

Tic Tac Toe

For this project, you will write a program that plays the game Tic Tac Toe.

Overview

The program will welcome the user and ask if they would like to play a game. If they answer yes, the program will ask the user who should go first, the computer or the human. Taking this into account the program will alternate computer and human player moves until one of three situations occur:

1. There are three 'X's in a row on the board. In this case, the computer wins since for our program, the computer always plays X.
2. There are three 'O's in a row on the board. In this case, the human wins since for our program, the human always plays O.
3. All of the positions have an 'X' or an 'O', but the same symbol does not occur three in a row on the board. This is a tie.

Once one of these situations occurs, the game is over and the program displays the result. The program will then ask the user if they want to play again. If they answer yes, the game process starts anew. If they answer no, the program bids farewell to the user and ends.

Writing the Program

A program skeleton (TicTacToeStarter.java) has been provided to help you write your program. The skeleton includes two class variables that are visible to all of the program's methods: a Scanner used to read user input from the keyboard and a char array of size nine used to represent the tic tac toe board.

In all, the program consists of eleven methods: `main`, `playGame`, `initializeGameBoard`, `processComputerMove`, `processHumanMove`, `displayGameBoard`, `isDone`, `isComputerWin`, `isHumanWin`, `isPlayerWin`, and `isTie`. A few of these already have some code in them, but most don't. All of them contain instructions on what you need to do in these methods.

Your job is to complete all of the missing code. In some cases you can write the code as you want, but in others you are provided with some information about what you need to do. Ultimately, your program should work in a fashion similar to what is presented in the Sample Run sections below. For your implementation, you should rename the file `TicTacToeStarter.java` to `TicTacToe<YourLastName>.java`.

Submitting your project

The project is due at the beginning of lab on **Tuesday, ????? ?th.** in lab.

At that time you need to hand in **printouts** of the following (stapled together):

1. Your source code for `TicTacToe.java`

2. Output from running your program. Your output should demonstrate the various features of your program. Your output example should include as many executions as necessary to demonstrate the various conditions in your program.

Also, you need to hand in a **USB flash drive** that contains your **TicTacToe<lastname>** project directory. Do not provide your entire workspace... just the TicTacToe project directory. Clearly label your flash drive with your name.

At that time you should hand in a printout of your TicTacToe<YourLastName>.java file and a copy of also must email your code to me by the above time at **stlauterburg@salisbury.edu**

Sample Run 1

Welcome to Tic-Tac-Toe!!

Would you like to play a game? (enter 'yes' or 'no'): yes

Who should move first? (c=computer or h=human): c

The computer is X, the human is O.

The computer chooses cell 6.

```

  |  |
--+---+---
  |  |
--+---+---
X |  |

```

Enter an empty position number (0-8): 0

The computer chooses cell 3.

```

O |  |
--+---+---
X |  |
--+---+---
X |  |

```

Enter an empty position number (0-8): 4

The computer chooses cell 5.

```

O |  |
--+---+---
X | O | X
--+---+---
X |  |

```

Enter an empty position number (0-8): 8

The human wins! The human must have cheated.

```

O |  |
--+---+---
X | O | X
--+---+---
X |  | O

```

Game over!
 Would you like to play again? (enter 'yes' or 'no'): no
 Goodbye!

Sample Run 2

Welcome to Tic-Tac-Toe!!
 Would you like to play a game? (enter 'yes' or 'no'): yes

Who should move first? (c=computer h=human): e
 "e" is not a valid option.

Who should move first? (c=computer h=human): h
 The computer is X, the human is O.

```

  | |
  +---+
  | |
  +---+
  | |
  
```

Enter an empty position number (0-8): 0
 The computer chooses cell 8.

```

0 | |
  +---+
  | |
  +---+
  | | X
  
```

Enter an empty position number (0-8): 8
 Invalid move.

```

0 | |
  +---+
  | |
  +---+
  | | X
  
```

Enter an empty position number (0-8): 13
 Invalid move.

```

0 | |
  +---+
  | |
  +---+
  | | X
  
```

Enter an empty position number (0-8): 2
 The computer chooses cell 6.

```

0 | | 0
  +---+
  | |
  
```

```

---+---+---
X |   | X

```

Enter an empty position number (0-8): 3
The computer chooses cell 5.

```

O |   | O
---+---+---
O |   | X
---+---+---
X |   | X

```

Enter an empty position number (0-8): 4
The computer chooses cell 7.
The computer wins! Humans are not very bright.

```

O |   | O
---+---+---
O | O | X
---+---+---
X | X | X

```

Game over!
Would you like to play again? (enter 'yes' or 'no'): no
Goodbye!

Sample Run 3

Welcome to Tic-Tac-Toe!!
Would you like to play a game? (enter 'yes' or 'no'): maybe
Goodbye!

Sample Run 4

Welcome to Tic-Tac-Toe!!
Would you like to play a game? (enter 'yes' or 'no'): yes

Who should move first? (c=computer h=human): c
The computer is X, the human is O.

The computer chooses cell 3.

```

|   |
---+---+---
X |   |
---+---+---
|   |

```

Enter an empty position number (0-8): 4
The computer chooses cell 0.

```

X |   |
---+---+---
X | O |

```

```
---+---+---  
  |   |
```

Enter an empty position number (0-8): 6
The computer chooses cell 2.

```
X |   | X  
---+---+---  
X | O |  
---+---+---  
O |   |
```

Enter an empty position number (0-8): 1
The computer chooses cell 8.

```
X | O | X  
---+---+---  
X | O |  
---+---+---  
O |   | X
```

Enter an empty position number (0-8): 5
The computer chooses cell 7.
A tie! The human got lucky.

```
X | O | X  
---+---+---  
X | O | O  
---+---+---  
O | X | X
```

Game over!
Would you like to play again? (enter 'yes' or 'no'): no
Goodbye!