

GOMOKU

Lab 3165, Thursday Evenings @ Station 63/64

University of Toronto

November 21, 2019

Project Milestones

- ▶ Display the empty board on the screen through VGA cable. Go over the resources posted on quercus regarding keyboard control and then implement the keyboard control. Find resources for the while/black token and the game board.
- ▶ Users should be able to move the pointer around on the screen using the arrow keys on the keyboard. Users should also be able to put the token down (using the enter key on the keyboard) on any valid position on the game board. Notice that tokens have alternating color, meaning that if the last token put down was a white one the next one should be black.
- ▶ Check if the game has been won or not. If won, by which player. Display a message for who won the game. Make the hex display various game stats, including the current player identified by the players number.

Worth Mentioning Features

- ▶ Support of keyboard control through the PS2 interface.
- ▶ Moving cursor on the screen to indicate the current location of the cursor. No more looking at hex and counting on the grid!
- ▶ Automatic alternating colour switching, avoids cheating in game.
- ▶ Placing a stone at a already occupied location is forbidden.
- ▶ Automatic judging of winner, more fair!

Implementation Details

Structure of the project

- ▶ `GOMOKU_FPGA/adapters/*`
 - ▶ Contains PS2 keyboard adapters, courtesy of Alex Hurka, link provided by professor on Quercus, under Project Proposal + Resources section.
 - ▶ Contains VGA Adapters, borrowed from Lab 7 of CSC258.
- ▶ `GOMOKU_FPGA/DE1_SoC.qsf`
 - ▶ Required pin assignment file for the FPGA board, provided by professor on Quercus.
- ▶ `GOMOKU_FPGA/gomoku.v`
 - ▶ Actual Implementation of the Gomoku Game, top level instantiation name is `gomoku`.
- ▶ `GOMOKU_FPGA/utils/*`
 - ▶ Contains utility files, including the `bmp2mif` written in C provided and a jupyter notebook that we used to generate some AND gates used in our code.

Implementation Details

Input using the PS2 Keyboard

- ▶ a for moving toward left by one position
- ▶ s for moving down by one position
- ▶ d for moving right by one position
- ▶ w for moving up by one position
- ▶ enter for placing the stone at the position where the cursor is currently at.

Implementation Details

Output Data on HEX and VGA display

- ▶ HEX0 for y location on the grid, from 0 up to 6
- ▶ HEX1 for x location on the grid, from 0 up to 6
- ▶ HEX4 is 1 if white won the game and zero otherwise
- ▶ HEX5 is 1 if black won the game and zero otherwise
- ▶ On the screen should be a $160 * 120$ output of the grid with the current game state.

Time for a little demo!

Thank you