TASK 1:

Apply minimax algorithm to make decision in tic tac toe game.

CODE:

```
# Owned
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#==============================================================
# {code}
def ConstBoard(board):
    print("Current State Of Board : \n\n");
    for i in range (0,9):
        if((i>0) and (i%3)==0):
            print("\n");
        if(board[i]==0):
            print("- ",end=" ");
        if (board[i]==1):
            print("O ",end=" ");
        if(board[i]==-1):
            print("X ",end=" ");
    print("\n\n");
def User1Turn(board):
    pos=input("Enter X's position from [1...9]: ");
    pos=int(pos);
    if(board[pos-1]!=0):
        print("Wrong Move!!!");
        exit(0) ;
    board[pos-1]=-1;
def User2Turn(board):
    pos=input("Enter O's position from [1...9]: ");
    pos=int(pos);
    if(board[pos-1]!=0):
        print("Wrong Move!!!");
        exit(0);
    board[pos-1]=1;
def minimax(board,player):
    x=analyzeboard(board);
    if(x!=0):
        return (x*player);
    pos=-1;
    value=-2;
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    for i in range(0,9):
        if(board[i]==0):
            board[i]=player;
            score=-minimax(board,(player*-1));
            if(score>value):
                value=score;
                pos=i;
            board[i]=0;

    if(pos==-1):
        return 0;
    return value;
def CompTurn(board):
    pos=-1;
    value=-2;
    for i in range(0,9):
        if(board[i]==0):
            board[i]=1;
            score=-minimax(board, -1);
            board[i]=0;
            if(score>value):
                value=score;
                pos=i;

    board[pos]=1;
def analyzeboard(board):
    cb=[[0,1,2],[3,4,5],[6,7,8],[0,3,6],[1,4,7],[2,5,8],[0,4,8],[2,4,6]];

    for i in range(0,8):
        if(board[cb[i][0]] != 0 and
           board[cb[i][0]] == board[cb[i][1]] and
           board[cb[i][0]] == board[cb[i][2]]):
            return board[cb[i][2]];
    return 0;
def main():
    choice=input("Enter 1 for single player, 2 for multiplayer: ");
    choice=int(choice);
    board=[0,0,0,0,0,0,0,0,0];
    if(choice==1):
        print("Computer : O Vs. You : X");
        player= input("Enter to play 1(st) or 2(nd) :");
        player = int(player);
        for i in range (0,9):
```
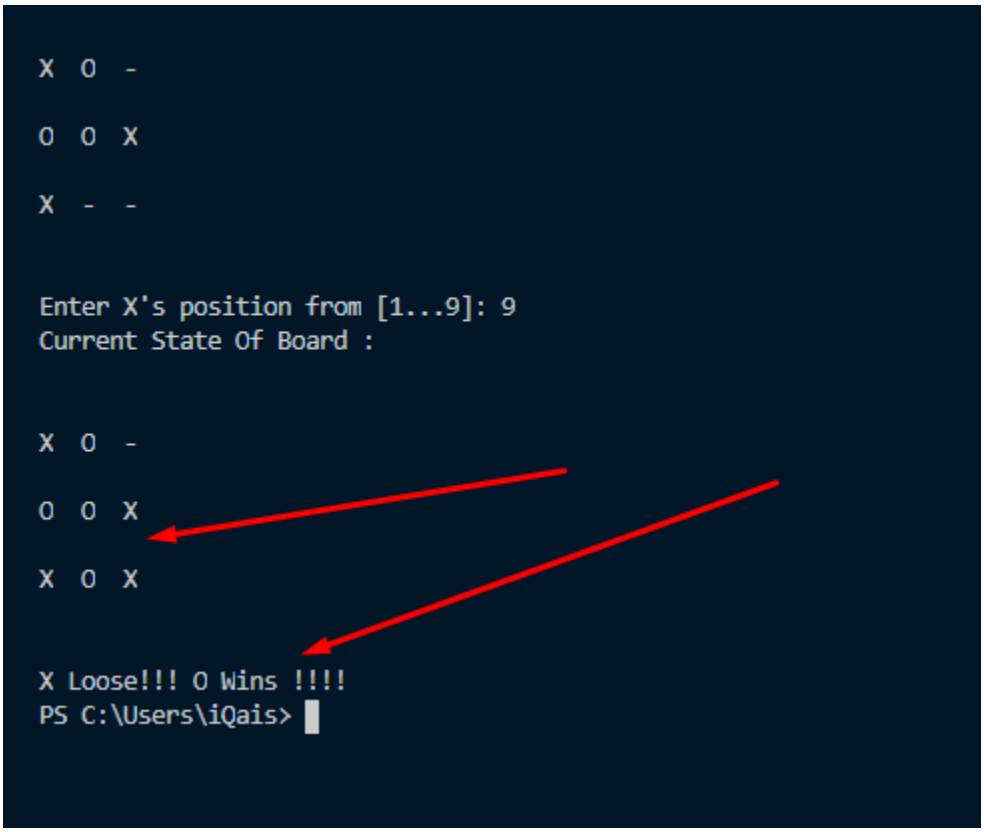

```
            if(analyzeboard(board)!=0):
                break;
            if((i+player)%2==0):
                CompTurn(board);
            else:
                ConstBoard(board);
                User1Turn(board);
    else:
        for i in range (0,9):
            if(analyzeboard(board)!=0):
                break;
            if((i)%2==0):
                ConstBoard(board);
                User1Turn(board);
            else:
                ConstBoard(board);
                User2Turn(board);

    x=analyzeboard(board);
    if(x==0):
         ConstBoard(board);
         print("Draw!!!")
    if(x==-1):
         ConstBoard(board);
         print("X Wins!!! Y Loose !!!")
    if(x==1):
         ConstBoard(board);
         print("X Loose!!! O Wins !!!!")
main()
```

OUTPUT:

```
PS C:\Users\iQais> & C:/Users/iQais/AppData/Local/Programs/Python/Python39/python.exe "
Enter 1 for single player, 2 for multiplayer: 1
Computer : O Vs. You : X
Enter to play 1(st) or 2(nd) :1
Current State Of Board :


-  -  -

-  -  -

-  -  -


Enter X's position from [1...9]: 1
Current State Of Board :


X  -  -

-  O  -

-  -  -
```

```
Enter X's position from [1...9]: 7
Current State Of Board :


X  -  -

O  O  -

X  -  -


Enter X's position from [1...9]: 6
Current State Of Board :


X  O  -

O  O  X

X  -  -


Enter X's position from [1...9]: 9
Current State Of Board :
```


X O -
O O X
X - -
Enter X's position from [1...9]: 9
Current State Of Board :
X O -
O O X
X O X
X Loose!!! O Wins !!!!
PS C:\Users\iQais>