CS M152A Lab Proposal

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Overview

For our project, we will create a 2-player version of the game Mancala on the FPGA board. The buttons will be used to select a pocket to take marbles out of, and the seven-segment display will show which player's current turn it is, the winning player, and whether or not we are in select mode.. The board and marbles will be displayed on a desktop monitor using a VGA display.

On-Screen Display

The screen will have two large rectangles on opposite ends to represent each player's stores. Between the two stores will be two rows of six pockets, which players will select to pick marbles out of. There will initially be four marbles in each pocket, and stores will be empty. As the marbles move, the on-screen display will change to reflect the current marble count of each pocket and store, up to 16 and 48 marbles respectively.

Game Functionality

On each player's turn, they can select a pocket using the left and right buttons on the board. The currently selected pocket will be highlighted. The marbles will move counter-clockwise, and will be deposited one-by-one in each pocket, as well as the current player's store. If the last marble from the selected pocket lands in a pocket that already contains one or more marbles, those marbles are picked up. This repeats until the marbles land in an empty pocket. If the last marble lands in a player's store, they are allowed to select another pocket. If all pockets on one side of the board are empty, the game ends. The remaining marbles will be moved to the respective player's store. For example, if all pockets on player 1's side are empty, remaining marbles will be moved to player 2's store. The winner is the one with more marbles in their store. If there is a tie, rather than displaying a winner on the seven-segment display we simply display "P-", to indicate that there is no clear winner.

Grading Rubric

Board VGA Display (15%) - Board layout resembles actual Mancala board, and selected pocket is highlighted properly.
Marble VGA Display (20%) - Number of marbles reflects the counter in the game module correctly.
Player Modes (10%) - Seven segment display shows which player's turn it is, and the player only has a choice of pockets on their side of the board.
Pocket Selection (10%) - Highlighted pocket changes with button input.
Marble Movement (20%) - Marble count increases counterclockwise, and continues until an empty pocket is reached. Marbles are only deposited in pockets, and the current player's store.

Scorekeeping (10%) - Keeping accurate count of how many marbles are in the players' stores.
Winner Display (10%) - Game ends when all pockets are empty. Board displays the winning player.
Reset (5%) - Marbles will return to original positions and the game will restart.