

Advanced Programming - Assignment 1 - Exercise 1

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Main design decisions

- The GUI has been designed with the support of the NetBeans GUI Builder.
- The “*reset*” action has been implemented via event-based communication. The `TTTCe`lls and the `TTTController` are registered as listeners of the *Reset* event and implement the `ResetListener` interface. The `ResetListener` interface has a single method `resetOccurred()` that the actual listeners implement in order to effectively execute the “*reset*” action.
- Also the “*won*” action has been implemented via event-based communication. The `TTTCe`lls and the `TTTController` are registered as listeners of the *Win* event and implement the `WinListener` interface. The `WinListener` interface has a single method `winOccurred(String winner, int type, int xPosition, int yPosition)` that the actual listeners implement in order to effectively execute the “*won*” action.
- The registration of the `TTTCe`lls and the `TTTController` as listeners of the *Reset* and *Win* events, in addition to the firing of those events, is demanded to the `TTTBoard`.
- Internally of the `TTTBoard`, the `TTTCe`lls are stored in a 3×3 matrix, which eases their manipulation.
- Every time a player makes a move, the corresponding `TTTCe`ll fires a *PropertyChange* event to the `TTTBoard`. The `TTTBoard` then updates its internal counters used to check for a victory.

In particular there is a counter for each row, for each column, for the diagonal, for the anti-diagonal and for the number of empty cells.

Depending on the cell that fired the event, the proper counters are incremented by 1 if the player *X* was the one to make the move, or by 4 in the other case. The choice of the increment is made in order to easily establish if one of the two players has won by simply checking the counters. In any case, the counter of empty cells is decremented by 1.

For example if the player *O* marks the cell [1, 2] (counting from 0), the counters `rows[1]`, `columns[2]` and `antiDiag` will be incremented by 4.

- After the update of the counters, the `TTTBoard` checks if a win occurred by verifying if a counter is equal to 3 (*X* has won) or 12 (*O* has won). It also checks if the counter of empty cells is equal to 0 (and the other counters are not 3 or 12), and then a tie has occurred.