

CS 307 Programming Assignment 2

Tic-Tac-Toe with Threads

In this homework, our aim was to create Tic Tac Toe game which includes two player, one of them is X, another one is O.

Firstly, there is a parent thread which is in the main part of the program and I create two thread for each player as playerX and playerO. I send players to the thread function which is called as TicTacToe but I have to provide the first player is X, I achieve it global game_turn variable. In the TicTacToe function, I use only one mutex to protect table which is achieved by creating matrix and is my critical session.

Thread Function(player) which is called in my function as TicTacToe

```
while (game is not end)
    lock the mutex
        If table is not full AND winner is not either X or O
            if player X's turn OR player O's turn
                find empty row and column value for matrix randomly
                check whether that player is win the game or not
                if player is win
                    finish the game
                else
                    give next turn to the other player
```

```
        If table is full AND (winner is not X OR Y) finish game as tie
```

```
    unlock the mutex
```

I use the coarse grained mechanism because the only critical session for my game is the table so matrix.

I prevent the the race condition as using the condition that the only one player can access to the table and global variables so players can not access a table at the same time. I mean that while game continues, only one player access the table in my code. Also, with the same idea I prevent the deadlocks because each player when their turn comes, they access the table and table then they unlock the mutex. Therefore, other player/thread cannot starve.