

# Software Requirements for Square

## Square

This document describes requirements for the software implementation of the classic game of Square, also known as Dots and Boxes, where players take turns drawing lines between adjacent dots on a grid. The goal is to complete boxes and earn points. This software will allow two players to play against each other or for one player to play against the computer. A description of the game plus the requirements of this implementation are provided below.

## The Game

Two players are presented with a 3x3 grid of dots with faded (gray/similar control color) lines between the dots. The players take turns 'drawing' lines. When a box is completed (i.e., all sides are connected), it is "claimed" (marked with the players symbol- e.g., X or O or maybe change the square's back color). The game ends when all boxes are claimed., the player with the most claimed/completed boxes wins.

## Software Implementation

### UI elements

The software will present the Square game with the UI elements listed below.

- 3x3 Grid of dots with faded (gray/similar control color) lines between the dots.
- Row of buttons on top of the screen (like a toolbar) that has:
  - Option buttons to choose between 2 Player or Play Against the Computer
  - Start button
  - Label to display Game Status message

### Player modes

There are two modes of play – Two player and Play against the computer – as described below.

#### *Two Player*

In this mode, each user clicks a faded line between two dots which turns the line black. If that line completes a box (all sides are black), it is claimed by the current player and then turn changes. If the line does not complete a box, turn changes.

#### *Play against the computer*

In this mode, the computer is letter O (or 2<sup>nd</sup> color). After X's turn the computer will make its move with an algorithm that follows the steps below sequentially:

1. Offense: If there is a line that will complete a box, then take it.
2. Defense:
  - a. Take a random line that will be the first of a box
  - b. If there are none, then take a "second" line
  - c. If there are no first or second lines available, take a third.

## Game Process and Rules

- The game starts when the player clicks Start. Until then all clicks on the spot buttons are ignored, and the game status message is "Click Start to begin Game."
- After Start is clicked: The message "Current Turn: X" is displayed. X takes turn by clicking on an available line, and the clicked line becomes black. If that line completes a box (all sides are black), it is claimed by the current player. Then, the current turn changes to "O," which is reflected in the game status message and when the player clicks. If a player clicks a line that is already taken, the click is ignored, with no effect to the line or current turn.
- When all the boxes are claimed:
  - Count the number of boxes claimed by each player.
  - The player with the most claimed boxes wins. Game status displays "Winner is: " followed by the winning letter.
- In the game state of Win all line clicks should be ignored.
- If the user clicks Start in middle of a game, then the game should interrupt and begin a new game.