MASTER OF TECHNOLOGY PROJECT REPORT

TIC TAC TOE

using Drools

Individual project
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1.0 EXECUTIVE SUMMARY

Tic-tac-toe (American English)or **Xs and Os**, is a paper-and-pencil game for two players, *X* and *O*, who take turns marking the spaces in a 3×3 grid. The player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row wins the game.

The following example game is won by the first player, X:

Because of the simplicity of tic-tac-toe, it is often used as a pedagogical tool for teaching the concepts of good sportsmanship and the branch of artificial intelligence that deals with the searching of game trees. It is straightforward to write a computer program to play tic-tac-toe perfectly

In this project, from the learnings of Drools Engine and the rules creation in Drools, an attempt is made to create a program that plays against a manual user. Drools rule are created to analyse the current state of the board and pick up the best cell to play as per the current board status.

The game was studied in detail and many combinations of the winning and losing patterns were studied to come up with general rules for the system to play when competing against a manual user. After the rules were identified, it was coded in Drools rules file. A java program interacts with the user to take the user inputs, then calculate the best position to play using rules and then display the current board status to the user

2.0 PROBLEM DESCRIPTION

The problem to be addressed in this project was identifying the general rules that need to be applied when playing against the manual opponent. For each move he makes, the program has to identify the best place to play. The program has to play towards making the game a tie or a win (in case the opponent is careless). In case the program starts the first move, the objective is to make a sure win. When the game starts, there are 9 cells available for the user to make the move and then for these moves, program had to choose a best move. When the user makes the second move, then there were multiple choices available for the program to choose from. The main challenge was identifying the general rule for this.

In this project, we have limited to the case when user starts the first move as that is the difficult case to make a tie or a win. The time limit to complete the project for submission was also a key factor in making this decision.

2.1 PROJECT OBJECTIVE

Make a drools + java program that plays against a manual user who makes the first move in the tic tac game.

3.0 KNOWLEDGE MODELING

Tic Tac Toe was played manually by playing both the role of user and opponent. Different combinations of levels and moves were played to understand the general rules of game. After going through different moves and levels of game the following patterns were identified.

1. The first two moves the program makes against the user is always the critical moves. This has to be played in the best location

Below is the key part of the program.
Based on the above rule,

A few rules were further identified for the First move the program makes and the second move the program makes.

If program makes the first move,

1. Play corner is the best move
2. If program plays in any corner cells and the user plays in any of the remaining corner cells, then program play in of the remaining corner cells again.
3. If program plays in the any corner cell and the user plays in center, then program plays the diagonal cell, completing the diagonal
4. If program plays in any corner cll and user plays in any corner cell away from Users ‘0’
5. If program pays in any edge middle cell and then user plays in center cell, then program plays in any cell except corner cells near to the 1 Program played in first move
6. If program played in edge middle cell and user plays in the adjacent cell next to cell program played, then program place second move in center
7. If program play in edge middle center and she plays in corner away from it, place in corner cells near to you.
8. If program plays in edge middle cell and user play in edge middle cell near to program’s then play second move in center
9. If program plays in edge middle cell and user play in edge middle cell away to program’s then play on any corner cell near to program’s first move.

If user makes the first move,

1. If user plays in any corner, program plays in center
2. If user plays in center , program plays in any corner
3. If opponent plays in any edge middle cell program plays in center

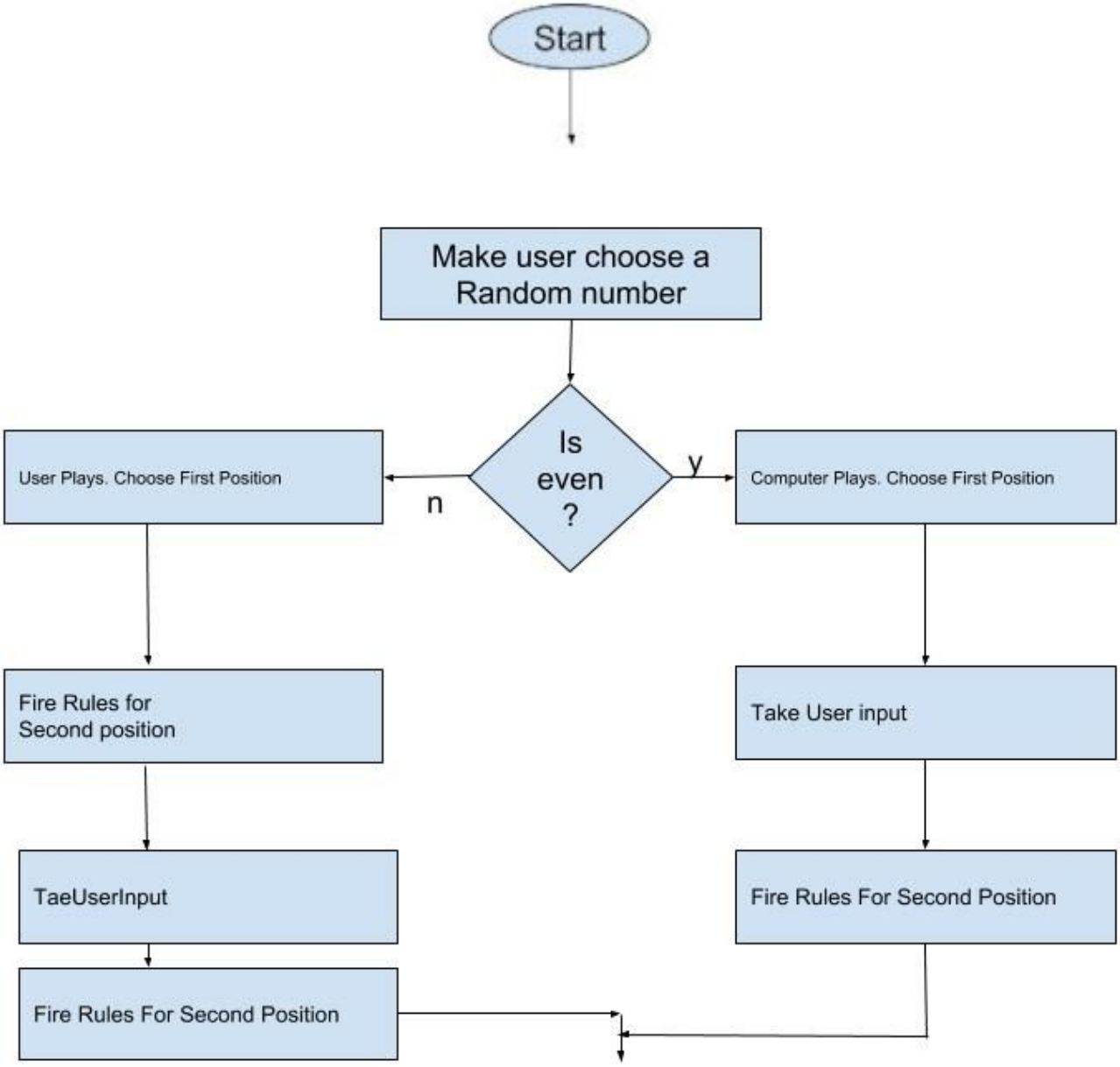
For the second move of program,

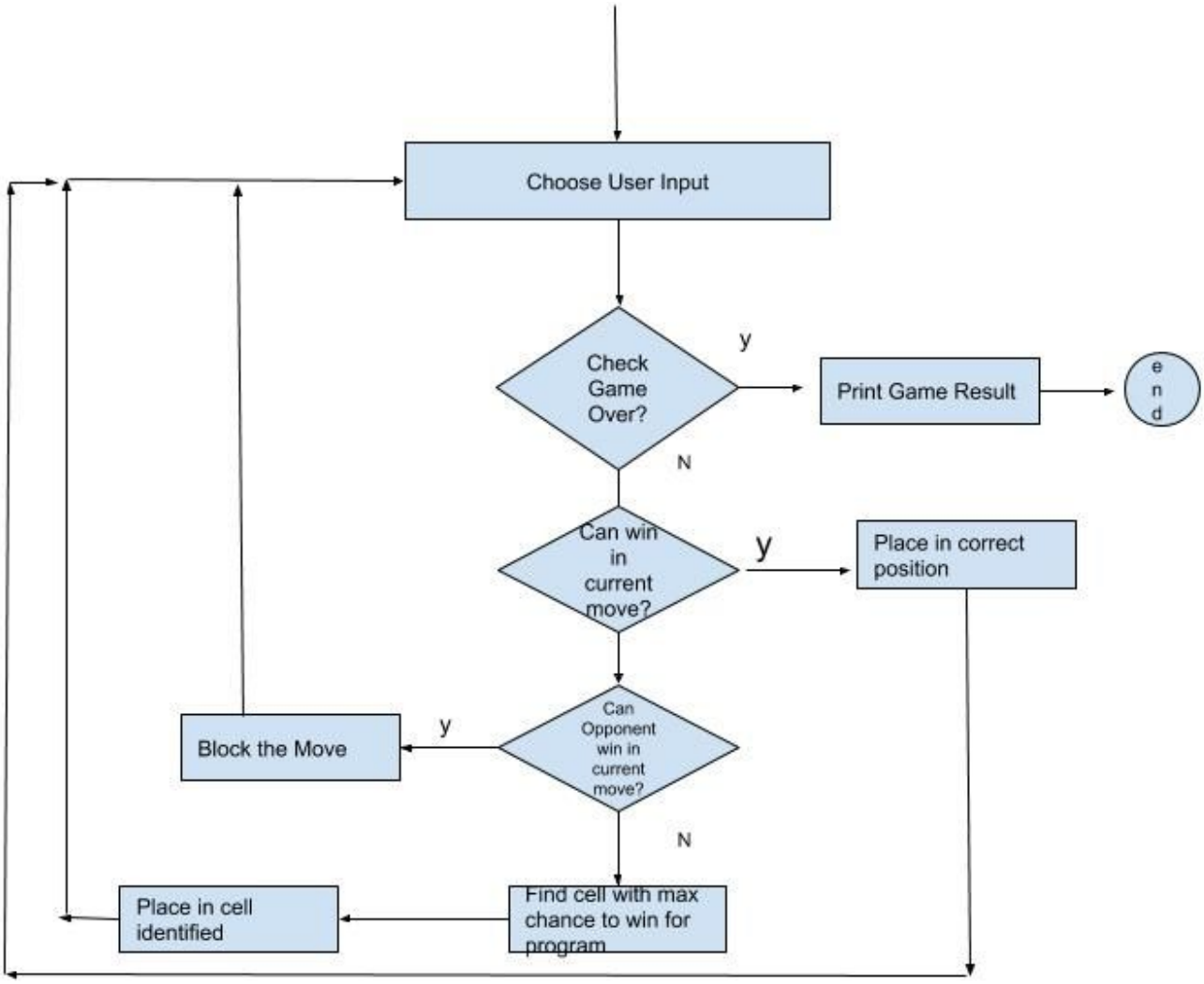
1. When user made a second move such that program cell is in between User's diagonal '0's, then play in any edge centre cells
2. When user played corner cell and program played corner cell and then user played on corner, program plays only on corner cells. Avoid any edge center cells
3. When user played in edge middle cell, program played in center and then user played in a corner cell not near to her first move, then program play on a corner that is diagonal to user's 0 and your center cell.
4. When user play in any edge middle cell, program play in center and user play in any corner cell except near to User's first corner cell, then program plays in a corner cell that is diagonal to one of her 0's

For our project , we have considered the part of rules where the user plays first. To arrive at this set of rules the first set of rules when the program ays first was mandatory.

4.0 SOLUTION

Flowchart




Choose User Input
Check Game Over?
y
Print Game Result
end
N
Can win in current move?
y
Place in correct position
Can Opponent win in current move?
y
Block the Move
N
Find cell with max chance to win for program
Place in cell identified

5.0 Conclusion

Java program to play tic tac was implemented for the case when user starts the first move.