Computer Architecture Midterm – Schematic and Block Diagram

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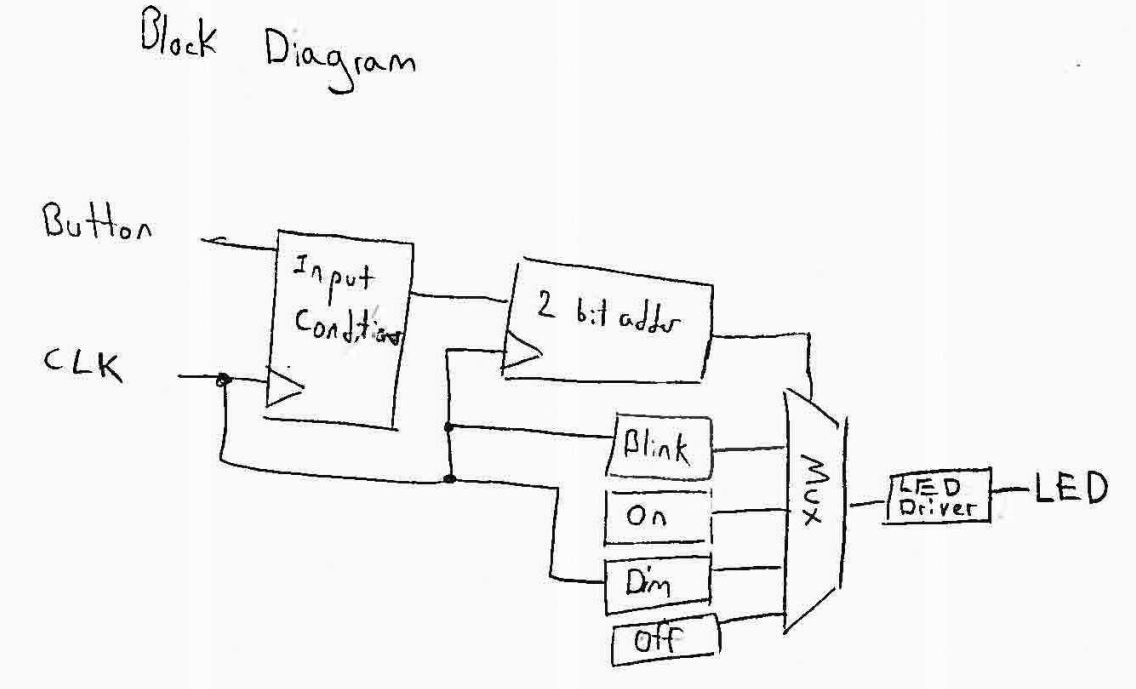
Block Diagram:



Schematic:

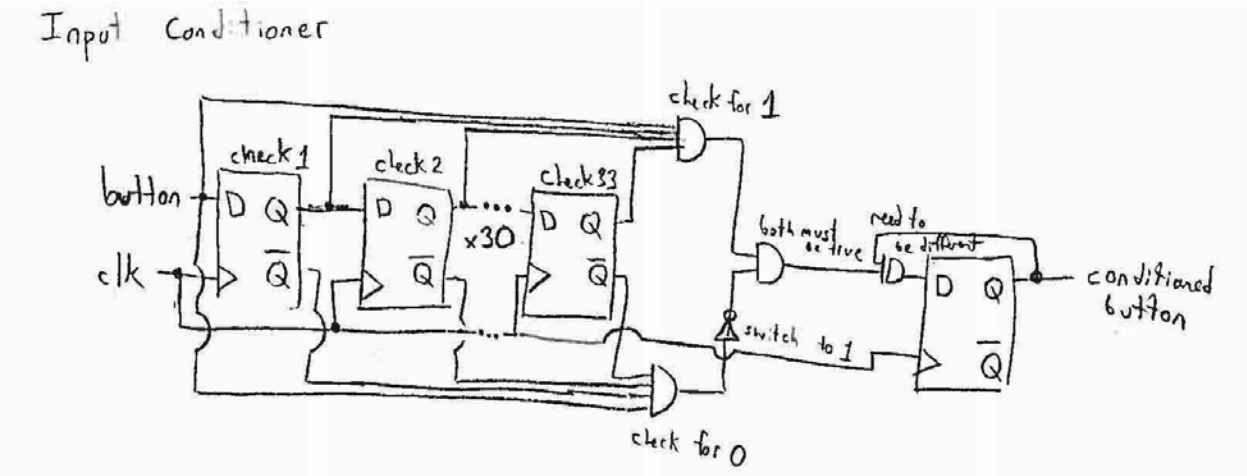
Input Conditioner:

Specification: Makes sure the button press is actually a button press and not just noise and only sends the signal once whenever the signal changes. To make sure the signal isn't noise a series of 33 D Flip-flops are used and all the outputs are compared to make sure they are all the same and the signal has stabilized. This number was found by dividing the length of the suspected signal noise decay: .001 seconds by the amount of seconds in a clock cycle: .0000305 seconds.

Inputs: Button, CLK

Outputs: Conditioned Button

Schematic:



Size:

Type	Number	Cost	Total
4 Input AND	2	5	10
2 Input AND	1	3	3
2 Input NAND	1	2	2
Inverter	1	1	1
Edge Triggered DFF	34	13	442
TOTAL			458

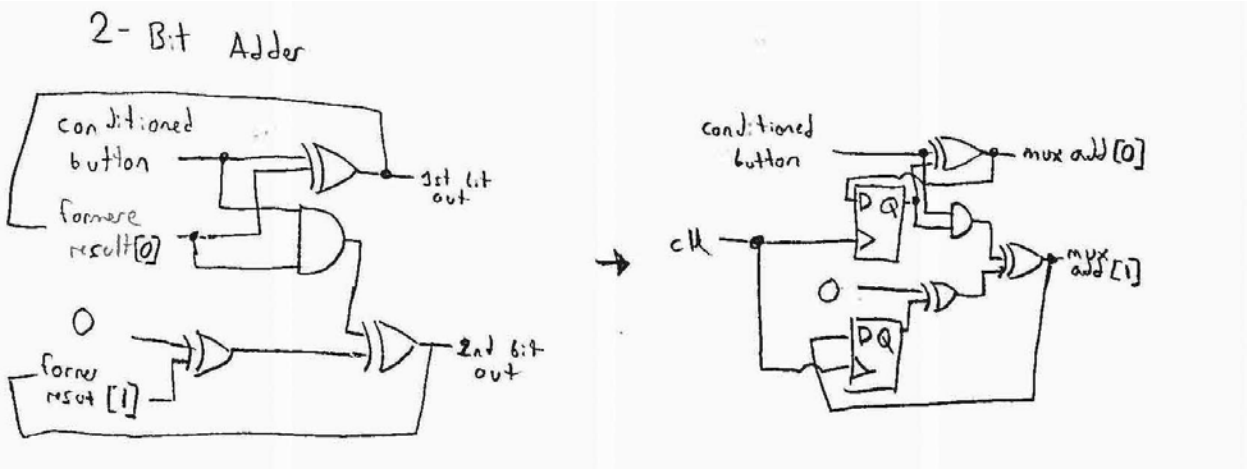
2-bit Adder

Specification: Creates the output used to address the MUX by having each press of the button add 1 to the current total. It does not deal with overflow for the second but and thus cycles through 0-3 continuously.

Inputs: Conditioned Button, CLK

Outputs: 2-bit Bus address for MUX

Schematic:



Size:

Type	Number	Cost	Total
2 Input AND	1	3	3
2 Input NOR	3	2	6
Edge Triggered DFF	2	13	26
TOTAL			35

Modes:

On:

Input: 1, Output: On Out for MUX

Off:

Input: 0, Output: Off Out for MUX

Dim:

Input: CLK, Output: Dim Out for MUX

Blink:

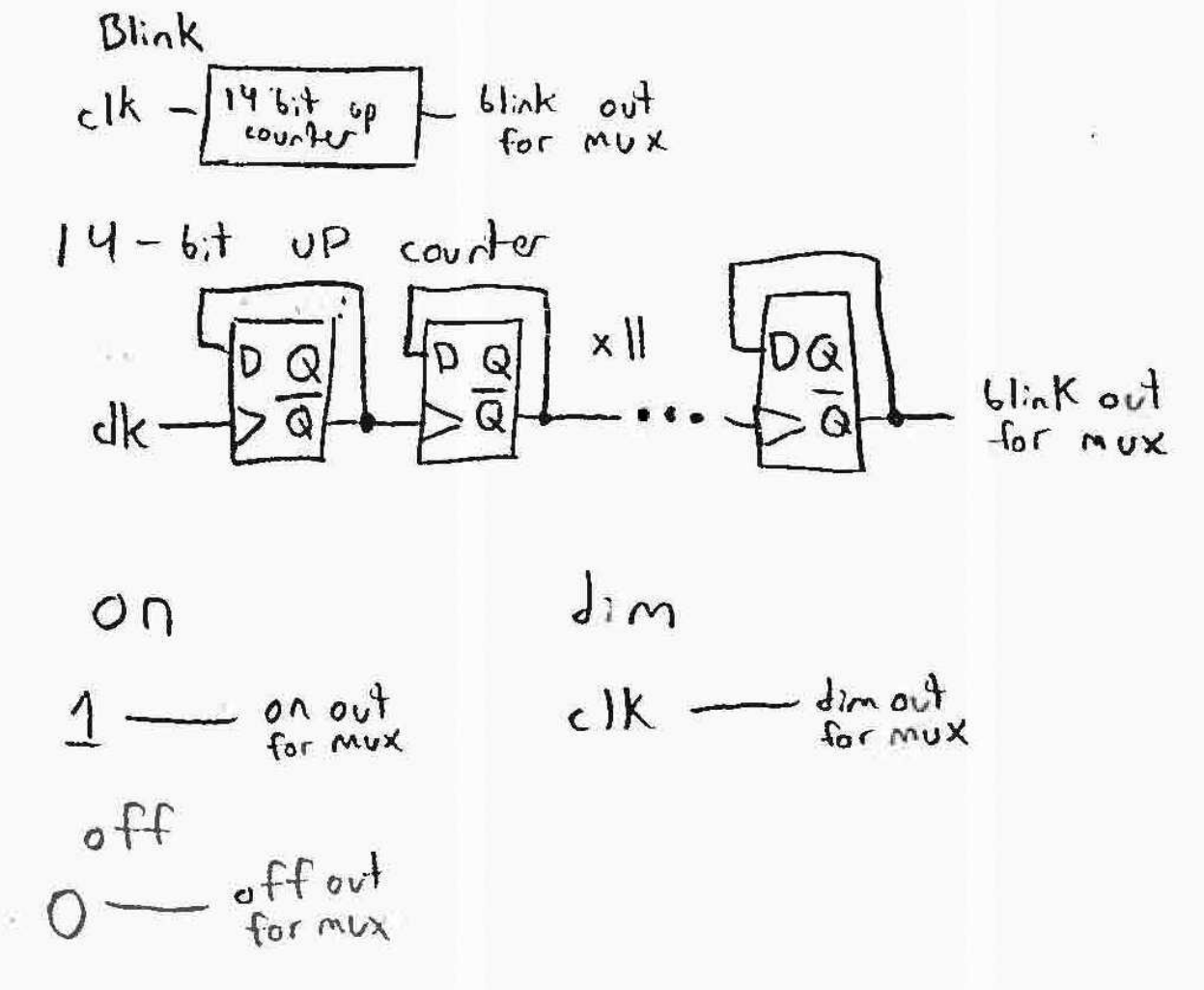
Specification: Causes the LED to blink at a rate visible to the eye. In this example a blink rate of .5 seconds or 2Hz was chosen and so the original Hz of the clock: 32,768 was reduced to 2 Hz by dividing it in half 14 times using a 14-bit up counter out of 14 Ede-triggered D- Flip-flops.

Input: CLK, Output: Blink Out for MUX

Cost:

Type	Number	Cost	Total
Edge Triggered DFF	14	13	182

Schematic:



Cost Estimation:

Component	Cost
Input Conditioner	458
2-bit Adder	35
MUX	23
Blink	182
LED Driver	211
System Clock	2
TOTAL	911

Other resources used:

http://www.circuitsgallery.com/2013/01/Binary-Up-Counter.html

http://www.edwardbosworth.com/CPSC2105/Lectures/Slides_05/Chapter_03/DecodersAndMux_files/image015.jpg

http://i.stack.imgur.com/TpBpr.gif

http://www.allaboutcircuits.com/textbook/digital/chpt-11/synchronous-counters/

I also used work I did with my teammates during Lab 2 as I didn't consider this assistance from others for this particular assignment

I did a lot of internet searching however the pages I ended up putting information into my work from are listed above.