Maze Runner

Jonatan Cogiel, Gabe Espinosa, Joni Llana, Roman Kulikovskiy

Overview

VGA

Controls

Game Conditions

Map

Game Physics/Logic

Introduction

As casual gamers, our purpose is to implement a creative and interactive game through programmable logic.

Video **G**raphics **A**rray

Requirements

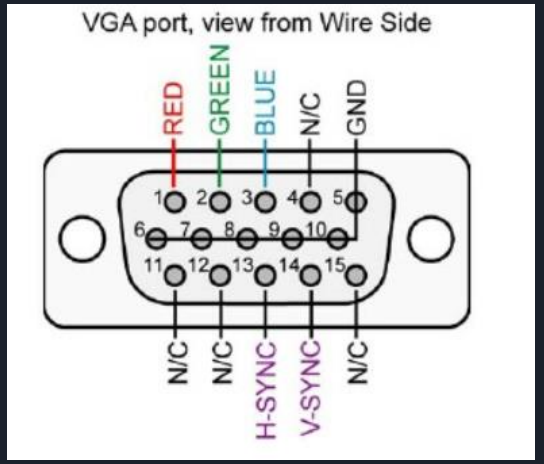
- Monitor
- VGA connector

Constraints File

- RGB analog signals (4 bits for each color)
- Hsync and Vsync

Features

- 108 MHz Clock
- 1280x1024 Resolution
- 60 Hz Refresh Rate



In game conditions and levels - State Machines

- Used state machine to determine level and conditions of game
  - Object -- 3 bits (determines in game condition)
    - 111 Player hits wall (results in player moving back to initial position)
    - 000 Player is in empty space (can move freely)
    - 001 player wins (then level changes)
  - State -- 3 bits (determines level in game)
    - 000 level 1
    - 001 level 2
    - 010 level 3
    - 011 (Player loses)
    - 100 (player wins)

Map

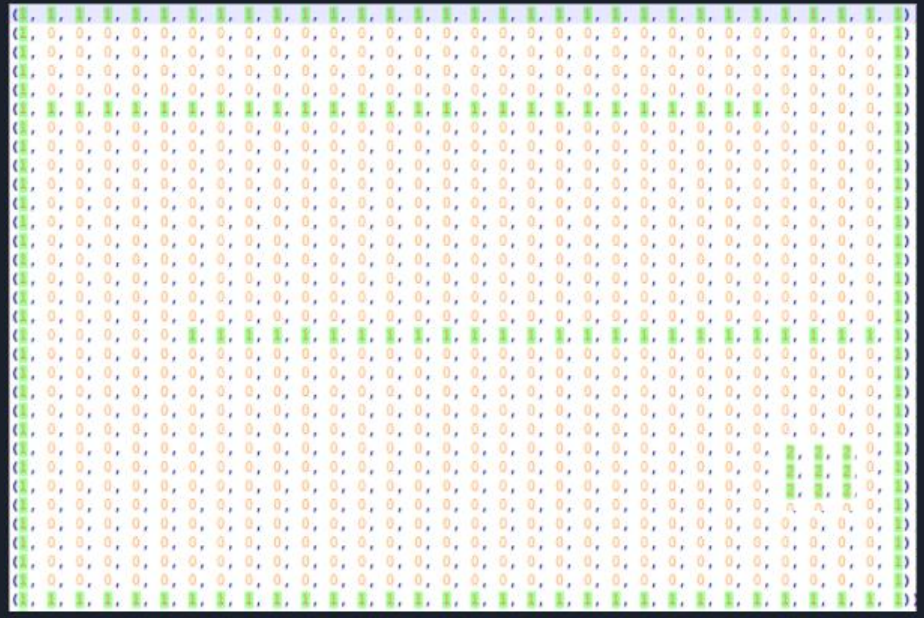
Map is a 32x32 matrix

Level 1 - State 000

0 - Indicates open space

1 - Indicates a wall

2 - Indicates win location



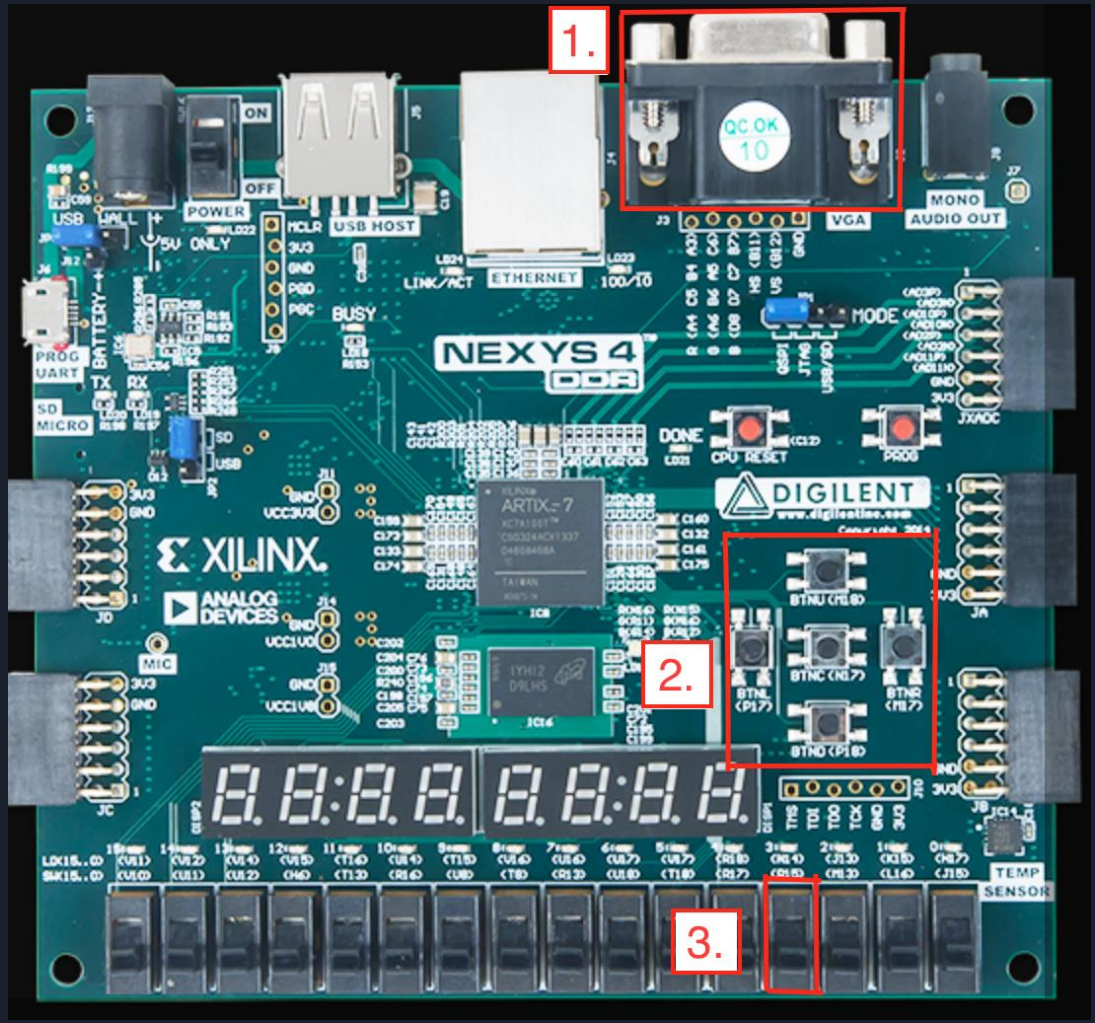
```
process(x, y, Map1)
variable pxl_Val: integer range 0 to 2;
begin
    if (x > 1024) then
        rgb <= (others => '0');
    else
        pxl_Val := Map1(y/32, x/32);
        if (pxl_Val = 1) then
            rgb <= (others => '1');
        elsif (pxl_Val = 2) then
            rgb <= "000011110000";
        else
            rgb <= (others => '0');
        end if;
    end if;
end process;
```

Controls

01 VGA - Connects monitor

02 Buttons - Player movements

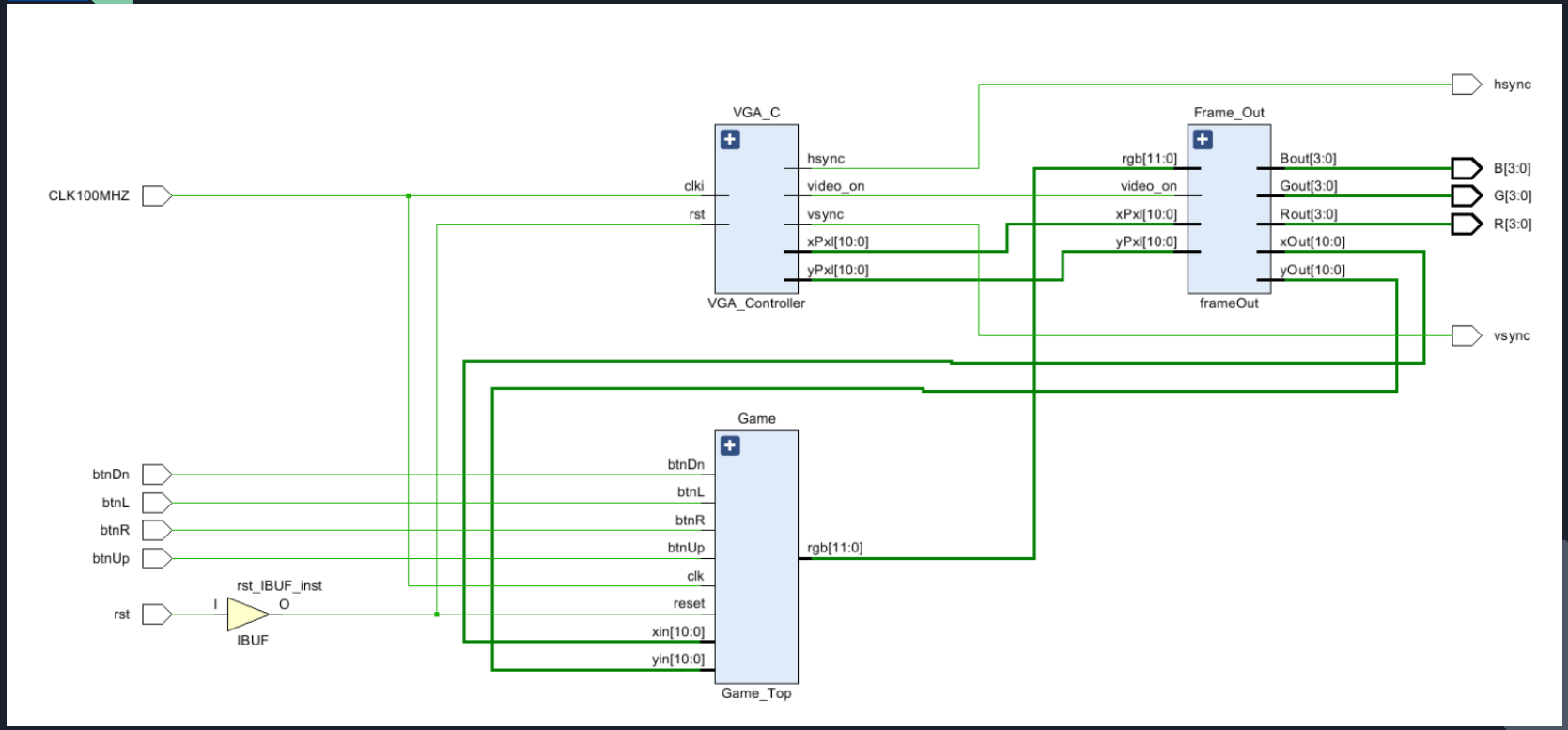
03 Switch - Resets game



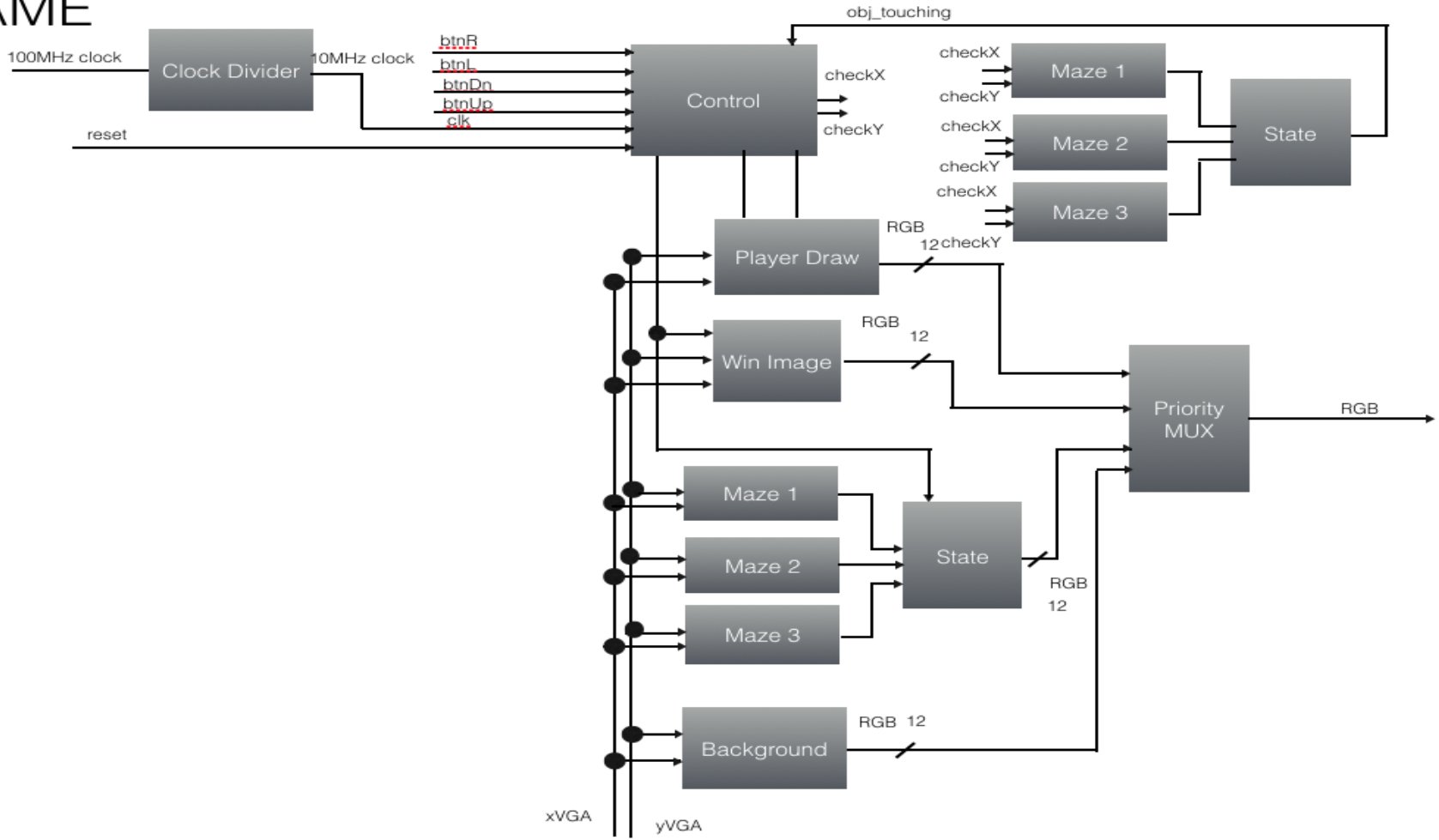
Game Physics/Logic

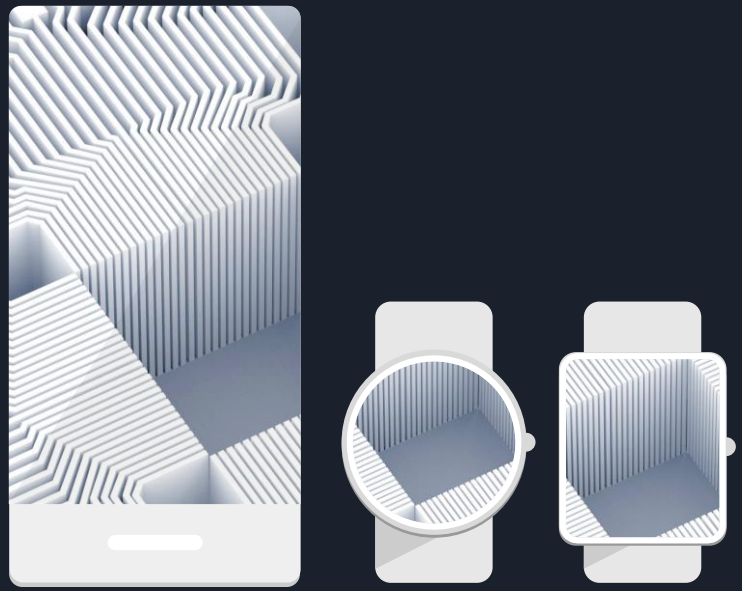
- The physics behind the game is that the player would move with acceleration, so the longer the button is pressed, the faster the block would move. When the block touches the wall, the individual must restart, while still trying to beat the clock.

Block Diagram



GAME


obj_touching
100MHz clock
Clock Divider
10MHz clock
btnR
btnL
btnDn
btnUp
clk
reset
Control
checkX
checkY
checkX
checkY
Maze 1
checkX
checkY
Maze 2
checkX
checkY
Maze 3
State
RGB
12
Player Draw
checkX
checkY
RGB
12
Win Image
Priority MUX
RGB
Maze 1
Maze 2
Maze 3
State
RGB
12
RGB
12
Background
xVGA
yVGA



Thank You!