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# ① Min - Max Algorithm:-

## Min-max Algorithm:-

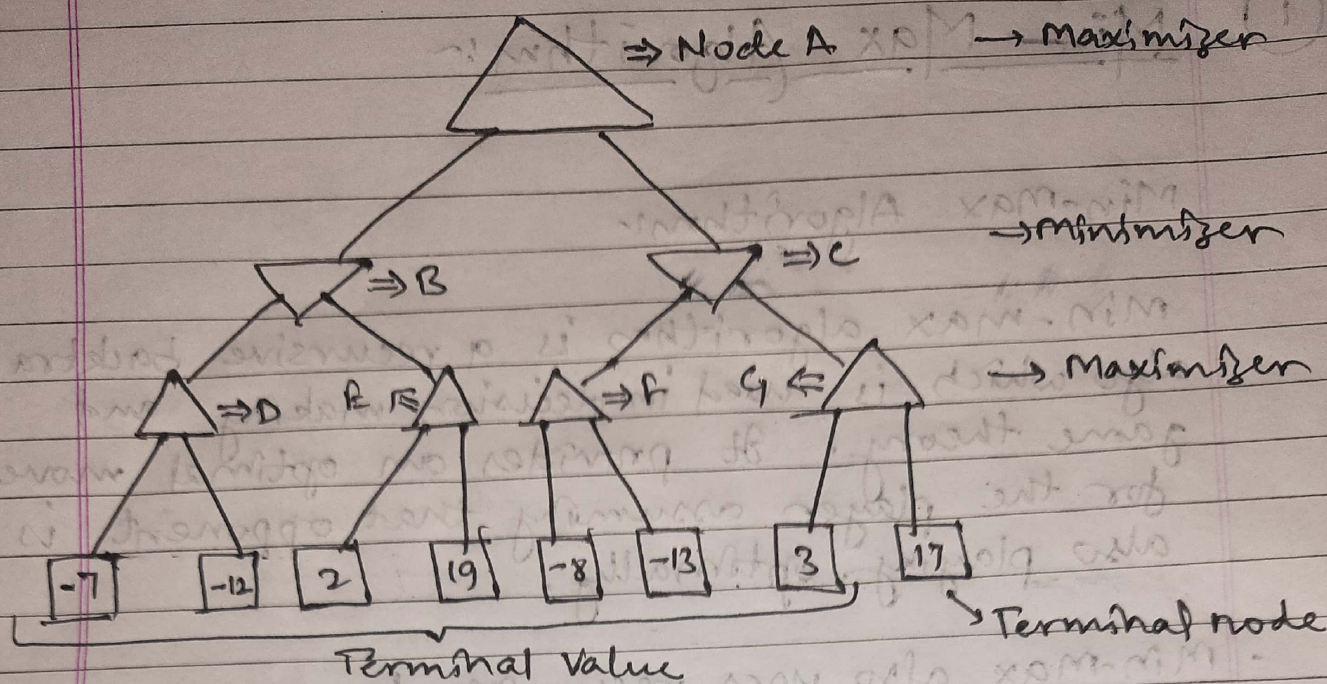
min-max algorithm is a recursive backtracking algo which is used in decision making and game theory. It provides an optimal move for the player assuming that opponent is also playing optimally.

- min-max also uses recursion to search through the game-tree.
- In this algo two players play the game, one is called MAX & other is called MIN.
- min-max algo is mostly used for game playing in AI.

### Step 1:

Let's ~~let~~ take A is the initial state of the tree. Suppose minimizer takes first turn (when or) which has worst case initial value =  $-\infty$ , and minimizer will take next turn which has worst-case initial value =  $+\infty$ .





Step 2:

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

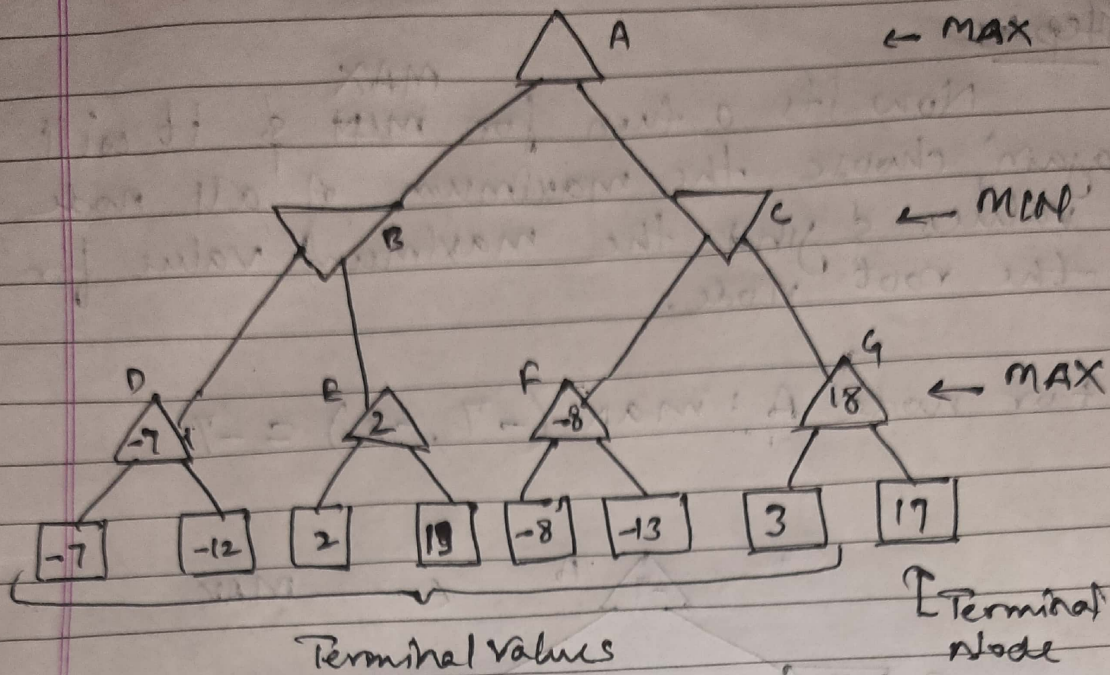
For node D:  $\max(-7, -\infty) \Rightarrow \max(-7, -12) = -7$

For node E:  $\max(2, -\infty) \Rightarrow \max(2, 19) = 19$

For node F:  $\max(-8, -\infty) \Rightarrow \max(-8, -13) = -8$

For node G:  $\max(3, -\infty) \Rightarrow \max(3, 17) = 17$  [ ]



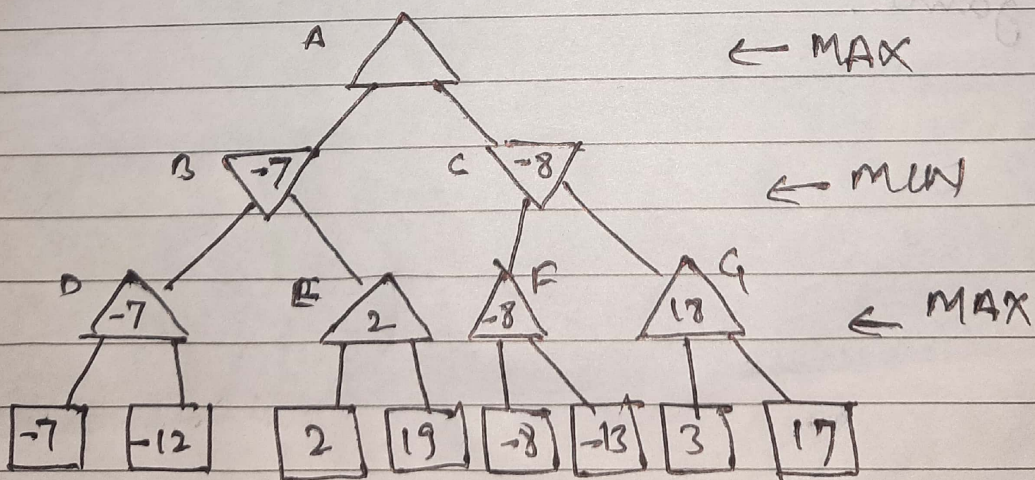


Step 3:

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

For node B :  $\min(-7, 2) = -7$

For node C :  $\min(-8, 18) = -8$

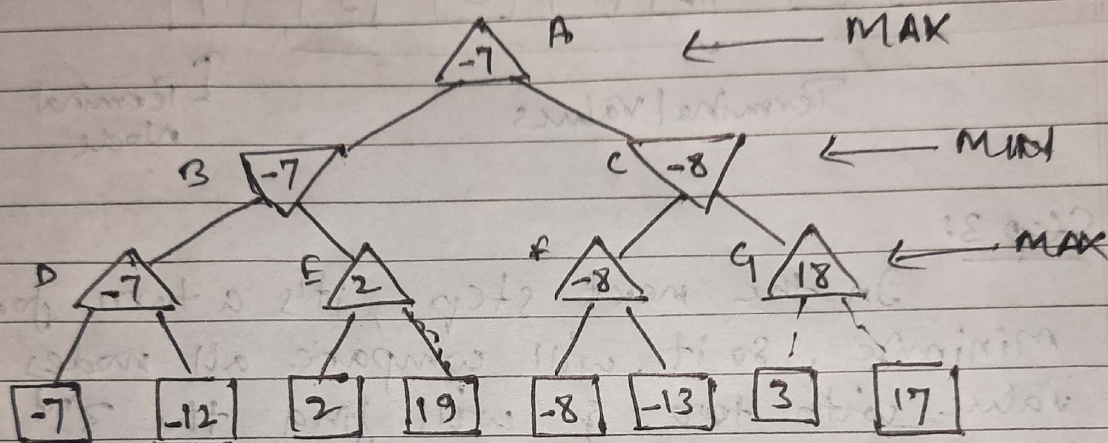




Step 4:

Now it's a turn for ~~min~~<sup>MAX</sup> & it will again choose the maximum of all node values & find the maximum value for the root node.

For node A:  $\max(-7, -8) = -7$



Hence, it was the complete workflow of the min-max algo with two player game.