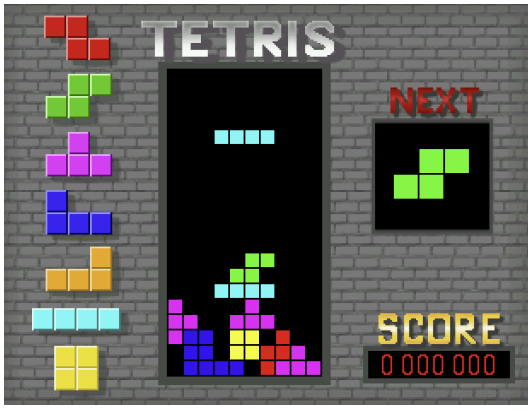
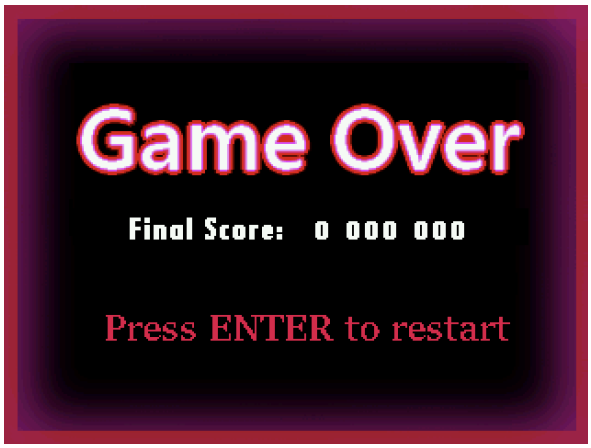
8/4/2024

ECE243 - Final Project
Project: Tetris
Team: Richelle Pereira & Christina Xie
PRA: PRA0108





Description:
Player controls geometric shapes, via PS/2 keyboard, descending on the game board on the VGA display. These shapes are composed of four square blocks each. The main objective is to strategically stack the shapes to form complete horizontal lines, facilitating their removal from the board and accruing points without filling the board to the top. The game is over when the board is filled to the top of the board, and no more blocks can be placed.

Featured:

- Used polling for checking inputs for PS/2 keyboard and clears the FIFO.
- Used a scoring algorithm to check and keep track of cleared rows and accordingly shift the board down by the number of rows cleared.
- Used algorithm to handle game logic depending on the inputs.

- Used helper function to rotate, shift, and drop down of the block and clearing of previous block for each previous animation.
- Coded proper collision logic to check when a block collides with another block or is within boundary.
- Used double-buffering to render the game on the VGA display for smoother visuals.
- Used structs like 'TetrisBlocks' to access the block attributes, positions and offsets.
- Used audio interface to output sounds for a major change (i.e. sound is outputted when… (1) row is cleared, (2) a shape collides with another shape, 3) game is over.

Controls:

- ❖ Used PS/2 keyboard interface to control the geometric shape's descending movement on the board.
- ❖ Following are the control keys:
  - ➢ Start/restart/continue game: 'ENTER'
  - ➢ Shift shape right: → or 'D'
  - ➢ Shift shape left: ← or 'A'
  - ➢ Rotate clockwise: ↑ or 'X'
  - ➢ Rotate counter-clockwise: 'Z'
  - ➢ Hard drop-down ↓ or 'SPACE'
  - ➢ Exit game: 'Q' / 'ESC'

Attribution Table:

	Names	
Tasks	Christina Xie	Richelle Pereira
Initial setup (definitions of const variables, starting functions for board base, tetris blocks, structs)	EF	WD, MR
Tetris Visual Designs (Background - start screen, end screen, instructions screen)	WD, MR,CR	EF, CR
Scoring function + Clearing of filled rows	WD, MR, CR	RS
PS/2 Keyboard connection setup (research for documentation and clearing the FIFOs functions for exact inputs)	RS, CR, MD	CR, MR, EF

Animation of shape descending on board (with shift right, left, rotate, clockwise, counterclockwise, and hard drop down)	CR, EF, WD	WD, CD, MR, RS
Game logic implementation (Structuring code in format that game starts, ends, moves shape in specific format)	EF, CD	WD, CD,EF
Helper functions (Checking validity of moves, copying arrays, generating random blocks)	EF	WD, MR, EF
Displaying scoring data and next block on VGA (drawing numbers and appropriately clearing when necessary)	EF, MR, CR	WD, CR
Sound effects for moving a block in place, clearing a row, gameover	EF	RS, WD

WD - Wrote function pseudo code and its C - code

EF - Helped with enhancement of functionality of functions

CR - Did code/design review and provided feedback

MR - Major review the code

RS - Researched information of this feature

Researched Material:

https://www-ug.eecg.toronto.edu/msl/handouts/DE1-SoC_Computer_Nios.pdf

https://www-ug.eecg.utoronto.ca/desl/nios_devices_SoC/ARM/dev_ps2.html

https://github.com/kk4ead/vga-vector/blob/master/alt_up_ps2_port.c