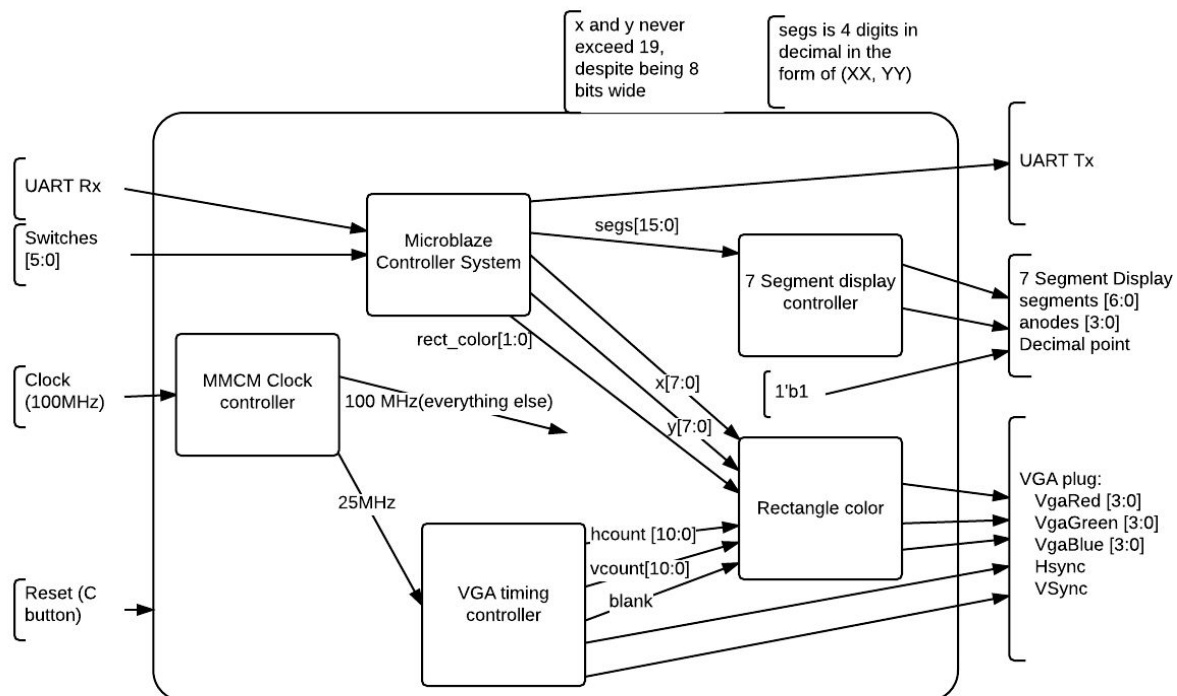


ECE 3829 Lab 3
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Summary

I set up this project in a fairly straightforward manner for my Basys3. I have the same 7-segment display and VGA timing controller (vga_controller_640_60) that I've used in past labs and have a rectangle color module (which was based on the one from lab 3) that controls the VGA color outputs. Most of the though in this lab goes into the Microblaze, which takes input from the UART serial (9600 baud) and when a 'u', 'd', 'l' or 'r' is pushed, moves the block (changes its x or y output) by one, keeping the x and y values between 0 and 19. It also allows me to change the block's color to white ('w'), blue ('b'), green ('g'), and yellow ('y') by pushing the appropriate key. It calculates the values shown on the 7-segment display (the x and y position of the rectangle in decimal). The microblaze also reports how many switches are on whenever one is changed.



```
Lab exercise 4. Ezra Davis
Block location: 10, 10
Block location: 10, 9
Block location: 10, 8
Block location: 10, 7
Block location: 10, 6
Block location: 9, 6
Block location: 8, 6
Block location: 7, 6
Block location: 6, 6
1 switches on.
2 switches on.
3 switches on.
4 switches on.
5 switches on.
6 switches on.
5 switches on.
1 switches on.
0 switches on.
█
```

Here's an example of the serial output from the Microblaze. On startup it displayed the first two lines. I then pushed 'u' a few times (moving the rectangle up while decreasing the y value). I then pressed 'l' to move it to the left.

After that, I started messing with the switches, flipping them on one after another. I then flipped all of them off quickly - you can see that the switch reporting isn't instantaneous as it doesn't count down from 6 to 0.

Here are a few pictures of the rectangle on the screen:



Resources

Resources of my code:

102 LUTs (0.49% utilization)

46 flip flops (0.11% utilization)

Microblaze:

716 LUTs (179 as memory) (3.44% utilization)

382 Flip flops (0.92% utilization)

8 Block RAM (RAMB36E1) (16% utilization)

Clock controller:

No LUTs, Block RAM, or flip flops

Warnings

top_level has port dp driven by constant 1 - The decimal point is always off, so I drove it with a constant.

All of the other warnings are related to the Microblaze and clock controller (missing files, unsynthesizable construct, unused elements).

Conclusion

I had a two odd problems with this lab - the first was that I originally named my project 'Lab 4'.

The SDK claims the the chip configuration file is invalid when there's a space in the path, and it took me an inordinate amount of time figuring that out. The other problem I had was with the serial output. I could read in characters from the computer's serial, but the computer wasn't receiving anything. Eventually, I figured out that I had a hardware problem, and I switched to the TA's Basys3, and everything worked out.

Once I worked out these problems, the rest of the lab went smoothly.