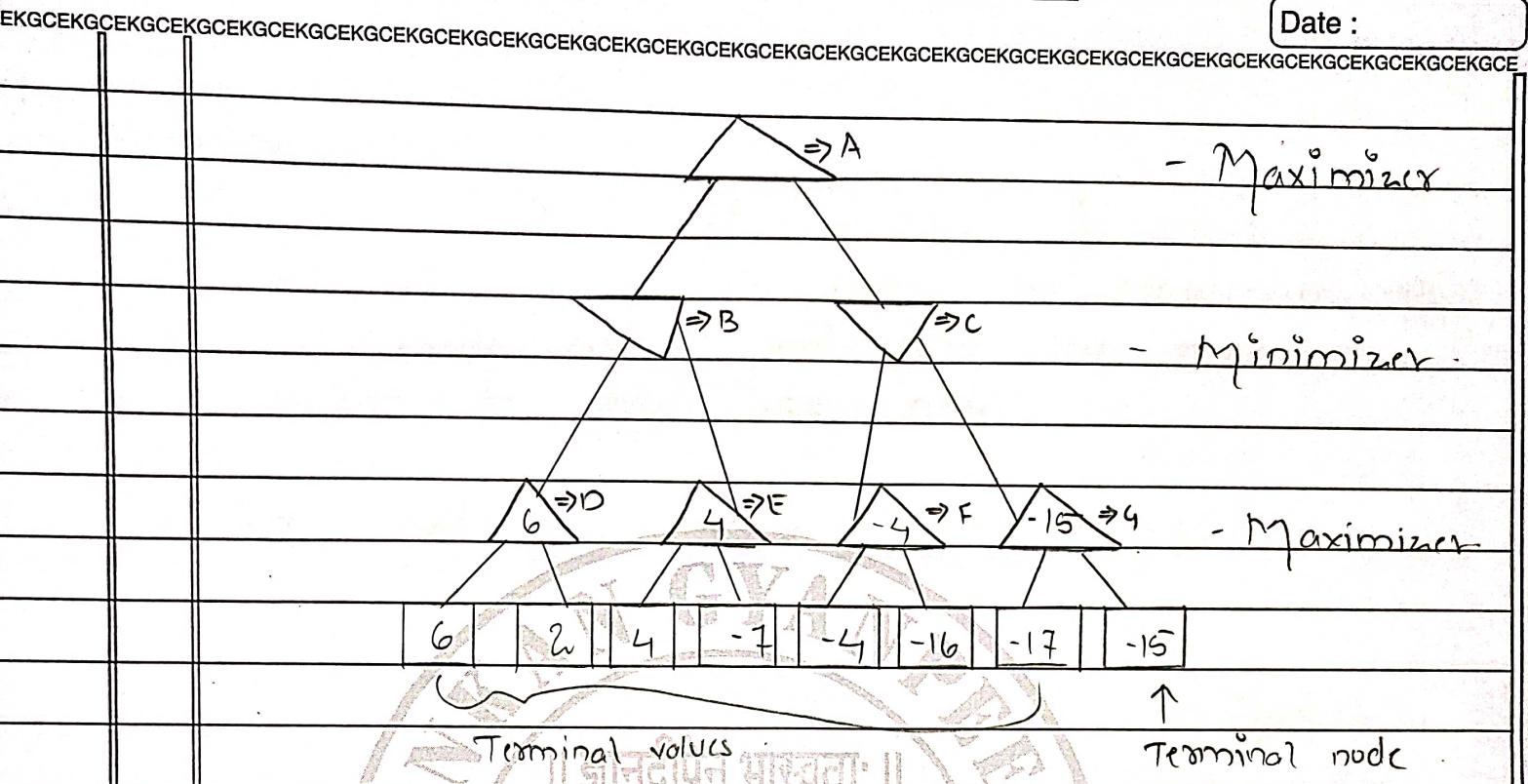
First we find the utilities value for the maximizer, its initial value is  $-\infty$ , so we will compare each value in terminal state with initial value of maximizer and determines the higher nodes values. It will find the maximum among all.

For node B :  $\max(6, -\infty) \Rightarrow \max(6, 2) = 6$

For node E :  $\max(4, -\infty) \Rightarrow \max(4, -7) = 4$

For node F :  $\max(-4, -\infty) \Rightarrow \max(-4, -16) = -4$

For node G :  $\max(-17, -\infty) \Rightarrow \max(-17, -15) = -15$

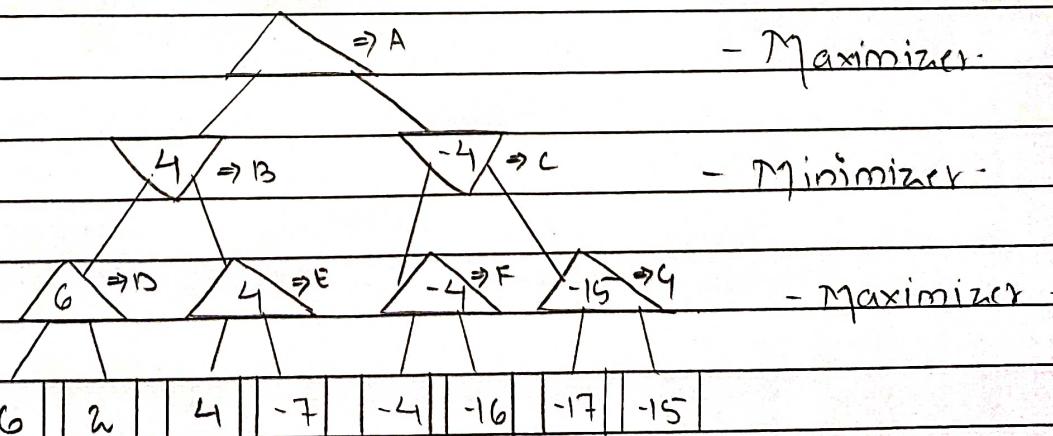


- Step 3:

In the next step, it's a turn for minimizer, so it will compare all nodes value with two, and will find the 3<sup>rd</sup> layer node value.

$$\text{For node B} - \min(6, 4) = 4$$

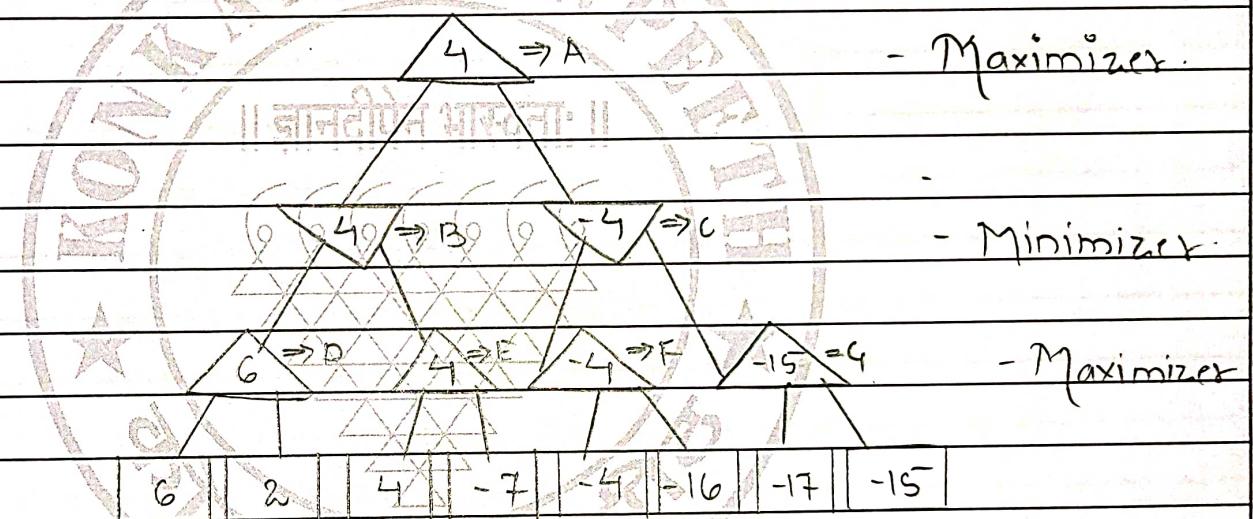
$$\text{For node C} - \min(-4, -15) = -4$$



- 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 (4, -4) = 4



Hence, it was the complete workflow of the ~~minimax~~ minimax algorithm with two player game.